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March 25, 2024

Via E-Mail, U.S. Mail, and Docket No. 23-AFC-03

Jesus Ramirez
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150 South Ninth Street
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Re: **California Unions for Reliable Energy's Comments on Preliminary Determination of Compliance for the Black Rock Geothermal Power Generation Plant**

Dear Mr. Ramirez:

We write on behalf of California Unions for Reliable Energy ("CURE") regarding the Imperial County Air Pollution Control District's ("Air District" or "ICAPCD") preliminary decision to grant a preliminary determination of compliance ("PDOC") to Black Rock Geothermal, LLC ("Applicant"), an indirect, wholly owned subsidiary of BHE Renewables, LLC ("BHER") for the Black Rock Geothermal Power Project ("Black Rock" or "Project").

For the reasons discussed below, the Air District must inform the California Energy Commission ("Commission") that a PDOC cannot be issued because the proposed Project would cause or contribute an exceedance of ambient air quality standards ("AAQS") and result in significant, unmitigated health risks due to toxic air contaminant ("TAC") emissions. If the Air District makes significant changes to the PDOC in response to public comments, the revised PDOC must then be re-noticed, and the public must have a full and fair opportunity to comment on the revisions.

I. INTRODUCTION

The Applicant submitted an Application for Certification ("AFC") to the Commission seeking approval to construct and operate a geothermal power plant

and associated interconnection transmission lines in an unincorporated area of Imperial County, California, near the southeastern edge of the Salton Sea.[1] The plant site is located northwest of the existing Vulcan Power Plant and the Hoch (Del Ranch) Power Plant.[2] When an AFC has been accepted by the Commission, the Air District must conduct a determination of compliance review, which is identical to what would be performed for an Authority to Construct ("ATC") application.[3] Accordingly, the Air District reviews the proposed Project to ensure that operation of the stationary source does not interfere with the attainment or maintenance of AAQS. The Air District must also evaluate the Project's health risks associated with emission of TACs, as required by Assembly Bill ("AB") 2588.

The PDOC identifies the following emissions equipment/sources for the proposed Project: the power plant, an emergency fire pump, 3 emergency generator sets, a biological oxidizer box (Ox-Box), a Sparger Abatement System, the cooling tower consisting of 9 cells equipped with high efficiency drift eliminators (0.0005%), a 20,000-gallon hydrochloric acid ("HCl") storage tank[4] and dosing system, an HCl scrubber, 5 production wells, 5 injection wells (brine), 1 injection well (condensate), and 1 injection well (aerated fluid).[5] Based on the results of an air quality impact analysis and health risk assessment ("HRA") for the proposed Project, the Air District issued a preliminary decision to grant a PDOC.[6]

We reviewed the PDOC, air quality permit application and amendments, and available supporting documents with the assistance of our technical expert, Komal Shukla, Ph.D., M.Sc., B.Sc., whose comments and qualifications are attached as Exhibit A.[7] Based on our review, we conclude the proposed Project fails to comply with all applicable Rules and Regulations of the Air District ("Rules"), including

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[1] TN 249752, Black Rock Geothermal Project Application for Certification Volume 1 (Apr. 18, 2023), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=249752&DocumentContentId=84391 (hereinafter "BRGP AFC").
[2] *Id.* at p.1-1.
[3] Imperial County Air Pollution Control District, Rule 207 New and Modified Stationary Source Review (last revised Sept. 11, 2018) (hereinafter "Rule 207"), *available at* https://apcd.imperialcounty.org/wp-content/uploads/2020/01/1RULE207.pdf.
[4] The PDOC incorrectly describes the Project's HCl storage tank as a 20,000-gallon tank, when in fact the Applicant's Revised Project Description shows that the Project would utilize a 10,000 gallon HCl storage tank and a 300 gallon diluted HCl storage tank.
[5] TN 254543, Preliminary Determination of Compliance (PDOC) Black Rock (Feb. 16, 2024), p. 49 (hereinafter "PDOC"), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=254543&DocumentContentId=89960.
[6] *Id.* at 2.
[7] **Exhibit A**, Letter to Ariana Abedifard, Adams Broadwell Joseph & Cardozo from Komal Shukla, Group Delta re: Comment Letter Black Rock Geothermal Project Preliminary Determination of Compliance (PDOC) (Mar. 21, 2024) (hereinafter "Shukla Comments").

Rule 207. As discussed in greater detail below, the PDOC suffers from fatal defects because it (1) fails to evaluate all emission sources, (2) shows that the Project would cause or contribute to the exceedance of Federal and State AAQS, (3) fails evaluate whether the proposed Project and the adjacent geothermal facilities constitute a single source, (4) demonstrates that the non-cancer hazards are significant and unmitigated, and (5) contains erroneous conditions.

Given these deficiencies, the Air District must inform the Commission that a PDOC cannot be issued unless it significantly revises the air quality modeling, emissions limits, and emissions controls to ensure compliance with all applicable Air District Rules and requirements.

II. STATEMENT OF INTEREST

CURE is a party to the Project's AFC proceeding before the Commission.[8] CURE is a coalition of unions whose members' environmental and economic interests are affected by the Project. Union members live in communities that suffer the impacts of projects that are detrimental to human health and the environment. Unions have a corresponding interest in acting to minimize the impacts of projects that would degrade the environment, and in enforcing environmental laws to protect their members.

The Project also affects the union members' longer term economic and environmental interests. CURE's coalition members construct, maintain and operate conventional and renewable power plants, energy storage facilities, and other industrial facilities in California where the coalition members live, work, and recreate. CURE is equally committed to building both a strong economy and a healthy environment. Environmental degradation jeopardizes future jobs by causing construction moratoriums, depleting limited air pollutant emissions offsets, consuming limited freshwater resources, and imposing other stresses on the environmental carrying capacity of the state. This in turn reduces future employment opportunities. In contrast, well designed projects that reduce environmental impacts improve long-term economic prospects.

III. LEGAL STANDARD

The Imperial County Air Pollution Control District issued the PDOC for the Project pursuant to ICAPCD's Rule 207 for power plants. Rule 207 D.4.b requires the Air Pollution Control Officer to conduct a determination of compliance review,

[8] TN 251916, Order Granting CURE's Petition to Intervene (Aug. 25, 2023), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=251916&DocumentContentId=86916.

which "shall consist of a review identical to that which would be performed if an application for an Authority to Construct had been received for the power plant," and "shall apply all provisions of this Rule [Rule 207] which apply to applications for an Authority to Construct."[9] Under Rule 207 D.4.b, the PDOC itself must consist of a review identical to that which would be performed if an application for an authority to construct had been received for the power plant and shall apply all provisions of Rule 207. Within 180 days of accepting an AFC as complete, the Air District must make a preliminary decision on:

- Whether the proposed power plant meets the requirements of this Rule and all other applicable District regulations; and
- In the event of compliance, what permit conditions will be required including the specific BACT requirements and a description of required mitigation measures.[10]

The preliminary written decision is treated as a preliminary decision under Rule 206 and must be finalized by the Air District only after being subject to the public notice and comment requirements of Rule 206.[11] The Air District shall not issue a preliminary determination of compliance unless all requirements of Rule 207 are met.[12]

Within 240 days of accepting an AFC as complete, the Air District must issue and submit to the Commission a PDOC or inform the Commission that a PDOC cannot be issued.[13] A determination of compliance confers the same rights and privileges as an ATC only when and if the Commission approves the application for certification, and the certificate includes all conditions of the final determination of compliance.[14]

As discussed in detail below, the Air District's own analysis demonstrates that the Project fails to comply with all applicable District Rules and regulations. As a result, the Air District must inform the Commission that it cannot issue a PDOC unless the air quality modeling, emissions limits, and any additional controls demonstrates that the Project would not cause or contribute to any exceedances of AAQS and would not result in significant, unmitigated health risks. If significant

[9] Rule 207 D.4.b-c.
[10] Rule 207 D.4.e.1.
[11] Rule 207 D.4.e.3.
[12] *Id.*
[13] Rule 207 D.4.f.
[14] Rule 207 D.4.f.

changes are made to the PDOC, the Air District must re-circulate the revised PDOC for public review and comment.

IV. THE AIR DISTRICT'S AIR QUALITY IMPACT ANALYSIS DID NOT COMPLY WITH RULE 207

The PDOC does not ensure that the operation of the Project will not interfere with the attainment or maintenance of AAQS, nor does it ensure no net increase in emissions from new sources which emit 137 pounds per day or more of nonattainment pollutants or their precursors.[15] The PDOC fails to rely on accurate or representative data for modeling. Thus, the PDOC does not comply with Rule 207 or the other applicable requirements for new source review under local, state and federal law. The District must issue a revised PDOC for public comment that complies with the law.

A. The Air Quality Model Is Not Consistent with EPA Guidelines

Section F.1.a. of Rule 207 requires that any air quality models used to estimate the effects of a new emissions unit be consistent with the requirements contained in the most recent edition of EPA's "Guidelines on Air Quality Models, 40 CFR 51 Appendix W" ("*Guidelines*").[16] The *Guidelines* provide a common basis for estimating the air quality concentrations of criteria pollutants used in assessing control strategies and developing emissions limits.[17] The EPA also published guidance for estimating single source impacts on secondary pollutants under the approach laid out in the *Guidelines*.[18] The Guidance on the Development of Modeled Emission Rates for Precursors ("MERPS") "reflects the EPA's recommendations for how air agencies conduct air quality modeling and related technical analyses to satisfy compliance demonstration requirements for ozone and secondary $PM_{2.5}$ under the Prevention of Significant Deterioration (PSD) permitting program."[19]

The air quality model relied upon by the Air District to determine the Project's compliance with AAQS suffers from three critical defects. First, the model fails to use an appropriate stack height in estimating secondary pollutant impacts.

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[15] Rule 207 A.1.b.
[16] 40 C.F.R Pt. 51, App. W; *see also* 82 Fed. Reg. 5182-235 (Jan. 17, 2017).
[17] 40 C.F.R Pt. 51, App. W, Preface.
[18] U.S. EPA, Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program (April 30, 2019), available at https://www.epa.gov/sites/default/files/2020-09/documents/epa-454_r-19-003.pdf (hereinafter "EPA Guidance on MERPs for Ozone and PM2.5").
[19] *Id.* at 1.

Second, the model fails to use a representative monitoring site for meteorological data and background particulate matter concentrations.[20] Third, the model fails to include nearby sources in the background concentrations as part of the cumulative impact analysis.[21]

1. *The Model Uses an Inaccurate Stack Height in Estimating Secondary Pollutant Impacts*

The EPA Guidance on MERPs for Ozone and $PM_{2.5}$ recommends:

> The permit applicant should provide the appropriate permitting authority with a *technically credible justification* that the source characteristics (e.g., *stack height*, emissions rate) of the specific project source described in a permit application and the chemical and physical environment (e.g., meteorology, background pollutant concentrations, and regional/local emissions) near that project source *are adequately represented by the selected hypothetical source(s).*[22]

The PDOC states: "direct emissions of primary pollutants such as NOx, SO2, and VOCs will contribute to the formation of secondary pollutants that must be compared to the CAAQS and NAAQS."[23] Here, "the modeled secondary pollutant impacts for a 10-meter stack in Los Angeles County were used to represent the project."[24] This hypothetical stack is inappropriate for two reasons.

First, the Air District's reliance on Los Angeles County is inappropriate because there are substantial differences in topography and atmospheric conditions between Los Angeles County and Imperial County, where the Project is located.[25]

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[20] *See also* Letter to Jesus Ramirez, Imperial County Air Pollution Control District from Andrew J. Graf, Adams Broadwell Joseph & Cardozo re: California Unions for Reliable Energy Comments on the Preliminary Decision to Grant a Preliminary Determination of Compliance for Elmore North Geothermal Power Generation Plant (Mar. 4 2024) pp. 5-6 (hereinafter "Elmore North PDOC Comments"), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=254833&DocumentContentId=90487; Letter to Jesus Ramirez, Imperial County Air Pollution Control District from Andrew J. Graf, Adams Broadwell Joseph & Cardozo re: California Unions for Reliable Energy Comments on the Preliminary Determination of Compliance for Morton Bay Geothermal Power Generation Plant (Mar. 11 2024) pp. 5-8 (hereinafter "Morton Bay PDOC Comments"), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=254968&DocumentContentId=90658.
[21] *See also* Elmore North PDOC Comments at pp. 7-8; Morton Bay PDOC Comments at pp. 8-10.
[22] EPA Guidance on MERPs for Ozone and PM2.5, p.40 (emphasis added).
[23] PDOC, p. 29.
[24] *Ibid.*
[25] Shukla Comments, p. 28.

Second, the assumed 10-meter stack height is inconsistent with the actual height used in the modeling analysis, which is reported to be 4.60 meters. As a result, the stack height does not adequately represent the Project.[26] Therefore, the Air District's air quality impact analysis violates Rule 207 because the stack height is inconsistent with applicable EPA guidance.

2. The Model Fails to Use a Representative Monitoring Site for Meteorological Data and Particulate Matter Background Concentrations

The *Guidelines* recommend that meteorological data be selected based on spatial and climatological (temporal) representativeness as well as the ability of individual of parameters selected to characterize the transport and dispersion conditions in the area of concern.[27] The representativeness of the measured data is dependent on numerous factors including but not limited to: (1) the proximity of the meteorological monitoring site to the area under consideration, (2) the complexity of the terrain, (3) the exposure of the meteorological monitoring site, and (4) the period of time during which data are collected.[28] Meteorological data collected by public agencies may be used if the data: (1) is equivalent in accuracy and detail (e.g., siting criteria, frequency of observations, data completeness, etc.) to National Weather Service data, (2) are judged to be adequately representative for the particular application, and (3) have undergone quality assurance checks.

The dispersion modeling utilized 5 years (2015-2018, 2021) of AERMET-processed meteorological data collected at the Imperial County Airport.[29] The years 2019 and 2020 were not included in the data set because they were determined to be incomplete by the California Air Resources Board.[30] The Applicant claims the data set was selected based on completeness, similar surrounding land use as the plant site and proximity to the facility.[31]

Meteorological data from the Airport is not representative of the Project site. A critical element of any air dispersion model is accurate, representative surface and upper air data.[32] The Airport is over 28 miles away from the Project site.[33] The choice

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[26] *Ibid.*
[27] 40 C.F.R Pt. 51, App. W § 8.4.1.b.
[28] *Ibid.*
[29] PDOC, p, 27.
[30] TN 250003-2, Black Rock Geothermal Project Air Quality Permit Application Part 1 (May 4, 2023) p. 5.1-31 (hereinafter "AQP Application"), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=250003-2&DocumentContentId=84732.
[31] *Ibid.*
[32] Shukla Comments, p.32.
[33] AQP Application, p.5.1-31.

to utilize data from this far distance contradicts the requirement to ensure spatial and climatological representativeness of the data under consideration.[34]

Dr. Shukla 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.[35] This monitoring station is less than 2 miles from the Project site.[36] Nine years (2015-2023) of hourly meteorological data and PM data collected from the station is publicly available online, which provides two additional years of recent meteorological parameters (2022 and 2023) compared to the Imperial County data.[37] As Dr. Shukla explains: "This local and up-to-date information stands as the most representative and reliable source for dispersion modeling inputs, ensuring a more accurate assessment of the Project's impact on air quality."[38]

The primary purpose of this station is to support the Salton Sea Air Quality Mitigation Program designed to address air quality mitigation requirements around the Salton Sea.[39] The station is equipped with a Themo Fisher Scientific TEOM 1405-D to take real-time measurements of PM_{10}.[40] The TEOM has a co-located 10-meter-tall meteorological tower equipped with instruments needed to support standard regulatory air dispersion models, including AERMOD.[41] The meteorological instruments are subject to site check and audits, data processing and quality assurance/quality control procedures, and calibration and audit procedures.[42]

The air quality impact analysis also fails to incorporate data from the nearby Sonny Bono monitoring station, situated within 2 miles of the project site, which holds pertinent PM_{10} air quality data for 2016 through the present.[43] This oversight undermines the completeness and accuracy of the Air District's review. The Air Quality Permit Application and PDOC rely on distant monitoring stations

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[34] Shukla Comments, p. 32.
[35] *Ibid*.
[36] *Ibid*.
[37] *Ibid* at 37; *See* Imperial Irrigation District, Salton Sea Air Quality Monitoring Program, Documents and Data (last accessed Mar. 22, 2024), *available at* https://www.dropbox.com/sh/xevsp0836vygiyj/AABQmBVzD95fUrrgjoIlTp50a?dl=0.
[38] Shukla Comments, p. 32.
[39] Imperial Irrigation District, Salton Sea Air Quality Mitigation Program (July 2016) p. 41, *available at* https://saltonseaprogram.com/aqm/docs/Salton_Sea_Air_Quality_Mitigation_Program.pdf.
[40] *Id.* at 43.
[41] *Ibid*.
[42] *Ibid*. appen. C at p. C-18; *see also id*., appen. D-2.
[43] Shukla Comments, p. 20

for PM_{10} and $PM_{2.5}$ background concentrations, such as Niland-English Road and Brawley-220 Main Street which are 7.6 miles and 13.8 miles away from the Project site, respectively.[44] To comply with the *Guidelines*, background concentration values from the Sonny Bono station provide an accurate depiction of current background pollution levels.[45]

The PDOC also fails to include background concentration data from the 40 additional monitoring stations currently active in Imperial County.[46] The Identifying Violations Affecting Neighborhoods ("IVAN") Air Monitoring network consists of 40 air monitors strategically placed throughout Imperial County, 13 of which are in close proximity to the Project site.[47] The PDOC should include all relevant monitoring sites in the background analysis of air quality to ensure that background concentrations are accurately reported for the region.

To comply with EPA Guidelines and ensure accurate modeling, the Air District must utilize representative meteorological data in the air quality modeling. Compliance with AAQS should not have been determined based on data from such a distant monitoring station when essentially site-specific data is available from a reliable source.

3. The Model Fails to Include Nearby Sources

Background concentrations are essential in constructing the air quality concentration for a cumulative impact analysis.[48] The *Guidelines* recommend that individual sources located in the vicinity of the source(s) under consideration for emissions limits that are not adequately represented by ambient monitoring data be accounted for by explicitly modeling their emissions.[49] Typically, sources that cause a significant concentration gradient in the vicinity of the source(s) under consideration for emissions limits are not adequately represented by background ambient monitoring.[50] For multi-source areas, such as the case here, the *Guidelines* recommend determining the appropriate background concentration by (1) identifying and characterizing contributions from nearby sources through explicit modeling, and (2) characterization of contributions from other sources through adequately representative ambient monitoring data.[51]

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[44] AQP Application, p. 5.1-10.
[45] Shukla Comments, p. 20.
[46] *Ibid.*
[47] *Id.* at 20-21.
[48] 40 C.F.R Pt. 51, App. W § 8.3.1.
[49] *Id.* §§ 8.3.1.i., 8.3.1.3.
[50] *Id.* §§ 8.3.1.i., 8.3.1.3.
[51] 40 C.F.R Pt. 51, App. W § 8.3.1.3.a.

The air quality model did not explicitly include any nearby sources because emissions from existing sources are assumed to be accounted for with the ambient air background concentrations.[52] However, there are clearly sources that will likely have a significant concentration gradient in the vicinity of the proposed Project that must be included in the modeling.

Dr. Shukla concludes that the PDOC falls short in its air quality analysis by omitting a crucial consideration—the emissions from operational geothermal facilities near the Project.[53] Notably absent from the air quality model are emissions from the CalEnergy Salton Sea Units 1 & 2/3&4/5 facilities, CalEnergy JM Leathers Facility, CalEnergy Central Services facility, CalEnergy Vulcan/Del Ranch facilities, and the existing CalEnergy JJ Elmore Facility.[54] The oversight extends to the exclusion of criteria pollutants (NOx, SOx, PM, CO, lead) and air toxins (VOCs, including benzene, toluene, diesel particulate matter, etc.) from the comprehensive assessment.[55] As Dr. Shukla explains: "This omission is particularly concerning given the BRGP's location within a designated Disadvantaged Community under SB 535 and the non-attainment status of the Imperial Valley Airshed."[56]

The *Guidelines* state that in most cases the nearby sources will be located within the first 10 to 20 kilometers (6.2 to 12.4 miles) from the source(s) under consideration.[57] Therefore, the 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.[58] All these geothermal facilities emit the same criteria pollutants of concern as Black Rock.

