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Jon Trujillo
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June 5, 2024

Mr. Jesus Ramirez
APC Division Manager
Imperial County Air Pollution Control District
150 South Ninth Street
El Centro, California 92243

RE: Selected Responses to the California Unions for Reliable Energy Comments on the Preliminary Decision to Grant a Preliminary Determination of Compliance for the Morton Bay Geothermal Power Generation Plant

Dear Mr. Ramirez:

Morton Bay Geothermal LLC (the Applicant) appreciates the work of the Imperial County Air Pollution Control District (ICAPCD) to produce a comprehensive Preliminary Determination of Compliance (PDOC) for the Morton Bay Geothermal Project (MBGP or Morton Bay).

The Applicant welcomes this opportunity to submit selected responses to certain comments submitted by the California Unions for Reliable Energy (CURE) on the PDOC for Morton Bay. CURE's comments on the PDOC were docketed with the California Energy Commission (CEC) on March 11, 2024[1]. The Applicant remains available to provide additional information in furtherance of issuance of the Final Determination of Compliance (FDOC) for the Morton Bay Geothermal Project.

1. The Dispersion Model Used the Most Representative, Accurate, and Reliable Meteorological Data Available and is Consistent with U.S. Environmental Protection Agency Guidelines.

In Section IV, Subsection A.1 of its comments, CURE asserts that the air quality model relied upon by the Air District to determine the project's compliance with Ambient Air Quality Standards (AAQS) failed to utilize representative meteorological data.[2] This assertion is incorrect.

First, the dispersion model utilized the most representative, accurate, and reliable meteorological data available, consistent with U.S. Environmental Protection Agency (EPA) Guidelines. In particular, the Applicant reviewed the meteorological data collected at the Sonny Bono monitoring station, which is the monitoring station that CURE recommended the Air District analyze within its comments.[3] Only two years of recent data (2020 and 2022) from that station meet the EPA requirements of 90 percent minimum completeness before substitution on a quarterly basis.[4] To ensure the worst-case meteorological conditions are adequately represented in the model results, the EPA requires the use of five years of adequately

[1] The CURE PDOC comments for the project (Transaction Number [TN] #254968) are available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=254968&DocumentContentId=90658.
[2] *Id.* at page 5.
[3] *Id.* at page 6, CURE recommends "that meteorological data from the nearby IID-operated Sonny Bono monitoring station be used because it is the best representation of the conditions that will exist during Project operation."
[4] Refer to Section 5.3.2 of EPA's *Meteorological Monitoring Guidance for Regulatory Modeling Applications* (EPA-454/R-99-005), which is available online at https://www.epa.gov/sites/default/files/2020-10/documents/mmgrma_0.pdf.

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representative National Weather Service (NWS) meteorological data, at least one year of site-specific data, or at least three years of prognostic meteorological data.[5]

In addition, the Sonny Bono monitoring station is not an Automated Surface Observing Systems (ASOS) station, unlike the Imperial County Airport NWS station. ASOS stations are those monitoring stations which collect sub-hourly 1 to 5-minute wind speed and wind direction readings. To reduce the number of calms and missing winds in the surface data, archived 1-minute winds for the ASOS stations can be used to calculate hourly average wind speeds and wind directions, which are used to supplement the standard archive of hourly observed winds processed in the American Meteorological Society/EPA Regulatory Model (AERMOD) Meteorological Preprocessor (AERMET).

