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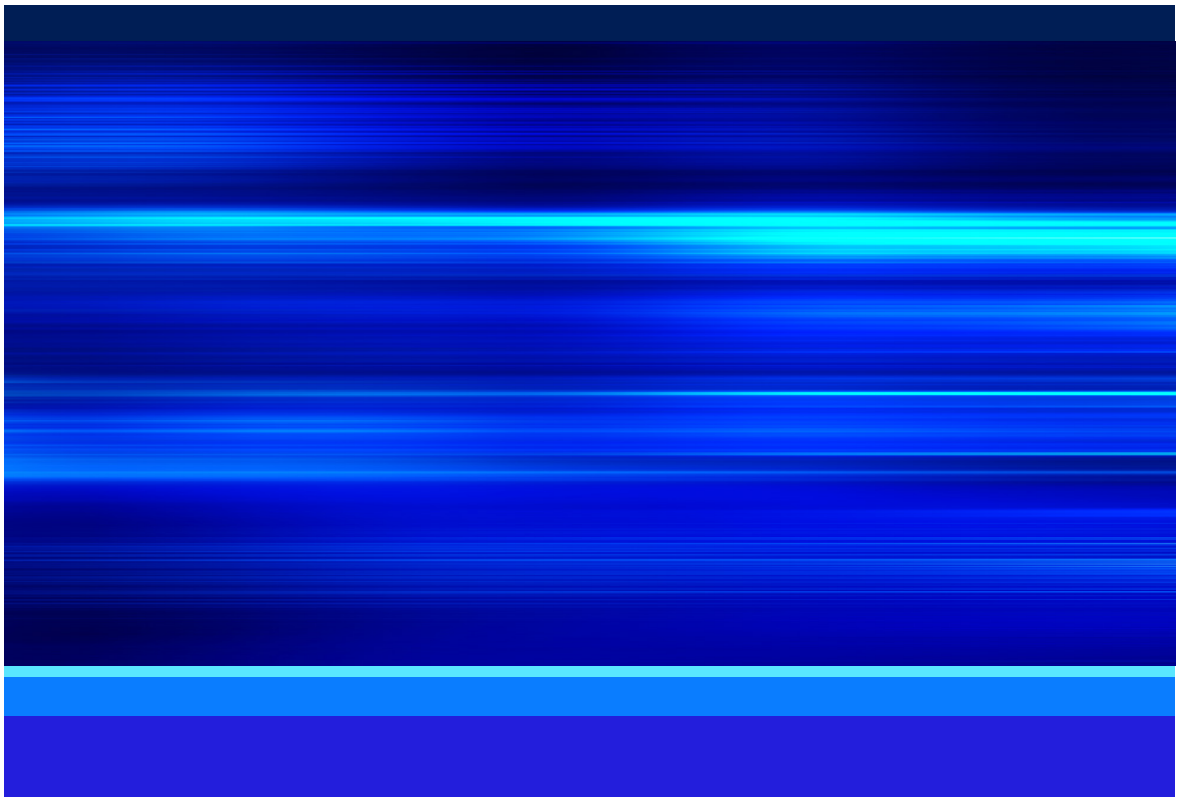
CURE Data Response Set 1 (Responses to Data Requests 1 to 99)

Submitted to
California Energy Commission

Prepared by
Morton Bay Geothermal LLC

With assistance from
Jacobs

Morton Bay Geothermal Project
(23-AFC-01)
November 28, 2023



Introduction

Attached are Morton Bay Geothermal LLC's[1] (Applicant) responses to the California Unions for Reliable Energy (CURE) *Data Requests Set 1* regarding the Application for Certification (AFC) for the Morton Bay Geothermal Project (MBGP) (23-AFC-01). This submittal includes a response to Data Requests 1 through 99.

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 1* 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 DR28-1, and so on. Figures or tables from the MBGP 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").

Contents

Attachments

Acronyms and Abbreviations

AFC	Application for Certification
BHER	BHE Renewables, LLC
BRGP	Black Rock Geothermal Project
CAISO	California Independent System Operator
CalGEM	California Department of Conservation, Geologic Energy Management Division
CEC	California Energy Commission
CEQA	California Environmental Quality Act
DA	Data Adequacy
DRR	Data Request Response
ENGP	Elmore North Geothermal Project
°F	Fahrenheit
GHG	greenhouse gas
HARP	Hotspots Analysis and Reporting Program
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
KGRA	Known Geothermal Resource Area
kV	kilovolts
MBGP	Morton Bay Geothermal Project
MW	megawatts
msl	mean seal level
NCG	non-condensable gas
OATT	Open Access Transmission Tariff
OEHHA	Office of Environmental Health Hazard Assessment
SCE	Southern California Edison
TDS	total dissolved solids
TN	tracking number

1. Project Description (DR 1-58)

Background: Land Ownership (DR 1-2)

The Morton Bay Geothermal Project ("MBGP" or "Project") Application for Certification ("AFC") at 1-2 states: "Morton Bay Geothermal LLC (the Applicant), an indirect, wholly owned subsidiary of BHER will construct, own, and operate the Project. The geothermal leasehold is owned and will be operated by Magma Power Company, a parent of the Applicant." Moreover, "[t]he Applicant plans to own and maintain the generation interconnection gen-tie line to route from [the Project] to the first point of interconnection within IID's balancing authority." (AFC at 2-67)

However, the AFC at 2-67 also explains that "IID will construct, own, operate, and maintain the network transmission line required for [the Project] to deliver through IID's balancing authority to the California Independent System Operator (CAISO)." "[I]rrigation drains and canals [are also] operated and managed by the Imperial Irrigation District (IID)…." (AFC at 5.2-13)

Data Requests:

1. *Provide land ownership information for all areas that overlap with or will be utilized by the MBGP components, as identified in Figure 1-4 at page 1-6 of the AFC.*

Response: A list of property owners was submitted with the AFC as Appendix 1A (TN#: 250250). Appendix 1A was submitted with an Application for Confidential Designation out of an abundance of caution given the personal information contained therein. On May 22, 2023, the CEC granted confidential designation to the individual names associated with the addresses listed in Appendix 1A (TN#: 250257). A redacted version of Appendix 1A is provided as an attachment to this response.

2. *State which entity will fund, construct, own, and operate the new switching station.*

Response: The new switching station will be funded and constructed by the applicants for the Morton Bay Geothermal Project, Elmore North Geothermal Project, and Black Rock Geothermal Project, which are Morton Bay Geothermal LLC, Elmore North Geothermal LLC, and Black Rock Geothermal LLC, respectively. However, the new switching station will be owned and operated by the Imperial Irrigation District (IID).

Background: Economics Affecting Project Life (DR 3)

The planned operational life of the MBGP facility is 40 years, according to the AFC at 2-54. However, the AFC at 2-54 explains that "[i]t is also possible that the facility could become economically noncompetitive earlier than the planned power plant's 40-year useful life."

Data Requests:

3. *Describe the circumstance that may render the facility "economically uncompetitive."*

Response: Circumstances that may render the facility "economically uncompetitive" may include nonrenewal of power purchase agreement(s).

Background: Connecting to Existing Geothermal Plant(s) (DR 4-8)

As of December 31, 2022, 4% of Berkshire Hathaway Energy's owned renewable energy generation capacity came from geothermal energy. (BHE) BHE Renewables, operating as CalEnergy, owns and operates

10 facilities in California's Imperial Valley that have approximately 350 MW capacity and produce electricity from steam. (Id.; BHE 2018)

The Applicant acknowledges in the AFC for the Elmore North Geothermal Project ("ENGP") the potential for the ENGP to "later [be] connected to the existing Applicant-owned geothermal plants to share geothermal fluid and steam…." (ENGP AFC at 5.1-16.) Although not owned by BHE Renewables, the MBGP is located near an existing geothermal facility, the Hudson Ranch Power Plant. (AFC at 1-1.)

Data Requests:

4. *Does the Applicant intend to connect to the MBGP to any existing geothermal plants in a current or future phase of the Project?*

Response: The Applicant does not intend to connect MBGP to any existing geothermal plants in a current or future phase of the Project.

5. *Explain what construction would be required for the MBGP to be connected to the existing Applicant-owned geothermal plants.*

Response: Please see the response to Data Request (DR) #4.

6. *Provide copies of all records that refer to or evaluate connecting the MBGP to the existing Applicant-owned geothermal plants.*

Response: There are no existing Applicant-owned geothermal plants.

7. *Provide a discussion of how the MBGP's connection to existing geothermal plants in a current of future phase may impact the operations.*

Response: Please see the response to DR #4.

8. *Provide a discussion of how the MBGP's connection to existing geothermal plants may impact the environment surrounding the MBGP and the existing facilities.*

Response: Please see the response to DR #4.