Further, Dr. Shukla found that localized monitoring of particulate matter reveals a distinct concentration gradient, with higher PM_{10} concentrations observed downwind of the Sonny Bono Salton Sea National Wildlife Reserve.[59] This observed gradient strongly implies a potential influence from existing facilities.[60] The failure

[52] AQP Application at p. 5.1-42, fn. 7.
[53] Shukla Comments, p. 13.
[54] *Ibid.*
[55] *Ibid.*
[56] *Ibid.*
[57] 40 C.F.R Pt. 51, App. W § 8.3.3.b.iii.
[58] Shukla Comments, p. 13.
[59] *Ibid.*
[60] *Ibid.*

to incorporate these emissions into the analysis raises substantial doubts about the overall accuracy and completeness of the Project's air quality impact assessment.[61]

The air quality modeling also fails to include nearby proposed sources. Specifically, the model does not expressly include emissions from the Morton Bay and Elmore North facilities.[62] Based on her review of the PDOCs for each proposed facility,[63] Dr. Shukla demonstrates that emissions from these three facilities would cause or contribute to violations of AAQS for PM_{10} and $PM_{2.5}$.

For example, the combined annual maximum $PM_{2.5}$ concentration for the three facilities is 29.26 µg/m^3 which exceeds the applicable CAAQS of 12.0 µg/m^3. The combined annual maximum PM_{10} concentration of 121.1 µg/m^3 which far exceeds the applicable CAAQS of 20.0 µg/m^3.[64] The combined maximum hourly PM_{10} concentration of 743 µg/m^3 far exceeds the applicable CAAQS of 50 µg/m^3. Finally, the combined maximum hourly PM_{10} concentration of 438 µg/m^3 far exceeds the applicable NAAQS of 150 µg/m^3.[65]

Dr. Shukla concludes that "[t]he potential cumulative effects on air quality, emissions, and overall environmental health necessitate a comprehensive analysis that encompasses the combined influence of all geothermal activities in the region. Addressing this oversight in a revised PDOC is paramount to ensuring a thorough understanding of the cumulative environmental impact of geothermal projects in the area."[66] The Air District must add the best available control technology to reduce PM_{10} and $PM_{2.5}$ emissions below the AAQS, and quantify any reductions from those additional measures, before can consider approval of the PDOC.

The model also does not expressly include emissions from other nearby proposed sources, including solar farms and geothermal exploration projects. These projects include: the Wilkinson Solar Farm, Lindsey Solar Farm, Midway Solar Farm IV, and the Ormat Wister Solar Project, along with the Hell's Kitchen

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[61] *Ibid.*
[62] *Id.* at 16.
[63] See TN 254004, Imperial County Air Pollution Control District, Preliminary Determination of Compliance: Elmore North (Jan. 2024), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=254004&DocumentContentId=89308; TN 254307, Imperial County Air Pollution Control District, Preliminary Determination of Compliance: Elmore North (Feb. 2024), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=254307&DocumentContentId=89667.
[64] *Id.* at 17.
[65] *Ibid.*
[66] *Id.* at 16.

Geothermal Exploration Project and the Energy Source Mineral ALTiS project.[67] Although the PDOC acknowledges that these projects are in the Project vicinity, it does to analyze their combined effects on air quality. As a result, the air quality model is inconsistent with the *Guidelines* requirement to expressly include nearby sources in the air quality model, and therefore violates Section F.1.a. of Rule 207.

Finally, the methodology used in the cumulative analysis is undisclosed and insufficient. The air quality analysis fails to provide detailed technical information regarding the specific modeling approach used. This lack of transparency raises concerns about the accuracy and reliability of the assessment. Additionally, as Dr. Shukla explains, the failure to include fence lines for cumulative sources in the modeling analysis overlooks potential emissions from these sources that could contribute to localized impacts on air quality. Overall, the PDOC's failure to adequately address the cumulative impacts of the Project prohibits adequate environmental assessment.

The Air District cannot adequately assess whether Black Rock will cause or contribute to a violation of the AAQS based on the analysis provided in the application or PDOC alone, nor are the PDOC's findings regarding the severity of exceedances supported by substantial evidence if relevant data is missing from the Air District's analysis. The Air District must require the Applicant to conduct a complete cumulative impact analysis that is expanded to include all the above sources, report the results of that analysis in a revised PDOC, and identify any additional BACT measures necessary to reduce cumulative exceedances.

V. THE BLACK ROCK, VULCAN, AND HOCH (DEL RANCH) POWER PLANTS MUST BE PERMITTED AS A SINGLE STATIONARY SOURCE

Rule 207 establishes preconstruction review requirements for new and modified stationary sources to ensure that the operation does not interfere with the attainment of AAQS. Section B of Rule 207 defines "stationary source" as "any building, structure, facility, equipment, or emissions unit which emits or may emit any affected pollutant directly or as a fugitive emission. Building, structure, or facility includes all pollutant emitting activities, including emissions unit which: (1) are located on one or more contiguous or adjacent properties, and (2) are under the same or common ownership or operation, or which are owned or operated by entities which are under common control, and (3) belong to the same industrial grouping either by virtue of falling in the same two-digit standard industrial classification

[67] AQP Application, p. 5.1-42.

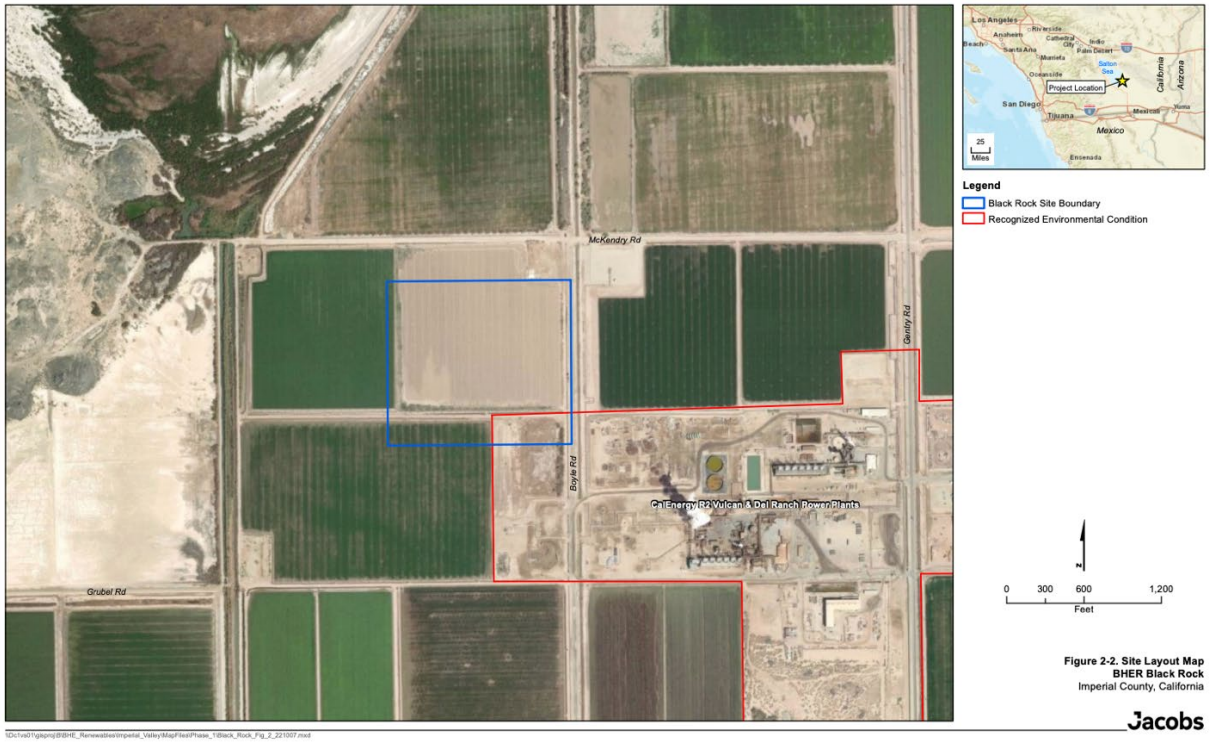
code or by virtue of being part of a common production process, industrial process, manufacturing process, or connected process involving a common raw material."[68]

The PDOC evaluates only sources from Black Rock. In doing so, the PDOC erroneously emits emissions from the CalEnergy Region 2 Vulcan and Hock (Del Ranch) Power Plant facilities ("Region 2 facilities") which, as discussed below, are located on a contiguous property, under common control, and belong to the same industrial grouping as the Black Rock facility. The Air District cannot issue a final determination of compliance until it conducts a revised air quality analysis that combines the emissions from the Black Rock, Vulcan, and Hoch (Del Ranch) power plants to determine whether (1) the stationary source qualifies as a major stationary source and (2) the stationary source interferes with attainment of AAQS.

A. Black Rock, Vulcan, and Hoch (Del Ranch) Are on Contiguous Properties

Under the first factor, the Air District must determine whether all pollutant emitting activities are located on contiguous properties. Section B of Rule 207 defines "contiguous property" as "two or more parcels of land with a common boundary separated solely by a public or private roadway or other public right-of-way." There can be no reasonable dispute that the Black Rock facility is contiguous to the existing facilities.[69] The two parcels are only separated by Boyle Road. Moreover, as conceded by the Applicant, a portion of the Project site is *intersected* by the property boundary of the existing facilities.[70] A visual representation of this intersection is provided below by the Applicant.[71]

[68] Rule 207.B.
[69] In the alternative, the Black Rock property is adjacent to the existing Vulcan and Hoch (Del Ranch) properties; therefore, the three facilities constitute a single source for purposes of demonstrating compliance with Rule 207. *See* AQP Application Appendix 5.1C, p. 1-1 ("The new plant will be on a parcel currently owned by BHER southeast of the Salton Sea near BHER's existing geothermal power plants, *specifically, adjacent to their Region 2 facility."); see also* AQP Application, p. 1-1 & p. 5.1-4.
[70] AQP Application Appendix 5-1 (Phase I Environmental Site Assessment), p. i ("The southeast corner of the Site is intersected by the property boundary for the CalEnergy's R2 Vulcan and Del Ranch Power Plants.")
[71] *Id.*, Figure 2-2.



B. Black Rock, Vulcan, and Hoch (Del Ranch) Are Under Common Control by BHE Renewables, LLC

Under the second factor, the Air District must determine whether the facilities are under common control. Determinations of common control are fact-specific and should be made by permitting authorities on a case-by-case basis.[72] In interpreting a similar definition of stationary source for the PSD permitting program, the EPA has stated that the determination of "control" focuses on the power or authority of one entity to dictate decisions of the other that could affect the applicability of, or compliance with, relevant air pollution regulatory requirements.[73]

[72] Letter to Hon. Patrick McDonnell, Secretary, Pennsylvania Department of Environmental Protection from William L. Wehrum, Assistant Administrator, Office of Air and Radiation, U.S. Environmental Protection Agency re: Meadowbrook Energy (Apr. 30, 2018) (hereinafter "Meadowbrook Letter"), *available at* https://www.epa.gov/sites/default/files/2018-05/documents/meadowbrook_2018.pdf.
[73] *Id.* at 6.

While the Applicant does not intend to connect Black Rock to any existing geothermal plants,[74] Rule 207 does not require that the two facilities be physically connected to qualify as a single stationary source. For example, the EPA determined that two independent facilities (power plant and coal mine) can be considered part of the same source when they are located on adjacent properties and are under common control.[75] Although the PSD regulations have been amended since the 1980 source determination to add the requirement that the pollutant emission activities belong to the same industrial grouping, the analysis remains the same. That is, the key inquiry is whether the independent facilities are under common control.

With respect to the power or authority to dictate decisions, the EPA explained in the April 2018 *Meadowbrook* letter:

> Control exists when one entity has the power or authority to restrict another entity's choices and effectively dictate a specific outcome, such that the controlled entity lacks autonomy to choose a different course of action. This power and authority could be exercised through various mechanisms, including common ownership or managerial authority (the chain of command within a corporate structure, including parent/subsidiary relationships), contractual obligations (e.g., where a contract gives one entity the authority to direct specific activities of another entity), and other forms of control where, although not specifically delineated by corporate structure or contract, one entity nonetheless has the ability to effectively direct the specific actions of another entity.. Thus, control can be established: (1) when one entity has the power to command the actions of another entity (e.g., Entity A expressly directs Entity B to "do X"); or (2) when one entity's actions effectively dictate the actions of another entity (e.g., Entity A's actions force Entity B to do X, and Entity B cannot do anything other than X). … Ultimately, the focus is not on *how* control is established (through ownership, contract, or otherwise), but on *whether* control is established – that is, whether one entity can expressly or effectively force another entity to take a specific course of action, which the other entity cannot avoid through its own independent decision-making.[76]

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[74] TN 253375, CURE Data Response Set 1 (Responses to Data Requests 1 to 99) (Nov. 29, 2023) p. 2, *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=253375&DocumentContentId=88594. .

[75] Memorandum to Director, Division of Stationary Source Enforcement from Allyn David, Director, Air Hazardous Materials Division re: PSD Applicability Determination (Apr. 24, 1980), *available at* https://www.epa.gov/sites/default/files/2015-07/documents/19800424.pdf.

[76] Meadowbrook Letter at pp. 6-7.

Black Rock is owned by Black Rock Geothermal, LLC, an indirect, wholly owned subsidiary of BHE Renewables, LLC ("BHER").[77] The Region 2 facilities are owned by BHER.[78] "Operating as CalEnergy, [BHER] owns 10 geothermal facilities in California's Imperial Valley with a total net capacity of 345 megawatts."[79] BHER is a wholly owned subsidiary of Berkshire Hathaway Energy Company.[80] BHER and Berkshire Hathaway Energy Company are subsidiaries of Berkshire Hathaway, Inc.[81]

The permit record does not adequately demonstrate the ownership and management structures of these two facilities. Elmore North and the Region 2 facilities are undoubtedly owned by BHER and presumably will be operated by the same operating entity, CalEnergy, as is the case for all other BHER owned geothermal power plants in the area. The Air District must assess whether there is common control over these facilities, requiring them to be permitted as a single source.

C. Black Rock, Vulcan, and Hoch (Del Ranch) Belong to the Same Industrial Grouping

Under the third factor, the Air District must determine whether the facilities belong to the same industrial group. The EPA has interpreted the phrase "same industrial grouping" to refer to the same Major Group, two-digit SIC code.[82] There

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[77] BRGP AFC, p.1.
[78] TN 250040, Black Rock Geothermal Project Resource Adequacy Report (May 8, 2023), p. v & 1-1, *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=250040&DocumentContentId=84758 ("The BHER portion of the field is divided into four operating geothermal power facilities: Region 1 (comprising Units 1 to 5), *Region 2 (comprising the Vulcan, Hoch* and Turbo-expander plants), Elmore, and Leathers. The existing BHER facilities are comprised of 10 power plants with a combined generating capacity of approximately 345 MW net."); *see also* AQP Application Appendix 5.1C, p. 1-1.
[79] BHE Renewables, Just the Facts (Apr. 2023) p. 2, *available at* https://www.brkenergy.com/content/published/api/v1.1/assets/CONT753EAC8FF076422DAC98F4A5F3341FEF/native?cb=_cache_a478&channelToken=43656b04884643bc9fe334ad550d375f&download=true.
[80] TN 23-ERDD-01, Response from BHE Renewables to Request for Information (Sept. 15, 2023) p. 1, *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=252279&DocumentContentId=87287.
[81] Berkshire Hathaway, Inc., Form 10-K (Dec. 31, 2023) Ex. 21, *available at* https://www.sec.gov/Archives/edgar/data/0001067983/000095017024019719/brka-ex21.htm; *see also* Berkshire Hathaway Energy, 2019 EEI Financial Conference (Nov. 2019) p. 5, *available at* https://www.sec.gov/Archives/edgar/data/1098296/000108131619000019/eei2019.htm.
[82] U.S. EPA, Interpreting "Adjacent" for New Source Review and Title V Source Determinations in All Industries Other Than Oil and Gas (Nov. 26, 2019), p.3, *available at* https://www.epa.gov/sites/default/files/2019-12/documents/adjacent_guidance.pdf.

can be no reasonable dispute that the Black Rock and the Region 2 facilities belong to the same industrial group because they share the same two digit SIC code– Major Group 49: Electric, Gas, and Sanitary Services.[83] "This major group includes establishments engaged in the generation, transmission, and/or distribution of electricity or gas or steam."[84] Black Rock and the Region 2 facilities are geothermal electric power generation facilities that provide electricity to the electric transmission and distribution systems. The Air District must conclude that the facilities satisfy the third factor.

VI. THE PROJECT WILL CAUSE OR CONTRIBUTE TO A VIOLATION OF AMBIENT AIR QUALITY STANDARDS

Rule 207 establishes the preconstruction review requirements for new stationary sources to ensure that the operation of such sources does not interfere with the attainment or maintenance of AAQS. Section C.5.b of Rule 207 prohibits emissions from a new emission unit from causing or worsening a violation of an AAQS. Section F.1 similarly states that "[i]n case shall emissions from a new emissions unit cause or make worse the violation of an AAQS.[85] The Applicant cannot demonstrate compliance with this requirement because the air quality modeling suffers from critical defects. In addition, the Air District fails to account for the more stringent NAAQS for $PM_{2.5}$ which were recently adopted and will be effective before the permitting process concludes.

A. The Project Would Cause or Contribute to a Violation of Newly Revised NAAQS for Annual $PM_{2.5}$

Section C.5.b.1 of Rule 207 prohibits emission from new sources from causing or worsening a violation of AAQS. On March 6, 2024, the EPA published a final rule to strengthen the NAAQS for $PM_{2.5}$.[86] EPA revised the level of primary (health-based) annual PM2.5 from 12.0 $\mu g/m^3$ to 9.0 $\mu g/m^3$, based on scientific evidence that shows the current standard does not protect public health with an adequate margin of safety, as required by the Clean Air Act.[87] Based on 2020-2022

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[83] *See* AQP Application Appendix 5-1 (Phase I Environmental Site Assessment), p. 358 (demonstrating Hoch's SIC code) & 419 (demonstrating Vulcan's SIC code); U.S. Department of Labor, Occupational Safety and Health Administration, SIC Manual, Major Group 49: Electric, Gas, and Sanitary Services, https://www.osha.gov/data/sic-manual/major-group-49 (last visited Mar. 4, 2024).
[84] *Ibid.*
[85] Rule 207.F.1.
[86] 89 Fed. Reg. 16202-406 (Mar. 6, 2024), *available at* https://www.govinfo.gov/content/pkg/FR-2024-03-06/pdf/2024-02637.pdf.
[87] 89 Fed. Reg. 16204-05.

data, Imperial County does not meet the revised annual primary $PM_{2.5}$ standard of 9.0 µg/m^3.[88]

Generally, applications received by the Air District are only subject to the new source review requirements in effect at the time the application is deemed completed. However, Rule 207 contains an exception. Section A.2.b. requires that more stringent federal requirements not yet incorporated into Rule 207 apply to the new or modified stationary source.

The effective date for the new NAAQS for annual $PM_{2.5}$ is 60 days following publication of the notice of final rulemaking in the Federal Register. Since the EPA published the new rule on March 6, 2024, the more stringent federal requirements become effective on May 6, 2024. Therefore, the Air District must determine whether the proposed Project will cause or contribute to an exceedance of the new standard.

The PDOC states that the Project's total maximum and background concentration of $PM_{2.5}$ is 8.90 µg/m^3.[89] However, as discussed in Section X, the Air District's failure to include nearby sources (both existing and proposed) in the air quality model results in a significant underestimation of $PM_{2.5}$ emissions. When these sources are included, $PM_{2.5}$ would exceed the 9.0 µg/m^3 threshold. Therefore, the proposed Project would cause or contribute to a violation of the more stringent NAAQS. The Air District cannot issue a PDOC until the Applicant demonstrates that the Project complies with the revised annual $PM_{2.5}$ standard.

B. The Project Would Cause or Contribute to a Violation of CAAQS and NAAQS for PM_{10} and $PM_{2.5}$

Dr. Shukla's analysis demonstrates if the Air District used the appropriate monitoring site, the Project would cause or contribute to a violation of AAQS for particulate matter. First, with respect to PM_{10}, Dr. Shukla finds that if the Sonny Bono background concentration and meteorology from the most recent year of 2022 is considered (49.65 µg/m^3), **the total maximum hourly concentration of PM_{10} would exceed the NAAQS standard of 150 µg/m^3.**[90] Further, Dr. Shukla casts doubt on the PDOC's finding that the facility's projected maximum impacts for 24-

[88] U.S. Environmental Protection Agency, Fine Particle Concentrations for Counties with Monitors Based on Air Quality Data from 2020-2022 (Feb. 2022) p. 1, *available at* https://www.epa.gov/system/files/documents/2024-02/table_annual-pm25-county-design-values-2020-2022-for-web.pdf.
[89] PDOC, p. 28.
[90] Shukla Comments, p. 24.

hour and annual PM_{10} concentrations would be below the SILs and would not significantly contribute to current exceedances of the PM_{10} CAAQS.[91] Dr. Shukla states: "Contrary to this claim, the emissions from the plant, and potentially from two nearby facilities operated by the same applicant, could substantially add to PM_{10} levels in the atmosphere, exacerbating existing exceedances."[92]

Second, with respect to $PM_{2.5}$, Dr. Shukla finds that reliance on monitoring stations such as Niland and Brawley, rather than the more representative Sonny Bono station, introduces uncertainties into the assessment of $PM_{2.5}$ concentrations.[93] The Sonny Bono station consistently records higher $PM_{2.5}$ concentrations, indicating a significant contribution to the background pollution load.[94]

The Air District cannot issue a PDOC until the Applicant demonstrates that the Project complies with the NAAQS and CAAQS for particulate matter (PM_{10} and $PM_{2.5}$) when the proper monitoring site is used. The Air District must also identify additional best available control technologies to further reduce particulate matter emissions and quantify the additional particulate reductions achieved with those additional measures before it can issue a PDOC.