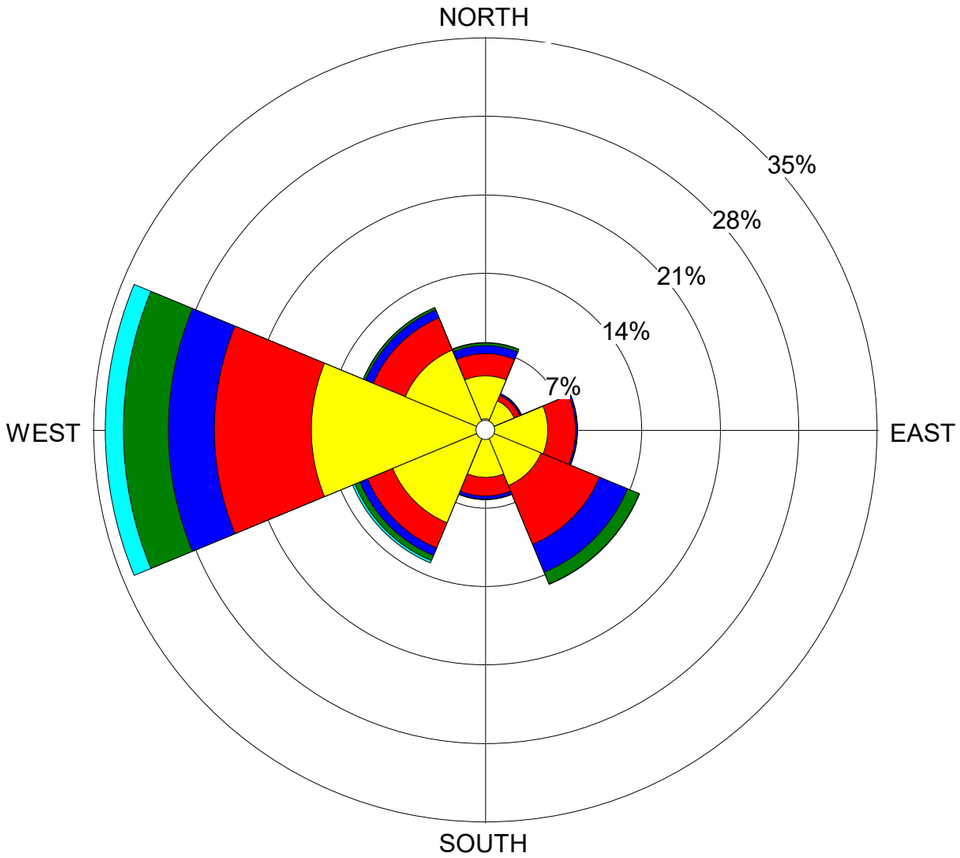
Lastly, although the Imperial County Airport is located over 28 miles from the project site, there are no significant geographic features between the two locations, and both are located south/southeast of the Salton Sea. The lack of significant geographic features between the two locations is itself an indicator of representativeness of the Imperial County Airport meteorological data,[6] but also leads to the expectation that wind speeds and wind directions in the project vicinity are similar to those incurred at the Imperial County Airport. This expected similarity is verified by comparing the wind rose for the Imperial County Airport (for years 2015 to 2018 and 2021) to the wind rose for the Sonny Bono monitoring station (for years 2020 to 2022). As shown in Figure IV.A.1-1, attached hereto, both wind roses share the predominant wind directions from the west and southeast.

Based on the above, the meteorological data collected at the Sonny Bono monitoring station is not more suitable for modeling as the data does not meet the minimum requirements for completeness and would not be any more representative of the project site than the Imperial County Airport data based on a comparison of wind roses. Furthermore, as an ASOS station, the Imperial County Airport NWS station may provide fewer missing hours of wind speeds and wind directions. For these reasons, the Applicant supports the continued use of the Imperial County Airport NWS station meteorological data, as previously approved both by the ICAPCD and CEC.[7]

The Applicant also reviewed the particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}) and particulate matter with aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$) data collected at the Sonny Bono monitoring station and found only two years of recent PM_{10} data (2018 and 2019) and none of the recent $PM_{2.5}$ data to meet the EPA's minimum requirements of 75 percent completeness of the scheduled sampling days on a quarterly basis.[8] Based on this evaluation, the Sonny Bono monitoring station does not provide a complete three-year dataset to compute a design value for PM_{10} or $PM_{2.5}$ for the air dispersion modeling analysis and is not recommended for use. Data collected from the community-level monitors enrolled in the Identifying Violations Affecting Neighborhoods (IVAN)

[5] Refer to Section 8.4.2(e) of Appendix W to 40 Code of Federal Regulations (CFR) Part 51, *Guideline on Air Quality Models*.
[6] Refer to Section 8.4.1(b)(2) of Appendix W to 40 CFR Part 51, *Guideline on Air Quality Models*.
[7] CEC Staff provided informal approval via electronic mail to the Applicant on December 14, 2022, and did not have any subsequent data requests associated with the modeling protocol. ICAPCD similarly did not have any comments regarding the modeling protocol during its completeness review of the permit application.
[8] Refer to Table 8-1 of EPA's *Guideline on Data Handling Conventions for the PM NAAQS* (EPA-454/R-99-009), which is available online at https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19990401_oaqps_epa-454_r-99-009_guideline_data_handling_pm_naaqs.pdf.

Imperial County Airport (2015 – 2018 and 2021)



Sonny Bono Monitoring Station (2020 – 2022)

