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MEMORANDUM

Date: September 27, 2019

To: California Energy Commission

From: Graeme Donaldson, CTR and Susanne Heim, Panorama Environmental, Inc.

Subject: Recommendations to Improve Lithium and Geothermal Permitting

Objective

Geothermal and lithium development at the Salton Sea presents opportunities to:

1. Generate geothermal power to address the State of California needs for baseload renewable energy to meet policy objectives for renewable energy integration and greenhouse gas reduction and
2. Achieve State objectives for creating a reliable domestic supply of lithium to power the electric vehicle market.

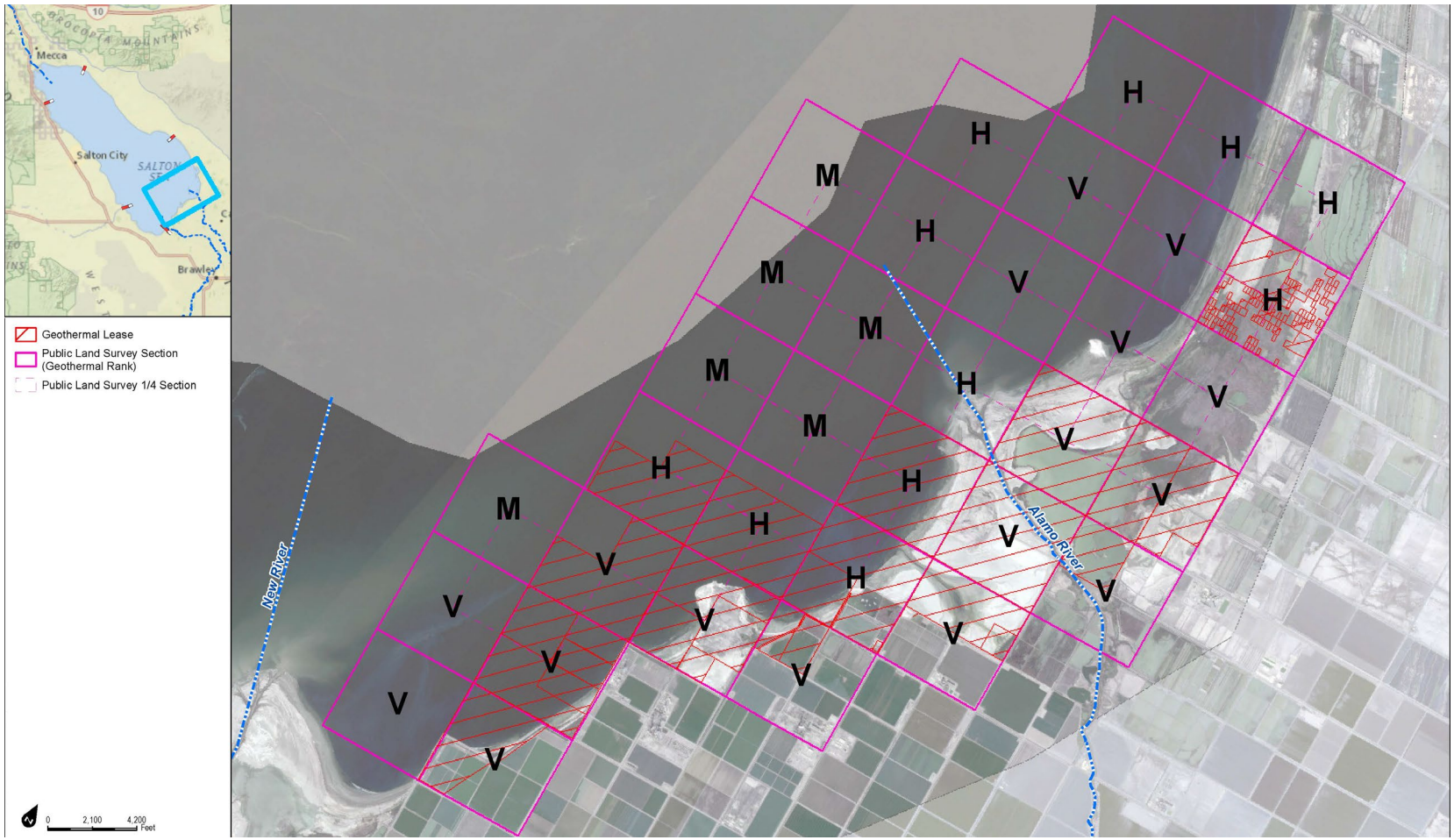
This memo identifies key regulatory/permitting hurdles to developing additional geothermal/lithium resources at the Salton Sea and presents possible solutions to either remove the hurdles or improve the permit timeline for geothermal and lithium projects.