Background: Geothermal Reservoir (DR 9-14)

The AFC at 2-6 distinguishes the Salton Sea Geothermal Reservoir from the Salton Sea Known Geothermal Resource Area ("KGRA") on the basis that the former is characterized by its producible fluids while the latter is characterized by an elevated geothermal gradient. The AFC's description suggests that the Salton Sea KGRA may not contain producible geothermal fluids. Yet, the proposed MBGP will be exploiting the Salton Sea KGRA by extracting producible geothermal fluids. (AFC at 2-1). The differences in characteristics between the Salton Sea Geothermal Reservoir from the Salton Sea KGRA are important because reservoir characteristics dictate the applicable technologies for energy production.

Additionally, injection wellhead pressures of 200 pounds per square inch (psi) are much lower than production wellhead pressures of 350 to 450 psi. (Id. at 2-6) While wellhead pressures are provided, typical reservoir pressures are not disclosed in the AFC. The specified production wellhead pressures suggest that the fluids in the reservoir at well depths of 7,500 ft are at higher pressures. This in turn suggests that the in-situ pressures at injection depths of 7,500 ft are even more elevated. The AFC at 2-19 also states that the "injection wells will be drilled using directional drilling technology." However, it is unclear whether directional drilling would be applied at both the production and injection well pads.

Finally, the AFC at 2-9 states: "Adequate pressure and temperature in the reservoir allow production wells to flow, after initial stimulation, without the use of pumps." But the AFC does not describe the actions or techniques that may be utilized during initial stimulation. Nor does the AFC describe whether initial surface water injection into the injection zone would occur.

Data Requests:

9. *Discuss the characteristics of the Salton Sea KGRA targeted for development of the MBGP. Please state explicitly whether there are producible fluids in the Salton Sea KGRA in addition to the elevated geothermal gradient.*

Response: MBGP is within the Salton Sea geothermal reservoir, which is within the Salton Sea KGRA, and contains producible fluids. This is also stated in section 2.3.2.2 of the AFC for MBGP: "The MBGP incorporates a feasible and practical layout for the generation of geothermal energy from the Salton Sea geothermal reservoir (reservoir), which contains proven resources." Some known geological and reservoir characteristics of the geothermal reservoir are as follows.

Geology

The Salton Sea geothermal reservoir occurs in fractured sedimentary rocks within the Salton Trough, a structural depression on the boundary between two tectonic plates. The northwest motion of the Pacific Plate on the west, relative to the North American Plate on the east, has created regional right-lateral faults striking NW-SE and local conjugate left-lateral faults striking NE-SW, shown as Figure 1 in the report titled Geology and a Working Conceptual Model of the Obsidian Butte (Unit 6) Sector of the Salton Sea Geothermal Field (Hulen et al., 2003[2]). A copy of this figure was provided within Data Request Set 2, Figure DRR 9a-1 (TN# 252809, docketed on 10/27/2023). The Salton Trough began its existence in Oligocene to Miocene time as a coaxial but smaller and shallower proto-rift, developed as a Basin and Range-style back-arc basin in response to subduction of the Farallon plate beneath the North American plate. Oligocene to Miocene basalts along the margins of the modern Trough attest to the lithospheric thinning, heating, and mafic-alkaline magmatism that accompanied the older rifting episode. The nature of the basement in the Trough remains conjectural. Gravity and seismic data suggest that low-density (2.3-2.55 g/cm3) sediments rest upon an intermediate-density (2.65 g/cm3) basement extending to about 39,000 feet depth. The intermediate basement, in turn, overlies a higher density (3.1 g/cm3) layer extending to the base of the crust at about 77,000 feet. This deep layer is inferred to be gabbro, added to the crust to compensate isostatically for the low-density sediments supplied from above (Hulen et al., 2003).

Heat sources for the high-temperature geothermal systems of the Salton Trough have traditionally been envisioned as gabbroic. The Salton Trough is filled to a depth of approximately four (4) miles with Colorado River sediments, interbedded with salt deposits from periods of lake evaporation. Within the Salton Sea field, past volcanic activity is indicated by five outcrops of rhyolite - Obsidian Butte, Rock Hill, Red Island (North and South), and Mullet Island) - as well as extrusive and shallow intrusive igneous rocks encountered in several wells.

Reservoir Properties (Temperature, Pressure, and fluid chemistry)

Figure 2 in the report entitled "Refined Conceptual Modeling and a New Resource Estimate for the Salton Sea Geothermal Field, Imperial Valley, California; Proceedings" identifies the shallow thermal

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

gradient anomaly compiled with data available through June 2002 (Hulen et al. 20023). A copy of this figure was provided within Data Request Set 2, Figure DRR 9a-2 (TN# 252809, docketed on 10/27/2023). The reservoir temperature at 1,350 feet below mean seal level (msl) is shown in Figure 2.1 of the resource adequacy report entitled "Numerical Reservoir Simulation of the Salton Sea Geothermal Resource for Power Generation," dated May 2023 (TN # 250040) which was provided to CEC. The reservoir pressure is shown in Figure 2.2 of the resource adequacy report. The expected fluid composition is shown in Table 2-2 of the Application for Certification for the Morton Bay Geothermal Project.

10. Provide data on the reservoir pressures in both the production and injection zones.

Response: The reservoir pressure is shown in Figure 2.2 of the resource adequacy report entitled "Numerical Reservoir Simulation of the Salton Sea Geothermal Resource for Power Generation," dated May 2023 (TN # 250042) which was docketed May 8, 2023. The resource adequacy report concludes that "the simulated forecast demonstrates that the resource can accommodate both existing geothermal power plants and the proposed geothermal power plants (Black Rock, Elmore North and Morton Bay) over the horizon of the evaluation (through 2065)".

11. Provide data on the clay envelope referenced at AFC page 2-6, including, but not limited to, its depth, thickness, and lateral continuity and extent.

Response: The clay envelope is comprised of lacustrine sediment that makes up the Brawley Formation, which extends from surface to ±1,000 feet depth and is present over the entirety of the Salton Sea KGRA.

12. Explain how geothermal fluid will be produced from the reservoir without pumping given that the static fluid levels in the reservoir are measured at 300 to 1,400 ft.

Response: The 300 to 1,400 foot deep fluid level is at static conditions. At flowing conditions, the produced brine has a temperature of 430 to 480 degrees Fahrenheit (°F) at the wellhead (see AFC section 2.3.2.2) and is a two-phase flow. This causes the column of the fluid in the wellbore to have a lower density which enables the production wells to produce naturally (without pumping). As stated in Section 2.3.2.2 of the AFC, the production wells are estimated to operate at a wellhead pressure of 350 to 450 pounds per square inch (psi).

13. Describe the actions and/or techniques that may be utilized during the "Initial stimulation" of production wells to allow the wells to flow without the use of pumps. Confirm whether initial surface water injection into the injection zone of the reservoir may occur.

Response: Initial stimulation of the production wells includes injecting nitrogen gas downhole using coil tubing. This will lower the density of the brine in the wellbore and enables the wells to flow without use of pumps. There is no initial surface water injection into the injection zone of the reservoir.

14. State whether directional drilling would be applied at both production and injection well pads. If so, state the estimated number of directionally drilled wells at each well pad.

Response: All wells (production and injection wells) will be directionally drilled. Figures DA 4.0-1aR and DA 4.0-1bR (TN # 253276) provides the number of well pads and the number of wells per well pad.

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

Background: Geothermal Resource Adequacy (DR 15-20)

The AFC at 2-9 highlights the heterogeneity of reservoir properties and comments on the results of the reservoir model calibration exercise. Calibration is performed by history matching reservoir data over the past 40 years. (AFC at 2-9) The AFC at 2-10 states that the results of the reservoir numerical model calibration demonstrate that the geothermal resource can support the MBGP.

The AFC validates the model's ability to forecast reservoir behavior. (Id.) However, it is not necessarily the case that calibration validates the capacity of a model to forecast future behavior. This is especially true for subsurface environments with complex geology and heterogeneous reservoir properties. No results of the model calibration are included in the AFC. Additionally, it is unclear if any uncertainty analysis was performed on the model's ability to forecast future reservoir behavior.

Data Requests:

15. *Explain whether the reservoir model was based on classical porous media flow assumptions, dual porosity conceptualization, or discrete fracture network.*

Response: The reservoir model was based on porous media flow assumptions.

16. *Explain whether the model was a Finite Difference, Finite Element, or Finite Volume spatial discretization.*

Response: The reservoir model utilized Finite Differencing discretization.

17. *Describe the criteria used to select the numerical model.*

Response: The reservoir model was developed to allow for full coverage of the currently developed geothermal resource area and additional areas that are believed to have geothermal development potential. The reservoir model was then calibrated to match the initial state of the reservoir and also its historical performance. The calibrated model was then utilized to forecast reservoir condition through 2065 and to confirm geothermal resource adequacy.