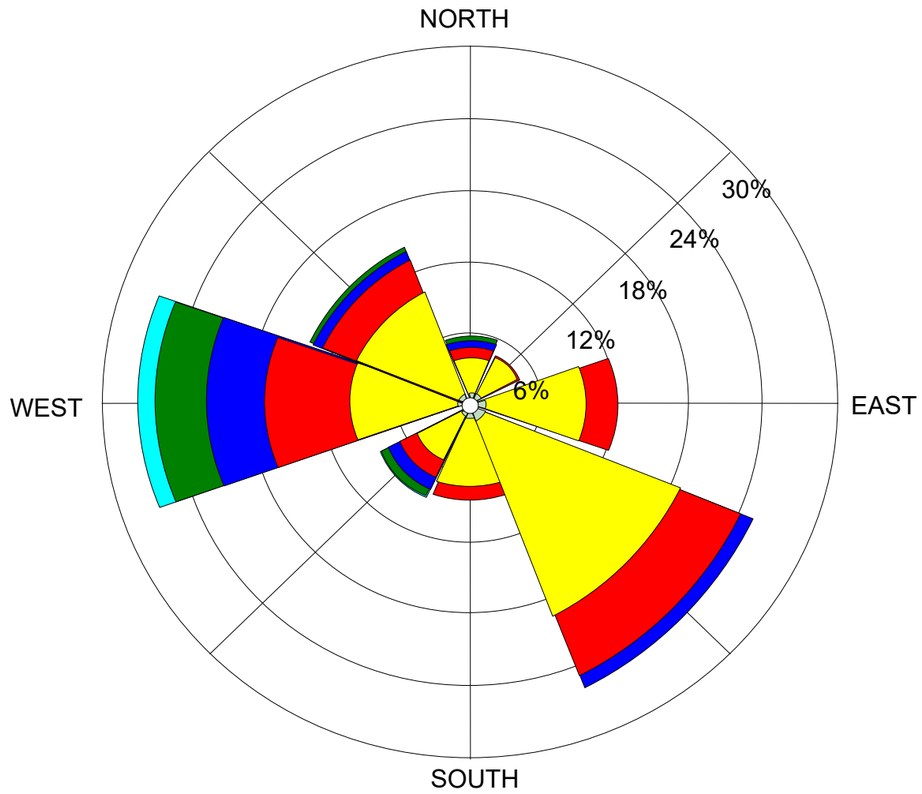


Figure IV.A.1-1
Comparison of Wind Roses
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network are also not recommended for use as these data are neither validated nor verified and do not come from regulatory monitors.[9] In turn, the Applicant appropriately used PM_{10} and $PM_{2.5}$ monitoring data collected at the quality assured air quality monitoring stations located in Niland and Brawley, respectively. These "regional" monitoring stations are located upwind of the project area, have recent quality assured data available, and are impacted by similar or adequately representative sources; therefore, they are considered suitable for use per Section 8.3.2(b) of Appendix W to 40 Code of Federal Regulations (CFR) Part 51, *Guideline on Air Quality Models*.

2. The Cumulative Impacts Modeling Appropriately Evaluated All Sources Not Represented in the Background Ambient Monitoring Data.

In Section IV, Subsection A.2 of its comments, CURE asserts that the cumulative impact analysis modeling "must also consider other existing and proposed facilities within 6 miles of the Project site including: CalEnergy Salton Sea Units 1 & 2/3&4/5 facilities, CalEnergy JM Leathers Facility, CalEnergy Central Services facility, CalEnergy Vulcan/Del Ranch facilities, and CalEnergy JJ Elmore Facility."[10] CURE is incorrect. As described below, the cumulative impacts analysis appropriately considered all existing and proposed facilities.

In a cumulative impact analysis, the EPA's guidance requires the evaluation of all sources which could contribute to impacts. However, the guidance only requires modeling of nearby sources that are not adequately represented in the background ambient monitoring data, particularly if those sources could contribute to areas where the project alone has Significant Impact Level (SIL) exceedances.[11] Of the facilities listed by CURE, all are existing, operational facilities that are adequately represented in background monitoring data.

In addition, as shown in Table 4-1 and Appendix A of the *Air Dispersion Modeling Report for Black Rock, Elmore North, and Morton Bay Geothermal Projects*, the SIL impact radius for the project's 24-hour and annual $PM_{2.5}$ impacts is small (i.e., 0.3 kilometer (km) or less). At such limited distances, it is unlikely that $PM_{2.5}$ impacts from nearby existing sources would overlap with the project's impact areas. This conclusion is further supported through consideration of the wind rose and the location and orientation of similar existing emission sources in the project vicinity. For example, J.L. Featherstone is an existing, operational facility located northeast of the project and, like the project, emits $PM_{2.5}$ from cooling towers. J.L. Featherstone's cooling towers are similarly located along the eastern edge of the property in a northwest to southeast configuration. Given the proximity of these two facilities and their slightly staggered positioning, $PM_{2.5}$ impacts from both facilities would be expected to occur in the same general direction (i.e., east of both property boundaries) under the same meteorological conditions instead of overlapping in an area requiring different wind directions (i.e., east of the project but south of J.L. Featherstone). Furthermore, in the rare event that $PM_{2.5}$ impacts from both facilities did overlap, they would have to do so persistently for 24-hours or the majority of a year to affect the modeled results, based on the averaging periods of the $PM_{2.5}$ standards. For these reasons, it is unlikely that the project's highest $PM_{2.5}$ impacts would overlap with the

[9] Refer to the disclaimer regarding the use of these data at https://ivan-imperial.org/air/map.
[10] CURE PDOC Comments, p. 9.
[11] Refer to Section 8.3.1 of Appendix W to 40 CFR Part 51, *Guideline on Air Quality Models*.

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highest $PM_{2.5}$ impacts from nearby existing sources; therefore, inclusion of such nearby existing sources in the cumulative impact analysis is not warranted.