C. The Project Would Cause or Contribute to a Violation of CAAQS for Hydrogen Sulfide

Section C.5.b.1 of Rule 207 prohibits emission from new sources from causing or worsening a violation of AAQS. The current CAAQS standard for hydrogen sulfide ("H_2S") is 0.03 parts per million (42 $\mu g/m^3$). With implementation of BACT, the Project is estimated to emit a maximum concentration of 25.2 $\mu g/m^3$.[95] **Dr. Shukla calculated that "when added to the background H_2S, the total concentration reaches 55.2 $\mu g/m^3$, significantly surpassing the standard."[96]**

The proposed Project is a significant source of H_2S emissions. The PDOC analyzes H_2S based on the worst-case subsequent year of operation.[97] The proposed Project exceeds the emission threshold of 100 pounds per day for H_2S thus

[91] *Id.* at 25.
[92] *Ibid.*
[93] *Id.* at 24.
[94] *Ibid.*
[95] *Id.* at 28.
[96] Shukla Comments, p.31.
[97] PDOC, p. 15.

triggering public notice requirement.[98] The proposed Project also exceeds the BACT threshold of potential to emit equal to or greater than 55 pounds per day.[99] And yet, while the PDOC determined background concentrations for all other criteria pollutants (albeit inconsistent with the *Guidelines* as discussed in Section IV.A.2.), the Air District did not identify any background concentration for H_2S.[100] This is a significant omission given the number of nearby sources that also emit large quantities of H_2S, in addition high concentrations of H_2S naturally occurring in the area.[101] While monitoring data for this pollutant is not readily available, that does not excuse the Air District from determining whether the proposed Project would cause or contribute to an exceedance of the CAAQS standard.

In 2010, the Air District utilized a background concentration of 36.7 $\mu g/m^3$ based on an average hourly concentration that was captured by the Niland monitoring station from 1993-1994.[102] Dr. Shukla's findings show that, if background concentrations for H_2S are considered as part of the air quality impact analysis, the Project would likely cause or contribute to an CAAQS violation.[103] The Air District cannot issue a PDOC until the Applicant demonstrates that the Project complies with the CAAQS for H_2S when background concentrations are included.

D. The Measures Proposed to Reduce Hydrogen Sulfide Emissions Does Not Meet the BACT Requirement for This Project

Dr. Shukla highlights several deficiencies in the BACT proposed to reduce the Project's H_2S emissions. Firstly, while the use of the oxidizing biocide process (BIOX) in the cooling tower basin may help mitigate H_2S emissions to some extent, it is deemed less efficient and effective compared to dedicated H_2S scrubbers or other advanced abatement technologies.[104]

Moreover, the reliance on naturally occurring bacteria in the OxBox for H_2S abatement from condensate is identified as risky and unreliable by Dr. Shukla.[105] This method's efficiency can vary significantly based on environmental factors, posing uncertainties regarding its ability to consistently meet emission control

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[98] *Id*. at 24.
[99] *Ibid.*
[100] PDOC, p. 28.
[101] Shukla Comments, p. 32.
[102] TN 58474, Revised Air Pollution Control District Determination of Compliance (Sept. 15, 2010) p. 20, *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=58474&DocumentContentId=50349.
[103] Shukla Comments, p.31.
[104] Shukla Comments, p. 10.
[105] *Ibid.*

requirements.[106] This is exacerbated by the lack of backup or redundancy measures in case these systems fail.[107]

Furthermore, the PDOC fails to provide crucial information regarding H_2S emissions, such as specific numerical limits from applicable regulations and standards.[108] Without this information, it is impossible to conduct a comprehensive assessment of emissions and evaluate the project's compliance with regulatory requirements. Additionally, the absence of a clear discussion on the frequency and methodology of monitoring for both particulate and H_2S emissions further compounds the uncertainty surrounding the project's environmental impact and regulatory compliance.[109]

Dr. Shukla's analysis also highlights the outdated and ambiguous nature of the BACT analysis for H_2S. Specifically, the PDOC relies on a BACT analysis from 2017 for a different facility, thereby failing to account for the specific BACT needs of the proposed Project or advancements in emission control technologies since that time.[110] Furthermore, the PDOC lacks a detailed description of the proposed BACT technologies and their alignment with the latest industry standards.[111] Dr. Shukla finds that a "thorough analysis of the proposed sparger system and biological oxidation box should be conducted, considering their effectiveness, reliability, and potential limitations" before the PDOC can be issued.[112]

Ultimately, Dr. Shukla's analysis indicates that the PDOC's proposed BACT may be insufficient to reduce H_2S emissions. The Air District must consider additional feasible BACT measures to reduce H_2S emissions before the PDOC can be issued.

E. There Is Insufficient Evidence That Post-Mitigation Measures Proposed Will Reduce Particulate Matter and H_2S Emissions

The air quality permit application asserts that "[p]articulate emissions from the cooling towers will be minimized by maintaining the TDS concentration in the circulating water and by controlling cooling tower drift losses to not more than 0.0005% of the total circulation rate. Particulate emissions from the filter cake handling equipment will be controlled by minimizing handling and keeping the filter

[106] *Ibid.*
[107] *Ibid.*
[108] *Ibid.*
[109] *Ibid.*
[110] *Id.* at 11.
[111] *Ibid.*
[112] *Ibid.*

cakes covered"[113] and that "concentrations of H_2S are present in non-condensable gas and condensate in the main condenser."[114] There is no evidence that these measures will sufficiently minimize particulate matter and H_2S emissions.[115]

The PDOC does not provide any details about the specific technologies or procedures in place to determine their efficacy.[116] The PDOC also lacks specific details regarding the particulate capture mechanisms and technologies.[117] As Dr. Shukla explains, "Merely minimizing handling of filter cakes and keeping them covered may not provide sufficient control over particulate emissions, especially considering the potential scale of operations at BRGP."[118] Ultimately, the PDOC must provide an accurate, comprehensive analysis and explanation as to how the proposed measures will reduce particulate matter and H_2S emissions to comply with Rule 207's requirement that the PDOC calculate "actual emissions" which most accurately represent the emission from the Project.

VII. THE AIR DISTRICT MUST INFORM THE COMMISSION THAT A PRELIMINARY DETERMINATION OF COMPLIANCE CANNOT BE ISSUED BECAUSE EMISSIONS FROM THE PROJECT EXCEED HEALTH RISK THRESHOLDS

AB 2588 requires facilities that are ranked as a high priority to submit a HRA to the Air District.[119] The HRA includes a comprehensive analysis of the dispersion of hazardous substances into the environment, the potential for human exposure, and a quantitative assessment of both individual and population-wide health risks associated with those levels of exposure.[120] The HRA must be consistent with the Risk Management Guidance for Stationary Sources of Air Toxics.[121]

The Applicant prepared an HRA following the Office of Environmental Health Hazard Assessment Risk Assessment Guidelines.[122] The HRA estimated

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[113] AQP Application, p. 2-27.
[114] *Ibid.*
[115] Shukla Comments, p. 9.
[116] *Ibid.*
[117] *Ibid.*
[118] *Ibid.*
[119] Health & Safety Code § 44340.
[120] California Air Resources Board, "Hot Spots" Risk Assessment, https://ww2.arb.ca.gov/our-work/programs/ab-2588-air-toxics-hot-spots/hot-spots-risk-assessment (last visited Mar. 22,2024).
[121] Health & Safety Code § 44340(a).
[122] AQP Application Appendix 5.9A, https://efiling.energy.ca.gov/GetDocument.aspx?tn=249762&DocumentContentId=84394; PDOC at p. 34.

risks of cancer, non-cancer chronic exposure, and non-cancer acute exposure based on AERMOD and HARP2 modeling.[123] As discussed below, the Applicant's own modeling demonstrate that the proposed Project's non-cancer acute health risk exceed the selected threshold despite likely underestimating the risks due to the use of nonrepresentative meteorological data.

A. The Project's TAC Emissions Exceed the Air District's Informal Threshold and SCAQMD Rule 1401 Threshold for Acute Non-Cancer Hazard Index

The Air District has not formally established health risk thresholds. However, based on the Air District's response to CARB and the California Air Pollution Control Officers Association ("CAPCOA"), the District identified the following permitting levels:[124]

- Best Available Control Technology for Toxics ("T-BACT") is triggered when the maximum individual cancer risk is greater than one in one million at any receptor location.
- The Air District will approve the permit only if all the following conditions are met:
    - The maximum individual cancer risk is less than one in one million at any receptor location if the permit unit is constructed without T-BACT *or* the maximum individual cancer risk is less than 10 in one million if the permit unit is constructed with T-BACT.
    - The total chronic hazard index is less than 1.0.
    - **The total acute hazard index is less than 1.0.**
    - The cancer burden is less than 0.5.

If any of one of these conditions is not met, the permit is denied.[125]

Because the Air District has not formally adopted thresholds, the Applicant analyzed health risks based on those established by South Coast Air Quality Management District ("SCAQMD").[126] SCAQMD has adopted the same thresholds

[123] PDOC at p. 34.
[124] California Air Resources Board and California Air Pollution Control Officers Association, Risk Management Guidance for Stationary Sources of Air Toxics (July 23, 2015) p. 45 ("TAC Stationary Source Guidance"), *available at* https://ww2.arb.ca.gov/sites/default/files/classic/toxics/rma/rmgssat.pdf.
[125] *Ibid*.
[126] AQP Application at p. 5.9-3; *see also* PDOC at p. 35.

as those communicated by the Air District to CARB and CAPCOA.[127] Under SCAQMD Rule 1401(d), the executive officer must deny the permit to construct a new, related or modified permit unit if emissions of any TACs occur, unless the applicant has substantiated all of the following:[128]

- The cumulative increase in MICR will not result in any of the following:[129]
  - An increased MICR greater than one in one million at any receptor location, if the permit unit is constructed without T-BACT;[130]
  - An increased MICR greater than ten in one million at any receptor location, if the permit is constructed with T-BACT;[131]
  - A cancer burden greater than 0.5.[132]
- The cumulative increase in total chronic HI for any target organ system due to total emission from the new, relocated or modified permit unit owned and operated by the applicant will not exceed 1.0 at any receptor.[133]
- **The cumulative increase in total acute HI for any target organ system due to total emissions from the new, relocated or modified permit unit owned and operated by the applicant will not exceed 1.0 at any receptor**.[134]

Here, the PDOC acknowledges that the proposed Project exceeds the thresholds for the maximally exposed individual worker and points of maximum impact for acute HI during routine operation of the cooling tower without startups and shutdowns, emergency generators, fire pump and HCl scrubber.[135] Specifically, the PDOC shows that the acute HI for the maximally exposed individual worker ("MEIW") is 1.66.[136] Because the hazard risks exceed the Air District's informal threshold and SCAMD adopted threshold, the Air District must inform the Commission that a PDOC cannot be issued.

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[127] TAC Stationary Source Guidance at p. 47; *see also* South Coast Air Quality Management District, Rule 1401. New Source Review of Toxi Air Contaminants (Sept. 1, 2017) (hereinafter "SCAQMD Rule 1401"), *available at* https://www.aqmd.gov/docs/default-source/rule-book/reg-xiv/rule-1401.pdf.
[128] SCAQMD Rule 1401(d).
[129] SCAQMD Rule 1401(d)(1).
[130] SCAQMD Rule 1401(d)(1)(A).
[131] SCAQMD Rule 1401(d)(1)(B).
[132] SCAQMD Rule 1401(d)(1)(C).
[133] SCAQMD Rule 1401(d)(2).
[134] SCAQMD Rule 1401(d)(3) (emphasis added).
[135] PDOC at p. 35.
[136] *Id.* at 36.

B. The HRA Is Flawed and Fails to Account for Radon Impacts

Dr. Shukla reviewed the AERMOD and HARP modeling files for the HRA and found that the health risk does not expressly quantify the risk from exposure to radon.[137] As Dr. Shukla notes, and the Applicant's air quality permit application confirms,[138] radon will be emitted from the proposed Project.[139]

Radon is a human carcinogen emitted from the cooling tower during normal operation, warm-up, and shutdown.[140] Radon, a colorless and odorless radioactive gas, poses significant health risks when inhaled. As it undergoes radioactive decay, radon releases solid particles that, when trapped in the lungs, emit alpha particles, increasing the risk of lung cancer), identified as the primary cause of lung cancer among non-smokers, contributes to approximately 21,000 lung cancer deaths annually, with a notable 2,900 cases occurring in non-smokers.[141] Despite the gravity of this issue, the PDOC lacks a thorough analysis of the specific health risks posed by radon emissions, including its potential carcinogenic impacts on human health.[142]

C. The HRA Modeling Fails to Use Representative Meteorological Data

Even though the Project's non-cancer hazard risks exceed applicable thresholds, the Project's health risks are significantly underestimated because of unrepresentative meteorological data. The PDOC relies on the same AERMOD model to estimate ambient air concentrations for the HRA as it did to determine compliance with AAQS.[143] As explained above, the Airport meteorological data utilized to model is not representative of the Project site. The HRA ignores the availability of data from the more representative Sonny Bono monitoring station just two miles away. The Air District's failure to accurately model the Project's health risks must be rectified before the Air District can issue a final PDOC.

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[137] *Ibid.*
[138] AQP Application, p. 5.1-17.
[139] Shukla Comments, p. 38.
[140] *Ibid.*
[141] U.S. Environmental Protection Agency, Health Risk of Radon (last updated Feb. 27, 2024), *available at* https://www.epa.gov/radon/health-risk-radon.
[142] Shukla Comments, p. 38.
[143] AQP Application, p. 5.9-4; PDOC, p. 34.

D. The HRA Fails to Include Emissions Estimates for All Hydrochloric Acid Tanks

The HRA must include emission estimates for all substances that are required to be quantified in the facility's emissions inventory report.[144] After submission of its initial air quality permit application to the Air District, the Applicant made a number of significant modifications to the project description, including a substantial increase in the amount of concentrated hydrochloric acid ("HCl") that would be used by the Project.[145] Specifically, the amount of HCl stored on site changed from one 1,250-gallon tank of <37% HCl to one 10,000-gallon tank of HCl (<37%) and one 300-gallon tank of dilute HCl (2.5%).[146] The Project anticipates using approximately 420,500 gallons of the <37% HCl and approximately 5,800,000 gallons of the 2.5% HCl.[147] An HCl scrubbing system will only be included on the concentrated HCl (<37%) tank.[148]

The PDOC incorrectly analyzes a 20,000-gallon HCl storage tank[149] and establishes an emission limit of 0.11 pounds per hour and 2.75 pounds per day.[150] The PDOC refers to a 20,000 HCl storage tank when the Revised Project Description states there will be *10,000*-gallon HCl (<37%) storage tank. The PDOC effectively establishes an emissions limit based on a tank twice the size than proposed for this Project. This error results in a violation of Section B of Rule 207 because it fails to report actual emissions from an Emissions Unit.[151]

The PDOC also fails to analyze emissions from the smaller 300-gallon HCl tank. Both Elmore North Geothermal Project and Morton Bay Geothermal Project include smaller diluted HCl tanks with scrubbing systems.[152] However, neither the

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[144] Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program: Risk Assessment Guidelines (Feb. 2015) p. 4-6, *available at* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.
[145] TN 253189, Black Rock Geothermal Project Revised General Arrangement Refinement (Nov. 17, 2023) p. 1 (hereinafter "Revised Project Description"), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=253189&DocumentContentId=88394.
[146] *Ibid.*
[147] *Id.* at 20.
[148] *Id.* at 1.
[149] *See* PDOC, p. 7 & p.49.
[150] PDOC, p. 40.
[151] ICAPCD Rule 207(B).
[152] *See* TN 253187, Elmore North Revised General Arrangement Refinement (Nov. 17, 2023) p. 1, *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=253187&DocumentContentId=88396; TN 253188, Morton Bay Revised General Arrangement Refinement (Nov. 17, 2023) p.1,

Applicant, nor the Air District analyzes emissions from the smaller tank. Nor do they explain why the smaller tank does not include a scrubbing system.[153] The smaller tank is an emission unit that must be analyzed in the PDOC. The Air District fails to justify its omission. Failure to analyze emissions from the additional HCl tank results in a further violation of Rule 207(B)'s requirement to accurately represent the emissions from an Emissions Unit.

As explained by Dr. Shukla, "HCl presents potential health risks, primarily through inhalation, skin contact, and ingestion, with symptoms including respiratory and gastrointestinal irritation, eye and skin problems. While HCl itself is not typically considered a carcinogen, prolonged exposure to its corrosive nature and potential interaction with other hazardous substances may contribute to overall health risks, including the potential for cancer. Workers in industrial settings may face increased occupational exposure risks. Proper safety measures, including the use of protective equipment and adherence to regulations, are crucial in mitigating these risks. A thorough risk assessment, considering concentration, duration, and specific work conditions, is recommended to address potential health impacts comprehensively."[154] The Air District's failure to analyze TAC emissions from the smaller tank and establish an emission limitation for that source must be rectified before the Air District can issue a final PDOC.

VIII. THE PROPOSED CONDITIONS ARE NOT ADEQUATE

The PDOC includes a condition which establishes a facility-wide emissions and throughput limit for HCl scrubber and tank operation.[155] The throughput limit is set at 52,560,000 gallons per year.[156] This throughput far exceeds the anticipated annual quantities for HCl. As stated in the revised project description, the Project is estimated to use approximately 420,500 gallons per year of HCl <37%.[157] Therefore, the throughput limit is 125 times greater than estimated usage rates.

The throughput also far exceeds the anticipated annual quantity of HCl 2.5%. As stated in the revised project description, the Project is estimated to use approximately 5,800,000 gallons of diluted HCl.[158] Therefore, the throughput limit is almost 9 times greater than estimated usage rate for diluted HCl. Condition B.9

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available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=253188&DocumentContentId=88397.
[153] Shukla Comments, p. 12.
[154] *Id.* at 13.
[155] PDOC, p. 40.
[156] *Ibid.*
[157] Revised Project Description, p. 20.
[158] *Ibid.*

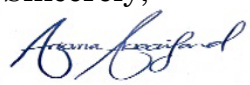
must be revised to accurately set a throughput limit consistent with anticipated operations, which considers all HCl tanks.

IX. CONCLUSION

For the reasons stated above, the Air District should inform the California Energy Commission that it cannot issue a PDOC and must revise the analysis to correct the numerous errors and omissions and recirculate a revised PDOC for public review and comment.

Thank you for your consideration of these comments.

Sincerely,



Ariana Abedifard
Andrew J. Graf
Kelilah D. Federman

Attachment
AA:acp

EXHIBIT A

GROUP DELTA

Adams Broadwell Joseph Cardozo
601 Gateway Blvd. Suite 1000
South San Francisco, CA 94080

March 21, 2024

Attention: **Ms. Ariana Abedifard**

Subject: Comment Letter Black Rock Geothermal Project Preliminary Determination of Compliance (PDOC)

Dear Ms. Abedifard:

In compliance with the request from Adams Broadwell Joseph & Cardozo (ABJC), Dr. Komal Shukla (Shukla) has undertaken a comprehensive review of the materials associated with the referenced project.

It is imperative to clarify that Dr. Shukla's review does not serve as an endorsement of the conclusions or content presented in the documentation. The absence of specific comments on certain aspects should not be interpreted as approval of those elements. Rather, Dr. Shukla's assessment aims to provide an objective evaluation of the potential environmental impacts associated with the proposed project. Through this process, Dr. Shukla aims to inform decision-makers about the potential environmental effects that may arise from the implementation of the proposed project.

Project Description:

The Black Rock Geothermal Plant (BRGP) is planned to be established on a 50-acre tract of land situated in Imperial County, east of the Salton Sea (Figure 1). This comprehensive project will encompass a geothermal resource production facility, a geothermal-powered power generation facility, and various ancillary structures.

The resource production facility will feature geothermal production and injection wells, pipelines, fluid and steam handling infrastructure, a solid handling system, a Class II surface impoundment, a service water pond, a retention basin, process injection pumps, and steam polishing equipment. Meanwhile, the power generation facility will house a triple-pressure condensing turbine/generator set, surface condensers, a non-condensable gas (NCG) removal system, a heat rejection system, a generator step-up transformer (230-kilovolt substation), and power distribution centers. Additionally, both facilities will be shared by a control building, service water pond, and other secondary support amenities.