18. *Provide a summary of explanation of the results of model calibration or history matching performed with the model.*

Response: As stated in the Numerical Reservoir Simulation of the Salton Sea Geothermal Resource for Power Generation," dated May 2023 (TN # 250042), "the history-matching results have shown that the numerical model was successful in simulating the behavior of the reservoir under the historical conditions of production and injection. Pressure, enthalpy, total dissolved solids (TDS), and non-condensable gases (NCG) trends measured from the production wells have been closely replicated by the model. Thus, the model is considered well calibrated for use in forecasting reservoir behavior." Additionally, the report concludes that "the simulated forecast demonstrates that the resource can accommodate both existing geothermal power plants and the proposed geothermal power plants (Black Rock, Elmore North and Morton Bay) over the horizon of the evaluation (through 2065)".

19. *Quantify measure of goodness of fit between historical data and model predicted reservoir behavior, including measures of uncertainty associated with model calibration parameters.*

Response: As stated in the Numerical Reservoir Simulation of the Salton Sea Geothermal Resource for Power Generation," dated May 2023 (TN # 250042), "the history-matching results have shown that the numerical model was successful in simulating the behavior of the reservoir under the historical conditions of production and injection. Pressure, enthalpy, TDS, and NCG trends measured from the production wells have been closely replicated by the model. Thus, the model is considered well calibrated for use in forecasting

reservoir behavior." Additionally, the resource adequacy report concludes that "the simulated forecast demonstrates that the resource can accommodate both existing geothermal power plants and the proposed geothermal power plants (Black Rock, Elmore North and Morton Bay) over the horizon of the evaluation (through 2065)".

20. *Analyze the model predicted uncertainty or variability based on the uncertainty of model calibration parameters.*

Response: Please see the response to DR #19.

Background: Production Wells and Pipelines (DR 21-23)

Nine initial production wells on six new well pads are proposed for extracting geothermal fluid. (AFC at 2-9.) The wells are to be optimally located using criteria summarized in the AFC at 2-16. Geothermal fluid will be extracted after an initial warm-up or initial stimulation phase of an unspecified duration. (Id. at 2-16.) The production pipeline design is modeled using unidentified stress analysis software programs. (Id. at 2-17.) During production well and pipeline installation, surplus soils of an unspecified tonnage or volume will be generated requiring disposal, as appropriate. (Id.)

Data Requests:

21. Clarify if the warm-up phase is the same as initial stimulation or not. If not, please describe the process for the warm-up phase.

Response: Initial stimulation of the production wells includes injecting nitrogen gas downhole using coil tubing. This will lower the density of the brine in the wellbore and enables the wells to flow without use of pumps. Following the initial stimulation, in the warm-up phase, the well will flow through the warm-up pipeline and into the atmospheric flash tank and brine pond until it reaches operational wellhead pressure and temperature.

22. Provide the metadata to the type of stress analysis software programs, including, but not limited to, numerical versus analytical, and type of numerical approach, e.g., finite element method.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. Preliminary stress analysis was performed on the proposed routes using the Bentley Systems AutoPIPE software. This software is an industry standard pipe stress and design software. AutoPIPE uses finite element analysis to model and simulate the behavior of the piping system under multiple loading conditions such as gravity, thermal and seismic events.

23. Estimate the tonnage of surplus soils during construction and drilling of production wells and pipelines.

Response: There will be a total of 20 wells (9 production and 11 injection) at the MBGP site. The surplus soils and drill cuttings from construction of the well pads, pipelines, and drilling operations is estimated to be approximately 21,000 cubic yards and will be hauled to an appropriate disposal site.

Background: Transmission Lines (DR 24-56)

The AFC at 2-5 states:

> *"The location and configuration of the Project have been selected to best match operating needs and available geothermal resources. A System Impact Study (IID BHE Cluster – 357 MW (IPP-150, IPP-151, IPP-152) System Impact Study, 2022) concluded IID network*

> *(transmission) upgrades are required to deliver additional energy to the Southern California Edison Devers Substation, including significant upgrades to IID's L-line transmission line with capacity for MBGP and future projects. IID's upgrades will support sustainable operation of IID's system and further power generation projects not affiliated with the Applicant. IID will construct and complete the network updates prior to Project operations."*

Based on an engineering, study, and design agreement between IID and BHE Renewables that was entered into on November 1, 2022, the transmission upgrades are anticipated to include the following:

- *A new 230 kV collection station;*
- *A new single circuit 230 kV transmission heading west in the direction of the 161kV L-line;*
- *When the new 230 kV line intersects the L-line, old double pole 161kV structures to be demolished and replaced with double circuit single pole steel structures to run both 161 and 230kV circuits. This will continue the entire route to Coachella Valley Substation;*
- *The new steel double circuit construction would be built to 230 kV specifications, including the 161kV L-line side for future proofing;*
- *Coachella Valley Substation would have to be expanded to accommodate at least two 230kV circuits (1 extra bay);*
- *New 230kV transmission line to run parallel with KN/KS lines from Coachella Valley to Ramon;*
- *Ramon Substation would have to be expanded to accommodate at least two 230 kV circuits;*
- *230 kV transmission between Ramon and Devers utilizing existing corridor.*

The agreement states that the new transmission line and associated infrastructure upgrades are necessary to address the Applicant's Transmission Service request and for MBGP, ENGP, and Black Rock Geothermal Project to interconnect to the CAISO controlled grid, through which the Applicant wishes to make wholesale sales of electricity. However, the AFC does not describe the new transmission line or associated infrastructure upgrades.

Data Requests:

24. *Identify the proposed IID transmission line route on a map, showing the settled areas, parks, recreational areas, scenic areas, and existing transmission lines within one mile of the proposed route(s).*

Response: The route for the IID transmission line has not been finalized. Therefore, it cannot be shown on a map at this time.

25. *Identify the proposed IID transmission line route on a map, showing the settled areas, parks, recreational areas, scenic areas, and existing transmission lines within one mile of the proposed route(s).*

Response: Please see the response to Data Request #24.

26. *Identify the rights-of-way for the proposed IID transmission line route on a map.*

Response: Please see the response to Data Request #24.

27. *State whether the proposed IID transmission line uses existing rights-of-way or of it proposes to use new rights-of-way.*

Response: Please see the response to Data Request #24.

28. State whether the proposed IID transmission line will be interconnected with the IID transmission grid.

Response: Yes, the proposed IID network transmission line will be interconnected to the IID transmission grid.

29. If the response is "yes" to Data Request 28, please describe how the proposed IID transmission line will be interconnected with the IID transmission grid.

Response: The details of the interconnection at the switching station have not been finalized at this time.

30. State whether the proposed IID transmission line will be fully reserved for the exclusive use of the BHE Renewables, LLC.

Response: No, the proposed IID transmission will not be fully reserved for the exclusive use of BHE Renewables, LLC. Furthermore, the proposed IID network upgrades, including the transmission line, are expected to be rated at 1,200 MWs, which is substantially greater than the Morton Bay, Elmore North, and Black Rock Geothermal Projects total output of 357 MWs (net). Based on the IID Generation Interconnection Queue (11/1/2023) there are over 1,400 MW of projects, including Morton Bay, Elmore North, and Black Rock Geothermal Projects, listed to interconnect into this IID network upgrade.

31. State whether BHE Renewables, LLC may also use the proposed IID transmission line to import power from CAISO into the IID grid.

Response: The Applicant has no plans to import electrical power from CAISO into the IID grid.

32. State whether the proposed IID transmission line will be available through IID's Open Access Transmission Tariff ("OATT") for other IID transmission customers to use.

Response: The Applicant expects that the network transmission line will be subject to IID's OATT.

33. If the response is "yes" to Data Request 32, provide an explanation of how the costs of the use of the proposed IID transmission line will be established.

Response: The terms for transmission service, including cost of service, are established by the provisions of IID's OATT.

34. State whether an application has been submitted to the Federal Energy Regulatory Commission ("FERC") to include the proposed IID transmission line rates in IID's OATT.

Response: The Applicant does not know if an application has been submitted to the Federal Energy Regulatory Commission to include the referenced IID network transmission line rates in IID's OATT.

35. If an application has been submitted to FERC, please provide a copy of the application.

Response: Please see the response to DR #34.

36. If an application has not been submitted to FERC, please state whether an application will be submitted to FERC to include the proposed IID transmission line rates in IID's OATT.

Response: The Applicant does not know if an application will be submitted to the Federal Energy Regulatory Commission to include the referenced IID network transmission line rates in IID's OATT.