Further, a cumulative impacts analysis was conducted for $PM_{2.5}$ per the modeling protocol approved by both the ICAPCD and CEC,[12] based on the project's operational emissions exceeding the SIL for both 24-hour and annual $PM_{2.5}$.[13] As described in Section 4.2 of the *Air Dispersion Modeling Report for Black Rock, Elmore North, and Morton Bay Geothermal Projects*,[14] the predominant contributor to $PM_{2.5}$ emissions within Imperial County is windblown dust, which is not attributed to localized emission sources. Apart from windblown dust, on-road vehicles are a greater contributor of $PM_{2.5}$ emissions within Imperial County than electric generating facilities. Based on this profile, the Applicant selected background monitors located in urban areas near the predominant contributors (i.e., arterial streets, interstates, and highways), thereby providing for the purposes of the analyses a potentially higher localized $PM_{2.5}$ background concentration than what is expected to be emitted by existing geothermal power plants in the project vicinity. This approach is consistent with EPA's recently released draft guidance on the development of background concentrations for use in modeling analyses, which suggests that selecting a background monitor located in an urban area may provide a more conservative assessment when the project source is in a more rural location.[15]

The portion of Imperial County in which the project is located is currently designated as an attainment area for $PM_{2.5}$ under both federal and state standards. For consistency with the project's location and the location of the meteorological monitoring data, the $PM_{2.5}$ background concentrations used in the Applicant's analysis were collected at monitoring stations located south of the Salton Sea, which are in or near the nonattainment portion of Imperial County. Use of these $PM_{2.5}$ background concentrations resulted in modeled cumulative impacts below the applicable standards, even with inclusion of contributions from the proposed Elmore North and Black Rock Geothermal Projects. As documented above, electric generating facilities are a smaller contributor to $PM_{2.5}$ emissions within Imperial County than fugitive dust and on-road vehicles. As such, it is unlikely that existing electric generating facilities already adequately represented in background monitoring data within Imperial County, such as J.L. Featherstone, present a significant $PM_{2.5}$ impact within the project vicinity.

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[12] The *Air Dispersion Modeling Protocol for Morton Bay Geothermal Plant Cumulative Impact Analysis* was docketed on September 28, 2023 (TN #252436). CEC Staff did not have any subsequent data requests associated with this submittal. ICAPCD similarly did not have any comments regarding this modeling protocol during its completeness review of the permit application.

[13] The CEC does not require a cumulative assessment for pollutants in which the facility impact is less than the EPA's applicable SIL.

[14] Refer to Attachment DRR 12-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (TN #253082).

[15] Section 4.3 of EPA's *Draft Guidance on Developing Background Concentrations for Use in Modeling Demonstrations* (EPA-454/P-23-001), which is available online at https://www.epa.gov/system/files/documents/2023-10/draft-guidance-on-developing-background-concentrations-for-use-in-modeling-demonstrations.pdf.

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3. The Project Would Not Cause or Contribute to a Violation of Newly Revised NAAQS for Annual PM2.5.

In conjunction with the EPA's release of its final rule to strengthen the annual National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$, the EPA also released an implementation guide[16] to help affected parties understand the timeline under which changes to permitting, area designations, etc. would be made. According to this guidance, all applicants for permits to construct a new major source or major modification of an existing stationary source after the effective date of the final rule (60 days after publication in the *Federal Register* or May 6, 2024) will need to conduct an air quality analysis that considers the revised $PM_{2.5}$ NAAQS. Because this project's permit application was deemed complete on June 22, 2023, which is well before the effective date of the final rule, and because the project is neither a major source nor a Prevention of Significant Deterioration (PSD) source of $PM_{2.5}$ emissions, an air quality analysis considering the revised $PM_{2.5}$ NAAQS is not required.

In addition, the Applicant's analysis conservatively assumed the project's cooling towers would operate 8,760 hours per year at the maximum $PM_{2.5}$ emission rate, without any consideration of periods of downtime or reduced cooling tower demand due to seasonal temperature variations. This condition simply cannot exist during operations. The Applicant could refine this assumption to reflect actual expected, much less frequent, cooling tower operations, rather than the conservative assumptions presented in the application, but nothing in Section A.2.b of Rule 207 requires such an exercise, especially where the project's application has already been deemed complete.

Further, the background concentration used in this modeling analysis comprises 96 percent of the new, reduced annual NAAQS for $PM_{2.5}$. During consideration of the $PM_{2.5}$ State Implementation Plan (SIP) for Imperial County, it was noted that Imperial County is impacted year-round by the international transport of pollutants from Mexicali, Mexico. Although the SIP is not required to address pollution originating from outside the borders of the United States, implementation of the revised $PM_{2.5}$ NAAQS will undoubtedly encourage implementation of additional control technologies throughout the state to bring down background concentrations within California. These new regulations and policies will ultimately reduce the project's potential $PM_{2.5}$ impacts.