#1 - Issue – Changing Limits of Waters of the United States

The Salton Sea is receding at a rate of approximately 1 mile every 5 years. Areas within the Salton Sea Known Geothermal Resource Area (SSKGRA) that have high concentrations of lithium and high geothermal temperatures have become exposed and will continue to be exposed as the Salton Sea recedes. Refer to Figures 1 and 2 for a map of areas of very high and high expected lithium concentrations and high temperature. The U.S. Army Corps of Engineers (Corps) delineated the limits of a portion of the Salton Sea in 2012 for the State of California Species Conservation and Habitat (SCH) Project. In the absence of a new delineation for the Salton Sea, the Corps has been applying the 2012 limits of the Salton Sea to areas where the Salton Sea has receded.

The receding sea has been modeled by the State of California to determine areas where mitigation will be needed to address the exposed playa. The areas of exposed playa are the focus of State of California dust suppression efforts to address health risk from mobilization of contaminants in the playa sediments. This video illustrates the extent that the sea has and is anticipated to recede over the next 30 years: https://youtu.be/Sua-gQyTScU. Areas that are currently under the Salton Sea will become available for geothermal and lithium development as the Salton Sea recedes exposing bare ground. Development of lithium and geothermal resources in areas of exposed playa would help to stabilize the playa from wind erosion, which could assist the State of California in meeting its objectives for dust mitigation at the Salton Sea.

Figure 1 Areas of Very High, High, and Moderate Lithium Concentrations at the Salton Sea



Note: V= very high concentrations of lithium; H= high concentrations of lithium; and M=moderately high lithium concentrations.

Source: IID 2015

Figure 2

Figure 2.4: Measured subsurface temperature distribution at -3,500 feet (msl)

FIG2-2 TM1500.DWG/11FEB04

#1 – Need to Delineate Salton Sea

The Corps needs to update the limits of jurisdiction over the Salton Sea to reflect the current circumstances with the changing sea elevation. A large portion of the areas that contain very high and high lithium concentrations and high geothermal temperatures are located within areas where the Salton Sea has receded. CalEnergy and Controlled Thermal Resources have existing geothermal and mineral leases in the area, but geothermal development and lithium extraction has not occurred in the area because the area was previously inundated by the Salton Sea and therefore inaccessible for development. Routine adjustment of the limits of waters of the U.S. to reflect current circumstances would create new opportunities for geothermal and lithium development at the Salton Sea by:

1) Focusing new lithium and geothermal development in areas of exposed playa where there are limited natural resource conflicts
2) Reduce permitting timelines for geothermal and lithium project in areas that no longer contain waters of the U.S.
3) Provide increased certainty over the regulatory requirements for geothermal development in areas where the Salton Sea has receded to spur financial investment in lithium development.

#1 – Opportunity - Technical Support to Adjust the Limits of the Waters of the United States

The State could fund a jurisdictional delineation study to redefine the limits of the Salton Sea within the SSKGRA. This scientific study would be used by the Corps to support adjustment of the jurisdictional limits of the Salton Sea. The Corps' regulatory process requires the Corps to respond to requests for jurisdictional determination, but the Corps will not update the limits of their jurisdiction in the absence of a third-party request for determination and supporting technical studies. The Corps' guidance provides that a wetland delineation and jurisdictional delineation is valid for 5 years. While the previous jurisdictional determination is more than 5 years old and does not represent the current circumstances, the Corps will not update the limits of their jurisdiction in the absence of a new study and formal request. The revised limits of the Salton Sea would remove a regulatory hurdle for future lithium and geothermal development in areas where the sea has receded.

#2 – Issue - Permitting Timelines

Lithium development can require permits from numerous state agencies including the Colorado River Regional Water Quality Control Board, California Department of Fish and Wildlife, Imperial County Air Quality Management District, Department of Toxic Substance Control, and California Geothermal Energy Management among others. The permitting timelines that are defined in Permit Streamlining Act are frequently exceeded with agency staff focusing on process rather than results.