37. State whether an application has been or will be submitted to CAISO for the proposed IID transmission line.

Response: The Applicant does not know if an application has been submitted to the CAISO for the referenced IID network transmission line

38. If an application has been submitted to CAISO, please provide a copy of the application.

Response: Please see the response to DR #37.

39. State whether an application has been or will be submitted to Southern California Edison ("SCE") for the proposed IID transmission line.

Response: The Applicant does not know if an application has been submitted to SCE for the referenced IID network transmission line

40. If an application has been submitted to the SCE, please provide a copy of the application.

Response: Please see the response to DR#39.

41. State whether the proposed IID transmission line will import power from CAISO into the IID grid.

Response: The Applicant cannot speak for IID with respect to the operation of its transmission system. Please see the Notice of Objection filed by the Applicant on November 14, 2023.

42. Provide copies of any and all environmental studies, reports, and/or analyses prepared pursuant to the California Environmental Quality Act ("CEQA") for the proposed IID transmission line.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023.

43. Provide copies of any and all environmental studies, reports and/or analyses prepared for pursuant to CEQA for the proposed substation upgrades.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023.

44. Describe the design, construction, and operation of any electric facilities, including IID powerlines, substations, switchyards, or other transmission equipment, which will be constructed or modified to transmit electrical power from the proposed powerplant to the CAISO controlled grid.

Response: Please see AFC pages 1-1 through 1-2; 2-2 through 2-5, 2-10 through 2-15; 2-22 through 2-23; 2-45 through 2-51; 2-53; 3-1 through 3-8 for the design, construction, and operation of electric facilities from the MBGP to the first point of interconnection to the IID system and design requirements for the network transmission line. Please see the Notice of Objection filed by the Applicant on November 14, 2023.

45. Describe how the route and additional transmission facilities were selected, including consideration given to the engineering constraints, environmental impacts, resource conveyance constraints, and electric transmission constraints.

Response: Please see AFC pages 1-1 through 1-2; 2-2 through 2-5, 2-10 through 2-15; 2-22 through 2-23; 2-45 through 2-51; 2-53; 3-1 through 3-8, and AFC Section 5 for the design, construction, and operation of transmission facilities from the MBGP to the first point of interconnection to the IID system and design requirements for the network transmission line. Please see the Notice of Objection filed by the Applicant on November 14, 2023. Please see the response to DR#24.

46. Describe the audible noise from existing IID switchyards that would be affected by the MBGP.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. The Applicant does not have information regarding the audible noise from existing IID switchyards. Potential audible noise levels from the MBGP, including the proposed IID switchyard, are evaluated in Section 5.7 of the AFC. As explained in Section 5.7.3.3.2 of the AFC, one potential electrical effect high-voltage gen-tie lines is corona, the ionization of the air that occurs at the surface of the energized conductor and suspension hardware attributable to very high electric field strength at the surface of the metal during certain conditions. Corona is generally a concern with transmission lines of 345-kilovolts and greater and with lines that are at higher elevations. Because MBGP will be interconnected at the 230-kV level, it is expected that no corona-related design issues will occur.

47. *Describe the audible noise from existing IID overheard transmission lines that would be affected by the MBGP.*

Response: Please see the response to DR #46.

48. *Estimate the future audible noise levels that would result from existing and proposed IID switchyards, calculated at the property boundary for the switchyards.*

Response: Please see the response to DR #46.

49. *Estimate the future audible noise levels that would result from existing and proposed IID transmission lines, calculated at the edge of the rights-of-way for transmission lines.*

Response: Please see the response to DR #46.

50. *Provide a discussion of the impacts to biological resources along the proposed IID transmission lines which are necessary for the MBGO to interconnect to the CAISO controlled grid.*

Response: Please see the response to DR #24 and the Notice of Objection filed by the Applicant on November 14, 2023.

51. *Provide a discussion of the impacts to biological resources at sites requiring upgrades to IID substations which are necessary for the MBGP to interconnect to the CAISO controlled grid.*

Response: Please see the response to DR #24 and the Notice of Objection filed by the Applicant on November 14, 2023.

52. *Estimate the existing electric magnetic fields from the proposed IID transmission lines which are necessary for the MBGP to interconnect to the CAISO controlled grid.*

Response: Please see the response to DR #24 and the Notice of Objection filed by the Applicant on November 14, 2023. Because the proposed IID network transmission line has not been constructed, there are no existing electric magnetic fields.

53. *Estimate the existing electric and magnetic field from the proposed IID substation upgrades which are necessary for the MBGP to interconnect to the CAISO controlled grid.*

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. Because the proposed IID substation upgrades have not been constructed, there are no existing electric and magnetic fields for those upgrades.

54. *Estimate the future electric and magnetic fields that would be created by the proposed IID transmission lines which are necessary for the MBGP to interconnect to the CAISO controlled grid.*

Response: Please see the response to DR#24 and the Notice of Objection filed by the Applicant on November 14, 2023.

55. *Estimate the future electric and magnetic fields that would be created by the proposed IID substation upgrades which are necessary for the MBGP to interconnect to the CAISO controlled grid.*

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023.

56. *Describe the impacts to air quality from construction associated with upgrades to existing IID substations which are necessary for the MBGP to interconnect to the CAISO controlled grid.*

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023.

Background: Fluid Injection System (DR 57-58)

The AFC at 2-19 to 2-22 describes the fluid injection system as comprising wells completed at a depth where the subsurface formation is competent with injection wells drilled using directional drilling technology. The AFC at 2-19 states that the "injection wells will be drilled using directional drilling technology." Because no information about the hydraulic properties of the formation (e.g., permeability, fractures) is provided, it is not possible to assess how spent fluid could be injected into competent rock. Such rock is often practically impermeable.

Data Requests:

57. *State the horizontal distance of directionally drilled injection wells.*

Response: The horizontal distance between an injection wellhead and its planned bottom hole location is anywhere from100 feet to 2,600 feet.

58. *Describe the intrinsic permeability and fracture aperture and density with regards to the feasibility of fluid injection into the competent subsurface formation.*

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. Section 2.3.3.2.4 of the AFC for MBGP states that "Injection wells will be cased to a depth where the subsurface formation is competent." This statement and the reference to "competent" formation is associated with selecting casing shoe depth and means that the casing shoe will be set at a depth where the formation rock is capable of withstanding the surrounding loads without collapsing (competent formation). The feasibility of fluid injection and the ability of the formation to receive injection is supported by 40 years of injection through many offset injection wells scattered in different parts of the Salton Sea geothermal reservoir. The historical injection records for all injection wells in Salton Sea geothermal reservoir are available through CalGEM geosteam website at: https://geosteam.conservation.ca.gov/.

Further, both CalGEM's and the California Energy Commission's determination regarding the availability of commercial geothermal resources in the Salton Sea KGRA to support the BRGP specifically considered the geologic structure of the Salton Trough and the Salton Sea Geothermal Field specifically, the updated reservoir modeling, and production and injection information. CalGEM concluded that "data suggests a stable resource with very little decline in production, temperatures or pressures." (TN#: 250205.) The determination of the availability of commercial quantities of geothermal resources necessarily supports the feasibility of fluid injection in the identified zones.

2. Air Quality and Health Risk (DR 59-77)

Background: Radioactive Hazardous Air Pollutants (DR 59-60)

The AFC lists radon as a Toxic Air Contaminant ("TAC") that may potentially be emitted from MBGP operations in Table 5.9-2 (AFC at 5.9-4) and present in emissions from the cooling tower in Table 5.9-3 (Id. at 5.9-5).

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. Studies in uranium miners have shown an increase in lung cancer and tumors of the lymphatic and hematopoietic tissues from inhalation exposure. However, it is not known whether the cancer risk is from uranium itself, or from radon or other confounding factors. (EPA 2016)

In addition to radon, many other radioactive elements are found in the Salton Sea geothermal fluids and would be emitted, including uranium (U), thorium (Th), radium (Ra), cesium (Cs), and strontium (Sr). (Elders 1983; Zukin 1987) These all have significant, documented health impacts that were not disclosed in the Application. Further, radionuclides (including radon) are hazardous air pollutants ("HAPs") that were not included in the health risk assessment ("HRA").

Data Requests:

59. *Provide all laboratory data sheets that report concentrations of radioactive elements in geothermal brines and emissions from brine processing equipment (U, Th, Ra, Cs, Sr) that will be used by the MBGP.*

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. The October 4, 2023 response to Imperial County Air Pollution Control District (ICAPCD) (TN#252548) includes estimated Radon emissions.

60. *Describe why the HRA does not include radioactive elements.*

Response: The Hotspots Analysis and Reporting Program (HARP) and the Office of Environmental Health Hazard Assessment (OEHHA) approved risk assessment values does not include Radionuclides (including Radon), which are the only radioactive elements expected to be present in the geothermal brine.