4. The Project Would Not Cause or Contribute to a Violation of CAAQS for Hydrogen Sulfide.

As stated in Section 5.1.9.6 of Attachment DRR 7-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (Transaction Number [TN] #253082), "H_2S in the ambient air near the Salton Sea is subject to episodic events that result in concentrations which temporarily exceed the CAAQS of 0.03 parts per million (ppm). These episodic events of H_2S exceedances are well known and largely due to biogenic sources and activity (SCAQMD 2021). As a result, monitoring data in the region may not be representative for use in a CAAQS modeling analysis and the project's modeled maximum impacts will instead be compared to the CAAQS directly."

To confirm these factual circumstances, the South Coast Air Quality Management District (SCAQMD) established hydrogen sulfide (H_2S) monitors along the north side of the Salton Sea to support notification

[16] Available online at https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-implementation-fact-sheet.pdf.

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and reporting of odor nuisances. Data collected at these monitors have exceeded the one-hour California Ambient Air Quality Standard (CAAQS) of 0.03 ppm on numerous occasions. Despite these known and reported results, the California Air Resources Board (CARB) continues to designate the area as attainment for H_2S. This designation supports the use of these monitored H_2S concentrations for odor evaluations only, which are often attributed to episodic events. Furthermore, the Salton Sea itself is a predominant source of naturally-occurring H_2S within the region; such biogenic sources should not prohibit the development of stationary sources which utilize the resources for renewable energy.

Consistent with the above, the Applicant initially proposed to model H_2S only as an odor nuisance. Following discussion with the ICAPCD and CEC, the Applicant agreed to conduct an H_2S modeling analysis for demonstration of compliance with the one-hour CAAQS despite such an analysis never having been requested for other geothermal power plants in the project vicinity. As shown in Table 5.1-31 of Attachment DRR 7-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (TN #253082), the project's maximum modeled H_2S concentration of 37.5 micrograms per cubic meter ($\mu g/m^3$) is less than the one-hour CAAQS of 42 $\mu g/m^3$. This analysis, the methodology of which was agreed to by both the ICAPCD and CEC, demonstrates a good faith effort by the Applicant to comply with requests made by the reviewing agencies and that, during routine operations, the project will not cause or contribute to an exceedance of the one-hour CAAQS for H_2S.

5. The Measures Proposed to Reduce the Project's Hydrogen Sulfide Emissions Do Meet the Requirement for Best Available Control Technology.

At the request of the ICAPCD, the Applicant prepared a Best Available Control Technology (BACT) analysis.[17] The analysis specifically considered the following additional control technologies for the project's H_2S emissions: direct injection of condensate for sour condensate liquid (H_2S) abatement and liquid redox technologies, including Stretford Process, SulFerox, and LO-CAT, for non-condensable gas (NCG) (H_2S) abatement.

The BACT analysis was performed following the EPA's top-down approach, which includes the following elements:

- Step 1: Identify potential control technologies
- Step 2: Eliminate technically infeasible options
- Step 3: Rank remaining control technologies by control effectiveness
- Step 4: Evaluate most effective controls
- Step 5: Select BACT

Per Step 2 of the above process, technically infeasible options are eligible for elimination from the BACT analysis and do not require further evaluation of control and cost effectiveness. As a result, the BACT analysis focused on technically feasible options that reduce emissions without formation of any associated

[17] Refer to Appendix 5.1E of Attachment DRR 7-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (TN #253082).

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secondary emissions. For example, although thermal oxidizers would reduce H_2S emissions, they require propane combustion to operate, which would lead to an increase in emissions of combustion contaminants.

ICAPCD Rule 207.B defines BACT as the most effective emission control device which has been achieved in practice or any other alternative emission control device determined to be technologically feasible and cost-effective by the Air Pollution Control Officer (APCO).[18] ICAPCD Rule 207.B further indicates that a cost-effectiveness analysis should be performed in accordance with methodology and criteria specified in the SCAQMD's BACT Guidelines.

Consistent with the EPA's top-down approach and the provisions of ICAPCD Rule 207.B, the cost-effectiveness of each technically feasible option was provided to ICAPCD. SCAQMD's BACT Guidelines indicate that a technology is considered to be cost effective if its "cost per ton of emissions reduced is less than the maximum required cost effectiveness."[19] However, no maximum required cost effectiveness is provided for H_2S. Therefore, the Applicant instead relied on a comparison of cost per ton of emissions reduced to determine which technology was the most cost-effective and recommended that technology for the project.

By preparing the BACT analysis, the Applicant adequately considered advancements in technology relevant to the project's H_2S emissions and ultimately proposed the technology that was both technically feasible and cost-effective, consistent with the provisions of ICAPCD Rule 207.B.

In addition, CURE's request for more details on the specific technologies and procedures to be employed to minimize particulate emissions from the project's filter cake handling equipment is unsubstantiated. The Applicant has already indicated that filter cakes will be kept covered and that the handling thereof will be minimized. As with fugitive dust control, these best management practices are generally recognized and accepted as suitable methods for minimizing particulate emissions. The details of implementing these best management practices will be developed as part of the project's operating and maintenance procedures, which are not required to be established prior to issuance of the FDOC.

