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October 25, 2023

Via Docket No. 23-AFC-01

Samantha Neumyer
Ellison, Schneider, Harris & Donlan LLP
2600 Capitol Avenue, Suite 400
Sacramento, CA 95816

Jerry Salamy
Jacobs
2485 Natomas Park Drive, Suite 600
Sacramento, California 95833

Re: CURE Data Requests Set 1 for Morton Bay Geothermal Project (23-AFC-01)

Dear Ms. Neumyer and Mr. Salamy:

California Unions for Reliable Energy ("CURE") submits this first set of data requests to Morton Bay Geothermal, LLC, an indirect wholly owned subsidiary of BHE Renewables, LLC, ("Applicant") for the Morton Bay Geothermal Project ("Project"), pursuant to Title 20, section 1716(b), of the California Code of Regulations. The requested information is necessary to: (1) more fully understand the Project; (2) assess whether the Project will be constructed and operated in compliance with all laws, ordinances, regulations, and standards; (3) assess whether the Project will result in significant environmental impacts; (4) assess whether the Project will be constructed and operated in a safe, efficient, and reliable manner; and (5) assess potential mitigation measures.

Pursuant to section 1716(f), written responses to these requests are due within 30 days. If you are unable to provide or object to providing the requested information by the due date, you must send a written notice of your objection(s) and/or inability to respond within 20 days.

6707-022j

Please contact me at agraf@adamsbroadwell.com if you have any questions. Thank you for your cooperation with these requests.

Sincerely,

Andrew J. Graf

AJG:ljl

6707-022j

STATE OF CALIFORNIA

STATE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

IN THE MATTER OF: MORTON BAY GEOTHERMAL PROJECT APPLICATION FOR CERTIFICATION	Docket No. 23-AFC-01

CALIFORNIA UNIONS FOR RELIABLE ENERGY DATA REQUESTS SET 1

October 25, 2023

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STATE OF CALIFORNIA

STATE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

IN THE MATTER OF: MORTON BAY GEOTHERMAL PROJECT APPLICATION FOR CERTIFICATION	Docket No. 23-AFC-01

CALIFORNIA UNIONS FOR RELIABLE ENERGY DATA REQUESTS SET 1

The following data requests are submitted by California Unions for Reliable Energy ("CURE") to Morton Bay Geothermal LLC ("the Applicant") pursuant to California Code of Regulations, tit. 20, § 1716. Please provide responses as soon as possible, but no later than November 27, 2023, to:

Andrew J. Graf
Adams Broadwell Joseph & Cardozo
601 Gateway Blvd., Suite 1000
South San Francisco, CA 94080
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Please identify the person who prepared the Applicant's responses to each data request. If you have any questions concerning the meaning of any data requests, please let us know.

MORTON BAY GEOTHERMAL PROJECT
CURE Data Requests Set 1 (Nos. 1-99)

PROJECT DESCRIPTION

BACKGROUND: LAND OWNERSHIP

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.

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

BACKGROUND: ECONOMICS AFFECTING PROJECT LIFE

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 circumstances that may render the facility "economically uncompetitive."

BACKGROUND: CONNECTING TO EXISTING GEOTHERMAL PLANT(S)

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 the 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.

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

7. Provide a discussion of how the MBGP's connection to existing geothermal plants may impact the operations.

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.

REFERENCES

BHE – Berkshire Hathaway Energy. Energy Unearthed. Available Online At: https://www.brkenergy.com/energy/geothermal.

BHE 2018 – Besseling, E. Lithium Recovery from Geothermal Brine—CEC Workshop and Discussion. Berkshire Hathaway Energy Renewables. Geothermal Grant and Loan Program Workshops and Discussions, California Energy Commission, Docket Number 17-GRDA-01. 2018. Available Online At: https://efiling.energy.ca.gov/getdocument.aspx?tn=225903.

ENGP AFC – Elmore North Geothermal LLC, Application for Certification for the Elmore North Geothermal Project, California Energy Commission, Docket Number 23-AFC-02. 2023. Available Online At: https://efiling.energy.ca.gov/GetDocument.aspx?tn=249737&DocumentContentId=84377.

BACKGROUND: GEOTHERMAL RESERVOIR

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.

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

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.

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.

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.

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.

BACKGROUND: GEOTHERMAL RESOURCE ADEQUACY

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.

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

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

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

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

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

BACKGROUND: PRODUCTION WELLS AND PIPELINES

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.

22. Provide the metadata on 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.

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

BACKGROUND: TRANSMISSION LINES

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 collector 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).

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).

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

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

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

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

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

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

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.

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.

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

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.

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

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

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

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

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

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.

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

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.

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.

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

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

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

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.

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

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.

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.

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.

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.

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.

56. Describe 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.

REFERENCES:

IID/BHE 2022 – Imperial Irrigation District. BHE Renewables, LLC. Engineering, Study, and Design Agreement between Imperial Irrigation District and BHE Renewables, LLC for the Salton Sea Transmission Project. November 1, 2022.

BACKGROUND: FLUID INJECTION SYSTEM

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.

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

BACKGROUND: RADIOACTIVE HAZARDOUS AIR POLLUTANTS

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.