Background: Construction Air Quality (DR 61-62)

The construction criteria pollutant emissions are summarized in Tables 5.1- 18 and 5.1-19 and in Appendix 5.1D. The AFC at 5.1-18 states that construction emissions were calculated using the CalEEMod User's Guide (ICF 2022). One of the key inputs in the CalEEMod model is the engine tier of the construction equipment that will be used, which determines the magnitude of emissions. The ATC at 5.1-26 states that Tier 4 final emission factors were assumed for all construction equipment except off-highway trucks and small equipment (<25 hp). However, the use of Tier 4 final construction equipment is not required in the AFC or in any mitigation measures.

Data Requests:

61. State whether Tier 4 Final construction equipment will be required for all construction equipment except for off-highway trucks and small equipment (<25 hp).

Response: The Applicant will utilize Tier-4 construction equipment to the extent feasible/available.

62. Demonstrate whether Tier 4 Final construction equipment is feasible.

Response: Tier-4 rated equipment is required for construction equipment manufactured after 2015. Most contractors' common equipment fleets comply to the extent feasible/available in compliance with In-Use Off Road Diesel -Fueled Fleet Regulations. Some specialty equipment or cranes may not meet this requirement, however, the use will be limited and only reserved if no other option is available.

Background: Valley Fever (DR 63-66)

The MBGP site is an area that is endemic for Coccidioidomycosis (abbreviated as cocci), commonly known as Valley Fever. Coccidioidomycosis is an infectious disease caused by inhaling the spores of Coccidioides ssp. (CDC 2023; Hospenthal 2018) Clinical manifestations range from influenza-like illness to progressive pulmonary disease and, in 1% of infections, potentially fatal disseminated disease. (Cummings 2010) When soil containing this fungus is disturbed by activities such as digging, vehicle use, construction, dust storms, or during earthquakes, the fungal spores become airborne. (CDPH 2016; Cummings 2010) Valley Fever outbreaks during construction in California have been widely reported. (Wilken 2015; AP 2013; Sondermeyer 2017; Das 2012; Pappagianis 2007; Cummings 2010) Spores raised during construction and/or windstorms, which are common in the area, can result in significant worker and public health impacts. (Williams 1979). Valley Fever is endemic in Imperial County. (CDPH 2016) The AFC does not evaluate impacts from Valley Fever.

Workers disturbing soil in areas where Valley Fever is common are at highest risk, with construction workers topping the list. (Wilken 2015) As the proposed site has the potential to contain Coccidioidomycosis spores and it is well known that they can easily become airborne when soil is disturbed, the MBGP construction site should be tested well in advance of construction to determine if spores are present. (Colson 2017) Accurate test methods have been developed and used in similar applications. (Bowers 2018; Coslon 2017) A study conducted in the Antelope Valley, slated for six solar ranches of varying sizes, concluded that soil analyses should be conducted before soil disturbance in endemic areas, noting: "Based on the findings of this study, we recommend that EIRs include soil analyses for Coccidioides spp. on land destined for construction of any type in endemic areas of the pathogen." (Colson 2017)

In response to an outbreak of Valley Fever in construction workers in 2007 at a construction site for a solar facility within San Luis Obispo County, its Public Health Department, in conjunction with the California Department of Public Health, developed recommendations to limit exposure to Valley Fever based on scientific information from the published literature. (CDPH 2014) The recommended measures go far beyond the conventional dust control measures used by Imperial County to minimize these emissions. These measures should be required for MBGP as it will be in an endemic area.

Data Requests:

63. Provide a discussion of whether Valley Fever spores may be present at the MBGP and provide all supporting documentation.

Response: The Applicant 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.

Valley Fever is an illness caused by a microscopic fungus known as *Coccidioides immitis*, which lives in the top 2 to 12 inches of soil in parts of California. *(See,* Labor Code § 6709(a).) Areas where Valley Fever is considered highly endemic include those identified by statute, such as San Luis Obispo County, or as identified by the California Department of Public Health in its yearly summary of coccidioidomycosis in California. (Labor Code §§ 6709(b), (e).) According to the California Department of Public Health, Valley Fever is most common in California in the Central Valley and Central Coast. [4] Valley Fever is not highly endemic in Imperial County. According to the California Department of Industrial Relations, "cultivated, irrigated soil may be less likely to contain the fungus compared to undisturbed soils." Similarly, a study found that "[l]andscapes that are disturbed by being reworked to the point of becoming an agricultural field are apparently rendered inhospitable for Coccidioides, possibly due to lack of the right combination of organic material in the soil, the application of chemicals that inhibit fungal growth, the physical disruption caused by frequent soil disturbances such as tilling, the establishment of microbes that act antagonists to the pathogen, or some combination of these factors."[5]

64. *Provide a discussion of the MBGP's potential impacts from Valley Fever on construction workers and nearby sensitive receptors and provide all supporting documentation.*

Response: Based on a review of the California Department of Public Health's Coccidioidomycosis in California Provisional Monthly Report[6], cases of valley fever occurring in Imperial County represents less than 0.3% of the statewide valley fever cases recorded between 2021 to 2023 (through September). Therefore, the potential exposure of construction workers and sensitive receptors to Valley Fever is expected to be very low. Furthermore, the implementation of the construction worker health and safety plans and the air quality fugitive dust mitigation measures proposed by the Applicant will reduce the already low potential impacts even further.

65. *Provide a list of measures that would be implemented to reduce Valley Fever exposure.*

Response: The Applicant's health and safety standards provide for workers to upgrade personal protection equipment (PPE) beyond the PPE specified by the job hazard assessment prepared for a specific task. While the potential exposure of construction workers and sensitive receptors to Valley Fever is expected to be low, the following measures already proposed for implementation by the Applicant will also have the effect of further reducing the potential for Valley Fever exposure. The Applicant will prepare a construction and operational health and safety plan that includes an Illness and Injury Prevention Plan (IIPP).

The IIPP will incorporate fugitive dust control measures in accordance with Imperial County Air Pollution Control District's Rule VIII containing measures that will minimize fugitive dust emissions. These measures will include the following:

- Limit of visual dust emissions to 20% opacity;
- Phasing work to minimize amount of disturbed surface area at any one time;
- Application of water or soil stabilizers;
- Specific measures to storage, transport, and handle bulk materials;
- Measures to control track out/carry out; and

[4] Coccidioidomycosis (Valley Fever) (ca.gov) Valley fever: Tailgate training guide for California construction workers

[5] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7432779/pdf/ijerph-17-05285.pdf

[6] https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciinCAProvisionalMonthlyReport.pdf

- Reduced vehicle speeds within construction areas; and
- Providing workers with Valley Fever tailgate training.

66. *Identify whether any of the following measures will be required to reduce Valley Fever exposure:*

    a) *Provide high-efficiency particulate ("HEP")-filtered, air-conditioned enclosed cabs on heavy equipment. Train workers on proper use of cabs, such as turning on air conditioning prior to using the equipment and keeping windows closed.*

    b) *Provide communication methods, such as 2-way radios, for use in enclosed cabs.*

    c) *Employees should be medically evaluated, fit-tested, and properly trained on the use of the respirators, and a full respiratory protection program in accordance with the applicable Cal/OSHA Respiratory Protection Standard (8 CCR 5144) should be in place.*

    d) *Provide National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers with a prior history of Valley Fever.*

    e) *Half-face respirators equipped with N-100 or P-100 filters should be used during digging. Employees should wear respirators when working near earth moving machinery.*

    f) *Prohibit eating and smoking at the worksite, and provide separate, clean eating areas with handwashing facilities.*

    g) *Avoid outdoor construction operations during unusually windy conditions or in dust storms.*

    h) *Consider limiting outdoor construction during the Fall to essential jobs only, as the risk of cocci infection is higher during this season.*

    i) *Thoroughly clean equipment, vehicles, and other items before they are moved off-site to other work locations.*

    j) *Provide workers with coveralls daily, lockers (or other systems for keeping work and street clothing and shoes separate), daily changing and showering facilities.*

    k) *Clothing should be changed after work every day, preferably at the work site.*

    l) *Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes; alternatively, consider installing boot-washing facilities.*

    m) *Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.*

    n) *Employees should have prompt access to medical care, including suspected work-related illnesses and injuries.*

    o) *Work with a medical professional to develop a protocol to medically evaluate employees who have symptoms of Valley Fever.*

    p) *Consider preferentially contracting with 1-2 clinics in the area and communicate with the health care providers in those clinics to ensure that providers are aware that Valley Fever has been reported in the area. This will increase the likelihood that ill workers will receive prompt, proper and consistent medical care.*

q) Respirator clearance should include medical evaluation for all new employees, annual reevaluation for changes in medical status, and annual training, and fit-testing.

r) Skin testing is not recommended for evaluation of Valley Fever.

s) If an employee is diagnosed with Valley Fever, a physician must determine if the employee should be taken off work, when they may return to work, and what type of work activities they may perform.