6. The Air District Can Issue the Final Determination of Compliance Consistent with the Requirements of Rule 1401.

ICAPCD can issue an FDOC, consistent with Rule 1401. CURE's arguments to the contrary are unavailing. As presented in Table 5.9-9 of Attachment DRR 7-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (TN #253082), the project's total chronic hazard index (HI) and total acute HI do exceed the significance thresholds of 1.0 only at the Point of Maximum Impact (PMI), which was the same receptor conservatively and arbitrarily used for the Maximum Exposed Individual Worker (MEIW).

For the purpose of calculating chronic HI, SCAQMD Rule 1401 considers "any location outside the boundaries of the facility at which a person could experience chronic exposure."[20] Because the PMI for

[18] https://apcd.imperialcounty.org/wp-content/uploads/2020/01/1RULE207.pdf
[19] https://www.aqmd.gov/docs/default-source/bact/bact-guidelines/bact-guidelines-2024/part-c_policy-and-procedures-for-non-major-polluting-facilities.pdf
[20] SCAQMD Rule 1401(c)(11)(B)

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chronic risk is located in the vicinity immediately surrounding the project (i.e., along the project fenceline), as shown in Figure 5.9-1 of Attachment DRR 7-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (TN #253082), it is not expected to be a location presenting a potential for long-term or chronic exposure (i.e., it is unlikely and beyond any reasonable possibility for an individual to be present at the project fenceline for eight hours per day for 25 years). Furthermore, the project's total chronic risk drops to less than 1.0 within 400 feet of the eastern fenceline. Although technically not within the project property, public access to this land is restricted as it is owned by BHER.

For the purpose of calculating acute HI, SCAQMD Rule 1401 considers "any location outside the boundaries of the facility at which a person could experience acute exposure."[21] Although the PMI for acute risk is similarly located in the vicinity immediately surrounding the project, it is reasonable to assume that an individual could be present at the project fenceline for one hour. However, ICAPCD has only formally established thresholds at which public notification of potential health risks is required.[22] Exceedance of these public notification thresholds does not prohibit ICAPCD from approving a permit for the emission source.

As stated in Section 5.9.3.5.1 of Attachment DRR 7-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (TN #253082), the Applicant will comply with the public notification requirements for the project's acute risks. Furthermore, the project has implemented source-specific Best Available Control Technology for Toxics (T-BACT), which is required by CARB's *Risk Management Guidance for Stationary Sources of Air Toxics*[23] for sources contributing acute health risks greater than the significance threshold.

7. The HRA Properly Analyzes and Accounts for Potential Radon Impacts.

CURE's claims related to potential radon impacts are unfounded. Radon (Rn-222) primarily is a hazard in occupations where workers may be exposed to Naturally Occurring Radioactive Materials (NORM) and to occupants in buildings overlying soils high in radium (Ra-226).[24] Radon workplace hazards are addressed as part of a facility occupational health and safety program; risks to the general public from radon exposure are addressed by programs administered by state and county health departments, which primarily involve education about indoor air testing and building mitigation. Selected sources of radon are managed under federal standards, including U.S. Nuclear Regulatory Commission (NRC) regulations and EPA's National Emissions Standards for Hazardous Air Pollutants (NESHAPs). For example, NRC regulations for uranium mill tailings include requirements to control the release of radon. The NESHAP for emissions of radon from U.S. Department of Energy facilities establishes a surface emission standard of 20 picocuries per square meter per second (pCi/m^2-s) from impoundments or disposal facilities. Because radon is managed as a radiation health hazard under other programs, it has not been identified as a toxic air contaminant (TAC) in California. An outcome of not being a TAC is that there are no risk assessment methods in the Office of

[21] SCAQMD Rule 1401(c)(11)(A)
[22] https://ww2.arb.ca.gov/ab-2588-district-prioritization-scores-and-risk-threshold-levels
[23] https://ww2.arb.ca.gov/sites/default/files/classic/toxics/rma/rmgssat.pdf
[24] International Commission on Radiological Protection (ICRP). 1993. *Protection Against Radon-222 at Home and at Work*. ICRP Publication 65. https://journals.sagepub.com/doi/pdf/10.1177/ANIB_23_2.

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Environmental Health Hazard Assessment's (OEHHA) guidelines for assessing radon emissions to ambient air.

The risk from the project's radon emissions can be assessed based on comparison with background levels in ambient air. An authoritative estimate of a typical concentration of radon in ambient (outdoor) air is 0.4 picocuries per liter (pCi/L).[25] Studies conducted by CARB reported a statewide average outdoor air concentration of 0.49 pCi/L.[26, 27]

Radon emissions from the project's cooling tower were modeled to estimate the annual average radon concentration for the Maximum Exposed Individual Resident (MEIR). As shown in Table VI.B-1 below, the annual average concentration at the MEIR is 0.0076 pCi/L, which is well within existing (background) levels of radon in air in California.

