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**LV Equity Technical Advisory Group Comments on Preliminary
Determination of Compliance (PDOC) for Elmore North Geothermal,
LLC**

Additional submitted attachment is included below.



March 4, 2024

Jesus Ramirez
Imperial County Air Pollution Control District
150 South Ninth Street
El Centro, CA 92243
via email: jesusramirez@co.imperial.ca.us

Re: Comments on Preliminary Determination of Compliance (PDOC) for Elmore North Geothermal, LLC

Dear Mr. Ramirez:

Please find below comments on the Preliminary Determination of Compliance (PDOC) for Elmore North Geothermal, LLC, submitted by experts from Comit  Civico del Valle's Lithium Valley Equity Technical Advisory Group.

The Lithium Valley Equity Technical Advisory Group collaborates with Comit  Civico del Valle and the Lithium Valley Community Coalition on:

- Reviewing of the scientific and legal literature to guide the development of a research agenda for the expansion of a circular lithium economy based in the Imperial Valley, with requirements for environmentally responsible raw material sourcing, refinement, and product design that supports material recovery, reuse, and recycling;
- Surveying Lithium Valley stakeholders to identify priorities that can contribute to government and academic research goals, while emphasizing participatory research models for community engagement and action;
- Connecting technical support to strengthen environmental and health mitigation measures in the preparation of Imperial County's Lithium Valley Programmatic Environmental Impact Report for local stakeholders; and
- Executing research/analysis that can support community benefit projects and agreements, in addition to educational pathways for a skilled and trained workforce, including internships, apprenticeships, certificate, and degree programs for Imperial Valley residents.

We have been conducting community-engaged research on environmental justice issues relating to the development of Lithium Valley and hold expertise in a variety of related fields. Our CVs are already on file with the County from previous comment periods in the planning process for Lithium Valley. We hope that our comments will be helpful in ensuring that any of the relevant proposed projects, including this one, are built in a just and sustainable way. In what follows we offer suggestions for further consideration of impacts related to air quality.

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Cumulative Impacts

- This analysis should carefully consider not only direct and induced, but also cumulative impacts on the entire Imperial County Air Pollution Control District, which is already severely degraded. Reduced inflow to the Salton Sea would indirectly impact air quality by exposing more lakebed and releasing toxic dust into the air.¹ Any worsening air quality would significantly impact public health and likely exceed legal thresholds, which must be analyzed and mitigated. Air flow models should include those that measure pollutant transport to other areas of Imperial County, air basins, and air districts. In addition, we must also consider the broader impact on air quality caused by the buildout of this project as well as other geothermal plants and renewable energy infrastructure developments throughout Imperial County on the already receding Salton Sea.
- In addition to dust suppression and mitigation, plans should be outlined for pavement of roads, ideally with permeable material to mitigate climate and health risks. Despite the well-known problems related to dust pollution in this area, a dust control plan is only required 10 days prior to construction, and paving roads is not required according to the document (Imperial County Air Pollution Control District, 2024, p. 32; 38). Internal combustion engines proposed by the Applicant may be exempt from emission limits if they are emergency standby engines (Imperial County Air Pollution Control District, 2024, p. 31), but the role of electric vehicles (EVs), including trucks and off-road vehicles, in mitigating air pollution from traffic and goods transportation should be outlined in detail with performance metrics for commute trip reduction, rideshare programs, and heavy-duty charging infrastructure.
- In addition to measures described by the Applicant in responses to data requests, such as PPE and fugitive dust control, mitigation planning should support more robust monitoring for Valley Fever infections in the County from exposure to soil pathogens in dust. Even if Valley Fever is not considered to be endemic in Imperial Valley, as the Applicant has asserted in response to data requests, disturbing soil has been linked to outbreaks in places where the fungus was not expected to live, according to the CDC.²
- Air quality impacts should include exposure to asbestos, lead, bird waste, and other respiratory irritants, with specific attention made in CalEnviro Screen designated areas.