An anticipated net output of approximately 77 MW is expected from the BRGP, tapping into the geothermal brine reservoir beneath the Salton Sea Known Geothermal Resource Area, where temperatures exceed 500 degrees Fahrenheit. Five production wells will extract geothermal fluid, which will be conveyed via aboveground pipelines to the adjacent steam handling system. Here, the fluid will undergo separation from the steam phase to yield high-pressure steam. Subsequently, the remaining fluid will undergo flashing at lower pressures to generate standard-pressure and low-pressure steam for the turbine.

To ensure optimal performance and sustainable injection into the reservoir, the geothermal fluid will undergo solids precipitation and clarification processes. Different injection wells will handle various fluid types, including spent geothermal fluid, aerated geothermal fluid from the impoundment, and condensate from the cooling tower. Mixing these fluids must be carefully managed to prevent scaling and excess precipitation risks. Steam from the resource production facility will power a triple condensing steam turbine after impurities are removed. The resulting condensed steam will serve as cooling tower makeup water, while the NCG will be extracted using a gas removal system. Extracted NCG will undergo hydrogen sulfide (H2S) abatement using an oxidizing biocide process (BIOX) in the cooling tower basin. Electricity generated by the BRGP will be transmitted to an onsite substation in the northeast region, from where it will be conveyed to a new Imperial Irrigation District (IID) switching station via a short interconnection transmission (gen-tie) line.

Resource Production Facility:

- Production wells extract geothermal fluid.
- Injection wells return spent geothermal fluid to the reservoir.
- Equipment includes production warmup pipelines, high-pressure separators, and atmospheric flash tanks.
- Each production well has an average capacity of 1,626,000 pounds per hour.
- Fluid contains approximately 22.4% total dissolved solids (TDS) and 0.14% non-condensable gas (NCG).

Fluid/Steam Handling System:

- High-pressure separator separates production fluid, producing high-pressure steam.
- Remaining fluid flows to standard-pressure and low-pressure crystallizers.
- Crystallizers separate steam from fluid.
- Fluid flows to atmospheric flash tank before entering primary clarifier.
- Fluid clarification system includes primary and secondary clarifiers.

- Solids dewatering system removes solids from slurry.

Fluid Injection System:

- Spent geothermal fluid transferred to injection wells via pipelines.
- Seven injection wells drilled using directional drilling technology.
- Injection pumping system monitored remotely from control room.
- Injection fluid pipeline exits site, requiring a 50-foot right of way.
- Class II surface impoundment holds spent geothermal fluid and other fluids.

Power Generation Facility:

- Turbine generator system includes high-, standard-, and low-pressure steam entries.
- Triple-pressure condensing turbine/generator set has a maximum output of 87 MW gross (77 net MW).
- Heat rejection system includes shell-and-tube condenser and counterflow cooling tower.
- Cooling tower consists of nine cell units with 480-volt motor-driven fans.

Facility Support System:

- Includes yard tanks for various purposes, such as condensate storage and chemical holding.
- Emergency standby diesel generators provide backup power.
- Fire protection system includes electric and diesel-fueled fire water pumps.

Abatement Equipment:

- Cooling tower equipped with high-efficiency drift eliminators to control particulate matter emissions.
- Ox-Box and Sparger System utilized for hydrogen sulfide (H2S) abatement.
- Hydrochloric acid (HCl) scrubber onsite for vapor displacement control during tank loading.

Power Generation Operating Scenarios:

- Emissions sources include testing units, emergency generators, diesel fire water pump, and cooling tower.
- Potential operating scenarios: commissioning, startup, shutdown, flowback testing, and routine power generation operations.

- Emissions may include steam-related pollutants and HCl emissions during tank loading.

Facility Description and Location:

The project will occupy around 55 acres of a 160-acre plot within Imperial County, California, situated between McKendry Road to the north, Severe Road to the west, and Boyle Road to the east. The town of Niland lies approximately eight miles northeast, while Calipatria is approximately six miles southeast from the plant site, as indicated in Figure 1. The vicinity comprises actively cultivated fields and existing geothermal projects, such as the Vulcan Power Plant and Hoch (Del Ranch) Power Plant, collectively known as the Region 2 facilities, situated southeast of the site. The Sonny Bono National Wildlife Refuge headquarters is about 0.7 miles northeast of the project. A pre-construction rendering of the project site is depicted in Figure 2, and an architectural depiction is provided in Figure 3.

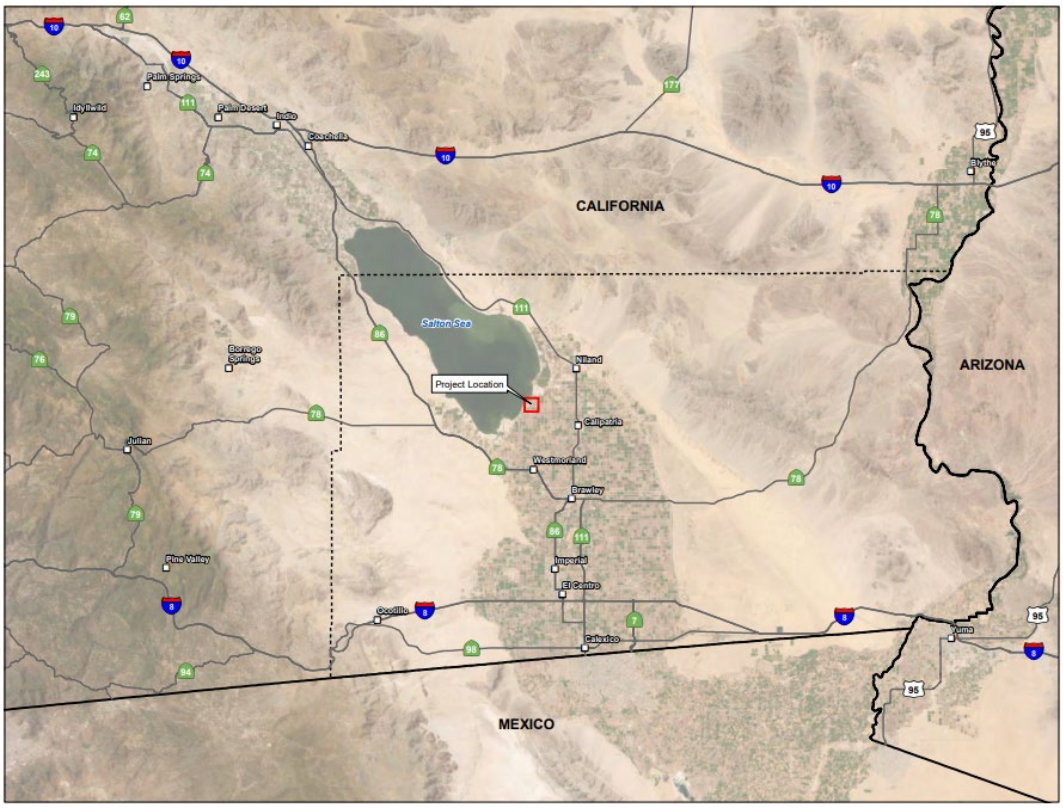


Figure 1: Project Vicinity Black Rock Geothermal Project (BRGP) Imperial County, California

The key project elements of the BRGP, along with their technical specifications, are summarized below:

- **Steam Turbine Generator System:** Includes a condensing turbine generator set with three steam entry pressures (high pressure, standard pressure, and low pressure).
- **Geothermal Fluid Processing Systems:** Comprises steam separation vessels, pipelines, and tanks for processing geothermal fluid.
- **Cooling Tower:** Consists of a seven-cell cooling tower for dissipating heat from the steam turbine generator system.
- **Interconnection to IID Elmore North Switching Station:** An approximately 2.2-mile aboveground generator tie-line connects BRGP to the proposed IID Elmore North switching station.
- **Wells and Well Pads:** Twelve wells on seven associated well pads, including five production wells on three well pads adjacent to the plant and seven injection wells on four well pads south of the plant.
- **Class II Surface Impoundment (Brine Pond):** Designed to receive aerated process fluid, geothermal fluid from overflow events, and geothermal fluid from partial draining of clarifiers during maintenance. Aerated fluid from the Brine Pond will be directed to a dedicated aerated fluid injection well.
- **Process Water Supply:** Supplied from IID via the Vail 4A Lateral Gate 459 or 460, with a secondary connection via Vail 4 Lateral Gate 417 or 418. Potable water supplied through a reverse osmosis system or equivalent, and/or delivered through commercial water service.
- **Construction Laydown Areas and Facilities:** Up to nine laydown and parking areas, two construction crew camps, and up to four borrow pits located throughout the region. Laydown and parking areas shared between BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project.

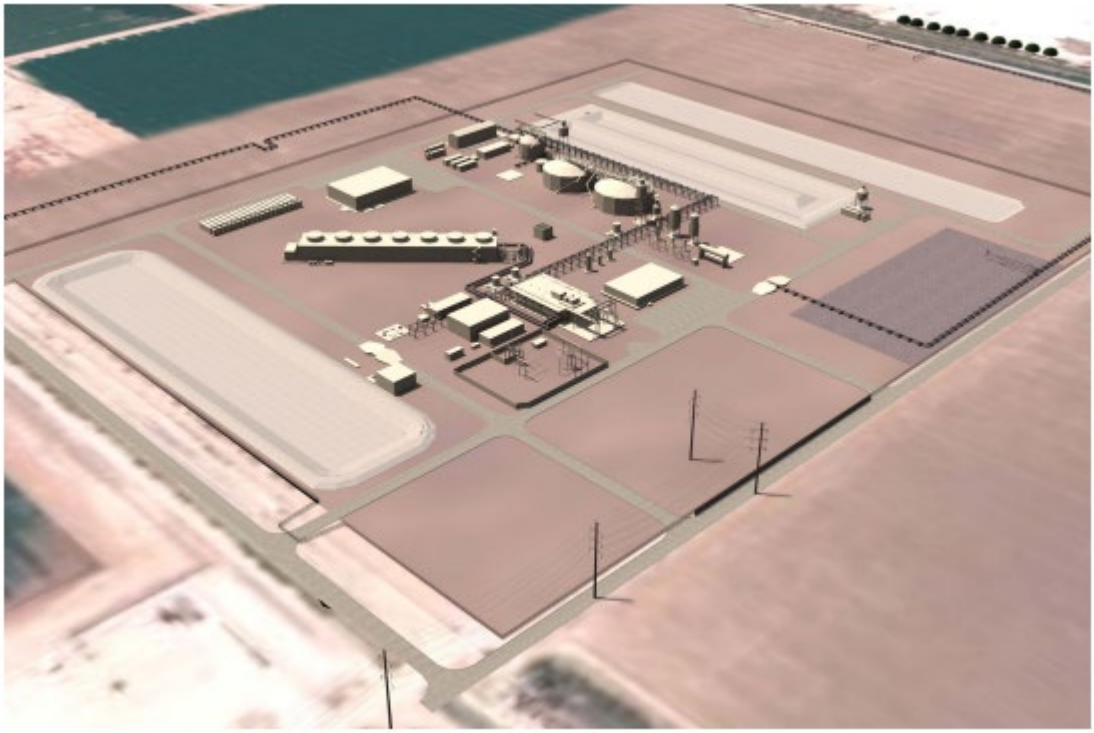


Figure 2: Architectural Rendering, Black Rock Geothermal Project Imperial County, California

Project Site Location and Current Air Quality Considerations

The proposed BRGP is located near the southern terminus of the Salton Sea, in proximity to Calipatria within Imperial County (see Figure 3). The surrounding land uses comprise existing geothermal power facilities, agricultural lands, and the Sonny Bono Salton Sea National Wildlife Refuge. Notably, the Imperial County Air Pollution Control District (ICAPCD or Air District) is classified as non-attainment for ozone concentrations under both the 8-hour Federal standard and the 1-hour and 8-hour California standards, along with non-attainment for PM_{10} based on the California standard.

Furthermore, the immediate vicinity of the Project Site has been identified as a disadvantaged community under Senate Bill 535 (refer to Figure 4). This designation mandates state investments aimed at improving public health, enhancing quality of life, and fostering economic opportunities within California's most burdened communities. Concurrently, it seeks to mitigate pollution contributing to climate change. The authorization for these investments stems from the California Global Warming Solutions Act of 2006 (Assembly Bill 32, Nunez, 2016). The introduction of additional air pollutants into an already impacted community will

disproportionately affect residents, underscoring the need for comprehensive evaluation and meticulous planning for the BRGP. (See Figures 3 for geographical references).

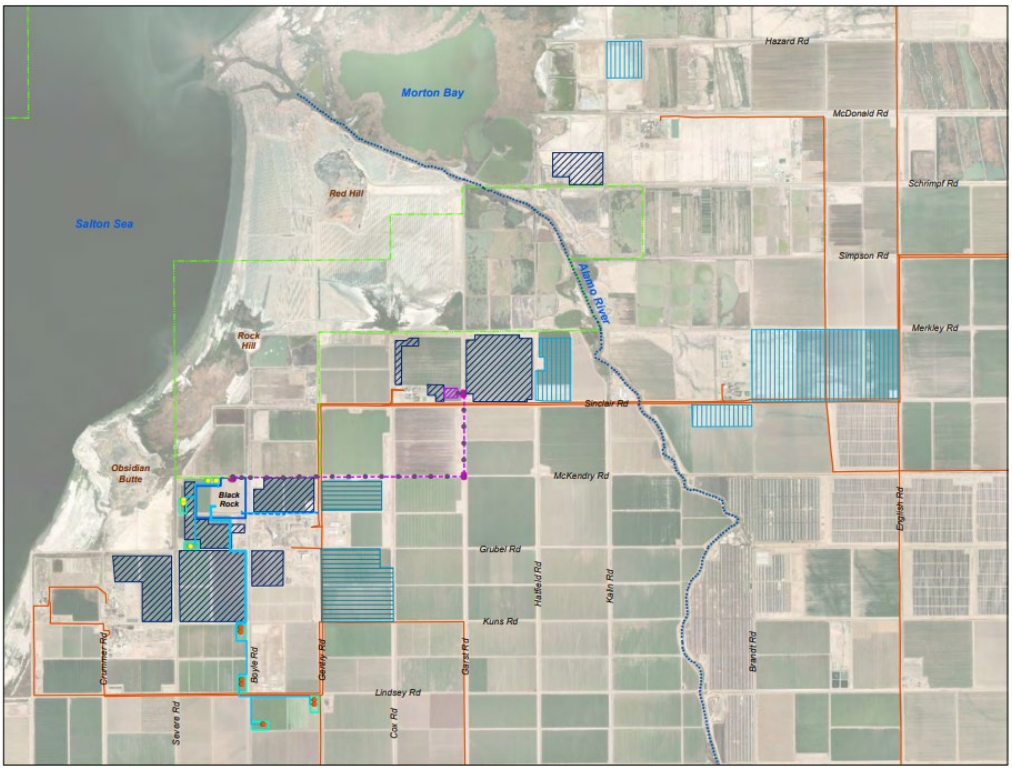


Figure 3: Project Location Black Rock Geothermal Project Imperial County, California

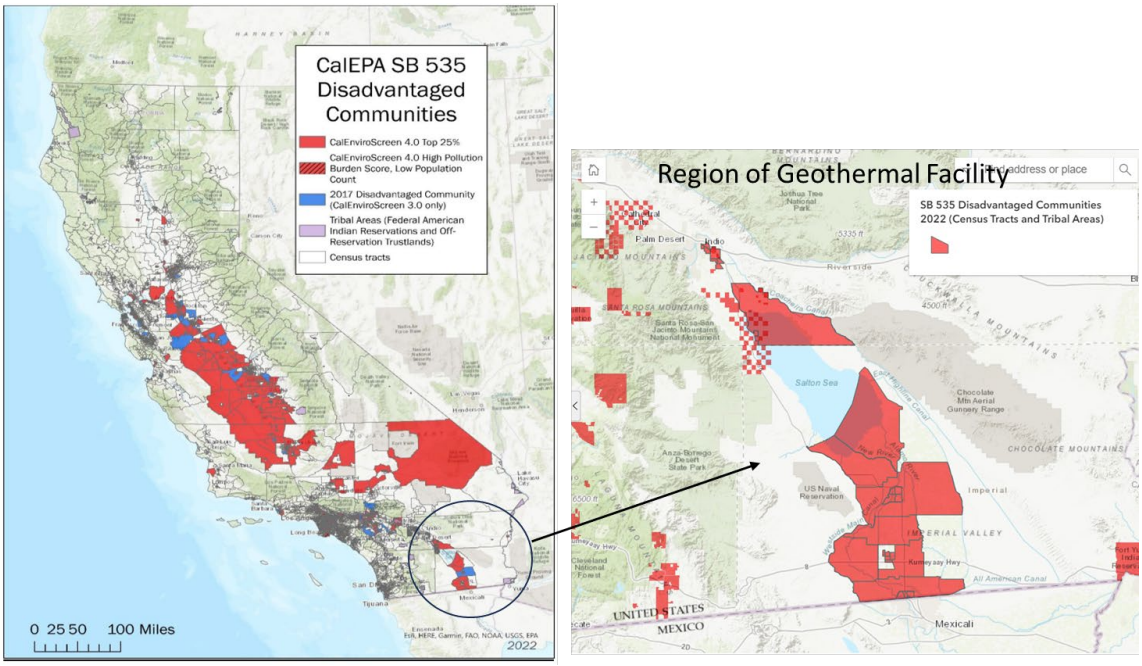


Figure 4: Disadvantaged Communities in California: A Geospatial Representation of Locations in Proximity to Geothermal Power Plants

The PDOC[1] lacks adherence to ICAPCD rules, particularly Rule 207 concerning new and modified stationary sources. This deficiency is evident in its omission of a comprehensive assessment of cumulative impacts resulting from Project emissions in conjunction with other proposed projects. Furthermore, the document inadequately analyzes the health risks associated with the release of radon into the community and neglects to evaluate emissions stemming from the storage of hydrogen chloride and the hydrogen chloride scrubbing system.

I. Inadequate Post-Mitigation Measures

According to the application's analysis, post-mitigation measures would result in the Project exhibiting less than significant impacts on air quality and public health.

In this context, the air quality permit application[2] states that "*During normal operating condition, the BRGP is predicted to generate a minimal amount of*

[1] TN 254543, Docket Number 23-AFC-03, Preliminary Determination of Compliance (PDOC) Black Rock (February 16, 2024) (hereinafter "PDOC"), available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=254543&DocumentContentId=89960.

[2] Jacobs, Black Rock Geothermal Project Air Quality Permit Application Part 1, Docket Number 23-AFC-03 (May 4, 2023), available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=250003-2&DocumentContentId=84732 (hereinafter "AQP Application").

particulate emissions. Particulate emissions from the cooling towers will be minimized by maintaining the TDS concentration in the circulating water and by controlling cooling tower drift losses to not more than 0.0005% of the total circulation rate. Particulate emissions from the filter cake handling equipment will be controlled by minimizing handling and keeping the filter cakes covered"[3] and that "*concentrations of H_2S are present in non-condensable gas and condensate in the main condenser.*"[4] The conclusion that the emissions will be minimized through these measures is unsupported for the following reasons:

- The document briefly addresses control measures for filter cake handling equipment but lacks details on the specific technologies or procedures in place. Additional information on these controls is necessary to determine their efficacy.
- While it is mentioned that particulate emissions will be minimized by maintaining Total Dissolved Solids (TDS) concentration in circulating water and controlling cooling tower drift losses, these measures alone may not adequately address particulate emissions.
- There is a lack of specific details on particulate capture mechanisms and technologies. Merely minimizing handling of filter cakes and keeping them covered may not provide sufficient control over particulate emissions, especially considering the potential scale of operations at BRGP.

II. Proposed Implementation of BACT is Inadequate

The Project is situated within an area designated by the U.S. Environmental Protection Agency as nonattainment for ozone and by the California Air Resources Board as nonattainment for ozone and particulate matter with a diameter less than 10 microns (PM_{10}). The application asserts that potential air quality impacts of the Project will be effectively mitigated through the implementation of best available control technology (BACT) specifically designed for managing hydrogen sulfide (H_2S) emissions arising from geothermal processes and addressing particulate matter emissions stemming from cooling tower operations.

A. Insufficient BACT Proposed for Hydrogen Sulfide Emissions

[3] *Ibid. P. 57*
[4] *Ibid. P. 57*

Our analysis identified the following deficiencies in the BACT proposed for Hydrogen Sulfide (H_2S):

- The method described for H_2S abatement using the oxidizing biocide process (BIOX) in the cooling tower basin is concerning. While BIOX may help mitigate H_2S emissions to some extent, it is typically less efficient and effective compared to dedicated H_2S scrubbers or other advanced abatement technologies.

- Relying on naturally occurring bacteria in the OxBox for H_2S abatement from condensate seems risky and unreliable. The efficiency of this method can vary significantly based on environmental factors and may not guarantee compliance with emissions limits. Moreover, there is no mention of backup or redundancy measures in case these systems fail to meet emission control requirements.

