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REPORT

Willow Rock Energy Storage Center (21-AFC-02)

Data Request Response Set 3

Submitted by:

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Foreword

On March 1, 2024, GEM A-CAES, LLC (Applicant) docketed the Supplemental Application for Certification (AFC) Volume 1 for the Willow Rock Energy Storage Center (WRESC; 21-AFC-02). On July 16, 2024, the Executive Director recommends that the Committee accept the Supplemental AFC as complete, and that the 12-month timeline to reach a decision on the AFC, as required by Public Resources Code section 25540.6, should begin.

Pursuant to Title 20, California Code of Regulations, section 1716, California Energy Commission (CEC) Staff on September 23, 2024, docketed Data Requests Set 3. Data Requests Set 3 presents a list of questions associated with the resource topic areas of Biological Resources; Greenhouse Gas Emissions (Climate Change); Hazardous Waste; Reliability; Transmission System Engineering; Water Resources; and Worker Safety and Fire Protection.

To address CEC Staff's request, each Data Request within Set 3 has been responded to with supplemental information or guidance on where the information may be found.

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1.0 INTRODUCTION

GEM A-CAES LLC's (the "Applicant") is responding to the California Energy Commission (CEC) Staff Data Requests Set 3, numbers:

- **Biological Resources**: DR42 through DR45
- **Greenhouse Gas Emissions**: DR46 through DR51
- **Hazardous Waste**: DR52 through DR60
- **Reliability**: DR61 through DR65
- **Transmission System Engineering**: DR66 through DR68
- **Water Resources**: DR69
- **Worker Safety and Fire Protection**: DR70 through DR80

This response document addresses CEC Data Request Set 3. The responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as presented by CEC Staff and are keyed to the Data Request (DR) numbers (DR#). New or revised graphics, tables, or attachments are provided as attachments and are numbered in reference to the Data Request number. For a hypothetical example, the first attachment used in response to Data Request DR42 would be numbered Attachment DR42-1. Each page in this response document is sequentially page-numbered consistently with the remainder of the document, although some attachments may also have their own internal page numbering system.

2.0 BIOLOGICAL RESOURCES

2.1 Acreage Impacts

2.1.1 Data Requests DR42 and DR43

In the Supplemental Application for Certification (supplemental application or Supplemental AFC), Sections 2.0 Project Description and 5.2 Biological Resources (TN254806), the applicant discusses temporary and permanent impacts. The impact discussion covers construction impacts based on the location of impact such as WRESC facility, laydown, parking, transmission poles, etc. While this information is very useful, there are discrepancies between the two sections. For example, habitat impacts from transmission pole placement vary from 0.29 acre (Section 5.2) to 16.1 acres (Section 2.0) and habitat impacts from access roads vary from 6.4 acres (Section 5.2) to 4 acres (Section 2.0). Table 5.2-6: Acreage of Land Use and Vegetation Communities provides acreages for each vegetation community/land use designation (TN 254806) which includes optional gen-tie routes and buffers). This table does not provide acreages based on temporary or permanent impacts. Table 7: Acreage of Land Use and Vegetation Communities (TN 258316) provides acreage for gen-tie line variances, P2 north, and P2 south. This table also does not provide acreages based on temporary or permanent impacts.

DR42: *Please rectify the discrepancies between the acreage number presented in Section 2.0 and Section 5.2 with regards to permanent and temporary acreage impacts.*

Response: The total summary of estimated permanent and temporary disturbances with and without onsite rock reuse are shown in Table 2-3 Section 2.0 has been updated to reflect current project features (slight increase in number of transmission poles and placement of pull and tensioning sites). See **Attachment DR42-1, Table**

DR 42-1. Please note that Table 5.2-6 reported acreages for the entire area that was surveyed for biological resources (including route options and buffers), the majority of which will not be disturbed by the project.

DR43: *Please update Table 5.2-6 and Table 7 to include permanent and temporary acreages of each vegetation community/land use based on the "location" of impact used in Table 2-3: Summary of Estimated Permanent and Temporary Disturbance With and Without Onsite Rock Re-use.*

Response: See **Attachment DR43-1, Table DR43-1** for a table including permanent and temporary acreages of each vegetation community/land use impact in the updated Table 2-3 provided in **Attachment DR42-1**.

2.2 California Desert Native Plant Protection – Cactus Species

2.2.1 Data Request DR44

The Flora Compendia in Appendix 5.2A (TN 254811) lists one cactus species – silver cholla (*Cylindropuntia echinocarpa*), which is not shown on any figures or in the GIS data already provided. The removal of this cactus requires a permit as well as a fee per plant removed in accordance with the California Desert Native Plant Protection Act (Division 23 of the California Food and Agricultural Code, Chapter 3 Regulated Native Plants, sections 80071-80075, and Chapter 4 Enforcement Powers and Administrative Responsibilities, sections 80101-80108) that will be incorporated into staff's conditions of certification. In order to determine the fee and where these species occur, they need to be counted and mapped.

DR44: *Please provide a map of the location(s) of silver cholla found within all areas of the project (e.g., project site, gen-tie, staging, parking, etc.) including (to the extent feasible) within a 500-foot buffer from the areas that will be impacted by the project.*

Response: See **Attachment DR44-1** for a map of the locations of silver cholla observations found in all areas of the project within a 500-foot buffer.