Best Available Control Technologies (BACT)

- According to the determination of compliance, BACT is triggered for PM10 and H2S emissions, and models show these emissions exceeding thresholds (Imperial County Air Pollution Control District, 2024, p. 24; 28; 35). Nonetheless, the Air District's proposed BACT alternatives were rejected. In some cases, tradeoffs regarding water use or other incompatibilities rendered such alternatives technically infeasible. However, in other instances proposed BACT alternatives were

¹ See: Johnston, J. E., Razafy, M., Lugo, H., Olmedo, L., & Farzan, S. F. (2019). The disappearing Salton Sea: A critical reflection on the emerging environmental threat of disappearing saline lakes and potential impacts on children's health. *Science of The Total Environment*, 663, 804–817. <https://doi.org/10.1016/j.scitotenv.2019.01.365>

See also: Farzan, S. F., Razafy, M., Eckel, S. P., Olmedo, L., Bejarano, E., & Johnston, J. E. (2019). Assessment of Respiratory Health Symptoms and Asthma in Children near a Drying Saline Lake. *International Journal of Environmental Research and Public Health*, 16(20), Article 20. <https://doi.org/10.3390/ijerph16203828>

² CDC. (2021, February 22). *Valley Fever Maps / Fungal Diseases*. <https://www.cdc.gov/fungal/diseases/coccidioidomycosis/maps.html>

rejected because they were considered less cost-effective, for example regenerative thermal oxidizers and bioreactors as potential alternatives to spargers (Imperial County Air Pollution Control District, 2024, p. 25). There needs to be substantial evidence showing that these alternatives are not cost effective. Without such evidence, these alternatives should be reconsidered in relation to the significant tax and financial incentives that the Applicant has been able to access for advancing this development project.³

- Moreover, the Applicant needs to ensure a process for periodic review of BACTs and other emerging best practices that can be employed. This could be achieved through an annual review process linked to the Specific Plan and Programmatic Environmental Impact Report for Lithium Valley, which includes this project in its study area. Whether or not BHE Renewables plans to extract lithium from this facility, it should be subject to a public review and the ability of the public and other public agencies to weigh in on emerging impacts, BACTs, and other issues that may emerge as the industry near the Salton Sea develops. For example, the Applicant should track progress toward better drift eliminators with a greater drift rate that can remove higher concentrations of pollutants.
- The Applicant should explain how mineralization buildup affects the effectiveness of drift eliminators and pollution control and their plan for maintenance and cleaning to ensure equipment operates to performance specifications.
- The proposed drift eliminators for the cooling towers are an “end-of-pipe” solution to air pollution emissions. The Applicant should pursue methods to remove contaminants like mercury and H₂S from the raw steam before they reach the generators, as upstream abatement or separation before the turbines will result in fewer downstream emissions. This could help reduce pollution and increase the capture of pollution at the cooling tower and help avoid heavy metals and other pollution emissions.

Brine Pond Alternatives

- Brine ponds represent one of the potential sources of hazardous waste and emissions at geothermal facilities (Dobson et al., 2023, p. 136).⁴ Based on the description of the Fluid Injection System, the brine pond at this proposed site appears to be used to temporarily store all manner of potentially hazardous waste (Imperial County Air Pollution Control District, 2024, p. 6).⁵ It is worth noting that there is a track record of spill-related contamination at most of the geothermal facilities in the Salton Sea Known Geothermal Resource Area (SSKGRA) after inaccurate predictions of low spill risk in previous EIRs, and CalEnergy / BHE Renewables already agreed to pay a \$910,000 penalty and conduct soil remediation as part of a 2007 consent

³ Bojórquez, A. (2023, July 23). *State approves sales and use tax exclusion incentives for lithium manufacturers in Imperial County*. Imperial Valley Press Online. https://www.ivpressonline.com/featured/state-approves-sales-and-use-tax-exclusion-incentives-for-lithium-manufacturers-in-imperial-county/article_654e1e2c-28df-11ee-97af-03fc855a40a4.html

⁴ Dobson, P., Araya, N., Brounce, M., Busse, M., Camarillo, M. K., English, L., Humphreys, J., Kalderon-Asael, B., McKibben, M., Millstein, D., Nakata, N., O’Sullivan, J., Planavsky, N., Popineau, J., Renaud, T., Riffault, J., Slattery, M., Sonnenthal, E., Spycher, N., ... White, M. (2023). *Characterizing the Geothermal Lithium Resource at the Salton Sea*. <https://escholarship.org/uc/item/4x8868mf>