Response: Please see the response to Data Request #64.

Background: Fire Pump (DR 67-72)

In AFC Appendix 5.1A, the Applicant reports criteria pollutants (NOx, CO, PM10, PM2.5, VOC) from the fire pump based on "vendor data." (AFC Appendix 5.1A at pdf 36) This same table also indicates that SOx emissions were "[c]alculated based upon 15 ppm USLD." (Id.)

Data Requests:

67. Provide the cited vendor data for NOx and all supporting documentation.

Response: CEC Data Response Set 1 (TN# 252491-1 through TN# 252491-9), Attachments DRR 5-1 and DRR 5-1 include the vendor data.

68. Provide the cited vendor data for CO and all supporting documentation.

Response: Please see the response to DR #67.

69. Provide the cited vendor data for PM_{10} and all supporting documentation.

Response: Please see the response to DR #67.

70. Provide the cited vendor data for PM2.5 and all supporting documentation.

Response: Please see the response to DR #67.

71. Provide the cited vendor data for VOCs and all supporting documentation.

Response: Please see the response to DR #67.

72. Provide the calculations for SOx emissions and all supporting documentation.

Response: SOx emissions were estimated based on California Diesel Ultralow Sulfur Fuel Regulations.[7]

Background: Chemical Composition of Effluents and Solid Wastes (DR 73-76)

The process flow diagram in Figure 3-1 of AFC Appendix 5-1 shows cooling water and clean brine from the clarifiers disposed by injection into wells and filter cake solids sent offsite to a landfill. (AFC Appendix 5-1 at 3-1)

[7] https://ww2.arb.ca.gov/resources/fact-sheets/california-low-sulfur-diesel-fuel-fact-sheet

Data Requests:

73. Describe the chemical composition data for the filter cake and provide all supporting documentation, including laboratory data sheets.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023.

74. Describe the chemical composition data for the cooling water and provide all supporting documentation, including laboratory data sheets.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. Condensate and injected geothermal fluid characterization can be found in Table 2-3. Condensate and injected geothermal fluid characterization (AFC Project Description page 2-20) provides expected chemical composition for the condensate and spent geothermal fluid to the injection wells.

75. Describe the chemical composition data for the clarifier brine and provide all supporting documentation, including laboratory data sheets.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. Condensate and injected geothermal fluid characterization can be found in Table 2-3 of the AFC on page 2-20 and provides expected chemical composition for the condensate and spent geothermal fluid to the injection wells.

76. Describe the chemical composition data for the clean brine from the clarifiers to be disposed by injection into wells and provide all supporting documentation, including laboratory data sheets.

Response: Condensate and injected geothermal fluid characterization can be found in Table 2-3 of the AFC on page 2-20 and provides expected chemical composition for the condensate and spent geothermal fluid to the injection wells.

Background: Modeling Report (DR 77)

AFC Appendix 5.1C at 3-1 states: "At the time this modeling protocol was submitted, design of the MB project was ongoing. … Associated emissions data and other final design data are currently being evaluated and are not presented in this protocol. These data will be finalized and included in the final modeling report."

Data Requests:

77. Provide the final modeling report referenced in AFC Appendix 5.1C at 3-1.

Response: The AFC Appendix 5.1B Operational Air Quality Impact analysis provides the source parameters and the associated building data used in Air Quality Modeling. Updated air quality modeling results that incorporate updated emission unit information and minor refinements to the general arrangement were submitted to the CEC and ICAPCD November 13, 2023 (TN# 253082).

3. Greenhouse Gas Emissions (DR 78)

Background: Greenhouse Gas Mitigation (DR 78)

Table 5.1-20 indicates that construction greenhouse gas (GHG) emissions of 19,171 MT/yr exceed the Imperial County Air Pollution Control District ("ICAPCD") CEQA significance threshold of 10,000 MT/yr. (AFC at 5.1-29)

Data Requests:

78. Please describe all feasible mitigation for construction GHG emissions.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. The feasible mitigation measures for reduction of construction GHG emissions include maintaining construction equipment consistent with manufacturer's recommendations, reducing construction idle time to five minutes or less, use of electric equipment when available/feasible, and recording the amount and types of fuels used during construction.

4. Geologic Hazards and Resources (DR 79-99)

Background: Construction and Drilling of Production/Injection Wells and Pipelines (DR 79-88)

The AFC at 2-45 states that diesel/electric drilling rigs will be used to construct the production and injection wells but does not state the actual type of rig technique options, such as percussion, cable tool, among others. It is also unclear whether eight weeks of drilling is to the reservoir depth of 7,500 ft for production and 7,500 ft for injection, or if it includes completion of all directional drilling activities.

Data Requests:

79. Describe the drilling technique(s) that will be employed for the MBGP.

Response: Rotary drilling with water-based drilling fluid and pressure control equipment will be utilized.

80. State the duration for directionally drilling of the MBGP's wells.

Response: Directional control will be maintained for the duration of the drilling operations.

81. Provide the well construction design details (e.g., well sizing/diameter, plugging/design near subsurface).

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. The hot brine injection well diameter will be 9-7/8 inch at its narrowest point and 30 inches at the broadest point. Casing materials will include carbon steel and corrosion resistant alloy(s). The aerated brine injection well diameter will be 8-1/2 inch at its narrowest point and 30 inches at the broadest point. Casing materials will include carbon steel. The production well diameter will be 12-1/4 inch at its narrowest point and 36 inches at the broadest point. Casing materials will include carbon steel and corrosion resistant alloy(s).

82. Describe the proposed well integrity or mechanical testing for the Project's wells.

Response: Mechanical integrity testing on injection wells is a biennial compliance requirement by CalGEM. Well integrity or mechanical testing includes methods: pressure testing and an injection profile survey including temperature, pressure and spinner surveys. During well construction, casing strings are pressure tested for integrity at the time of drilling operations in accordance with CalGEM's regulations.

83. Explain whether geophysical logs of exploratory boreholes and/or existing production and injection wells were evaluated to inform MBGP's design, construction, and/or operations.

Response: Geophysical logs from offset wells within one to two miles radius of the proposed wells for MBGP were evaluated. Geophysical logs and other well information are available on CalGEM's GeoSteam website at https://geosteam.conservation.ca.gov.

84. If geophysical logs of exploratory boreholes and/or existing production and injection wells were evaluated to inform MBGP's design, construction, and/or operations, please specify which wells were considered in this analysis, summarize the results from this analysis, and provide all documents relied upon.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. Geophysical logs from offset wells within one to two miles radius of the proposed wells for MBGP were evaluated. Geophysical logs and other well information are available on CalGEM's GeoSteam website at

https://geosteam.conservation.ca.gov. The adequacy of the resource was examined using numerical reservoir modeling. A report (resource adequacy report) entitled "Numerical Reservoir Simulation of the Salton Sea Geothermal Resource for Power Generation, dated May 2023 (TN # 250040) was provided to CEC. The resource adequacy report concludes that "the simulated forecast demonstrates that the resource can accommodate both existing geothermal power plants and the proposed geothermal power plants (Black Rock, Elmore North and Morton Bay) over the horizon of the evaluation (through 2065)".

85. Describe the hydraulic properties of the production and injection formations.

Response: See the response to DR 9 which includes geological, pressure, temperature and fluid chemistry properties of the geothermal resource.

86. Describe any relevant engineering and geologic controls that may be utilized during construction to minimize fluid migration from injection sites.

Response: Injection wells are constructed and completed using carbon steel and corrosion resistant alloy casing in such a way that injection is restricted within the intended zone of injection.

87. Provide documentation regarding the hydraulic properties of faults in the MBGP area to evaluate the potential for migration of injected spent geothermal fluids.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. Injection wells are constructed and completed using carbon steel and corrosion resistant alloy casing in such a way that injection is restricted within the intended zone of injection. Figures DRR 9b-1 Preliminary Hot Brine Injection Well Diagram and Figure 9b-2 Preliminary Aerated Brine Injection Well Diagram were docketed under a request for confidential designation as part of Data Request Set 2 (TN #252817).

88. Provide all documentation regarding the potential for cavity formation in producing rock.

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023. There are no known cavity formations in producing lithology within the Salton Sea KGRA.