2.3 Raven Management Plan

2.3.1 Data Request DR45

DR45: *Please provide an updated draft Raven Management Plan with the current project information.*

Response: Please see **Attachment DR45-1** for a draft of the Raven Management Plan for the project.

3.0 GREENHOUSE GAS EMISSIONS (CLIMATE CHANGE)

3.1 CEQA Guidelines

3.1.1 Data Request DR46

Appendix G of the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et seq.) directs agencies to evaluate whether a project conflicts with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases (GHGs). Staff needs more information to fully evaluate GHG emissions under CEQA Appendix G.

DR46: *Has the project applicant explored the procurement of renewable diesel for the emergency backup generators and the emergency fire pump as a means of demonstrating consistency with the State of California's goal of carbon neutrality established in 100 Percent Clean Energy Act of 2018 (Senate Bill 100, De León, Chapter 312, Statutes of 2018). If not, why not?*

Response: The Applicant will commit to procurement of renewable diesel for the emergency backup generators and the emergency fire pump to the extent that renewable diesel is reasonably available.

3.2 California Code of Regulations, Title 17, Section 95352

3.2.1 Data Request DR47

Section 3.2 of the supplemental application states that the proposed circuit breakers would contain sulfur hexafluoride (SF6). According to the California Code of Regulations, title 17, section 95352, starting on the applicable phase-out dates, no person may acquire SF6 gas-insulated equipment (GIE) for use in California unless certain provisions apply.

DR47: *Please describe how the project would comply with the California Code of Regulations, title 17, section 95352.*

Response: The Applicant will endeavor to incorporate non-SF6 insulated circuit breakers in the final design that comply with the phase-out requirements in California Code of Regulations, title 17, section 95352. Alternative circuit breakers are currently being evaluated. If a non-SF6 alternative is only available from a single supplier then the regulation provides for an exemption from this requirement. Either conforming to non-SF6 insulated circuit breaker specifications or a statement that the project will qualify for an exemption will be provided to the CEC prior to commencement of construction.

3.3 Refrigerant

3.3.1 Data Requests DR48 through DR51

The Project Description section of the Supplemental AFC states that all buildings will be equipped with air conditioning systems, but the refrigerant is not specified, there are no calculations of refrigerant usage/leakage and the contribution to GHG emissions.

DR48: *Please identify the refrigerant to be used in the air conditioning systems.*

Response: A listing of the air conditioning systems currently proposed for the facility is included as **Attachment DR48-1**. Many of the proposed systems are not specified. The Applicant anticipates completing these preliminary specifications by first quarter 2025. An updated Attachment 48-1 including additional data will be supplied when it becomes available. Currently, there are two refrigerants proposed for use, i.e., R-410A and R-454B. **Attachments DR48-2** and **DR48-3** are the Material and Safety Data (MSDS) sheets for both refrigerants.

DR49: *Please explain how the use of the proposed refrigerant would be allowed in the hydrofluorocarbon (HFC) statewide emission reduction target under SB 1383 (Lara, Chapter 395, Statutes of 2016) (Health and Safety Code, section 39730.5).*

Response: California Health and Safety Code (HSC) Section 39730.5 requires the State to develop, approve, and implement a comprehensive short-lived climate pollutant (SLCP) strategy, i.e., 39730.5 (a) through (c). The CARB websites noted below present a vast amount of data on the SLCP, including the state's progress in meeting the goals and requirements of 39730.5:

https://ww2.arb.ca.gov/our-work/programs/slcp
https://ww2.arb.ca.gov/our-work/programs/stationary-hydrofluorocarbon-reduction-measures
https://ww2.arb.ca.gov/our-work/programs/refrigerant-management-program

Each of the refrigerants noted above in DR48, and the compliance data presented in DR51 indicate that both are allowed for use under the current regulatory framework as they meet the global warming potential (GWP) and date requirements of Section 39735.

DR50: *Please provide calculations of refrigerant usage/leakage and the contribution to GHG emissions.*

Response: Attachments DR50-1 and DR50-2 provide the emissions calculations for the currently known systems that will use R-410A or R-454B refrigerants, respectively. These calculations will be updated by 1Q25 when additional A/C specifications are expected to be available.

DR51: *Please explain how the proposed refrigerant would comply with the sale and distribution prohibition timelines established in SB 1206 (Skinner, Chapter 884, Statutes of 2022) (Health and Safety Code, section 39735).*

Response: R-410A: A portion of the packaged HVAC equipment is planned to utilize R-410A refrigerant which will be charged with bulk supply. Refrigerant R410A has a rated GWP value of 2088, and as such it meets the current requirements of SB1206 until 1-1-2030 when the GWP requirement will be lowered from 2200 to 1500. Purchasing of R410A and use, i.e., initial charging, system servicing, and refrigerant evacuation must be accomplished by persons holding Section 608 II or Universal 608 certifications per EPA regulations. Maintenance of these systems will utilize reclaimed R-410A beginning in 2030 or sooner if required by law. More favorable refrigerant alternatives will be considered for use in 2030 if made more widely available by equipment vendors in the future as a response to current and future legislation.