⁵ Imperial County Air Pollution Control District. (2024). *Preliminary Determination of Compliance (POC) Elmore North*. California Energy Commission. <https://efiling.energy.ca.gov/GetDocument.aspx?tn=254004&DocumentContentId=89308>

agreement.⁶ Alternatives to brine ponds should be considered for onsite waste handling and storage, such as: (a) above-ground, sealed storage containers to prevent spills and wind-blown contaminants, and secured to avoid tipping in the event of earthquakes; (b) effectively covered to minimize emissions; and/or (c) covered solar to generate further onsite renewable energy that could also serve as an alternative to diesel generation. Given the high potential likelihood of hazardous materials, these storage containers should not be treated as exempt like the tank storage contents described in the compliance decision—some of which may contain 20,000 gallons of hydrochloric acid (Imperial County Air Pollution Control District, 2024, p. 7; 23).

- It is imperative to develop and implement a comprehensive stormwater management plan that meticulously separates centralized and/or decentralized spill control mitigation facilities from stormwater runoff management infrastructure. This approach is designed to safeguard against adverse impacts during extreme hydrologic events. By delineating distinct zones for spill control and stormwater management, the potential contamination present in spill control facilities can be effectively contained, preventing its dispersion into surrounding areas via stormwater runoff that may have other knock-on effects for air quality in the broader Salton Sea region. This proactive measure not only preserves the integrity of stormwater management systems but also mitigates the environmental risks associated with the spread of contaminants, and consequent costs.

PM10 Emissions

- According to the compliance decision, modeling results for this project exceed the CAAQS standards for PM10 (Imperial County Air Pollution Control District, 2024, p. 28). However, this is dismissed because 24-hour and annual background PM10 concentrations already exceed the CAAQS based on data from 2019-2021 from the Niland monitoring site (Imperial County Air Pollution Control District, 2024, p. 29). This failure of compliance seems to be allowed based on the logic that Imperial Valley is a “green sacrifice zone.”⁷ While renewable energy development may appear to meet state and federal climate action goals, it must not render the area a green sacrifice zone by perpetuating unresolved environmental problems or creating new ones, especially considering the urgent need for environmental justice and ecological restoration of the Salton Sea region.

Radon and other hazardous Non-Condensable Gases (NCGs)

- In response to data requests, BHER recently disclosed emissions of radon as high as 2515 pCi/L from Non-Condensable Gas Vacuum Discharge at the CalEnergy Elmore Geothermal Power Plant (Jacobs and Black Rock Geothermal LLC, p. 19).⁸ Whether this gas enters the atmosphere or remains inside the facility, this is an alarmingly high level of exposure for workers and fenceline communities, considering the significant cancer risks outlined by the EPA for long-

⁶ CalEnergy Operating Corp., SRPD GIC851471 (Dep’t of Toxic Substances Control Mar. 7, 2007) (corrective action consent agreement).

⁷ See: Cantor, A., & Knuth, S. (2019). Speculations on the postnatural: Restoration, accumulation, and sacrifice at the Salton Sea. *Environment and Planning A: Economy and Space*, 51(2), 527–544. <https://doi.org/10.1177/0308518X18796510>
See also: Zografos, C., & Robbins, P. (2020). Green Sacrifice Zones, or Why a Green New Deal Cannot Ignore the Cost Shifts of Just Transitions. *One Earth*, 3(5), 543–546. <https://doi.org/10.1016/j.oneear.2020.10.012>

⁸ Jacobs, & Black Rock Geothermal LLC. (2023). Black Rock Geothermal Project Response to ICAPCD Data Request #1. California Energy Commission. <https://efiling.energy.ca.gov/GetDocument.aspx?tn=252546&DocumentContentId=87632>

term exposures to radon above 4 pCi/L.⁹ Exposure to this radioactive gas is the leading cause of death due to lung cancer among non-smokers.¹⁰ High soil radon has been detected across geothermally active areas, and scientists have analyzed radionuclides in geothermal brine via aquifer host rocks beneath the Salton Sea.¹¹ OSHA offers guidelines for protecting workers in different exposure scenarios.¹² Nonetheless, in the determination of compliance, cancer risks are considered below the SCAQMD significance threshold (Imperial County Air Pollution Control District, 2024, p. 35).