Table VI.B-1. Radon Concentration at the MEIR

Parameter	**Value**
Annual Maximum Modeled TAC Impact [a]	20.91 µg/m^3 per g/s
	2.09E+07 pCi/m^3 per Ci/s
Annual Radon Emissions [b]	11.4 Ci/year
	3.62E-07 Ci/s
Annual Maximum Radon Impact [c]	7.57 pCi/m^3
	7.57E-03 pCi/L

[a] The Annual Maximum Modeled TAC Impact was taken as the maximum annual impact for the cooling towers from the 1 g/s TAC AERMOD run and converted to units of pCi/m^3 per Ci/s using the following conversion factors:

1 µg = 1.00E-06 g
1 g = 1.50E+05 Ci[28]
1 Ci = 1.00E+12 pCi

[b] Annual Radon Emissions were taken from Appendix 5.1A, Table 1 of Attachment DRR 7-1 of the *Morton Bay Geothermal Project Data Request Response Set 1 (Revised Responses to Data Requests 3, 4, 7, 10 to 13, and 73 to 77)* (TN #253082) and converted to units of Ci/s using the following conversion factor:

1 year = 3.15E+07 s

[c] The Annual Maximum Radon Impact was calculated by scaling the Annual Maximum Modeled TAC Impact by the Annual Radon Emissions and converted to units of pCi/L using the following conversion factor:

1 m^3 = 1,000 L

Notes:
µg = microgram(s)
Ci = curie(s)

[25] Agency for Toxic Substances and Disease Registry (ATSDR). 2012. *Toxicological Profile for Radon*. May. https://www.atsdr.cdc.gov/ToxProfiles/tp145.pdf.
[26] Liu, K-S et al. 1990. *Survey of Residential Indoor and Outdoor Radon Concentrations in California*. https://ww2.arb.ca.gov/sites/default/files/classic/research/apr/past/a6-194-53.pdf.
[27] Liu, K-S et al. 1991. *Annual Average Radon Concentrations in California Residences*. Journal of Air and Waste Management Association. 41(9):1207-1212. https://www.tandfonline.com/doi/abs/10.1080/10473289.1991.10466917.
[28] https://www.ncbi.nlm.nih.gov/books/NBK158787/table/T23/

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Ci/s = curie(s) per second
g = gram(s)
g/s = gram(s) per second
L = liter(s)
m^3 = cubic meter(s)
pCi = picocurie(s)
pCi/m^3 = picocurie(s) per cubic meter
s = second(s)

While radon cancer risk may not have been included in the project's health risk assessment (HRA), there is sufficient basis to show that radon emissions from the proposed project do not represent an increased health risk. Specifically, the lifetime cancer risk from the radon concentration at the MEIR location is estimated to be less than 1 in 1 million, as shown in Table VI.B-2. Other hazards associated with radon (for example workplace hazards) are addressed through existing regulatory programs.

Table VI.B-2 Lifetime Cancer Risk from Radon Concentration in Air at the MEIR

Parameter	Value
Radon-222 Concentration	0.0076 pCi/L
Working Level (WL) [a]	0.00003
Working Level Month (WLM) [b]	0.001
Lifetime Cancer Risk [c]	0.00000083 or 0.83 in 1 million

[a] The WL represents the energy of radon daughters (i.e., isotopes from rapidly decaying radon) and is calculated per the following equation:

WL = Radon-222 Concentration (pCi/L) x Equilibrium Factor x Fraction of Time Exposed to Radon Concentration in Air / 100, where:
Equilibrium Factor = 0.4 for residences[29]
Fraction of Time Exposed to Radon Concentration in Air = 1 (default)

[b] The WLM is calculated per the following equation:

WLM = WL x Exposure Time (hours) / 170 hours per month, where:
Exposure Time = 7,000 hours for residential[30]

[c] The Lifetime Cancer Risk was calculated per the following equation, based on calculations presented in NRC training:[31]

Lifetime Cancer Risk = WLM x Risk Factor per WLM, where:
Risk Factor per WLM = 0.00066, based on the mid-point of the estimated range[32]

8. The HRA Modeling Uses Representative Meteorological Data

The metrological data the HRA relied upon in the PDOC is proper and representative. The Applicant reviewed the meteorological data collected at the Sonny Bono monitoring station and found only two years

[29] ICRP. 1993. *Protection Against Radon-222 at Home and at Work*. ICRP Publication 65. https://journals.sagepub.com/doi/pdf/10.1177/ANIB_23_2.
[30] *Id.*
[31] https://www.nrc.gov/docs/ML1122/ML11227A237.pdf
[32] EPA. 2003. EPA Assessment of Risks from Radon in Homes. EPA 402-R-03-003. Available online at https://www.epa.gov/sites/default/files/2015-05/documents/402-r-03-003.pdf.