R-454B: The remaining portion of the packaged HVAC equipment is planned to utilize R-454B refrigerant which will be charged with bulk supply. Refrigerant R454B has a rated GWP value of 466, and as such it meets the current requirements of SB1206, presently as well as in the future, when the GWP requirement will be lowered to 750. Purchasing of R454B and use, i.e., initial charging, system servicing, and refrigerant evacuation must be accomplished by persons holding Section 608 II or Universal 608 certifications per EPA regulations. Maintenance of these systems will utilize new or reclaimed R-454B beginning in 2025 or sooner if required by law. More favorable refrigerant alternatives will be considered for use after 2033 if made more widely available by equipment vendors in the future as a response to current and future legislation.

4.0 HAZARDOUS WASTE

4.1 Hazardous Waste Storage

4.1.1 Data Requests DR52 through DR57

The supplemental application (Section 2.0 and Section 5.14) indicates several methods will be used to properly manage and dispose of hazardous waste generated by the project, including waste oil recycling and disposal of hazardous waste at a Class I landfill. Section 5.14 indicates that hazardous wastes would be transported and disposed of by a transporter. Additionally, the supplemental application indicates that hazardous waste generated at the WRESC facility will not be stored onsite for more than 90 days following its generation date and will be transported offsite by a permitted hazardous waste transporter and disposed of at a facility appropriately licensed to accept the identified hazardous waste product. Section 5.14.4.1.2 – Hazardous Waste Best Practices and Mitigation Measures indicates:

- prior to disposal, wastewater will be tested with the applicable U.S. EPA method to determine chemical constituents and characteristics and if determined to be hazardous, it will be disposed of in accordance with the Clean Water Act and the Resource Conservation and Recovery Act (RCRA); and

- hazardous waste will be collected in satellite accumulation containers near the points of generation and before the end of each workday, the hazardous waste deposited in the satellite accumulation containers will be moved to a designated central accumulation area located onsite.

DR52: *Section 5.14.4.1.2 indicates that hazardous wastewater would be disposed of in accordance with the Clean Water Act and RCRA (both federal requirements), however it does not indicate how disposal of hazardous wastewater would comply with State requirements, such as the Hazardous Waste Control Law, Porter-Cologne Act and related Water Code sections, and local requirements. Please provide a summary of which State and local regulations and requirements would apply to the testing, storage, transportation, and disposal of hazardous wastewater and how they would be applied.*

Response: During the project's construction, hazardous wastewater may be produced during the cleaning of pipes and vessels. As described in Section 5.14 of the Supplemental AFC, the Project's operations are not anticipated to produce hazardous wastewater.

DR53: *How will potentially hazardous wastewater be segregated prior to testing and disposal? What is the volume of hazardous wastewater that will be allowed to accumulate (be stored) onsite prior to disposal? How often will wastewater identified as hazardous be disposed of?*

Response: Hazardous wastewater is anticipated to only be generated during construction activities. The wastewater producers during construction will test the waste stream after its generation and will be disposed of in accordance with applicable laws, ordinances, regulations, and standards (LORS).

DR54: *Identify the potential locations of the satellite accumulation containers.*

Response: Potential locations of satellite accumulation containers for construction and operations are depicted on plot plans presented as **Attachment DR54-1** and **Attachment DR54-2**, respectively. Due to size, **Attachment DR54-1** and **Attachment DR54-2** have been submitted via Kiteworks.

DR55: *Identify the anticipated hazardous wastes that would be deposited into the satellite accumulations containers and which, if any, of the hazardous wastes would need to be segregated into separate containers.*

Response: The hazardous wastes anticipated to be deposited into satellite containers are listed in Sections 5.14.1.2.1 and 5.14.1.2.2 of the Supplemental AFC. Waste from paintings and coatings, as well as aerosol cans, would need to be segregated into different containers.

DR56: *Identify the potential location of the designated central hazardous waste location on site and the type of waste storage containers and the approximate number and volume of hazardous waste containers that would be stored in this location.*

Response: The potential locations of the designated central hazardous waste storage area for construction and operations are depicted on plot plans provided as **Attachment DR54-1** and **Attachment DR54-2**, respectively. As stated in Section 5.14.4.2.2 of the Supplemental AFC, hazardous waste will be accumulated according to the Title 22 California Code of Regulation Requirements and will be stored in certified USDOT containers of up to 500-gallon storage capacity.

DR57: *Please clarify whether hazardous waste transporters will be registered for transporting the various anticipated hazardous wastes generated by the project.*

Response: In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes, unless the person holds a valid registration issued by the Department of Toxic Substances Control (DTSC). It is unlawful for any person to transfer custody of a hazardous waste to a transporter who does not hold a valid registration issued by DTSC. A hazardous waste registration issued by DTSC to a transporter is not transferable to any other person and is valid for one year only. In accordance with Division 20, Chapter 6.5, Article 6.5, Article 6.6, and Article 13 of the California Health and Safety Code (Health & Safety Code), the transportation of hazardous waste from the Project stie will performed by a registered transporter.

4.2 Energetic Waste

4.2.1 Data Request DR38

Storage and transportation of energetic waste is mentioned in Section 5.14.4.1.2, however it is not discussed elsewhere in Section 5.14, nor is disposal of energetic waste noted anywhere in the section. The section notes that energetic waste would be stored and transported in accordance with the Military Munitions Rule found in Title 40 CFR Part 266, Subpart M, however California has not adopted this rule in its entirety.

DR58: *Is energetic waste anticipated from construction activities, and if so, how much and what would it consist of?*

Response: There will be no energetic waste from underground construction.

DR59: *Where would energetic waste be stored at the Project site and how would it be disposed of?*

Response: There will be no energetic waste.