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

REFERENCES:

EPA 2016 – Environmental Protection Agency, Radionuclides (including Radon, Radium and Uranium) (Sept. 2016). Available Online At: https://www.epa.gov/sites/default/files/2016-09/documents/radionuclides.pdf

Elders 1983 – Wilfred A. Elders and Lewis H. Cohen, The Salton Sea Geothermal Field, California, as a Near-Field Natural Analog of a Radioactive Waste Repository in Salt, Report BMI/ONWI-513, November 1983. Available Online At: https://www.osti.gov/servlets/purl/5585044

Zukin 1987 – Jeffrey G. Zukin, Douglas E. Mammond, The-Lung Ku, and Wilfred A. Elders, Uranium-thorium Series Radionuclides in Brines and Reservoir Rocks from two Deep Geothermal Boreholes in the Salton Sea Geothermal Field, Southeastern California, Geochimica et Cosmochimica Acta, Vol. 51, Issue 10, October 1987, pp. 2719-2731. Available Online At: https://www.sciencedirect.com/science/article/abs/pii/0016703787901529

BACKGROUND: CONSTRUCTION AIR QUALITY

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).

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

BACKGROUND: VALLEY FEVER

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.

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.

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

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. [1]

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.

REFERENCES

AP 2013 – The Associated Press, Valley Fever Hits 28 at Calif. Solar Plant Sites, *The San Diego Union-Tribune*, May 1, 2013; http://www.sandiegouniontribune.com/sdut-valley-fever-hits-28-at-calif-solar-plant-sites-2013may01-story.html.

Bowers 2018 – J. R. Bowers et al., Direct Detection of Coccidioides from Arizona Soils Using CocciENV, a Highly Sensitive and Specific Real-time PCR Assay, *Medical Mycology*, 2018. Available Online At: https://academic.oup.com/mmy/article/57/2/246/4925226.

CDC 2023 – Centers for Disease Control, Fungal Diseases, Information for Health Professionals About Valley Fever (Coccidioidomycosis), https://www.cdc.gov/fungal/diseases/coccidioidomycosis/health-professionals.html (last updated August 4, 2023).

CDPH 2014 – California Department of Public Health, Preventing Work-Related Coccidioidomycosis (Valley Fever) Available Online At: https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/CocciFact.pdf.

[1] Short-term skin tests that produce results within 48 hours are now available. See Kerry Klein, NPR for Central California, New Valley Fever Skin Test Shows Promise, But Obstacles Remain, November 21, 2016; http://kvpr.org/post/new-valley-fever-skin-test-shows-promise-obstacles-remain.

CDPH 2016 – California Department of Public Health, Valley Fever Fact Sheet, January 2016. Available Online At: https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/ValleyFeverFactSheet.pdf.

Colson 2017 – Colson et al., Large-Scale Land Development, Fugitive Dust, and Increased Coccidioidomycosis Incidence in the Antelope Valley of California, 1999-2014. Mycopatholgia, 2017 Jun; 182(5-6);439-458.

CSG 2016 – Coccidioidomycosis Study Group, Proceedings of the 60th Annual Coccidioidomycosis Study Group Meeting, April 8–9, 2016, Fresno, CA. Available Online At: https://vfce.arizona.edu/sites/vfce/files/csg_60th_annual.pdf.

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Williams 1979 – P. L. Williams, D. L. Sable, P. Mendez, and L. T. Smyth, Symptomatic Coccidioidomycosis Following a Severe Natural Dust Storm: An Outbreak at the Naval Air Station, Lemoore, Calif, *Chest*, pp. 566-70, 1979; https://pubmed.ncbi.nlm.nih.gov/498830/.

BACKGROUND: FIRE PUMP

In AFC Appendix 5.1A, the Applicant reports criteria pollutants (NOx, CO, PM_{10}, $PM_{2.5}$, VOC) from the fire pump based on "vendor data." (AFC Appenidx 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.

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

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

70. Provide the cited vendor data for $PM_{2.5}$ and all supporting documentation.

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

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

BACKGROUND: CHEMICAL COMPOSITION OF EFFLUENTS AND SOLID WASTES

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)

DATA REQUESTS

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

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

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

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.

BACKGROUND: MODELING REPORT

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.

GREENHOUSE GAS EMISSIONS

BACKGROUND: GREENHOUSE GAS MITIGATION

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.

BACKGROUND: CONSTRUCTION AND DRILLING OF PRODUCTION/INJECTION WELLS AND PIPELINES

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.

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

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

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

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.

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.

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

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

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

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

BACKGROUND: GEOLOGICAL HAZARDS

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.

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

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

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

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

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

BACKGROUND: SUBSURFACE GEOTECHNICAL DATA

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.

BACKGROUND: SURFACE RUPTURE

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.

REFERENCES:

Larsen 1991 – Larsen, S., Reilinger, R. 1991. Age constraints for the present fault configuration in the imperial valley, California: Evidence for northwestward propagation of the gulf of California rift system. Journal of Geophysical Research: Solid Earth 96, 10339–10346.

Sharp 1982 – Sharp, R.V., Lienkaemper, J.J., Bonilla, M., Burke, D., Fox, B., Herd, D., Miller, D., Morton, D., Ponti, D., Rymer, M., et al., 1982. Surface faulting in the central imperial valley. The Imperial Valley, California, Earthquake of October 15, 119–143.

BACKGROUND: LITHIUM EXTRACTION

"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.

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.

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

REFERENCES:

Energies 2021 – Stringfellow, W. T., Dobson, P. F. Technology for the Recovery of Lithium from Geothermal Brines. Energies. 14(20), p. 6805. 2021.

CEC 2020 – California Energy Commission. Geothermal, Lithium Recovery Projects Get Boost from California Energy Commission. May 13, 2020. Available Online At: https://www.energy.ca.gov/news/2020-05/geothermal-lithium-recovery-projects-get-boost-california-energy-commission

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