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of recent data (2020 and 2022) to meet the EPA's requirements of 90 percent minimum completeness before substitution on a quarterly basis.[33] To ensure the worst-case meteorological conditions are adequately represented in the model results, the EPA requires the use of five years of adequately representative NWS meteorological data, at least one year of site-specific data, or at least three years of prognostic meteorological data.[34]

In addition, the Sonny Bono monitoring station is not an ASOS station, unlike the Imperial County Airport NWS station. ASOS stations are those monitoring stations which collect sub-hourly 1 to 5-minute wind speed and wind direction readings. To reduce the number of calms and missing winds in the surface data, archived 1-minute winds for the ASOS stations can be used to calculate hourly average wind speeds and wind directions, which are used to supplement the standard archive of hourly observed winds processed in AERMET.

The Imperial County Airport is located approximately 28 miles from the project site. Significantly, for the purposes of the PDOC's conclusions, there are no significant geographic features between the two locations, and both are located south/southeast of the Salton Sea. The lack of significant geographic features between the two locations is itself an indicator of representativeness of the Imperial County Airport meteorological data,[35] but also leads to the expectation that wind speeds and wind directions in the project vicinity are similar to those incurred at the Imperial County Airport. This expected similarity is verified by comparing the wind rose for the Imperial County Airport (for years 2015 to 2018 and 2021) to the wind rose for the Sonny Bono monitoring station (for years 2020 to 2022). As shown in Figure IV.A.1-1, both wind roses share the predominant wind directions from the west and southeast.

Based on the above, the meteorological data collected at the Sonny Bono monitoring station is not suitable for modeling as the data does not meet the minimum requirements for completeness. Beyond its incompleteness, the use of this data would not be any more representative of the project site than the Imperial County Airport data based on a comparison of wind roses. Furthermore, as an ASOS station, the Imperial County Airport NWS station may provide fewer missing hours of wind speeds and wind directions. For these reasons, the use of the Imperial County Airport NWS station meteorological data in the PDOC's analysis is representative, as previously approved both by the ICAPCD and CEC.[36]

9. The HRA Properly Analyzes the Emissions Estimates for Hydrochloric Acid.

As explained in the application materials submitted to the ICAPCD, the project's hydrochloric acid (HCl) emissions were properly attributed to the 20,000-gallon storage tank. As explained, the HCl emissions estimate was developed independent of the HCl concentration and size of the storage tank. Specifically, the project's HCl emissions assumed a maximum filling rate of 100 gallons per minute (gpm) with the scrubber

[33] Refer to Section 5.3.2 of EPA's *Meteorological Monitoring Guidance for Regulatory Modeling Applications* (EPA-454/R-99-005), which is available online at https://www.epa.gov/sites/default/files/2020-10/documents/mmgrma_0.pdf.
[34] Refer to Section 8.4.2(e) of Appendix W to 40 CFR Part 51, *Guideline on Air Quality Models*.
[35] Refer to Section 8.4.1(b)(2) of Appendix W to 40 CFR Part 51, *Guideline on Air Quality Models*.
[36] CEC Staff provided informal approval via electronic mail to the Applicant on December 14, 2022, and did not have any subsequent data requests associated with the modeling protocol. ICAPCD similarly did not have any comments regarding the modeling protocol during its completeness review of the permit application.

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operating up to 365 days per year. These conservative assumptions are inclusive of scrubber operation for both the 20,000-gallon and 800-gallon HCl storage tanks.

Furthermore, the project's HRA did include HCl emissions from an HCl scrubber. Because the source modeling parameters were based upon an estimated scrubber size (instead of a specific storage tank) and because the assigned emissions were inclusive of scrubber operation for both HCl storage tanks, the HRA results should be considered to reflect potential health risks resulting from both HCl storage tanks. For these reasons, the additional analysis specific to the 800-gallon HCl storage tank CURE seeks is not required.

10. Condition B.9 Was Developed Consistent with the Applicant's Potential To Emit Estimate and is Independent of the Yearly Anticipated HCl.

Although the project's HCl emissions were attributed to the 20,000-gallon storage tank, the HCl emissions estimate was developed independent of the HCl concentration and size of the storage tank. The project's HCl emissions assumed a maximum filling rate of 100 gpm with the scrubber operating up to 365 days per year. These conservative assumptions are inclusive of scrubber operation for both the 20,000-gallon and 800-gallon HCl storage tanks and represent the project's potential to emit (PTE) HCl. Permit Condition B.9 was developed consistent with the Applicant's PTE estimate and is independent of the anticipated annual HCl throughput expected each year.

The Applicant Remains Available to Support the Issuance of the FDOC

Thank you for the opportunity to address some of the selected comments of CURE. The Applicant looks forward to working with the ICAPCD during the finalization of the Determination of Compliance. Please contact Anoop Sukumaran at (760) 348-4275 (email address: Anoop.Sukumaran@calenergy.com) or Jerry Salamy at (916) 769-8919 (email address: Jerry.Salamy@jacobs.com) if you have any questions or if you need additional information.

Sincerely,

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