DR60: *Clarify which portions of the Military Munitions Rule found in Title 40 CFR Part 266, Subpart M would apply to the project and which State regulations would be applicable to the storage, transportation, and disposal of project generated energetic waste and provide a summary of these regulations.*

Response: There will be no energetic waste.

5.0 RELIABILITY

5.1 Operational Challenges

5.1.1 Data Requests DR61 through DR65

Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs and must achieve an availability factor similar to existing power plant facilities in the California electricity grid system. According to the Supplemental AFC (TN 254805), the WRESC would be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan. As addressed in the Issue Identification Statement (TN 258407), staff identified the possibility of some operational challenges (issues) with the proposed project, especially given the projected heavy usage of the equipment. These issues were identified through staff's independent research on the reliability of compressed air energy storage (CAES) facilities.

The issues include:

- Affects of corroison on the piping system;
- Prolonged downtime with single-cavern design (maintenance or inspection); and
- Significant pressure changes in the air compressors and turbines.

It is unclear whether the project has considered or implemented design mitigations to address these issues. Further discussion is needed so that staff can evaluate and assess the project's projected operational reliability..

DR61: *Please discuss methods for mitigating the effects of corrosion (e.g., material selection, inspection, testing, and maintenance) on the piping system in the air filter upstream of the gas turbine and any other piping system that may be susceptible to severe corrosion.*

Response: All components in the piping and process streams are designed for the specific conditions. While hard rock storage caverns have significantly lower corrosion risk than their salt-based counterparts, appropriate measures are taken to mitigate, monitor, and remedy corrosion. For example: piping, pump, valve, filter, vessel, and exchanger materials are specifically selected to meet corrosion requirements for safe operations over their service life.

The following corrosion-resistant metallurgies are under consideration for air-facing piping and pressure vessels: austenitic stainless steel (300 series), duplex stainless steel, and 300-series clad carbon steel. Where there are lower temperatures, epoxy-coated carbon steel is also being considered. Monitoring programs including ultrasonic testing and filter capture product testing are a standard part of the expected operating protocol.

DR62: *Since the project would be constructed with a single cavern, would the project still be able to fully or even partially operate if supply of compressed air to the turbines is not available through the primary feedline(s)? For example, would the facility be designed with redundant systems such as secondary compressed air feedline(s)? Has the project considered above ground compressed air storage tanks for redundancy?*

Response: Underground storage caverns are extremely reliable, with no need to re-enter after construction. The proposed caverns are to be built in massive quartz monzonite. The local conditions have been evaluated based on in situ testing as well as core extraction and testing. The results indicate the proposed cavern horizon is part of a massive crystalline formation of very robust integrity; they do not suffer the deformation and creep issues associated with salt caverns due to the integrity of the rock structure. These stable formations also provide a very reliable formation to host the steel-lined concrete shafts, without the deformations that sometimes damage well casings in salt caverns and formations. These caverns are also below the surface seismic waves and consistent with underground structure guidance are considered safe caverns for seismically active regions. Based on this reliability, a redundant system is deemed unnecessary.

Above-ground air storage vessels are not economically viable; they have been contemplated by Hydrostor and other compressed air technology suppliers in the past and the terrestrial pressure vessel cost is vastly greater than an underground storage cavern.

DR63: *Are there any anticipated issues with maintaining and inspecting the cavern? If yes, has the applicant considered constructing dual caverns to address potential maintenance and inspection related challenges? For example, decreasing the volume of the proposed cavern and constructing dual caverns?*

Response: The cavern is designed for long-term global stability through the operational life of 50 years and is designed not to be re-entered during the operational phase of the project. The formation has been shown to be massive and competent enough to maintain long-term global stability. The isobaric operational pressures (approximately 900-psi) exerted by the subsurface fluid (alternating water and compressed air) will have additional confining and stabilizing effects on the cavern walls, further enhancing the cavern's structural integrity over several decades. Construction of dual caverns with separate dedicated Air and Water Shafts for each cavern will be cost-prohibitive and will lead to very long construction phases, jeopardizing the project viability.

DR64: *Does the applicant anticipate any significant issues with the air compressor and turbine when operating at varying pressure loads, such as metallurgical- and fatigue-related degradation.*

Response: No. The compensated cavern basis ensures near-constant pressure on the system. The cavern pressure swing is less than about 2 bar (or around 29 pounds per square inch [psi]. This constant pressure reduces fatigue cycling amplitude on all air pressure-bearing mechanical components. Those mechanical components are designed for the full power condition, as well as transient conditions through starting, stopping, and power ramping.

DR65: *Staff is aware that Hydrostor has been issued a permit to construct and operate a 200 MW compressed air energy storage facility in Australia but has not found information that backed up that permit approval. Please provide NEPA or CEQA equivalent assessments that the permitting agency conducted.*

Response: The Applicant's long duration energy storage project in Broken Hill, Australia is called the Silver City Energy Storage Project and includes development of a 200 MW / 1600 MWh advanced compressed air energy storage facility with associated infrastructure. Under the *Environmental Planning and Assessment Act 1979*, projects can be declared State Significant Development if they are important to the State for economic, environmental or social reasons. The Silver City Energy Storage Project is in the late stages of permitting as a State Significant Development project with the New South Wales government. An Environmental Impact Statement was circulated for public review and all comments have been received. The next steps are for the NSW staff to make a recommendation and then the Minister for Planning will make a final decision as the consent authority. All documents including the NEPA and CEQA equivalent Environmental Impact Statement are publicly available on the NSW website via the following link: Silver City Energy Storage System | Planning Portal - Department of Planning and Environment (nsw.gov.au).