Background: Geological Hazards (DR 89-94)

The AFC at 5.4-2 describes the geologic setting of the Project site as seismically active Brawley Seismic Zone situated within the southern end of the San Andreas Fault complex. Although no fault is known to actively traverse the Project site, several active faults within the general vicinity of the Salton Sea and the Project site are identified with slip rates ranging from a few millimeters per year (mm/y) to over 25 mm/y and moment magnitudes averaging greater than 6.0 for the largest recorded earthquakes. (AFC at 5.4-2)

Several geologic hazards and their associated risks are assessed qualitatively in the AFC using geotechnical data in published reports and from tests conducted at the project site. Liquefaction of Project site soils due to ground shaking from earthquakes is one such hazard and is assessed to have only a moderate potential of occurrence. (AFC at 5.4-7) Given the presence of shallow groundwater and loose cohesionless soils at the Project site, there may be evidence demonstrating a higher than moderate potential for soil liquefaction. Additionally, the only consideration of mass movement in the assessment of geologic hazards is limited to landslides even though the Salton Sea area is known to be prone to flash flooding and associated debris flows. (Id.) Finally, the analysis of subsidence in AFC section 5.4.1.5.5 focuses mainly on "settling or sinking of the ground surface over a regional area typically as a result of groundwater and oil extraction," which disregards the potential for geothermal induced subsidence.

Data Requests:

89. Explain and provide evidentiary support for the conclusion that there is only a moderate potential for soil liquefaction at the MBGP site, despite the presence of shallow groundwater and soils that are prone to liquefaction.

Response: Landmark's geotechnical report (provided as Appendix 5.4A of the AFC, TN# 249730) for the MBGP site states that the subsurface materials are composed primarily of non-liquefiable clay. The report identifies isolated interbedded layers of silt and silty sand between depths of 17.5 and 50 feet and states that calculated liquefaction settlement is between ½ and 1 inch. Liquefaction settlement is considered to be moderate due to the isolated nature of the potentially liquefiable deposits and the overlying layer of clay that mitigates surface manifestations of liquefaction settlement.

90. Describe the mass movement due to flash flooding as a geologic hazard at the Project site.

Response: As discussed in the Imperial County General Plan, Seismic and Public Safety Element[8], while in an instance of flash flooding some mass movement will occur it is expected to be localized and minor. The risk of any significant landslide is nil. Within the project sites all stormwater will be contained on the project site. Perimeter berms will provide adequate protection of any mass movement onto or off the site.

91. Describe any mitigation measures that would be necessary to minimize significant impacts.

Response: Flood risk will be mitigated by construction of a perimeter berm. Liquefaction risks will be reduced by an engineered ground improvement.

92. Provide a discussion of the flooding events in the MBGP area vicinity over the last twenty (20) years.

Response: There have been no recorded flooding events in the Morton Bay area vicinity over the last twenty (20) years.

93. Describe the potential for land subsidence due to the extraction of geothermal fluids.

Response: The Salton Sea Known Geothermal Resource Area's ground surface has an elevation of 220 feet to 230 feet below mean sea level, which is a demonstration of active subsidence associated with the active tectonics of the region and the local pull-apart basin, as noted in the background. The extraction and reinjection of geothermal fluids for this Project are sited in competent reservoir rocks, where subsidence is driven by natural fault movement rather than fluid withdraw within saturated sediments as in most groundwater and oil extraction.

94. *Describe any mitigation measures that would be necessary to minimize significant impacts caused by land subsidence due to extraction of geothermal fluids.*

Response: No significant impacts are anticipated due to subsidence associated with the extraction and reinjection of geothermal fluids. The Project anticipates monitoring and reporting annually relative subsidence. Subsidence monitoring is performed by surveying (measuring) elevations of known benchmarks through the operating geothermal area and comparing the elevations to the prior year's survey along with other historic elevation surveys. Subsidence trends, rates and significant earthquakes are evaluated with the resulting data.

[8] https://www.icpds.com/assets/planning/seismic-and-public-safety.pdf

Background: Subsurface Geotechnical Data (DR 95)

Appendix 5.4A for Geologic Resources contains geotechnical reports of the surface infrastructure and foundations. The analysis in Appendix 5.4A omits information regarding the relevant subsurface geology from production and injection strata, as well as the intervening strata between the surface materials and the deeper target formations.

Data Requests:

95. Provide data detailing the subsurface geology from production and injection strata as well as the intervening strata between the shallow subsurface and the deeper target formations.

Response: The lithology penetrated by injection and production wells is composed of a sedimentary sequence of the Brawley Formation which lies atop the Borrego Formation and is cut rarely by rhyolite intrusives. A complete description of lithology of Salton Sea Geothermal Field can be found in Hulen, J., Norton, D., Kaspereit, D., Murray, L., Putte, T.V.D., and Wright, M., 2003, Geology and a working conceptual model of the Obsidian Butte (Unit 6) sector of the Salton Sea Geothermal Field, California. Geothermal Resource Council Transactions, Vol. 27, pp. 227-240. Descriptions of detailed subsurface geology from production and injection strata from geothermal wells drilled in the Known Geothermal Resource Area's are known as mud logs, which contain a detailed lithology log with descriptions, can be found at CalGEM's GeoSteam website at https://geosteam.conservation.ca.gov.

Background: Subsurface Rupture (DR 96)

Appendix 5.4A for Geologic Resources concludes that "surface fault rupture is considered to be low at the project site." (AFC, Appendix 5.4 at 12) However, the MBGP lies within the Brawley Seismic Zone ("BSZ"), which experienced 30 km of surface rupture in the 1979 Imperial Valley earthquake that occurred along the Imperial fault. (AFC at 5.4-2; Larsen 1991) According to Larsen and Reilinger (1991), the BSZ experienced surface rupture with cracks as large as 13 km. (Id.). In fact, the BSZ is so named because it is a known zone of surface rupture. (Sharp 1982)

Data Requests:

96. Describe whether these surface rupture events were isolated incidents or if there is potential for surface rupture to recur.

Response: The Imperial fault ruptures are not located near the MBGP project area. The northernmost surface ruptures caused by the 1940 Imperial Fault earthquake and the 1979 Imperial Fault earthquake occurred 19.8 miles/31.9 km south of the MBGP project area. As indicated in Appendix 5.4A for Geologic Resources "surface fault rupture is considered to be low at the project site."

Background: Lithium Extraction (DR 97-99)

"Brines from geothermal power production have been identified as a potential domestic source of lithium; however, lithium-rich geothermal brines are characterized by complex chemistry, high salinity, and high temperatures, which pose unique challenges for economic lithium extraction." (Energies 2021) State and federal grant funding has been awarded to fund lithium recovery projects at existing Applicant-owned geothermal plants in the Salton Sea Known Geothermal Resource Area. For example, BHER Minerals, LLC received a $6 million grant from the California Energy Commission ("CEC") for a demonstration plant to recover lithium from geothermal brine in the form of a lithium chloride solution at an existing geothermal power facility in Calipatria. (CEC 2020) BHER Minerals, LLC received around $15 million from U.S.

Department of Energy ("DOE") for electrolytic production of battery-grade lithium hydroxide monohydrate from lithium chloride extracted from geothermal brine. (DE-FOA-0002322)

"Simbol, Inc. operated research and development (R&D) facilities in California, including [] a skid-mounted pilot plant that was used to test lithium extraction from geothermal brines at the CalEnergy Elmore geothermal power plant …." (Energies 2021) Additionally, "CalEnergy Minerals operated a zinc metal manufacturing facility at its Elmore power plant in the early 2000s…. The facility operated commercially for several years, but the venture was abandoned in 2004 as a result of not meeting production goals and a drop in commodity prices." (Id.)

Data Requests:

97. *Describe the results and conclusions from the lithium recovery activities funded by the CEC and DOE grants. If efforts remain ongoing, please summarize these continuing projects.*

Response: Please see the Notice of Objection filed by the Applicant on November 14, 2023.

98. *State whether trial or demonstration project(s) involving lithium extraction and/or production are ongoing at any existing BHE-owned geothermal facilities within 25 miles of the MBGP.*

Response: Yes.

99. *Describe whether the Applicant is considering incorporating mineral extraction other than lithium in a current of future phase of the MBGP.*

Response: As discussed in Data Request Response Set 1, responses to DRs 40-42 (TN# 252491-1 through TN #252491-8), mineral extraction, including lithium, is not proposed as part of the MBGP.