- The PDOC refers to a compliance limit for H_2S emissions, but the document does not specify the actual numerical limit or reference the applicable regulations or standards. This information is crucial for a comprehensive assessment of emissions.

- The document does not elaborate on the frequency and methodology of monitoring for both particulate and H_2S emissions. A robust monitoring plan is essential for ensuring ongoing compliance and addressing potential variations over time.

- The PDOC lacks a clear discussion of r applicable emissions standards. To ensure transparency and accountability, the Air District should include specific references to relevant environmental regulations or standards governing particulate and H_2S emissions. This would allow for a clear understanding of the regulatory framework governing the project.

According to the applicant's statement, project operations will not lead to emissions surpassing the ICAPCD Rule 207(B) "major stationary source" thresholds. Additionally, the facility is expected to stay within the limits defined by Rule 207(C)(2)(a) offset threshold values. The applicant asserts their commitment to implementing Best Available Control Technology (BACT) specifically targeting particulate matter and hydrogen sulfide (H_2S). But our review indicates that the PDOC's proposed BACT may be insufficient to reduce H_2S emissions.

B. Outdated and Ambiguous BACT Analysis for H_2S

The air quality permit application part-1 states that "*ICAPCD approved a BACT analysis for a similar facility in 2017. This approved BACT analysis utilized a sparger system for H2S removal from the gas stream and a biological oxidation box...*"[5]

Relying on a BACT analysis from 2017 for a different facility does not fully account for the specific BACT needs of this facility or advancements in emission control technologies since that time. The PDOC's reliance on a 2017 BACT analysis does not demonstrate that the most effective and current BACT measures will be applied to this facility. It is essential to conduct an updated analysis considering the latest available technologies and the specific characteristics of the proposed project.

The application also states, *"The proposed Project would use up-to-date technologies and the H_2S control system is typical in geothermal power plant designs that have been permitted in other air districts and in other states.*"[6]

The statement that the proposed Project would use up-to-date technologies lacks requisite specificity. The Air District must provide a detailed description of the technologies and their alignment with the latest industry standards to validate this claim. In particular, a thorough analysis of the proposed sparger system and biological oxidation box should be conducted, considering their effectiveness, reliability, and potential limitations. Additionally, alternative technologies or control measures must be explored and compared to the currently proposed BACT measures to ensure the selected system represents the best available control technology options.

III. Deficiencies in Assessing Potential TAC Emissions from HCl Source

The BRGP incorporates a 10,000-gallon hydrochloric acid (HCl) storage tank and dosing system, along with an additional HCl storage tank accompanied by a scrubber on-site.[7] The scrubber operates during tank loading operations to manage vapor displacement during filling, anticipated for 8,760 hours annually. The PDOC erroneously focuses on the analysis of a 20,000-gallon HCl storage tank, setting emissions limits at 0.11 pounds per hour and 2.75 pounds per day. It is being quantified under O&M emissions in the Table 1 consists of emissions from HCl scrubber (operation annual emissions).[8] The Revised General Arrangement

[5] AQP Application, P. 122
[6] *Ibid P. 122*
[7] TN 253192, Docket Number 23-AFC-03, Jacobs, Revised General Arrangement Refinement (Nov. 17, 2023), available at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=23-AFC-03.
[8] PDOC Table 6 Summary – Project Operational Annual Emissions, p. 22.

Refinement provides that the Project Description is modified to "change amount of HCl stored on site from 1,250 gallons of 37% HCl to one, 300-gallon tank of dilute HCl (2.5%) and one, 10,000-gallon tank of concentrated HCl (<37%). HCl scrubbing system included on concentrated HCL (<37%) tank."[9]

Neither the Applicant nor the Air District address TAC emissions from the smaller HCl storage tank as it is not identified as in the equipment/source list in the PDOC. Nor does the PDOC analyze the scrubbing system needed for the smaller HCl tank given that both Elmore North Geothermal Project and Morton Bay Geothermal Project's smaller diluted HCl tanks require a scrubbing system. The absence of TAC emissions analysis and an established emission limitation for the smaller tank result in unsupported compliance findings and require additional analysis from both the Applicant and the Air District before the issuance of a final DOC.

Table 6. Summary – Project Operation Annual Emissions

Pollutant	First Year Annual Emissions (tpy) [c]				Subsequent Year Annual Emissions with Startups, Shutdowns, & Emission Control Downtime (tpy)				Subsequent Year Annual Emissions without Startups, Shutdowns, & Emission Control Downtime (tpy)			
	Steam System [a]	Fire Pump	Emergency Generators [b]	O&M [d]	Steam System [a]	Fire Pump	Emergency Generators [b]	O&M [d]	Steam System [a]	Fire Pump	Emergency Generators [b]	O&M [d]
NO_x	--	0.04	0.36	1.28	--	0.04	0.36	1.28	--	0.04	0.36	1.28
CO	--	0.01	1.88	4.84	--	0.01	1.88	4.84	--	0.01	1.88	4.84
VOC	2.04	<0.01	0.10	0.15	2.42	<0.01	0.10	0.15	2.52	<0.01	0.10	0.15
PM_{10}	4.51	<0.01	0.02	0.08	8.20	<0.01	0.02	0.08	9.36	<0.01	0.02	0.08
$PM_{2.5}$	2.70	<0.01	0.02	0.04	4.92	<0.01	0.02	0.04	5.62	<0.01	0.02	0.04
SO_x	--	<0.01	<0.01	0.01	--	<0.01	<0.01	0.01	--	<0.01	<0.01	0.01
H_2S	82.0	--	--	--	27.7	--	--	--	3.7	--	--	--
HAPs	2.06	<0.01	0.02	0.55[e]	2.42	<0.01	0.02	0.55[e]	2.52	<0.01	0.02	0.55[e]
Ammonia	308	--	0.03	--	527	--	0.03	--	590	--	0.03	--
CO_2e [f]	40,808	3.27	371	1,194	48,295	3.27	371	1,194	50,320	3.27	371	1,194

Notes:
[a] Steam system emissions are emitted from the PTU, RM, or cooling towers.
[b] Emissions include those from three 3.25 MW generators.
[c] First year annual emissions include commissioning activities with the remaining year routine operations.
[d] Emissions include those associated with gas-insulated equipment, the HCl scrubber, and O&M equipment and vehicles.
[e] Combustion-related HAPs conservatively assumed to be equal to PM_{10} with DPM considered a surrogate for HAPs.
[f] CO_2e emissions in the "tpy" column are reported in short tons and not metric tons.
-- Pollutant not emitted.

Table 1: Annual Emission Estimates During Project Operations

[9] TN 253189, Black Rock Geothermal Project Revised General Arrangement Refinement (Nov. 17, 2023) p. 1, *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=253189&DocumentContentId=88394.

HCl presents potential health risks, primarily through inhalation, skin contact, and ingestion, with symptoms including respiratory and gastrointestinal irritation, eye and skin problems. While HCl itself is not typically considered a carcinogen, prolonged exposure to its corrosive nature and potential interaction with other hazardous substances may contribute to overall health risks, including the potential for cancer. Workers in industrial settings may face increased occupational exposure risks. Proper safety measures, including the use of protective equipment and adherence to regulations, are crucial in mitigating these risks. A thorough risk assessment, considering concentration, duration, and specific work conditions, is recommended to address potential health impacts comprehensively.

IV. Critical Gap in Air Quality Analysis: Excluding Emissions from Nearby Geothermal Facilities

The PDOC falls short in its air quality analysis by omitting a crucial consideration—the emissions from operational geothermal facilities near the BRGP. Notably absent from the cumulative emission evaluation are emissions from the CalEnergy Salton Sea Units 1 & 2/3&4/5 facilities, CalEnergy JM Leathers Facility, CalEnergy Central Services facility, CalEnergy Vulcan/Del Ranch facilities, and the existing CalEnergy JJ Elmore Facility[10] (Figure 5 and Table 2). The oversight extends to the exclusion of criteria pollutants (NOx, SOx, PM, CO, lead) and air toxins (VOCs, including benzene, toluene, diesel particulate matter, etc.) from the comprehensive assessment.

This omission is particularly concerning given the BRGP's location within a designated Disadvantaged Community under SB 535 and the non-attainment status of the Imperial Valley Airshed. Moreover, localized monitoring of particulate matter reveals a distinct concentration gradient, with higher PM10 concentrations observed downwind of the Sonny Bono Salton Sea National Wildlife Reserve. This observed gradient strongly implies a potential influence from existing facilities. The failure to incorporate these emissions into the analysis raises substantial doubts about the overall accuracy and completeness of the Project's air quality impact assessment. Furthermore, it raises serious concerns about the potential exacerbation of pollutant gradients with the introduction of additional geothermal plants, underscoring the urgency of addressing this critical gap in the evaluation process.

[10] https://www.icpds.com/assets/planning/energy-maps/imperial-county-geothermal-09-15-2017.pdf.

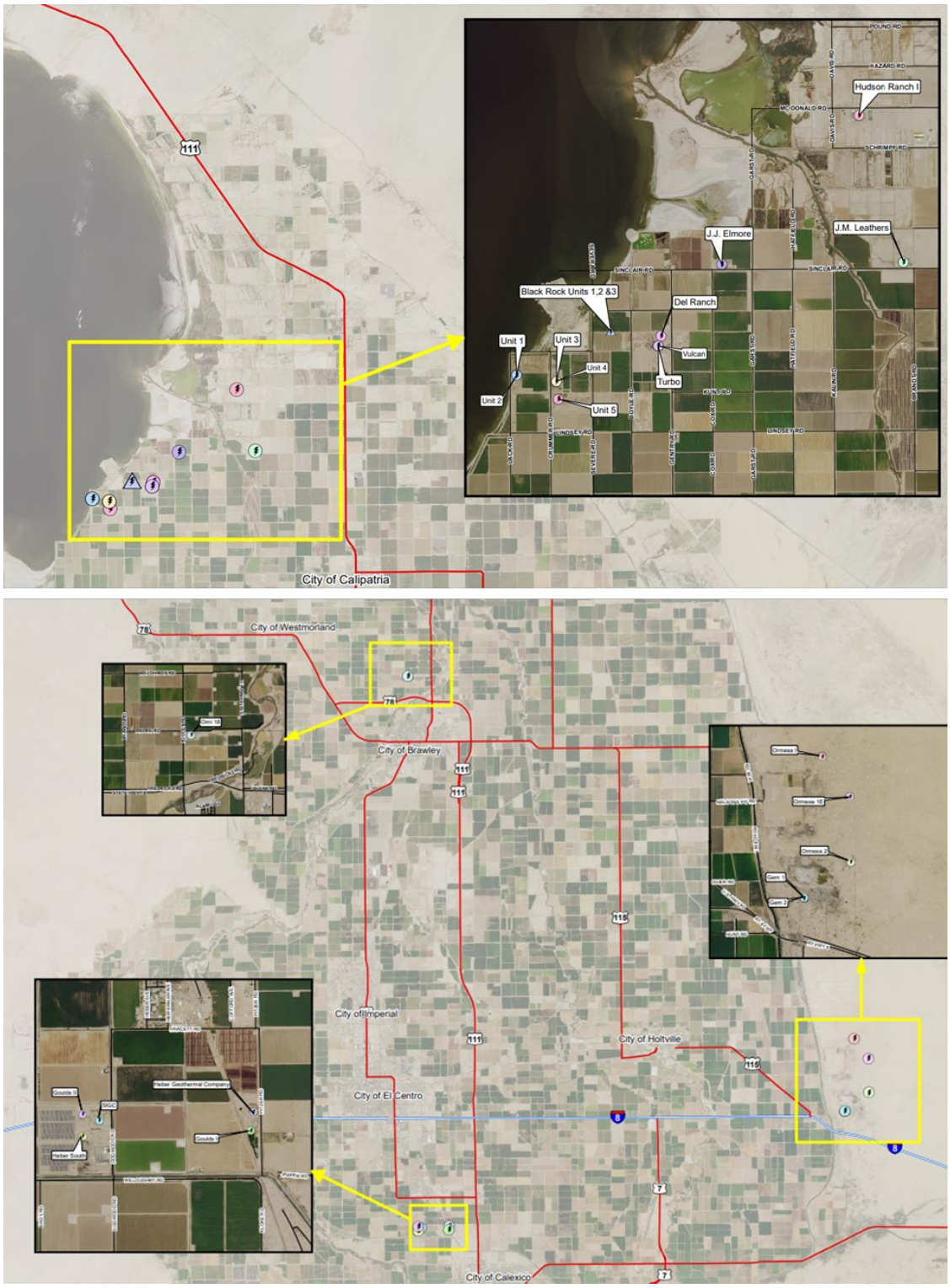


Figure 5: Geothermal Projects in Imperial County

Project Name/Location	Net Capacity (MW)	Commercial Operation Date
Elmore Backpressure Turbine	7	2019
Elmore	42	1989
Leathers	42	1990
Vulcan	38	1986
Del Ranch	42	1989
CE Turbo (backpressure turbine)	10	2000
Salton Sea 1	10	1982
Salton Sea 2	16	1990
Salton Sea 3	50	1989
Salton Sea 4	42	1996
Salton Sea 5	46	2000
Hudson Ranch Power 1	50	2012
Total Existing	**395**	

Table 2: Geothermal Power Plants Operating in the Salton Sea Area

V. Cumulative Impact Analysis Omits Emissions from Two Other Proposed Geothermal Facilities, Six Other Proposed Constructions, and Uses Insufficient Methodology

The PDOC lacks sufficient attention to the requirement for a cumulative impacts analysis, as mandated by the California Energy Commission (CEC). This analysis is crucial for evaluating the potential environmental effects of the project's typical operating mode, particularly concerning pollutants surpassing the Class II Significant Impact Levels (SILs). Despite regulatory obligations, the PDOC inadequately addresses this crucial aspect. By failing to conduct the cumulative impacts analysis, the project overlooks significant considerations regarding emissions from stationary sources within a 6-mile radius, including the Applicant's other two proposed geothermal plants, Elmore North and Morton Bay. This oversight points to a critical deficiency in the project's compliance strategy, indicating a gap in its environmental assessment and risk mitigation efforts.

A. The Cumulative Impact Analysis Omits the Elmore North Geothermal Project and the Morton Bay Geothermal Project

The PDOC fails to account for the cumulative impact arising from both existing geothermal projects and other proposed ventures by the Applicant in the immediate vicinity of the BRGP. Notably, the operational geothermal projects and the Applicant's additional proposed developments, namely the Elmore North Geothermal Project and the Morton Bay Geothermal Project, are situated near the BRGP (Figure 6). The absence of an integrated evaluation considering these coexisting projects raises significant concerns about the overall completeness and accuracy of the environmental impact assessment. Emissions from the three projects were quantified separately and have not been combined to determine the cumulative impacts on the surrounding community. The potential cumulative effects on air quality, emissions, and overall environmental health necessitate a comprehensive analysis that encompasses the combined influence of all geothermal activities in the region. Addressing this oversight is paramount to ensure a thorough understanding of the cumulative environmental impact of geothermal projects in the area.

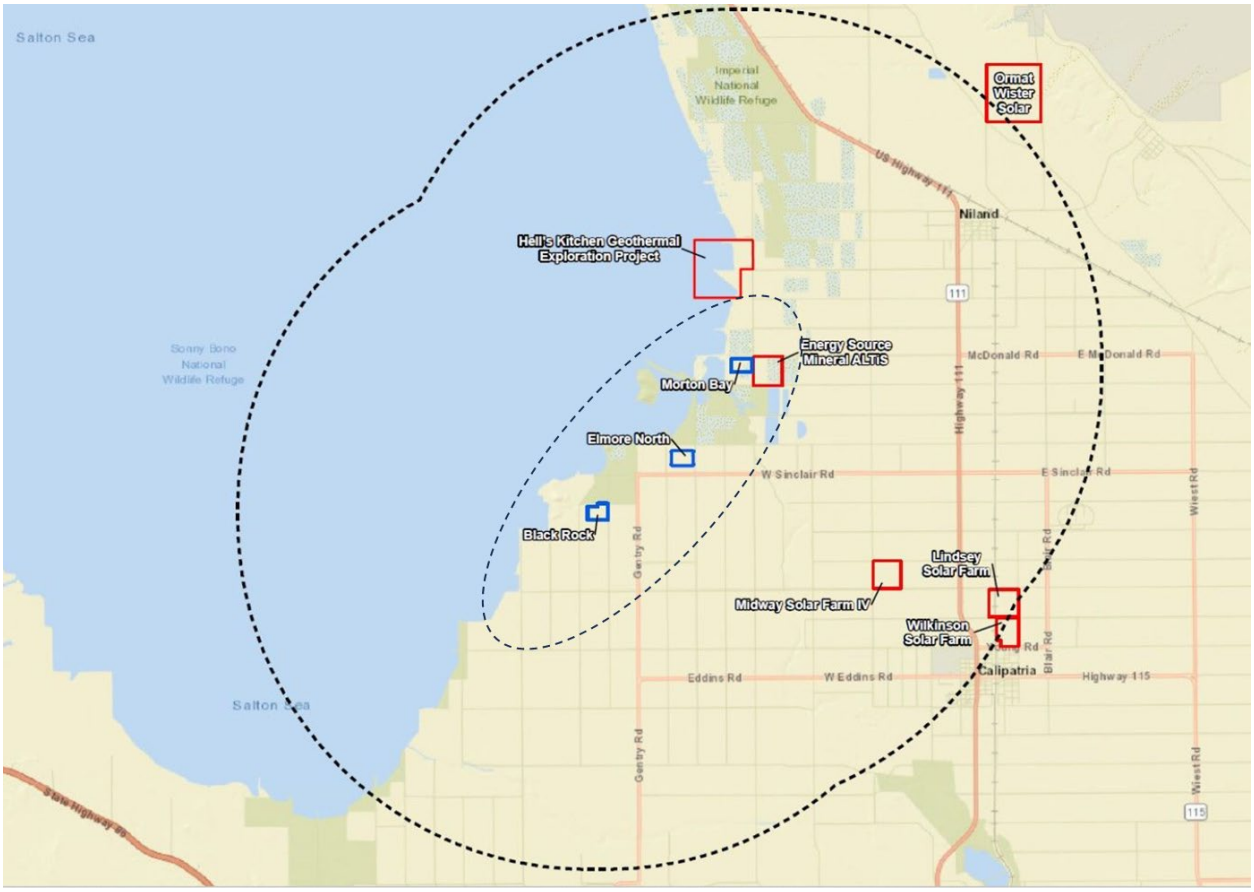


Figure 6: Spatial Overview of the Applicant's Three Geothermal Projects - Elmore North Geothermal Project (ENGP), Black Rock Geothermal Project (BRGP), and Morton Bay Geothermal Project (MBGP)

Notably, the cumulative analysis lacks a calculation of the annual maximum CAAQS $PM_{2.5}$ and PM_{10} concentrations from all three facilities. The presented data highlights the individual annual maximum CAAQS $PM_{2.5}$ and PM_{10} concentrations from the Black Rock, Morton Bay, and Elmore North geothermal plants. However, a comprehensive evaluation of the cumulative impact of emissions from all three plants is notably absent.

Plant	Annual Max CAAQS $PM_{2.5}$ ($\mu g/m^3$)	Annual Max CAAQS PM_{10} ($\mu g/m^3$)
Black Rock	9.65	40.2
Morton Bay	9.83	40.5
Elmore North	9.78	40.4

Table 4: Annual Max CAAQS $PM_{2.5}$ and PM_{10} ($\mu g/m^3$) from MBGP, BRGP and ENGP

Total Annual Max CAAQS PM2.5 Concentration: 9.65 + 9.83 + 9.78 = 29.26 $\mu g/m^3$

Total Annual Max CAAQS PM10 Concentration: 40.2 + 40.5 + 40.4 = 121.1 $\mu g/m^3$

This cumulative analysis indicates that the combined annual maximum CAAQS $PM_{2.5}$ concentration from all three geothermal plants is 29.26 $\mu g/m^3$ (crossing the standard of 12.0 $\mu g/m^3$ already), while the combined annual maximum CAAQS PM_{10} annual maximum concentration is 121.1 $\mu g/m^3$. While the individual concentrations for CAAQS PM_{10} annual maximum may appear compliant, the absence of a combined assessment obscures the true environmental impact.

When examining the PM_{10} 24-hour maximum levels across all three plants, it is evident that they collectively exceed both CAAQS and NAAQS. This underscores the necessity for a holistic evaluation that considers the cumulative contribution of emissions from multiple sources in the vicinity.