Interested persons may benefit from reading the "Agency Advice" submittals, which are comment letters on the Environmental Impact Statement. For example, the local council has documented reasons for their support (getContent (nsw.gov.au):

> *Broken Hill City Council wishes to express its strong support for Hydrostor's Compressed Air Energy Storage (CAES) project located on the outskirts of the city. This project holds the potential to bring about numerous long term and short term benefits to the local community and the broader region. One of the most significant advantages of the Hydrostor project is its contribution to a more sustainable and reliable energy infrastructure. CAES technology allows for the efficient storage of excess renewable energy, addressing the intermittent nature of sources like solar and wind power that have been welcomed into the region over the past decade. The project aligns with Council's commitment to reduce its carbon footprint as outlined in our Renewable Energy Action Plan. The project also satisfies key objectives requested by the locals via the city's Community Strategic Plan, including pursuing renewable energy and battery technology, enhancing the circular economy via renewable resources, and the minimisation of environmental, social and rehabilitation impacts associated with mining. Moreover, the Hydrostor project is expected to create a positive economic impact on the local community. The construction phase alone will generate 780 job opportunities, providing employment for residents and stimulating economic growth in Broken Hill. The long-term operation of the facility will require 70 skilled workers, fostering the development of a skilled workforce in the region. In addition to its environmental and economic benefits, the Hydrostor project contributes to the overall energy security of Broken Hill. Given its ability to store and release energy as needed, a CAES system would enhance the stability of the local power supply, mitigating the impact of fluctuations in energy production and consumption, and reducing the city's reliance on ageing diesel-fuelled*

turbines as a back-up energy source. Council also notes the thorough approach to community engagement undertaken by Hydrostor, particularly with regard to consultation with local traditional owners, the Wilyakali people. Other engagement activities appear to have covered everyone from individuals through to sporting groups and large businesses, indicating a genuine commitment to local engagement. In conclusion, we see Hydrostor's Compressed Air Energy Storage project as a crucial step towards fostering a sustainable, prosperous, and resilient future for Broken Hill. The positive environmental, economic, and energy security impacts make this initiative a valuable asset to the community and the broader region (Broken Hill Council n.d.).

6.0 TRANSMISSION SYSTEM ENGINEERING

6.1 Queue Cluster 13 Interconnection Studies

6.1.1 Data Requests DR66 and DR67

As indicated in the Queue Cluster 13 Interconnection Studies, the project is proposed to interconnect to the Southern California Edison (SCE) Whirlwind Substation.

DR66: *Please provide a detailed Whirlwind Substation one-line diagram. Show all equipment ratings, including bay arrangement of the breakers, disconnect switches, buses, and other equipment that would be required for interconnection of the project.*

Response: Please see Applicant's Notice (TN# 259534) Pursuant to 20 CCR § 1716(f) Regarding Staff's Data Requests Set 3, submitted on October 14, 2024, which respectfully objects to this data request.

DR67: *Please provide an executed Large Generator Interconnection Agreement.*

Response: Attachment DR67-1 has been submitted under a repeated application for confidentiality. The Applicant is working on an amendment with Southern California Edison that references the location of the updated WRESC site.

6.2 Los Angeles Department of Water and Power (LADWP) High Voltage Transmission Corridor

6.2.1 Data Request DR68

In the supplemental application, Section 2.1.19 indicated that there are expected to be a small number of short underground gen-tie line segment crossings of a Los Angeles Department of Water and Power (LADWP) high voltage transmission corridor and in other locations where the transmission corridor is congested with preexisting facilities.

DR68: *Please provide evidence that the LADWP and any other neighboring utilities are notified and agree to any changes to utilities corridors and service interruptions (if any) that may occur.*

Response: Attachment DR68-1 presents official written communications dated July 18, 2024 between the Applicant and LADWP.

7.0 WATER RESOURCES

7.1 Regional Water Quality Control Board Comments

7.1.1 Data Request DR69

In response to request for comments from CEC staff, the Lahontan Regional Water Quality Control Board (RWQCB) determined that the filing of the report of waste discharge was incomplete and additional information is needed pursuant to Division 7, Section 13000 et seq. of the California Water Code (TN 258495).[1]

DR69:– *Please provide responses to the comments provided by the RWQCB and submit requested applications and accompanying information to the CEC. Please contact the RWQCB directly if you require any clarification. Provide supporting documentation for any supplemental clarification determinations between the applicant and the RWQCB.*

The following are requests for additional information issued by the Lahontan Regional Water Quality Control Board*:*

Lahontan RWQCB 69-A*. We request the Applicant provide specific end use/disposal for all liquid and solid waste streams, including but not limited to waste rock, dewatering waste, boring/drill waste, reverse osmosis reject water, cooling tower blowdown, evaporative cooler spray to atmosphere, thermal system water losses, and washdown losses. Additionally, we request the Applicant provide a full characterization (chemical composition) of all liquid waste streams. This information is necessary to determine whether we would request the Applicant to submit a Report of Waste Discharge.*

Response: Subsections 1a-1i provide a summary specific end use and disposal details for liquid and solid waste streams.

a. **Waste rock**: There is no liquid waste stream associated with excavation of cavern rock. Waste rock will not be generated as part of the construction process. Underground processing will occur prior to bringing the rock to the surface as 8-inch minus rock as part of the cavern development construction activities. Excavated material will be processed further at the surface for onsite beneficial use for the architectural berm construction or sent offsite to a licensed aggregate facility for processing as aggregate. Excavated material characterization was completed to provide information on chemical composition and leaching potential via the California modified waste extraction test (WET) using deionized water. The rock characterization results of the four samples collected from geotechnical borings advanced within the cavern construction area are included in **Attachment 69A-1, Table DR 69A-1**. The results indicate that the material does not pose a high potential to impact the environment.