Attachment DR 1
Morton Bay Geothermal Project AFC
Appendix 1A Redacted
Property Owner List

Attachment 1
AFC Appendix 1A Morton Bay - Redacted Property Owners List

Assessor Parcel Number	Address	City	State	Zip Code
020-010-010	P O BOX 85	VALYERMO	CA	93563
020-010-028	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-010-029	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-010-030	NO ADDRESS ON FILE			
020-010-032	P O BOX 657	DES MOINES	IA	50306
020-010-032	405 W POUND	CALIPATRIA	CA	92233
020-010-034	P O BOX 657	DES MOINES	IA	50306
020-010-035	P O BOX 657	DES MOINES	IA	50306
020-010-035	622 MC DONALD RD	CALIPATRIA	CA	92233
020-070-016	P O BOX 900697	PALMDALE	CA	93590
020-070-020	P O BOX 900697	PALMDALE	CA	93590
020-070-033	P.O. BOX 1421	MONTEBELLO	CA	90640
020-070-034	P O BOX 900697	PALMDALE	CA	93590
020-070-035	31650 MELVIN ST	MENIFEE	CA	92584
020-070-036	P O BOX 900697	PALMDALE	CA	93590
020-070-039	8356 PONCE AVE	WEST HILLS	CA	91304
020-070-040	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-070-044	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-070-062	3292 MARICOPA HWY	OJAI	CA	93023
020-070-063	P O BOX 657	DES MOINES	IA	50306
020-070-064	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-070-065	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-100-004	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-100-007	P O BOX 657	DES MOINES	IA	50306
020-100-007	7505 DAVIS RD	CALIPATRIA	CA	92233
020-100-009	PO BOX 944209	SACRAMENTO	CA	94244
020-100-010	P O BOX 267	CALIPATRIA	CA	92233
020-100-011	P O BOX 267	CALIPATRIA	CA	92233
020-100-012	P O BOX 267	CALIPATRIA	CA	92233
020-100-012	P O BOX 267	CALIPATRIA	CA	92233
020-100-019	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-100-023	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-100-025	PO BOX 285	HOUSTON	TX	77001
020-100-025	7598 DAVIS RD	CALIPATRIA	CA	92233
020-100-028	P O BOX 657	DES MOINES	IA	50306
020-100-029	P O BOX 657	DES MOINES	IA	50306
020-100-030	681 MARILYN AVE	BRAWLEY	CA	92227
020-100-032	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-100-033	PO BOX 944209	SACRAMENTO	CA	94244
020-100-036	681 MARILYN AVE	BRAWLEY	CA	92227
020-100-036	600 W SINCLAIR RD	CALIPATRIA	CA	92233
020-100-037	P O BOX 657	DES MOINES	IA	50306
020-100-038	P O BOX 657	DES MOINES	IA	50306
020-100-039	P O BOX 657	DES MOINES	IA	50306
020-100-039	786 W SINCLAIR RD	CALIPATRIA	CA	92233
020-100-040	P O BOX 657	DES MOINES	IA	50306
020-100-040	342 W SINCLAIR RD	CALIPATRIA	CA	92233
020-100-041	P O BOX 267	CALIPATRIA	CA	92233
020-100-042	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-100-043	696 N 8TH ST	BRAWLEY	CA	92227
020-100-044	12544 HIGH BLUFF DR	SAN DIEGO	CA	92130
020-100-044	409 W MC DONALD RD	CALIPATRIA	CA	92233
020-100-046	P O BOX 267	CALIPATRIA	CA	92233
020-100-047	7362 REMCON CIR	EL PASO	TX	79912
020-100-047	7362 REMCON CIR	EL PASO	TX	79912
020-110-003	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-110-004	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-110-005	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-110-006	29400 CRAWFORD CANYON RD	MURRIETA	CA	92563
020-110-006	7005 SEVERE DR	CALIPATRIA	CA	92233
020-110-008	P O BOX 657	DES MOINES	IA	50306
020-110-008	1011 W MC KENDRY RD	CALIPATRIA	CA	92233
020-110-009	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-110-010	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-110-018	696 N 8TH ST	BRAWLEY	CA	92227
020-110-019	PO BOX 657	DES MOINES	IA	50306
020-110-019	6920 LACK RD	CALIPATRIA	CA	92233
020-110-029	696 N 8TH ST	BRAWLEY	CA	92227
020-110-031	696 N 8TH ST	BRAWLEY	CA	92227

Attachment 1
AFC Appendix 1A Morton Bay - Redacted Property Owners List

Assessor Parcel Number	Address	City	State	Zip Code
020-110-032	1849 C ST NW	WASHINGTON	CA	90240
020-110-033	1849 C ST NW	WASHINGTON	CA	90240
020-110-034	906 W SINCLAIR RD	CALIPATRIA	CA	92233
020-110-035	P O BOX 657	DES MOINES	IA	50306
020-110-038	P O BOX 657	DES MOINES	IA	50306
020-110-038	7030 GENTRY RD	CALIPATRIA	CA	92233
020-110-039	P O BOX 657	DES MOINES	IA	50306
020-110-039	6922 CRUMMER RD	CALIPATRIA	CA	92233
020-110-042	PO BOX 657	DES MOINES	IA	50306
020-110-042	7001 GENTRY RD	CALIPATRIA	CA	92233
020-110-043	PO BOX 285	HOUSTON	TX	77001
020-110-043	950 W LINDSEY RD	CALIPATRIA	CA	92233
020-110-046	P O BOX 657	DES MOINES	IA	50306
020-110-047	P.O. BOX 657	DES MOINES	IA	50306
020-110-047	6999 GENTRY	CALIPATRIA	CA	92233
020-110-048	700 ROGUE WOOD DR	WHITE CITY	OR	97503
020-110-049	P O BOX 657	DES MOINES	IA	50306
020-110-049	6858 CRUMMER	CALIPATRIA	CA	92233
020-110-050	824 CORRIENTE POINT DR	REDWOOD CITY	CA	94065
020-110-051	696 N 8TH ST	BRAWLEY	CA	92227
020-110-055	P O BOX 657	DES MOINES	IA	50306
020-120-005	P. O. BOX 1031	HAPPY CAMP	CA	96039
020-120-005	605 W SINCLAIR DR	CALIPATRIA	CA	92233
020-120-010	681 MARILYN AVE	BRAWLEY	CA	92227
020-120-012	333 E BARIONI BLVD	IMPERIAL	CA	92251
020-120-040	696 N 8TH ST	BRAWLEY	CA	92227
020-120-046	696 N 8TH ST	BRAWLEY	CA	92227
020-120-047	681 MARILYN AVE	BRAWLEY	CA	92227
020-120-048	681 MARILYN AVE	BRAWLEY	CA	92227
020-120-049	P O BOX 657	DES MOINES	IA	50306
020-120-050	8 RED TAIL TRACE	CARMEL	CA	93923
020-120-054	P O BOX 657	DES MOINES	IA	50306
020-120-054	7095 COX RD	CALIPATRIA	CA	92233
020-120-056	P O BOX 657	DES MOINES	IA	50306
020-120-057	P O BOX 657	DES MOINES	IA	50306
020-120-058	3949 AUSTIN RD	BRAWLEY	CA	92227
020-120-059	7030 GENTRY RD	CALIPATRIA	CA	92233
020-120-060	P O BOX 657	DES MOINES	IA	50306
020-120-061	696 N 8TH ST	BRAWLEY	CA	92227
020-120-062	696 N 8TH ST	BRAWLEY	CA	92227
020-130-017	824 CORRIENTE POINT DR	REDWOOD CITY	CA	94065
020-130-018	696 N 8TH ST	BRAWLEY	CA	92227
020-130-019	696 N 8TH ST	BRAWLEY	CA	92227
021-200-011	P O BOX 657	DES MOINES	IA	50306
021-300-001	P O BOX 657	DES MOINES	IA	50306
021-300-013	5701 TRUXTUN AVE	BAKERSFIELD	CA	93309
022-010-008	PO BOX 772	CALIPATRIA	CA	92233
022-010-011	11149 N TORREY PINES RD	LA JOLLA	CA	92037
022-010-011	11149 N TORREY PINES RD	LA JOLLA	CA	92037
022-010-011	250 W SCHRIMPF RD	CALIPATRIA	CA	92233
022-010-011	250 W SCHRIMPF RD	CALIPATRIA	CA	92233
022-100-001	8 RED TAIL TRACE	CARMEL	CA	93923
022-100-001	8 RED TAIL TRACE	CARMEL	CA	93923
022-100-002	1008 S NOVARRO SSTREET	WEST COVINA	CA	91791
022-100-004	P O BOX 937	IMPERIAL	CA	92251
022-100-010	15510 OLIVE BRANCH DR	LA MIRADA	CA	90638
022-100-011	P O BOX 657	DES MOINES	IA	50306
022-100-012	PO BOX 1178	TEMECULA	CA	92593
022-100-013	PO BOX 1178	TEMECULA	CA	92593
022-130-008	2434 NIDO AGUILA	ALPINE	CA	91901
022-130-008	385 W SINCLAIR RD MIDWAY SF I	CALIPATRIA	CA	92233
022-130-009	P O BOX 1748	EL CENTRO	CA	92244
022-130-009	7192 ENGLISH RD	CALIPATRIA	CA	92233
022-130-011	P.O. BOX 937	IMPERIAL	CA	92251
022-130-012	P.O. BOX 937	IMPERIAL	CA	92251
022-130-013	P.O. BOX 937	IMPERIAL	CA	92251