Upon totaling the PM10 24-hour max. levels across all three plants:

- For CAAQS: Total PM10 24-hour max. = 248 $\mu g/m^3$ (Elmore) + 249 $\mu g/m^3$ (Morton Bay) + 246 $\mu g/m^3$ (Black Rock) = 743 $\mu g/m^3$

- For NAAQS: Total PM10 24-hour max. = 146 μg/m³ (Elmore) + 147 μg/m³ (Morton Bay) + 145 μg/m³ (Black Rock) = 438 μg/m³

The PDOC fails to adequately address the cumulative impact of emissions from the three geothermal plants, Black Rock, Morton Bay, and Elmore, situated in close proximity to each other. By presenting the emissions from each plant individually, the PDOC overlooks the fact that these sources collectively contribute to the pollution load in the local atmosphere. While the individual emissions from each plant may appear to be within acceptable limits, a combined assessment reveals that the total annual maximum CAAQS $PM_{2.5}$ concentration exceeds the standard, indicating a significant environmental concern. Moreover, when considering the PM10 24-hour maximum levels across all three plants, it becomes evident that they collectively surpass both CAAQS and NAAQS, highlighting the necessity for a comprehensive evaluation.

Given that these geothermal plants operate using similar technology and are subject to the same meteorological conditions, treating them as separate emission sources in the assessment is insufficient. Instead, they should be analyzed as a collective source of emissions with different emission points in a facility, considering their cumulative impact on air quality and public health in the surrounding area.

B. The Cumulative Analysis Fails to Consider Emissions from Other Nearby Stationary Sources

The PDOC lists several pending and under-construction projects in the vicinity, such as the Wilkinson Solar Farm, Lindsey Solar Farm, Midway Solar Farm IV, and the Ormat Wister Solar Project (Table 5.1-27 on page 135)[11]. These projects (Table 3), along with the Hell's Kitchen Geothermal Exploration Project and the Energy Source Mineral ALTiS project, are identified for inclusion in the cumulative impacts analysis. Despite this acknowledgment, the PDOC falls short in providing a comprehensive assessment of their combined effects on air quality.

[11] AQP Application P. 135

CUP-0011	Project Name	Applicant	Area-Location	Phase
13-0031	Wilkinson Solar Farm	8 Minute Energy	Niland	Pending Construction
13-0032	Lindsey Solar Farm	8 Minute Energy	Niland	Pending Construction
17-0014	Midway Solar Farm IV	8 Minute Energy	Calipatria	Pending Construction
18-0040	Ormat Wister Solar	Omi 22 LLC/Ormat	Niland	Under Construction
21-0021	Hell's Kitchen Geothermal Exploration Project	Controlled Thermal Resources	Niland	Entitlement Process
20-0008	Energy Source Mineral ALTiS	Energy Source Minerals	Imperial County	Pending Construction

Table 3 – Facilities near BRGP

C. The Cumulative Analysis Methodology is Undisclosed and Insufficient

The PDOC states that the cumulative impacts analysis will utilize the same modeling methodology as presented in Section 5.1.9.1. However, it fails to elaborate on the specifics of this methodology or provide sufficient technical details regarding the modeling approach. This lack of transparency raises concerns about the accuracy and reliability of the assessment. Furthermore, the PDOC mentions that the fence lines for the cumulative sources will not be included in the modeling analysis, as they do not define the ambient boundary for modeling purposes. This decision overlooks potential emissions from these sources that could contribute to localized impacts on air quality, thus undermining the comprehensiveness of the assessment.

Overall, the PDOC's failure to adequately address the cumulative impacts assessment represents a significant gap in its environmental evaluation process. Without a thorough analysis of the combined effects of multiple sources, the project risks underestimating its potential air quality impacts, thereby compromising its compliance with regulatory standards and its commitment to environmental stewardship.

VI. The PDOC's Reliance on Distant Monitoring Stations for PM_{10} and $PM_{2.5}$ Measurements Overlooks Existing Monitoring Sites in Close Proximity to the Project Site

A. The PDOC Fails to Consider Data from Air Quality Monitoring Sites Close to the Project

The Air Quality Permit Application relies on ambient criteria pollutant background concentrations from the following monitoring sites[12]:

- Niland-English Road (AQS ID: 60254004) [7.6 miles from Project]: 24-hour PM_{10} concentrations (2019-2021) and ozone concentrations (2019)
- Brawley-220 Main Street (AQS ID: 60250007) [13.8 miles from Project]: 24-hour $PM_{2.5}$ concentrations (2019-2021), and annual $PM_{2.5}$ concentrations (2019-2020)

- El Centro-9th Street (AQS ID: 60251003) [26.1 miles from Project]: annual $PM_{2.5}$ concentrations (2021), ozone concentrations (2020-2021), 1-hour NO_2 concentrations (2019-2021), and annual NO_2 concentrations (2020-2021)

- Calexico-Ethel Street (AQS ID: 60250005) [34.6 miles from Project]: annual NO_2 concentrations (2019), 1-hour SO_2 concentrations (2019-2021), 24-hour SO_2 concentrations (2019-2021), 1-hour CO concentrations (2019-2021), and 8-hour CO concentrations (2019-2021).

The application states: *"The Project site is bounded by McKendry Road to the north, Boyle Road to the east, and Severe Road to the west. The town of Niland is approximately eight miles northeast of the plant site, and the town of Calipatria is approximately six miles southeast of the plant site. The Red Hill Marina County Park is approximately two miles east of the PGF. The Sonny Bono Wildlife Refuge Headquarters is approximately 0.75-mile northeast of the PGF. The Alamo River is approximately three miles southwest of the plant site, and the New River is approximately five miles southwest of the plant site."*[13] The application therefore clearly acknowledges that Sonny Bono is closer to site than other stations.

The air quality assessment ostensibly aimed to showcase compliance with California and National Ambient Air Quality Standards (CAAQS and NAAQS) for various pollutants, including NOx, CO, SO_2, PM_{10}, $PM_{2.5}$, and H_2S. However, it falls significantly short in its methodological rigor.

Despite Imperial County's existing non-attainment status for ozone and PM_{10}, the analysis inexplicably neglects data[14] from the nearby Sonny Bono monitoring station (ARB # 13602), situated within 2 miles of the project site, which holds pertinent air quality information for 2019 and 2020. This oversight undermines the completeness and accuracy of the PDOC's assessment.

[12] AQP Application, P. 103
[13] *Ibid*. P. 161
[14] https://saltonseaprogram.com/aqm/index.php.

Furthermore, the selection of monitoring stations for PM_{10} and $PM_{2.5}$ concentrations, such as Niland-English Road and Brawley-220 Main Street, respectively, raises serious concerns about the representativeness of the chosen locations (Figure 7 and Figure 8)[15]. A more comprehensive and critical approach utilize background concentration values from the Sonny Bono station, which not only is in closer proximity but also covers the more recent years of 2021 and 2022, thereby providing a more accurate depiction of current background pollution levels.

The application also neglects to acknowledge the existence of 40 additional active monitoring stations in Imperial County. Information available on the Identifying Violations Affecting Neighborhoods (IVAN) website reveals that the IVAN Air Monitoring network consists of 40 air monitors strategically placed throughout Imperial County. As of September 2016, all but 7 of these monitors have been successfully installed. There are 13 IVAN stations in close proximity to the Project Site. The PDOC should include data from all relevant monitoring sites in the background analysis of air quality to ensure that background concentrations are accurately reported for the region.

[15] https://ivan-imperial.org/air/map.

Figure 7: Monitoring Stations Identified in Application

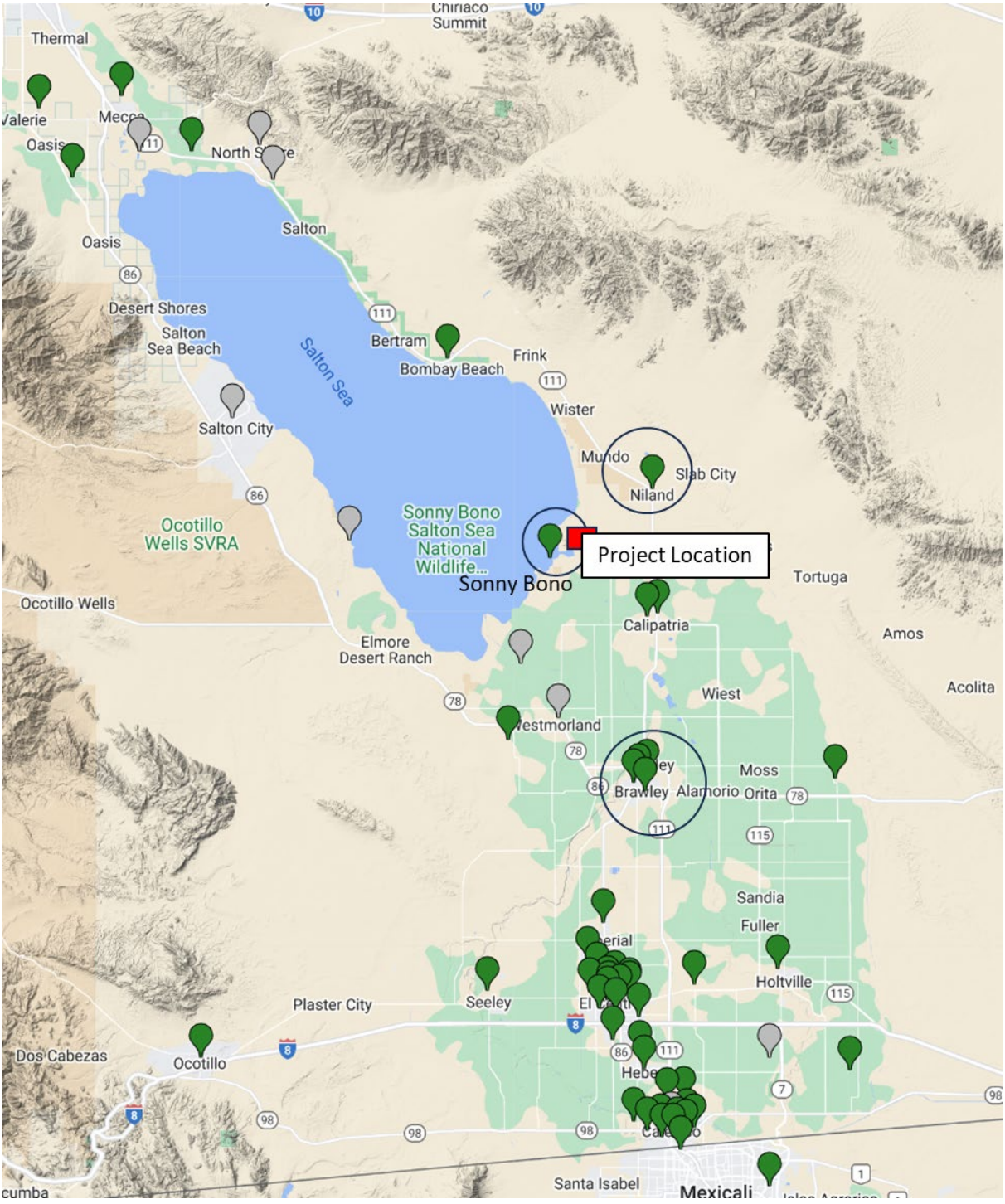


Figure 8: Map Illustrating Project Location (BRGP) with Sonny Bono, Niland, and Brawley Monitoring Stations in Proximity

In essence, the methodology employed in this analysis lacks the necessary depth and inclusivity, compromising its credibility and potentially resulting in a downplaying underestimation of the true environmental impact of the proposed project. The glaring omissions and questionable choices in data selection undermine the overall validity of the findings, necessitating a reevaluation of the air quality assessment.

B. Relying on a Representative Monitoring Site Will Result in Greater PM_{10} and $PM_{2.5}$ Concentrations

The air quality permit application suggests that: "*The Project's maximum modeled concentrations are conservatively compared to the CAAQS and NAAQS, regardless of the SIL results, maximum combined impacts (modeled plus background) are less than all the CAAQS and NAAQS except for the PM_{10} CAAQS. The modeled exceedances of the PM_{10} CAAQS are due to high background concentrations, which already exceed the CAAQS (the area is already designated as a nonattainment area for the PM_{10} CAAQS).*"[16]

The air quality permit application asserts the conservative comparison of the Project's maximum modeled concentrations with the CAAQS and NAAQS. Despite this claim, the combined impacts (modeled plus background) are purportedly below all the CAAQS and NAAQS, except for the PM_{10} CAAQS. The PM_{10} CAAQS exceedances in the modeling results are attributed to elevated background concentrations, already surpassing the standards in an area designated as nonattainment for PM_{10} CAAQS.

[16] AQP Application, p. 138.

Pollutant	Averaging Period	Maximum Conc. (µg/m³)	Background Conc. (µg/m³)	Total Conc. (µg/m³)	CAAQS (µg/m³)	NAAQS (µg/m³)	Exceeds Standard?
NO_2	1-hour max. (CAAQS)	139	105	244	339	--	No
	5-year avg. of 1-hour (NAAQS)	1.03	65.2	66.2	--	188	No
	Annual max.	0.07	17.4	17.5	57	100	No
H_2S	1-hour max. (CAAQS)	25.2	--	25.2	42	--	No
CO	1-hour max. (CAAQS and NAAQS)	828	5,266	6,094	23,000	40,000	No
	8-hour max. (CAAQS and NAAQS)	83.5	3,549	3,633	10,000	10,000	No
SO_2	1-hour max. (CAAQS and NAAQS)	<0.01	22.5	22.5	655	196	No
	3-hour max. (NAAQS)	<0.01	22.5	22.5	--	1,300	No
	24-hour max. (CAAQS and NAAQS)	<0.01	7.10	7.10	105	365	No
	Annual max. (NAAQS)	<0.01	1.10	1.10	--	80	No
PM_{10}	24-hour max. (CAAQS)	4.48	241.3	246	50	--	Yes
	24-hour avg. (NAAQS)	2.97	142	145	--	150	No
	Annual max. (CAAQS)	0.41	39.8	40.2	20	--	Yes
$PM_{2.5}$	5-year avg. of 24-hour yearly (NAAQS)	1.44	21.0	22.4	--	35	No
	Annual max. (CAAQS)	0.25	9.40	9.65	12	--	No
	5-year avg. of annual concentrations (NAAQS)	0.23	8.67	8.90	--	12.0	No

Table 5: Operation Air Quality Impact Results Compared to Ambient Air Quality Standards

The reliance on Niland and Brawley monitoring stations for $PM_{2.5}$ concentrations, as opposed to closer and the more representative Sonny Bono station, raises concerns. The annual and hourly $PM_{2.5}$ concentrations at Sonny Bono consistently surpass those at Niland and Brawley during various episodes, significantly contributing to the background pollution load. When utilizing the correct representative monitoring station (Sonny Bono), the 24-hour average $PM_{2.5}$ concentration from operational activities (Table 5) is calculated at 145 µg/m³, closely approaching the 150 µg/m³ NAAQS standard. This brings into question the PDOC's claim that the combined impacts remain below the set standards.

Furthermore, if the Sonny Bono background concentration and meteorology (calm wind pattern – 3.5 m/s, see wind rose for Sonny Bono) from the recent year (2022 – 49.65 µg/m³) is considered, the calculated concentration of PM_{10} would exceed 150 µg/m³, surpassing the NAAQS standard as well. Currently PDOC relies on Niland station and has taken 35.9 µg/m³ as the annual average PM_{10} concentration for 2020 and 39.8 µg/m³ for 2021 (As shown in Table 5.1-4 in Air quality permit application). Additionally, the PDOC hasn't taken 2022 observations for Niland station which is also high (47.9 µg/m³). This underscores the importance of

considering the most up-to-date and representative data for a comprehensive and accurate assessment of the Project's environmental impacts.

In essence, the discrepancies in the choice of background concentrations and monitoring stations, particularly the omission of the more pertinent Sonny Bono data (see 2023 particulate matter concentrations in the figure below, Figure 9), introduce uncertainties into the accuracy and reliability of the air quality permit application and PDOC because the PDOC's conclusions rely on ambient conditions that are not representative of conditions in the immediate vicinity of the project site. The emissions analysis must be revised to incorporate an analysis of local background conditions in order to accurately assess the Project's net increase in emissions and assess compliance with AAQs. .

The assertion that the facility's projected maximum impacts for 24-hour and annual PM_{10} concentrations would be below the SILs and would not significantly contribute to current exceedances of the PM_{10} CAAQS is not supported by the evidence provided with the PDOC and warrants critical scrutiny. Contrary to this claim, the emissions from the plant, and potentially from two nearby facilities operated by the same applicant, could substantially add to PM_{10} levels in the atmosphere, exacerbating existing exceedances.

Pollutant and Averaging Time	Background Value (µg/m³) [a]
Ozone – 1-hour Maximum CAAQS	128
Ozone – 8-hour Maximum CAAQS/NAAQS	108
PM_{10} – 24-hour Maximum CAAQS	241.3
PM_{10} – 24-hour High, 2nd High NAAQS [b]	142
PM_{10} – Annual Maximum CAAQS	39.8
$PM_{2.5}$ – 3-Year Average of Annual 24-hour 98th Percentiles NAAQS	21.0
$PM_{2.5}$ – Annual Maximum CAAQS	9.40
$PM_{2.5}$ – 3-Year Average of Annual Values NAAQS	8.67
CO – 1-hour Maximum CAAQS/NAAQS	5,266
CO – 8-hour Maximum CAAQS/NAAQS	3,549
NO_2 – 1-hour Maximum CAAQS	105
NO_2 – 3-Year Average of Max Daily Annual 1-hour 98th Percentiles NAAQS	65.2
NO_2 – Annual Maximum CAAQS/NAAQS	17.4
SO_2 – 1-hour Maximum CAAQS/NAAQS	22.5
SO_2 – 3-hour Maximum NAAQS [c]	22.5
SO_2 – 24-hour Maximum CAAQS/NAAQS	7.10
SO_2 – Annual Maximum NAAQS	1.10

[a] Where applicable, monitored concentrations were converted from ppm/ppb to µg/m³ using the standard molar volume of air at normal temperature and pressure conditions (NTP) of 24.45 liters per mole.

[b] 24-hour PM_{10} background value assumes one exceedance may occur per year on average. Over the 3-year period, two of the maximum three concentrations occur in 2021. Therefore, the design value is the high, 2nd high for 2020.

[c] The 3-hour SO_2 background value conservatively uses the 1-hour SO_2 background value.

Table 6: Background air quality concentrations

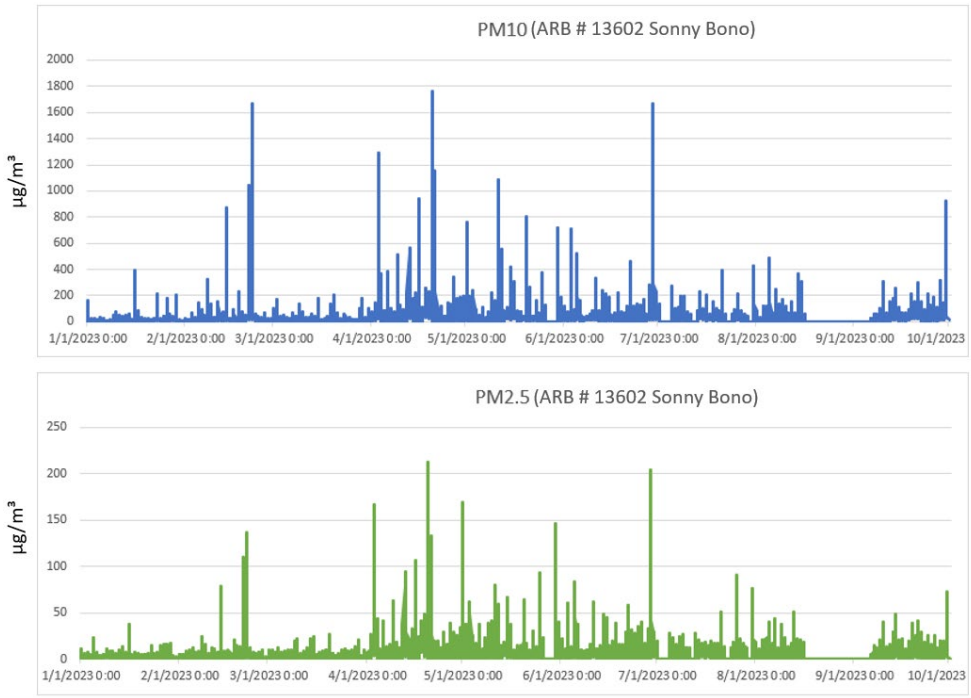


Figure 9: 2023 Air Quality Concentrations of $PM_{2.5}$ and PM_{10} at Sonny Bono Monitoring Station

The PDOC's failure to assess potential cumulative impacts from multiple sources within proximity of the project is a significant omission which raises concerns about the accuracy of the Air District's assessment. Given that the facility operates in an area already designated as nonattainment for PM_{10} CAAQS, dismissing the contribution of the project to current exceedances appears to be an oversimplification. Moreover, the omission of consideration for $PM_{2.5}$ emissions is notable, as it is a critical component in evaluating overall air quality. Ignoring the potential collective impact of PM_{10} and $PM_{2.5}$ emissions from the facility and neighboring sources undermines the integrity of the claim that the project would not significantly contribute to existing PM_{10} NAAQS exceedances. Further, the assertion regarding construction emissions and reliance on control measures lacks supporting evidence demonstrating their efficacy. The specified threshold for PM_{10} emissions during construction may inadequately account for cumulative impacts in a nonattainment area.