- Radon is not mentioned in the Air District determination of compliance until the very end of the document as source tests needed for analysis. It is not included in estimates of emissions that focus primarily on hydrogen sulfide (p. 15-22). Given the disclosure of significant levels of radon at neighboring facilities, it is critical to consider more rigorous mitigation measures comparable to the abatement of hydrogen sulfide described in the document, including: limits on emissions, continuous monitoring, notification and reporting, as well as surveying to further analyze results. These mitigation measures would help to prevent and control cumulative atmospheric emissions of all NCGs, including radon, before this proposed project and other related developments are approved. Occupational radon exposures should also be monitored to ensure that they remain below levels suggested by OSHA for worker health and safety.¹³
- Other non-condensable gases should receive similar attention, including ammonia, arsenic, mercury, benzene, toluene, and xylene (Imperial County Air Pollution Control District, 2024, p. 47). Exposure to hydrogen sulfide emissions from geothermal plants is associated with an increase in hospitalization due to respiratory diseases, as well as nervous system disorders and cardiovascular diseases.¹⁴ The need for a robust hydrogen sulfide reduction system in geothermal energy development is well known.¹⁵ Yet, while hydrogen sulfide is considered a “nuisance” due in part to its odor, the air quality health standards for the other NCGs also ought to be rigorously monitored (Imperial County Air Pollution Control District, 2024, p. 32).

⁹ US EPA. (2014, August 14). *Health Risk of Radon* [Overviews and Factsheets]. <https://www.epa.gov/radon/health-risk-radon>

¹⁰ Somsunun, K., Prapamontol, T., Pothirat, C., Liwsrisakun, C., Pongnikorn, D., Fongmoon, D., Chantara, S., Wongpoomchai, R., Naksen, W., Autavapromporn, N., & Tokonami, S. (2022). Estimation of lung cancer deaths attributable to indoor radon exposure in upper northern Thailand. *Scientific Reports*, 12(1), Article 1. <https://doi.org/10.1038/s41598-022-09122-y>

¹¹ See: Aydar, E., & Diker, C. (2021). Carcinogen soil radon enrichment in a geothermal area: Case of Güzelçamlı-Davutlar district of Aydın city, western Turkey. *Ecotoxicology and Environmental Safety*, 208, 111466. <https://doi.org/10.1016/j.ecoenv.2020.111466>

See also: Zuckin, J. G., Hammond, D. E., Teh-Lung, K., & Elders, W. A. (1987). Uranium-thorium series radionuclides in brines and reservoir rocks from two deep geothermal boreholes in the Salton Sea Geothermal Field, southeastern California. *Geochimica et Cosmochimica Acta*, 51(10), 2719–2731. [https://doi.org/10.1016/0016-7037\(87\)90152-9](https://doi.org/10.1016/0016-7037(87)90152-9)

¹² Occupational Safety and Health Administration. *Ionizing Radiation—Hazard Recognition*. <https://www.osha.gov/ionizing-radiation/hazards>

¹³ Degu Belete, G., & Alemu Anteneh, Y. (2021). General overview of radon studies in health hazard perspectives. *Journal of Oncology*, 2021. <https://www.hindawi.com/journals/jo/2021/6659795/>

¹⁴ Bustaffa, E., Cori, L., Manzella, A., Nuvolone, D., Minichilli, F., Bianchi, F., & Gorini, F. (2020). The health of communities living in proximity of geothermal plants generating heat and electricity: A review. *Science of The Total Environment*, 706, 135998. <https://doi.org/10.1016/j.scitotenv.2019.135998>

¹⁵ Özcelik, M. (2022). Environmental and social impacts of the increasing number of geothermal power plants (Büyük Menderes Graben—Turkey). *Environmental Science and Pollution Research*, 29(11), 15526–15538. <https://doi.org/10.1007/s11356-021-16941-5>

Sincerely,



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