#2 – Need to Improve Permitting Timelines

Greater tracking and accountability is needed at higher levels of government to ensure that state regulatory agencies prioritize lithium permitting due to the importance of lithium and geothermal development to meeting state goals for reduction in carbon emissions and renewable energy. The importance of lithium and geothermal projects to the socio-economic conditions at the Salton Sea as well as the State as a whole needs to be communicated to regulatory staff so that they understand the importance of their role in developing a domestic supply of lithium. Regulatory staff may also lack experience with lithium permitting and may delay the permit process due to limited understanding for the process that is involved.

#2 – Opportunity - Tracking of Lithium Project Permitting Schedules and Regulator Training

The State of California should create a permit tracking system for lithium/geothermal projects and require weekly updates from regulators on the status of permit issuance and any issues that have been encountered in the process. The State should also organize a training for regulators who are working on lithium permits to ensure that they understand 1) the importance of lithium and geothermal development to meeting State goals and 2) the mechanics of the lithium and geothermal process and how it relates to their regulatory process.

#3 – Issue - Absence of Procurement for Baseload Renewable Energy

Lithium extraction from geothermal brine requires a reduction in the temperature of the brine prior to extraction. The temperature reduction is best accomplished through energy production from geothermal power production technology. Lithium and geothermal production occur 24 hours a day. The State of California and neighboring states in recent years have been uninterested in procuring baseload renewables due to the amount of solar power that is on the market. The State of California is regulating the procurement of renewable power through the integrated resource planning (IRP) process at the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC), but a central buyer has not yet been established to address issues of resource adequacy in a consolidated manner. The lack of baseload renewable power has also contributed in part to the CPUC's proposed extension of once through cooling in California by another 3 years, which exceeds the retirement date that was previously mandated. The procurement process is also focused on short-term targets and typically does not extend out to the timeframe it takes to get a lithium project constructed and on the market. The CPUC in the 2018-19 IRP cycle determined that it would be economical to procure an additional 1,700 megawatts of geothermal power by 2030, but that decision has not translated into new procurement opportunities for baseload geothermal energy to date. The lack of available power purchase agreements for geothermal power slows the development of geothermal and lithium projects because reduction of heat to extract lithium is most effectively achieved through production of geothermal power. Procurement of geothermal power would both help the state address the resource adequacy challenges that it currently faces and provide

a domestic supply of lithium for battery production to support both electrification of the vehicle market and energy storage for electrical system reliability.

#3 – Need Opportunities for Geothermal (Baseload) Power Procurement

Purchasers of electric power, including load serving entities (i.e., investor owned utilities and community choice aggregators) and publicly owned utilities, need to include opportunities in their procurement process for baseload geothermal power to allow for additional lithium extraction associated with baseload power generation. The procurement market also needs to align the procurement timeframe for baseload power to align with the timeframe it takes to get a lithium and geothermal project on the market.

#3 – Create Opportunities for Geothermal Power Procurement in the Regulatory Process for the IRP and Resource Adequacy Proceedings

The CPUC and CEC are regulating the IRP process. As part of this regulation, the state could pass on requirements to load serving entities and publicly owned utilities for procurement of baseload renewable energy. In addition, the central buyer that is being developed by the CPUC through the resource adequacy proceeding should provide opportunities for advanced power purchase agreements for geothermal power in consideration of the timeframe that it takes to develop a geothermal project. Greater certainty over the procurement process and market for geothermal power and specifically purchase agreements for geothermal power will help spur investment into lithium extraction by creating additional opportunities for lithium generation.

Summary

This memo identifies three opportunities for the State of California to improve the regulatory process and improve opportunities for production of lithium power. These opportunities include:

1. State funding for a study to support the Corps adjustment of the limits of the Salton Sea to reflect current circumstances. Update of limits of waters of the U,S, at the Salton Sea to reflect current circumstances would remove a regulatory hurdle for extraction of lithium from areas that were previously inundated by the Salton Sea.
2. Creating a centralized tracking system for lithium project permitting by various state regulatory agencies, requiring regular reporting from regulators on the status of the permit process, and providing training to regulators on the lithium extraction process.
3. Encourage advanced procurement of geothermal power through the IRP and resource adequacy process to create new market opportunities for lithium extraction from geothermal brine.