In essence, the PDOC downplays the significance of the potential environmental impacts of the facility by solely focusing on SILs for PM_{10} and overlooking the broader context of cumulative emissions.

VII. The Project Would Cause or Contribute to a Violation of Newly Revised NAAQS for Annual $PM_{2.5}$

On March 6, 2024, the EPA published a final rule to strengthen the NAAQS for $PM_{2.5}$[17]. EPA's rule revises the level of primary (health-based) annual $PM_{2.5}$ from 12.0 µg/m3 to 9.0 µg/m3, based on scientific evidence that shows the current standard does not protect public health with an adequate margin of safety, as required by the Clean Air Act. Based on 2020-2022 data, Imperial County does not meet the revised annual primary $PM_{2.5}$ standard of 9.0 µg/m3. This revision accentuates the potential environmental impact. Based on 2020-2022 data, Imperial County does not meet the revised annual primary $PM_{2.5}$ standard of 9.0 µg/m3.[18]

Generally, applications received by the Air District are only subject to the new source review requirements in effect at the time the application is deemed completed. However, Rule 207 contains an exception. Section A.2.b. requires that more stringent federal requirements not yet incorporated into Rule 207 apply to the new or modified stationary source.

The effective date for the new NAAQS for annual PM2.5 is 60 days following publication of the notice of final rulemaking in the Federal Register. While the new rule has not yet been published in the Federal Register, it will undoubtedly become effective before the proposed Project is certified by the Commission. Therefore, the Air District must determine whether the proposed Project will cause or contribute to an exceedance of the new standard.

The current modeling already demonstrates that the Project's new emissions would cause or contribute to a violation of the revised standards. When we incorporate the annual average $PM_{2.5}$ concentration (background concentration) measured at the Brawley station in 2020 (9.44 µg/m^3) and 2023 (9.05 µg/m^3) with the project's maximum concentration (0.23 µg/m3), the combined concentration surpasses the standard of 9 µg/m^3.The PDOC shows that the Project's maximum concentration of $PM_{2.5}$ is 0.23 µg/m^3 and the background concentration is 8.67 µg/m^3, for a total concentration of 8.90 µg/m.[319] The analyses utilize three years average data and

[17] U.S. Environmental Protection Agency, EPA Finalizes Stnger Standards for Harmful Soot Pollution, Significantly Increasing Health and Clean Air Protections for Families, Workers, and Communities (Feb. 7, 2024), available at https://www.epa.gov/newsreleases/epa-finalizes-strongerstandards-harmful-soot-pollution-significantly-increasing.
[18] U.S. Environmental Protection Agency, Fine Particle Concentrations for Counties with Monitors Based on Air Quality Data from 2020-2022 (Feb. 2022) p. 1, available at https://www.epa.gov/system/files/documents/2024-02/table_annual-pm25-county-design-values-2020-2022-for-web.pdf.
[19] PDOC at P. 28

reports it as "5-year avg. of annual concentrations (NAAQS)" (as mentioned in PDOC[20] : "The background data were collected for years 2019-2021 based on the most representative monitoring stations in Imperial County"). The revised annual primary PM2.5 standard of 9.0 µg/m3 should be assessed against the annual average concentration of each individual year, rather than aggregating total concentartion over three or five years. The Air District cannot issue a PDOC until the Applicant demonstrates that the Project complies with the revised annual $PM_{2.5}$ standard.

VIII. Critical Flaws in Secondary $PM_{2.5}$ Modeling Methodology: Implications for Air Quality Assessment

The PDOC's method for modeling secondary PM2.5 emissions demonstrates critical shortcomings in technical accuracy and adherence to established best practices, posing significant concerns regarding the reliability of the air quality assessment for the project.

The PDOC details: *"The secondary formation of PM2.5 and ozone from their precursors was also accounted in the Project's operational impacts based upon EPA Maximum Emission Rates of Precursors (MERPS) View Qlik8 and EPA Methodology. The modeled secondary pollutant impacts for a 10-meter stack in Los Angeles County were used to represent the project, then scaled based on the estimated precursor emission rates from operation of the project.*"[21]

In addition, PDOC also states the following - "*only one representative cooling tower stack was modeled as it represents the Project's only source with a stack height greater than 10 m that emits criteria pollutants.*"[22] Which means that all other sources stack height is less than 10 meters for modeling primary PM2.5 through AERMOD.

Here firstly, the PDOC's reliance on modeled data from Los Angeles County to represent secondary $PM_{2.5}$ impacts is fundamentally flawed given the substantial differences in topography and atmospheric conditions between Los Angeles County and Imperial County. Imperial County's flat terrain, coupled with its proximity to mountainous terrain, creates distinct atmospheric dynamics that cannot be adequately captured by modeling data from a dissimilar geographic region. For instance, Imperial County experiences unique airflow patterns influenced by the surrounding mountain ranges, which can significantly impact pollutant dispersion.

Moreover, the selected stack height of 10 meters is inconsistent with the actual stack height used in the dispersion modeling analysis, which is reported to be 4.60

[20] PDOC at P. 27
[21] AQP Application, P. 137
[22] *Ibid*. P. 139

meters (see Table 8 for Height taken in BRGP Construction Modeled Point Source Parameters[23]). This inconsistency introduces a significant discrepancy in the modeling results and undermines the accuracy of the assessment. The PDOC's decision to utilize a 10-meter stack height for secondary $PM_{2.5}$ modeling contradicts established best practices in atmospheric dispersion modeling as well. A more appropriate approach involves conducting a comprehensive good engineering practice (GEP) stack height screening to determine the optimal stack height for modeling.

As part of this analysis, a good engineering practice (GEP) stack height screening should be performed to determine which stack height should be used in the modeling. The GEP stack height is defined as the height in which the plume dispersion from the stack is not influenced by building downwash. This GEP stack height is calculated as the lesser of the following two criteria:

- *65 m*
- *The sum of the maximum building height for which the stack is in the area of influence plus 1.5 times the lesser of the building height or projected building width.* [24]

This screening process considers various factors, including nearby building heights, terrain complexity, and atmospheric stability, to ensure accurate representation of plume dispersion. The PDOC's failure to conduct such a screening reflects a critical oversight in the modeling methodology. Furthermore, the PDOC neglects to provide essential details regarding the technical parameters and options utilized in the secondary PM2.5 modeling process. This lack of transparency undermines the credibility and reproducibility of the modeling results, as stakeholders are unable to assess the validity of the modeling approach or verify its compliance with regulatory standards. The calculated secondary impact results are presented in Table 7.[25]

To compound these deficiencies, the PDOC overlooks the significance of incorporating AERMOD's plume rise model enhancement (PRIME) algorithm to account for building downwash and complex terrain effects. Given Imperial County's proximity to mountainous terrain, accurately modeling pollutant dispersion requires consideration of these factors to avoid underestimating potential impacts on air quality.

[23] *Ibid*. P. 13
[24] AQP Application, P. 124
[25] *Ibid.*, Table 5.1-28. Operation Air Quality Impact Results – Secondary Emissions from Precursors.

In summary, the PDOC's approach to modeling secondary PM2.5 emissions falls short of scientific rigor and best practices, compromising the accuracy and reliability of the air quality assessment. Rectifying these deficiencies is imperative to ensure that the environmental impact of the project is thoroughly evaluated and mitigated in accordance with regulatory requirements.

Pollutant	Precursor	Modeled Precursor Emission Rate (tpy)	Modeled Secondary Impact Concentration (µg/m³) [a]	Project Emissions (tpy)	Project Secondary Impact Concentration (µg/m³)
24-Hour $PM_{2.5}$	NO_x	500	0.025	1.19	<0.01
	SO_2	500	0.077	<0.01	<0.01
Annual $PM_{2.5}$	NO_x	500	0.001	1.19	<0.01
	SO_2	500	0.002	<0.01	<0.01
8-Hour Ozone	NO_x	500	0.84	1.19	<0.01
	VOC	500	0.06	1.01	<0.01

[a] The modeled secondary impacts were obtained from the Los Angeles County hypothetical source with a 10-m stack height.

Table 7: Modeled secondary impacts of $PM_{2.5}$

BRGP Construction Modeled Point Source Parameters

Source ID	Source Type	Stack Release Type	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
POINT_1	POINT	HORIZONTAL	Construction Point Source 1	628,110.00	3,670,890.00	-70.11	4.60	533.00	18.00	0.13
POINT_2	POINT	HORIZONTAL	Construction Point Source 2	628,135.00	3,670,890.00	-70.12	4.60	533.00	18.00	0.13
POINT_3	POINT	HORIZONTAL	Construction Point Source 3	628,160.00	3,670,890.00	-70.09	4.60	533.00	18.00	0.13
POINT_4	POINT	HORIZONTAL	Construction Point Source 4	628,185.00	3,670,890.00	-70.11	4.60	533.00	18.00	0.13
POINT_5	POINT	HORIZONTAL	Construction Point Source 5	628,210.00	3,670,890.00	-70.06	4.60	533.00	18.00	0.13
POINT_6	POINT	HORIZONTAL	Construction Point Source 6	628,235.00	3,670,890.00	-70.03	4.60	533.00	18.00	0.13
POINT_7	POINT	HORIZONTAL	Construction Point Source 7	628,260.00	3,670,890.00	-70.01	4.60	533.00	18.00	0.13
POINT_8	POINT	HORIZONTAL	Construction Point Source 8	628,285.00	3,670,890.00	-69.98	4.60	533.00	18.00	0.13
POINT_9	POINT	HORIZONTAL	Construction Point Source 9	628,310.00	3,670,890.00	-69.88	4.60	533.00	18.00	0.13
POINT_10	POINT	HORIZONTAL	Construction Point Source 10	628,335.00	3,670,890.00	-69.85	4.60	533.00	18.00	0.13
POINT_11	POINT	HORIZONTAL	Construction Point Source 11	628,360.00	3,670,890.00	-69.81	4.60	533.00	18.00	0.13
POINT_12	POINT	HORIZONTAL	Construction Point Source 12	627,835.00	3,670,790.00	-70.10	4.60	533.00	18.00	0.13
POINT_13	POINT	HORIZONTAL	Construction Point Source 13	627,835.00	3,670,765.00	-70.06	4.60	533.00	18.00	0.13
POINT_14	POINT	HORIZONTAL	Construction Point Source 14	627,835.00	3,670,740.00	-70.01	4.60	533.00	18.00	0.13
POINT_15	POINT	HORIZONTAL	Construction Point Source 15	627,835.00	3,670,715.00	-69.97	4.60	533.00	18.00	0.13
POINT_16	POINT	HORIZONTAL	Construction Point Source 16	627,835.00	3,670,690.00	-69.94	4.60	533.00	18.00	0.13
POINT_17	POINT	HORIZONTAL	Construction Point Source 17	627,835.00	3,670,665.00	-69.90	4.60	533.00	18.00	0.13
POINT_18	POINT	HORIZONTAL	Construction Point Source 18	627,835.00	3,670,640.00	-69.85	4.60	533.00	18.00	0.13
POINT_19	POINT	HORIZONTAL	Construction Point Source 19	627,835.00	3,670,615.00	-69.80	4.60	533.00	18.00	0.13
POINT_20	POINT	HORIZONTAL	Construction Point Source 20	627,835.00	3,670,590.00	-69.75	4.60	533.00	18.00	0.13
POINT_21	POINT	HORIZONTAL	Construction Point Source 21	627,835.00	3,670,565.00	-69.71	4.60	533.00	18.00	0.13
POINT_22	POINT	HORIZONTAL	Construction Point Source 22	627,835.00	3,670,540.00	-69.66	4.60	533.00	18.00	0.13
POINT_23	POINT	HORIZONTAL	Construction Point Source 23	627,835.00	3,670,515.00	-69.60	4.60	533.00	18.00	0.13
POINT_24	POINT	HORIZONTAL	Construction Point Source 24	627,835.00	3,670,490.00	-69.38	4.60	533.00	18.00	0.13
POINT_25	POINT	HORIZONTAL	Construction Point Source 25	627,860.00	3,670,790.00	-70.10	4.60	533.00	18.00	0.13
POINT_26	POINT	HORIZONTAL	Construction Point Source 26	627,860.00	3,670,765.00	-70.06	4.60	533.00	18.00	0.13
POINT_27	POINT	HORIZONTAL	Construction Point Source 27	627,860.00	3,670,740.00	-70.01	4.60	533.00	18.00	0.13
POINT_28	POINT	HORIZONTAL	Construction Point Source 28	627,860.00	3,670,715.00	-69.95	4.60	533.00	18.00	0.13
POINT_29	POINT	HORIZONTAL	Construction Point Source 29	627,860.00	3,670,690.00	-69.93	4.60	533.00	18.00	0.13
POINT_30	POINT	HORIZONTAL	Construction Point Source 30	627,860.00	3,670,665.00	-69.89	4.60	533.00	18.00	0.13
POINT_31	POINT	HORIZONTAL	Construction Point Source 31	627,860.00	3,670,640.00	-69.81	4.60	533.00	18.00	0.13
POINT_32	POINT	HORIZONTAL	Construction Point Source 32	627,860.00	3,670,615.00	-69.77	4.60	533.00	18.00	0.13
POINT_33	POINT	HORIZONTAL	Construction Point Source 33	627,860.00	3,670,590.00	-69.74	4.60	533.00	18.00	0.13
POINT_34	POINT	HORIZONTAL	Construction Point Source 34	627,860.00	3,670,565.00	-69.68	4.60	533.00	18.00	0.13
POINT_35	POINT	HORIZONTAL	Construction Point Source 35	627,860.00	3,670,540.00	-69.64	4.60	533.00	18.00	0.13
POINT_36	POINT	HORIZONTAL	Construction Point Source 36	627,860.00	3,670,515.00	-69.57	4.60	533.00	18.00	0.13
POINT_37	POINT	HORIZONTAL	Construction Point Source 37	627,860.00	3,670,490.00	-69.44	4.60	533.00	18.00	0.13
POINT_38	POINT	HORIZONTAL	Construction Point Source 38	627,885.00	3,670,790.00	-70.06	4.60	533.00	18.00	0.13
POINT_39	POINT	HORIZONTAL	Construction Point Source 39	627,885.00	3,670,765.00	-70.03	4.60	533.00	18.00	0.13
POINT_40	POINT	HORIZONTAL	Construction Point Source 40	627,885.00	3,670,740.00	-70.01	4.60	533.00	18.00	0.13

Table 8: BRGP Construction Modeled Point Source Parameters (stack height details)

IX. Critical Oversight: Concealed H2S Background Concentrations in the PDOC

The BRGP application raises serious concerns by omitting vital information regarding H_2S concentrations in the community. Equally troubling is ICAPCD's failure to incorporate a background concentration into the cumulative impact analysis within the PDOC.

Referring to the Black Rock 1, 2, and 3 Geothermal Power Project[26] – Major Amendment Staff Assessment, the application acknowledges that H_2S emissions stem from both natural and anthropogenic sources, such as geologic processes, oil production, refining, wastewater treatment, and geothermal power plants. However, the discontinuation of monitoring at the Niland station, initially established to monitor ambient H_2S levels in the geothermal area, due to operational issues with the H_2S monitor is a significant gap.

The Staff Assessment from 2010 proposes a background concentration of 24.6 micrograms per cubic meter (µg/m³), calculated from an average hourly concentration during 1993-1994. Importantly, this background concentration constituted 59% of the State standard of 42 µg/m³, indicating that 30 µg/m³ is naturally present in the background.

The PDOC analyzes H_2S based on the worst-case subsequent year of operation. The proposed Project exceeds the emission threshold of 100 pounds per day for H_2S[27] (the BRGP will exceed the emissions threshold in Section C.3 of 100 pounds per day for H2S and thus will trigger public notice requirements of this rule). The proposed Project also exceeds the BACT threshold of potential to emit equal to or greater than 55 pounds per day.[28]

The PDOC's failure to disclose H_2S background concentrations results in underestimation of cumulative impacts. When considering all sources, it becomes apparent that the Project may contribute to an exceedance. This is particularly concerning as the PDOC estimates the maximum concentration of H_2S emissions to be 25.2 µg/m³[29]. When added to the background H_2S, the total concentration reaches 55.2 µg/m³, significantly surpassing the standard. Cumulatively, Morton Bay Geothermal Plant (MBGP) releases 37.5 µg/m³ of H_2S and Elmore North Geothermal

[26] Black Rock 1, 2, and 3 Geothermal Project – Major Amendment, Staff Assessment, Dec. 3, 2010, p. 4.1-6 to 4.1-7, 4.1-11. Accessed at https://efiling.energy.ca.gov/GetDocument.aspx?tn=59129&DocumentContentId=50350
[27] PDOC at p. 24.
[28] *Ibid.* p.24
[29] *Ibid.* p. 28.

Plant (ENGP) [30] releases 36.7 µg/m³. All three proposed projects also exceed the BACT threshold of potential to emit to or greater than 55 pounds per day. Together, just these three facilities emit 99.4 µg/m³ which is more than twice of state standard of 42 µg/m³. This lack of disclosure, cumulative analysis of H2S from nearby sources and potential underestimation underscores the pressing need for a more thorough and transparent assessment of the Project's impact on ambient H_2S concentrations in the area.

X. Flawed Dispersion Modeling of Meteorology: Inadequate Use of Distant Meteorological Data

The AERMOD analysis for emissions from the Project Site alarmingly relied on meteorological data from the Imperial County Airport (KIPL), situated a staggering 28 miles south of the Project Site. This choice blatantly contradicts U.S. EPA guidance, which mandates spatial and climatological representativeness of the area under consideration.

The selection of KIPL raises significant concerns, as it neglects crucial factors determining representativeness, including the proximity of the monitoring station to the area, the intricacy of terrain, exposure of the site, and the timeframe for data collection. A more suitable alternative is readily available—the Sonny Bono monitoring station, located within 2 miles of the Project Site, possesses superior representativeness of local conditions during both the construction and operational phases.

Accurate meteorological data, both surface and upper air, is fundamental for any air dispersion model. The imprudent reliance on data from a station 28 miles away introduces a glaring deficiency in the modeling process (Figure 10). To rectify this, an immediate and thorough collection of hourly meteorological and PM10 data from the IID's Sonny Bono monitoring station is imperative. This local and up-to-date information stands as the most representative and reliable source for dispersion modeling inputs, ensuring a more accurate assessment of the Project's impact on air quality.

[30] *Ibid.*

Figure 10: Topographical Map of Black Rock Geothermal Project's Proximity to the Imperial County Airport and Sonny Bono

The examination of wind speed, elucidated through wind rose plots for both KIPL and Sonny Bono stations (Figure 11 and Figure 12), is pivotal for understanding the atmospheric dispersion patterns. Notably, KIPL registers an average wind speed of 3.4 m/s, marginally lower than Sonny Bono's 3.51 m/s. However, the key differentiator lies in the prominent wind directions at these locations, with Imperial exhibiting notably calmer conditions.

The reliance on a segmented approach with AERMOD,[31] as described in the publication by Pandey and Sharan 2019,[32] underscores the significance of considering rapid changes in wind patterns. The assumption that a 2-minute mean wind direction estimates the plume is integral to this approach. Scientifically published insights suggest that under low wind speeds such as 3.5 m/s, the plume does not travel significant distances (velocity = distance/time). In low and variable winds, no single plume centerline is obvious, and the observed concentration distribution is multi-peaked and non-Gaussian (Sagendorf and Dickson, 1974)[33] especially in stable

[31] Cimorelli, A.J., Perry, S.G., Venkatram, A., Weil, J.C., Paine, R.J., Wilson, R.B., Lee, R.F., Peters, W.D., Brode, R.W., 2005. AERMOD: a dispersion model for industrial source applications. Part I: general model formulation and boundary layer characterization. J. Appl. Meteorol. 44, 682–693.
[32] https://www.sciencedirect.com/science/article/abs/pii/S1352231019300391?via%3Dihub.
[33] Sagendorf, J.D., Dickson, C.R., 1974. Diffusion under Low-Wind Speed, Inversion Conditions. NOAA Technical Memorandum. ERL ARL-52.

conditions. This critical observation challenges the rationale behind selecting a meteorological station, KIPL, situated at a considerable distance from the facility.

The application acknowledges the site's flat topography with an average elevation of 230 feet below average mean sea level, emphasizing a lack of complex terrain.[34] Despite this, the modeling analysis employs default settings for complex terrain, including temperature gradients, wind profile exponents, and elevated receptor heights.[35] This discrepancy introduces a counterintuitive element, as flat terrain should be modeled without complex terrain adjustments. The use of these settings designed for mountainous terrain can lead to underestimated pollutant concentrations, potentially misrepresenting the actual dispersion characteristics. A more accurate modeling approach should align with the site's flat nature, avoiding unnecessary complexities that may compromise the reliability of the dispersion modeling outcomes.