   Should the excavated material be further processed at the surface, there will be no washing of the rock to remove fines as part of the additional processing. During processing, water will be used for dust suppression, however, there will be no runoff or liquid discharge. No wastewater will be generated during operations. The wash water will be collected and properly disposed offsite if it cannot be reclaimed for onsite use.

b. **Dewatering waste**: No dewatering of groundwater is anticipated for cavern construction. Occasional water accumulated within the shaft may come from ancillary activities such as dust suppression, rock

[1] TN 258495 – ROC - 8/7/2024 Lahontan Regional Water Quality Control Board (RWQCB) Staff Review and Comments

mass grouting and cavern wall/crown washing at the end of construction. Any such water recovered from the cavern will be sent to the drilling pond, where the particulate matter will be allowed to settle similar to the drill cuttings during shaft construction. The settled particulate matter will be periodically disposed offsite. The clarified water will be reused onsite. A localized dewatering system may be needed as part of the construction of the water intake/outtake structure at the bottom of the compensation reservoir. The water would be pumped with a submersible pump to a holding tank for onsite use (e.g., dust suppression).

c. **Boring/drill waste**: During shaft construction using the blind boring method, the drilling fluid (i.e., water/bentonite mud/rock mixture) needs a density of 9.5 to 10 pounds per gallon to provide confinement and maintain structural integrity of the rock mass around the shaft perimeter. Given the density of water is 8.33 pounds per gallon, a higher density drilling fluid is attained through the addition of bentonite mud (14-20% by weight). No additional additives are anticipated to be used during the drilling process. As the shaft boring advances downwards, the drilling fluid will remove the drill cuttings from the shaft column into the temporary drilling pond, where majority of the cuttings or particles will settle under gravity. To ensure adequate retention time for the recirculated drilling fluid in the drilling pond, the pond will be constructed with a volume of at least three (3) times the maximum volume of the shaft, which will allow the suspended particulate matter to settle under gravity. The drilling fluid returned into the shaft for continued boring is pumped from the opposite end of the drilling pond from where the drilling fluid emergent from the shaft is delivered, allowing for the drill cuttings to settle under gravity. The entire process runs continuously on a closed loop, where the drilling fluid is contained within the shaft column, is delivered into a fully lined drilling pond to allow settlement of the drill cuttings and the drilling fluid devoid of cuttings is recycled into the shaft. The settled drill cutting fines will be periodically dredged and shipped offsite for proper disposal during and at the end of construction.

d. **Reverse osmosis reject water**: Reverse osmosis (RO) will primarily be used for the initial thermal management system fill. The source water for the RO system will be the AVEK supply water. Attached is the estimated expected quality of the RO reject stream for initial thermal management system fill (**Attachment DR69A-2**). The RO reject from the initial fill will be directed to a holding tank for offsite disposal. During operations, for adding smaller amounts of demineralized water to the thermal management system after initial fill to account for system operational or maintenance losses, two options may be used: 1) trailers with deionizer (DI) bottles will be used for demineralized water production. The DI bottles will be switched out when the resin is exhausted so will not have a reject stream; or 2) a portable RO system that will produce an RO reject waste stream, which will be sent to the evaporation pond. The RO reject waste is anticipated to be of similar quality as the initial fill RO reject. Compensation reservoir water will not need to be treated.

e. **Cooling water blowdown**: There is no cooling tower as part of the project; it is an air-cooled heat exchanger with a closed loop circulating water stream with no water discharge as noted under the thermal management system description.

f. **Evaporative cooler spray to atmosphere**: The source of water related to the evaporative cooler spray is the surface water reservoir. The water passes through a filter to remove suspended solids and then into the cooler. There is no liquid waste stream from this process as water mist from the nozzle tips will completely evaporate into water vapor into the atmosphere.

g. **Thermal system water losses**: The thermal management system is a closed loop water system where there is no liquid waste stream, including regular blowdowns, as part of routine operations. Demineralized water losses from the thermal management system may include intermittent vapor discharge from valves on top of the cold water tanks and electric heater spheres. There is no continuous blowdown of the thermal management systems. Minor losses may occur for valves, flanges, etc., which will go from plant drains to the oil water separator, and then to the evaporation pond. The composition of the thermal management system water is demineralized water that is treated with oxygen scavenger, amine, biocide. Additionally, infrequent draining of equipment for maintenance may occur on occasion. This water will be directed through an oil water separator and then to the evaporation pond.

h. **Washdown water losses**: Washdown water losses are anticipated to be primarily evaporative. Exposed equipment will be periodically washed down with AVEK water. Any excess washdown water will be collected and sent to the evaporation pond. Furthermore, the Applicant will not wash down any equipment with oily residues. Equipment that has oily residues will be cleaned with rags and sorbents, and appropriate cleaning solutions will be applied to the rags and sorbents. After cleaning, the oily rags and sorbents will be properly stored, manifested, and disposed of by licensed disposal companies in the regulatory-required time.

i. **Sanitary waste**: As noted in the Supplemental AFC, septic waste from the administration/control building will be directed to a nearby underground septic storage tank, pumped out periodically by truck, and trucked offsite to an approved disposal facility. Alternatively, the sanitary sewer system will consist of a lateral septic system containing a lateral line from the structure to a septic tank. From there, the waste will flow to the lateral system of pipes that allows the waste from the septic system to discharge via perforations in the lateral pipes.