Receptor Grid Selection and Coverage: Grid Resolution Near Fence Line: The use of discrete receptors every 25 meters around the ambient air boundary (fence line) is a common practice. However, the abrupt transition from 25-meter spacing to 100-meter spacing at 500 meters from the grid origin may introduce potential gaps in capturing localized impacts near the facility. A more gradual transition or additional receptors in critical areas may enhance the accuracy of the assessment.

Calculation Exclusion within Fence Line: The decision not to calculate concentrations within the facility fence line raises questions about the potential localized impacts and exposure risks to on-site personnel. A clear justification for this exclusion should be provided, and alternative approaches, such as refining the receptor grid near the source, could be considered.

The inherent flaw in this approach is evident in the miscalculation of dispersion, leading to an underestimation of pollutant concentrations on receptors. By computing dispersion based on a distant met station under low wind speeds, the model fails to accurately represent the actual atmospheric behavior, thereby compromising the reliability of the entire analysis.

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[34] AQP Application, p. 98 (“*“The site topography is flat with an average elevation of 230 feet below average mean sea level. The nearest complex terrain (terrain exceeding Project stack heights) is a string of mountainous terrain running from the southwest to the northwest approximately 17 miles northeast of the Project.”),*

[35] *Ibid*. p. 123 (*“Default model options for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option were used in this modeling analysis.”*).

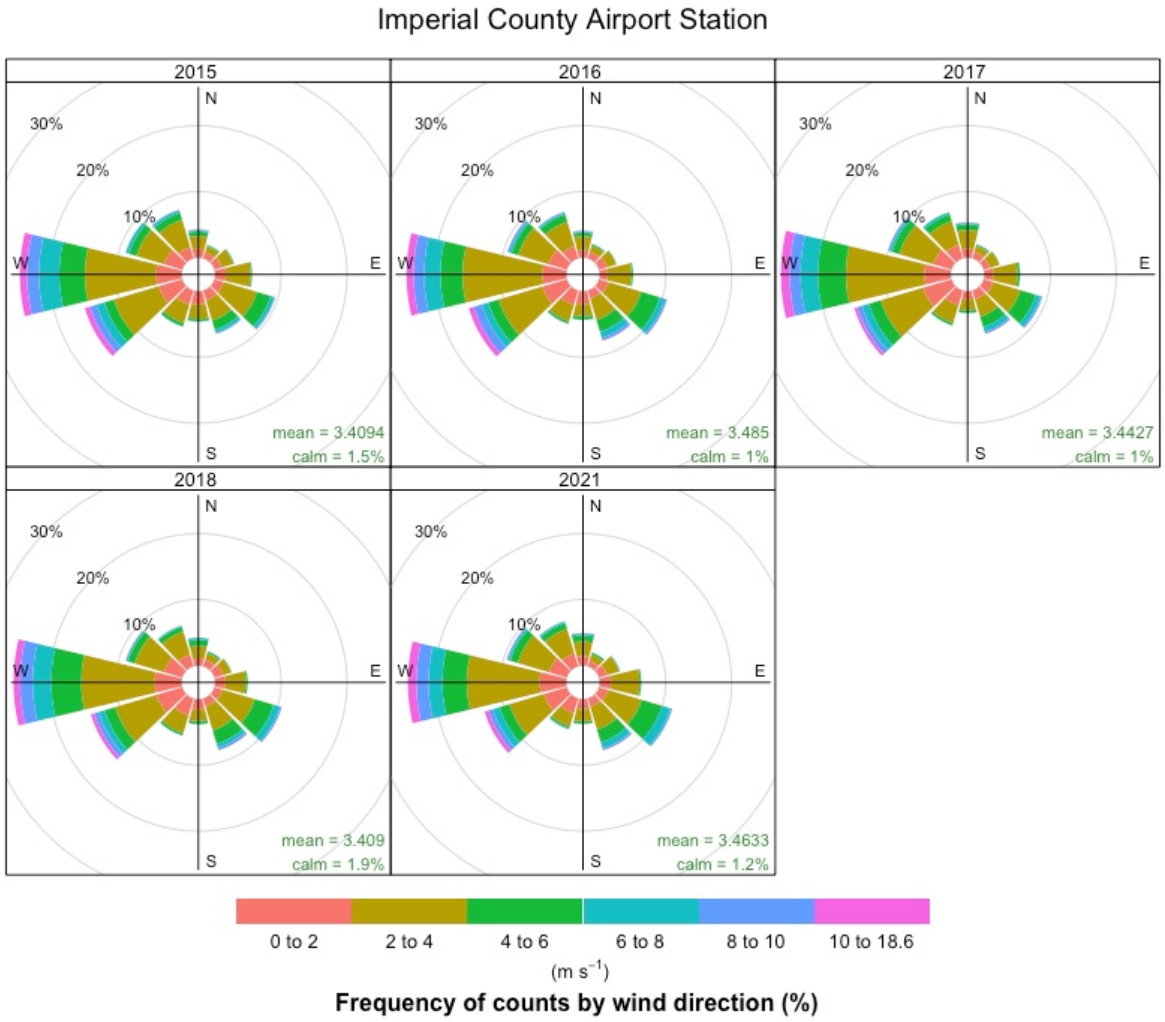

Figure 11: Wind Rose Plot Illustrating Wind Conditions at Imperial County Airport Monitoring Station

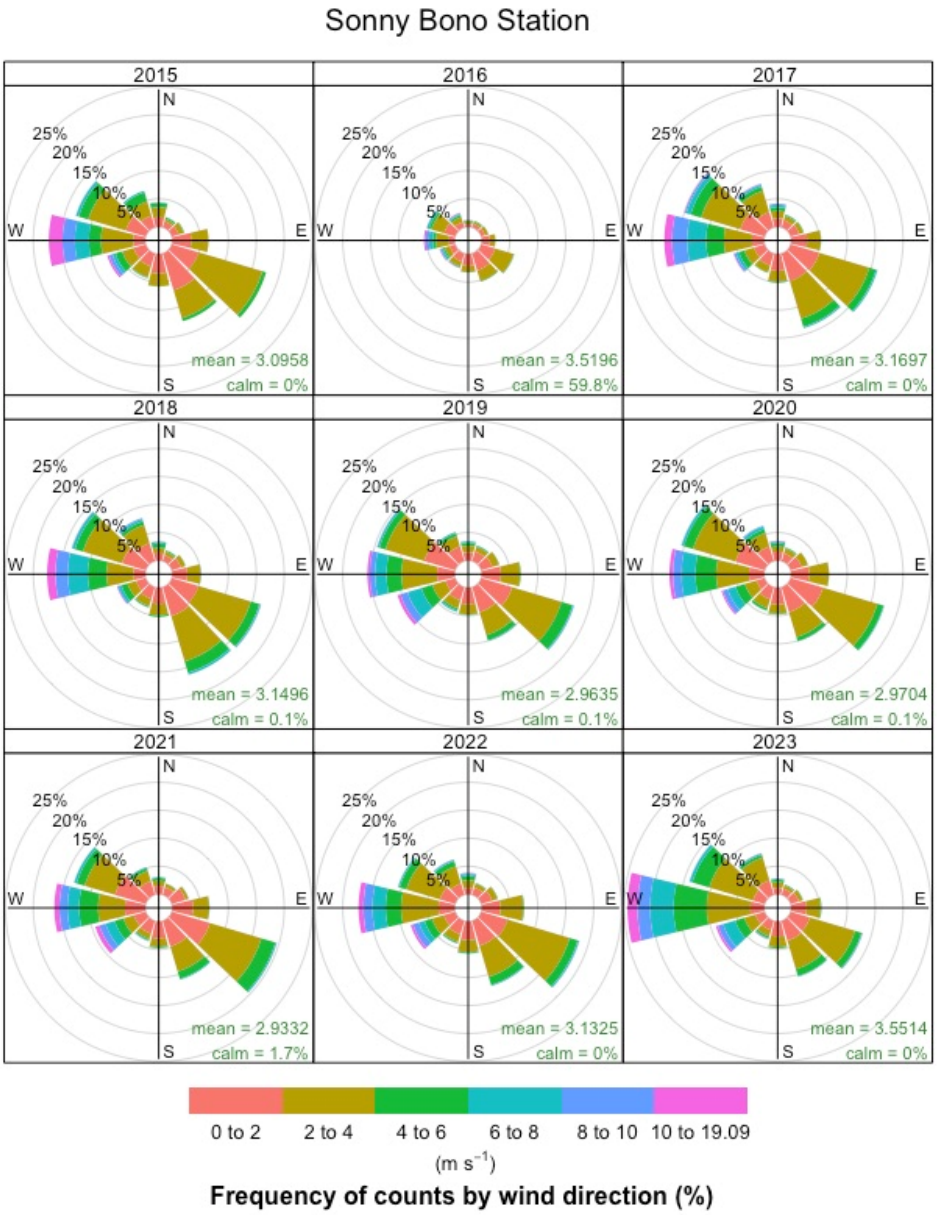

Figure 12: Wind Rose Plot Illustrating Wind Conditions at Sonny Bono Monitoring Station

Additionally, the plume concentration is intricately linked to meteorological factors such as wind speed, relative humidity, and wind direction, governed by the Gaussian plume distribution equation as outlined in the AERMOD manual[36]. Notably, the plume is conveyed with an effective wind speed that remains non-zero, even in the absence of mean wind speed. As the wind speed (u) is utilized to compute the Concentration (Figure 13) Therefore, accurate estimation of concentrations using

[36] https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

the Gaussian plume formulation for horizontal spread in AERMOD necessitates the incorporation of the appropriate effects of wind meandering, as emphasized by Qian and Venkatram in 2011[37].

$$C_s(x, y, z) = \frac{Q}{\sqrt{2\pi}\sigma_z U_e} F(x, y) \left[\exp\left\{ -\frac{(H_s - z)^2}{2\sigma_z^2} \right\} + \exp\left\{ -\frac{(-H_s - z)^2}{2\sigma_z^2} \right\} \right] \quad (1)$$

where $F(x, y)$ is the weighted horizontal distribution function, U_e is the effective wind speed, H_s is the effective stack height, z is the receptor height, Q is the source strength and σ_z is the vertical dispersion parameter.

Figure 13: Gaussian plume equation in AERMOD

Moreover, the Sonny Bono station provides a comprehensive dataset spanning from 2015 to 2023, affording two additional years of recent meteorological parameters (2022 and 2023) compared to the Imperial County data. Given this, there exists no rationale for the applicant to exclusively rely on Imperial County observations. The utilization of the more extensive and up-to-date Sonny Bono station data is imperative for ensuring the precision and relevance of the meteorological inputs in the assessment.

XI. Neglected Health Risks: Radon Exposure

The health risk assessment in BRGP Air Quality Permit Application raises significant concerns by not explicitly quantifying the potential health risks associated with radon exposure, a recognized human carcinogen emitted from the cooling tower during normal operation, warm-up, and shutdown. Radon (Radon, a colorless and odorless radioactive gas, poses significant health risks when inhaled. As it undergoes radioactive decay, radon releases solid particles that, when trapped in the lungs, emit alpha particles, increasing the risk of lung cancer), identified as the primary cause of lung cancer among non-smokers, contributes to approximately 21,000 lung cancer

[37] Qian, W., Venkatram, A., 2011. Performance of steady-state dispersion models under low wind-speed conditions. Boundary-Layer Meteorol. 138, 478–491.

deaths annually, with a notable 2,900 cases occurring in non-smokers[38]. Despite the gravity of this issue, the assessment lacks a thorough analysis of the specific health risks posed by radon emissions, including its potential carcinogenic impacts on respiratory health. The provided estimate of 7.44E-02 PTU (curies per year) for radon emissions (as presented in Table 5.9-4. Operational Annual TAC Emissions Estimates – Routine Operating Year)[39], while acknowledged, remains insufficient in addressing the comprehensive health implications. The Surgeon General's 2005 national health advisory on radon underscores its significance, emphasizing the need for a more detailed and critical evaluation of the potential health risks associated with radon exposure in the BRGP, especially focusing on its direct impact on respiratory health and the associated carcinogenic effects.[40]

Conclusion

The facts identified and referenced in this comment letter led me to reasonably conclude that the Project could result emissions increases that may exceed IAPCD Rule 207 thresholds without adequate BACT. As currently proposed, the Project is likely to result in significant impacts on air quality and public health if allowed to proceed.

Sincerely,

Dr. Komal Shukla

[38] U.S.EPA. 2024. Health Risk Of Radon. Accessed February 29, 2024.https://www.epa.gov/radon/health-risk-radon.
[39] AQP Application, P. 167
[40] HSS Press Office. 2005. Surgeon General Releases National Health Advisory On Radon. Thursday, January 13, 2005)

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Air Quality Scientist

GROUP DELTA

Education
Ph.D. in Photochemical Modeling of Air Pollution (Environmental Engineering), Indian Institute of Technology Delhi-IIT Delhi (Photochemical Modeling of Ground Level Ozone), Delhi, India; Visiting Ph.D. Student, Institute Fellow, Gees, University of Birmingham, UK; MPhil Environment and Sustainable Development, IESD, Banaras Hindu University, Varanasi, India; M.Sc. Environment Management, University School of Environment Management (Sustainable and Low Carbon Energy Plan for Delhi), Delhi, India; B.Sc Chemistry (with honors) in Chemistry, University of Delhi, India

Years of Experience: 7

Years with Group Delta: 1

Dr. Shukla has a Ph.D. in air quality and atmospheric phenomenon modeling, with a strong technical background in tropospheric chemistry, industrial and city level environmental solutions, regulatory and global model applications, trace gases and particulate matter impact on human health and climate, and observations data analytic. Dr. Shukla is an air quality emissions modeler with nearly a decade of technical and research experience. She served as an in-house lead in federal contract scientific projects supporting the EPA's mission. Related experience includes:

Litigation, Compliance, Environmental Justice, On-Road Emissions, Industrial Emissions, California: As Air Quality Modeling Scientist, Ms. Shukla completed two major projects, including: Project I: Source apportionment of ozone and particulate matter pollution using photochemical modeling techniques, and Project II: Transportation and near-road air quality and emissions projection.

Environment and Climate Change Canada (ECCC), Toronto, Canada: As Research Scientist (Air Quality Modeling and Compliance in Alberta), Ms. Shukla completed two significant projects, including: Project I: Developing a photo-chemical transport model to understand oil and sands region emissions in North America and Project II: Modeling applications in delineating chemistry of tropospheric tracers.

University of North Carolina, Institute of Environment, Chapel Hill, North Carolina: As Postdoctoral Research Associate (Air Quality – Nyserda Led Air Quality Model Development, Ms. Shukla worked on critical projects including: Project I: Air quality modeling of various city level sources and health exposure sciences in New York City, - funded by NYSERDA and Project II: TRECH project (https://www.hsph.harvard.edu/c-change/news/trechstudy/) - Transportation, Equity, Climate & Health CMAQ based modeling of vehicular emission and policy assessment on the East Coast.

Indian Institute of Technology Delhi (IIT Delhi), Delhi, India: As Research Associate, Ms. Shukla worked on Project I: Quantification and contribution of paddy stubble burning emissions in Haryana to estimate PM2.5 concentrations in its surrounding cities and Delhi. Role: Modelling meteorology and PM2.5 for north India using WRF-chem and Project II: A Systems Approach to Air Pollution in Delhi (ASAAP) mobility grant funded by GCRF and NERC. Role: Monitored outdoor PM2.5 concentrations at two flyovers in Delhi and assessed pavement dwellers exposure to air pollution of PM2.5 near heavily trafficked roads to see impact on dwellers.

Various Technical Skills
Languages: T and C Shell-script, MATLAB, Fortran, Python, NCL, R, and NETCDF satellite data retrievals and analysis
Models: WRF-Chem, GEM-MACH, CMAQ, GCAM, CTOOLS, AERMOD, CALPUFF, ADMS, MOVES, InMAP and COBRA.

GROUP DELTA

Photochemical pollutant and aerosol/dust modeling and urban air quality. Expertise in tropospheric chemistry, machine learning aided regression models, WRF-Chem/CMAQ (Chemical transport models), dispersion models.

Air Quality: CTOOLS/AERMOD/ADMS/R-LINE and satellite data assessment (OMI-AURA and MODIS). USEPA observation and meteorology handling, anthrapoegenic/energy emission inventory QA and preparation (MOVES), and impacts-benefits.

Select Research Papers:

- Shukla, K., Seppanen, C., Naess, B., Chang, C., Cooley, D., Maier, A., .. &Arunachalam, S. (2022). ZIP Code Level Estimation of Air Quality and Health Risk Due to Particulate Matter Pollution in New York City. Environmental Science & Technology.
- Shukla, K., Kumar, P., Mann, G. S., & Khare, M. (2020). Mapping spatial distribution of particulate matter using Kriging and Inverse Distance Weighting at supersites of megacity Delhi. Sustainable cities and society, 54, 101997.
- Shukla, K., Srivastava, P. K., Banerjee, T., & Aneja, V. P. (2017). Trend and variability of atmospheric ozone over middle lndo-Gangetic Plain: impacts of seasonality and precursor gases. Environmental Science and Pollution Research, 24(1), 164-179.
- Shukla, K., Dadheech, N., Kumar, P., & Khare, M. (2021). Regression-based flexible models for photochemical air pollutants in the national capital territory of megacity Delhi. Chemosphere, 272, 129611.
- Gulia, S., Khanna, 1., Shukla, K., & Khare, M. (2020). Ambient air pollutant monitoring and analysis protocol for low- and middle-income countries: An element of comprehensive urban air quality management framework. Atmospheric Environment, 222, 117120.
- Khare, M., & Shukla, K. (2020). Outdoor and Indoor Air Pollutant Exposure. In Environmental Pollutant Exposures and Public Health (pp. 95-114)
- Kumar, G. S., Sharma, A., Shukla, K., & Nema, A. K. (2020). Dynamic programming-based decision-making model for selecting optimal air pollution control technologies for an urban setting. In Smart Cities-Opportunities and Challenges (pp. 709-729). Springer, Singa pore.

Select Technical Conferences:

- Shukla, K., OJha, N., & Khare, M., (2019) Air Quality Simulations over Delhi Using WRF-Chem in Conference of Indian Aerosol Science and Technology Association 2018 "Aerosol lmpacts:Human Health to Climate Change" 2018 http://cas.iitd.ac.in/iasta20l8/pdf/
- Shukla, K., Xiaoming, C., OJha, N., & Khare, M., (2018), Air Quality Simulations over Delhi Using WRF-Chem: Effects of Lo- cal Pollution and Regional-Scale Transport , A42A-0l presented at 2018 Fall Meeting, AGU, Washington, D.C., 10-14 Dec. http://abstractsearch.agu.org/meetings/2018/FM/A42A-0l. htm1 (Talk)
- Shukla, K., & Khare M., (2019) Behaviour of Ground Level Ozone and Its Association with Precursors and Meteorology in Delhi, India, AS17-A023, Atmospheric Chemistry in Highly Polluted Environments: Emissions, Fates, and Impacts, AS17-A023 presented at 2019 16th Annual meeting AOGS, Singapore, 28th -2nd August (Poster)
- Shukla, K., Kumar, S., & Nema A., (2019) Environmental Characterization of Two Chromium-based Industrial Waste Contaminated Sites of India, accepted as BllH-2219, to be presented in presented at 2019 Fall Meeting, AGU, San Francisco, CA, USA 09-13 Dec. (Poster)
- Shukla, K., & Khare M., (2019), Behavioral Chemistry of ground level ozone formation in heavily polluted environment of Delhi city, accepted as A21G-2645, to be presented in presented at 2019 Fall Meeting, AGU, San Francisco, CA, USA 09-13 Dec.
- (Poster) Kumar. S, Sharma. A., Shukla K., Nema, A.K., (2019). Dynamic programming based decision-making model for selecting optimal air pollution control technologies for an urban setting. Presented at 1st smart cities conference, Delhi, India (Talk).

International Panelist

Air Pollution, Environmental Management and Policy Related Invited Talks:

- Minimizing air pollution in Delhi city, Pure Earth, NY, USA, Boston College, 2019
- Photochemical pollution in heavily polluted environments of India and China" in the Development of Traffic Pollution Dispersion Models based upon Artificial Intelligence Technology, Chang'an University, Xian, 2019, China
- Air Pollution Challenges and Mitigation Opportunities in Delhi, CADTIME, Newcastle University, 2019, UK
- Indoor Air Quality: Problems and Initiatives", 2nd Indian International National Conference on Air Quality Management (IICAQM 2017): Health and Exposure, Indian Institute of Technology Delhi, New Delhi 2017, India
- Tackling the Challenges of Air Pollution in India", Indian Institute of Public Administration, New Delhi, 2019, lndia