Lahontan RWQCB 69-B. *The Supplemental Application discusses a water balance that includes additions and losses measured against the capacity of a hydrostatically compensating reservoir. Most of these losses are not shown in the process flow diagram associated with the power generation flow diagram. We request the Applicant provide a process flow diagram that consolidates the water balance and the power generation components, this would yield a more complete understanding of how the water balance correlates with the hydrostatically compensating reservoir included as a component to produce power. This information is necessary to determine whether we would request the Applicant to submit a Report of Waste Discharge.*

Response: **Attachment DR69B-1, Figure DR69B-1** presents a simplified process flow chart that consolidates the water black and the power generation components.

Figure DR69B-1 depicts the water movement related to the thermal charge and discharge modes of the system during operation. The charge mode cycle takes 13.5 hours to complete and the discharge mode cycle takes 8 hours to complete. Process water is managed via three primary closed loops: 1) cavern/compensation reservoir; 2) thermal management system; and 3) cooling water system. For the cavern/compensation reservoir, water is either in the cavern or compensation reservoir once the charge or discharge process is complete. For the thermal management system, water is either in the electric heater spheres or cold-water tanks once the charge or discharge process is complete. The cooling water system loop has the least amount of water of the three and provides auxiliary cooling capacity to the thermal management system during extreme ambient temperature days. The cooling mechanisms used in the thermal management system and cooling water system are the same and consist of air-cooled heat exchangers. No cooling towers are used in any part of the process.

In **Figure DR69B-1**, the water streams in blue are additions and the water streams in red are subtractions to the overall system. The legend summarizes the estimated yearly amounts of each water stream based on an average precipitation year and assumed operating condition. The water balance is anticipated to be net zero for a normal precipitation year under the assumed operating condition. The retractable cover on the compensation reservoir allows for flexibility in the evaporation rate to provide a means to control water levels within the compensation reservoir. The water discharge from the system consist of evaporative and liquid. The evaporative losses are used to extinction and are designated as “to atm” in **Figure DR69B-1**. The potential liquid discharges will be sent to the evaporation pond and are water treatment reject water from Reverse Osmosis (stream E), maintenance water (stream I), and excess compensation reservoir water (stream D). See Response 69-G for more details on the anticipated water quality. The annual averages have been updated since the Supplemental AFC because of advances in the engineering design.

The initial fill of the compensation reservoir will be potable water sourced from AVEK. AVEK’s water quality report is included in the Supplemental AFC and is attached to this response for convenience (**Attachment DR69B-2**). The initial fill of the thermal water system will also be sourced from AVEK. However, the water will be treated first using reverse osmosis system. The reject or concentrate will be collected and properly disposed of offsite according to applicable regulations.

Lahontan RWQCB 69C. *The Supplemental Application describes discharge of dewatering waste during construction. We recommend that dewatering wastes be contained and reused onsite as dust control to the extent practicable. Discharges of dewatering waste to land, and other low threat discharges including boring waste and inert waste, may be subject to the requirements of General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality, WQO-2003-0003-DWQ. We will likely request the Applicant submit a Notice of Intent for General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality, WQO-2003-0003-DWQ.*

Response: As noted under Section 69-Ab and Ac, there will be no dewatering waste during construction of the cavern. A small amount of groundwater dewatering is anticipated for the reservoir construction.

Lahontan RWQCB 69D. *The Jurisdictional Delineation report does not include maps of sufficient scale to identify waters of the state onsite or in the vicinity. Additionally, the report does not include field data or supporting documentation for the conclusions made regarding presence or absence of waters. We request the Applicant update this report to include appropriately scaled maps and supporting documentation (including field data sheets). This information is necessary to determine whether waters of the state are present on site and whether we will request the Applicant to submit a Report of Waste Discharge.*

Response: The Applicant filed a Confidential version of the Jurisdictional Delineation report that is zoomed in. The Water Board will need to submit a request to CEC to release the updated jurisdictional delineation report.

Lahontan RWQCB DR69E. *We request the Applicant provide a draft Storm Water Pollution Prevention Plan. This plan will help us better understand stormwater flow paths and capture for reuse and/or percolation, and aid in our determination whether a National Pollutant Discharge Elimination System (NPDES) permit or an individual stormwater permit would be appropriate for this project.*

Response: For construction, the Applicant is committed to preparing a SWPPP as indicated in the Supplemental AFC. The intent is to prepare it later in the project engineering and design phase per the usual CEC post-

Certifciation detailed design process. The Applicant has provided a revised flow diagram to clarify the project is not co-mingling process water and stormwater (see Response 69-B).

SIC code 4911 pertains to electric services specific to electric generation by use of steam. As this facility does not employ the use of steam, SIC code 4911 does not apply. No stormwater is being discharged from the site as detailed in Preliminary Hydrology & Hydraulic Analysis (TN# 256622, Docketed May 31, 2024). The stormwater retention pond is being designed to zero discharge with respect to the 24-hour, 100-year storm event. Based on conversations with the Water Board, an outlet will be incorporated into the design for stormwater to discharge without compromising the integrity of the pond should it be necessary under storm events greater than the design capacity. No process water will be comingled with stormwater and sent to the stormwater retention pond.

Lahontan RWQCB DR69F. *We will require the Applicant to submit a Report of Waste Discharge for the evaporation pond. This pond must be constructed, maintained, monitored, and closed in accordance with California Code of Regulations, title 27.*

Response: The Applicant will submit a Report of Waste Discharge for the evaporation pond. The following are potential waste streams that may be required during the life of the project. At no time will process water be comingle with stormwater.

- Reservoir management water level (allowance for potential future needs).
- Reject from RO system (allowance for potential future needs).
- Maintenance catchment
  - Floor drains (oil/water separator)
  - Water from closed-loop piping of the thermal management system collected during maintenance

See response to Lahontan RWQCB DR 69-G for anticipated water quality of the compensation reservoir water. The anticipated water quality of the reject from RO system is attached (**Attachment DR69A-2**). The maintenance water quality will be the already treated water from thermal management system and wash water from the floor drains after it passes through an oil water separator. The source water for the washing will be the reservoir water or water supplied by AVEK.

Lahontan RWQCB DR69G. *We request the Applicant provide a full characterization (chemical composition) of the water in the hydrostatic pond and the source of the water. How will the water quality of the hydrostatic pond water change over time during operation? What mitigations will be in place to ensure that this water will not come in contact with groundwater? We request the Applicant provide an operations and maintenance plan for the hydrostatic pond system. This information is necessary to determine whether sufficient mitigations are in place and whether we would request the Applicant to submit a Report of Waste Discharge.*

Response: Please see response to DR69H below for information in response to this request. The following provides additional information on the compensation reservoir specifically.

Compensation Reservoir Construction

The compensation reservoir will be constructed above groundwater level and be lined with a synthetic layer. A bedding/foundation layer of at least one foot in thickness will be placed beneath the liner to prevent damage to the liner. The reservoir will have a floating cover to manage evaporative losses and avoid being an attractive nuisance

for wildlife. The reservoir will be initially filled entirely from AVEK potable water where no on-site groundwater will be sourced. For the construction of the reservoir, no dewatering is anticipated necessary except for the potential construction of the reservoir water intake structure. Should dewatering be necessary for this component, the water will be captured and reused onsite for dust suppression. The reservoir construction will include safeguards to minimize leaks and ensure that if a leak occurs it is identified and addressed appropriately. Additionally, the cavern will serve as contingency storge should the need arise to drain the reservoir for repairs or maintenance.

An operations and maintenance plan will be prepared prior to commencing site operation for the compensation reservoir. The objectives of the operations and maintenance plan will be to demonstrate that site activities are performed in a manner that is protective of state waters and that waste containment infrastructure for waste management units and the compensation reservoir are being maintained and operated in a manner that will minimize the potential for discharge of wastes or process water. The operations and maintenance plan will also identify actions that the facility will take to respond should a discharge be identified and will include following elements:

a) A contingency plan in the event of a release due to operations or disposal activities or the compensation reservoir, including plans for notification of agencies and actions required to initiate an investigation, if necessary;

b) A description of operations that could generate waste (solid and liquid) and a demonstration that State waters are being protected; and

c) The scheduled periodic inspection and maintenance of containment features and monitoring infrastructure.

Compensation Water Quality

The compensation system is filled initially during the construction period. In operations, it works within a closed loop, is not modified through the energy storage process, and is not returned to another distribution system afterward. The water acts as a displacement fluid to ensure a constant pressure to the compressed air storage cavern using the principle of hydrostatic head. The water is retained within the lined and covered reservoir at the surface and the air-tight cavern underground, traveling between those two through sealed and grouted water conduits. The water quality is therefore not anticipated to quantifiably impact local receptors.

Over the course of the facility's operational life, the volume balance is maintained principally through capturing precipitation and capturing water that is a by-product of compressing atmospheric air – both processes that serve to control water quality through the avoidance of mineral concentration that occurs with evaporation. A water balance has been conducted and the mineral concentration is expected to increase by less than 0.1 mg/L on an annualized basis.

Over the life of the project, the water quality is expected to be dictated by contact with the storage bodies (reservoir liners/covers, cavern geology, and storage air). Each of these are discussed in the following sub-sections, however the most indicative of the local conditions is the groundwater laboratory tests from the water samples taken at the site from the proposed cavern host rock geology.

Compensation water quality will be monitored in operations.

- ***Influence of liners and covers:*** The liners and covers under consideration are liners commonly employed in reservoirs worldwide, including in drinking water reservoirs. Significant research over the years has

demonstrated that the inclusion of a liner and cover dramatically improves the water quality of off-stream (or closed-loop) reservoirs, Dougherty et al. (2007)[2] through reduced interaction with sediments and reduced photosynthesis. Robust guidance is available (for example from American Water Works Association in Kirmeyer et al. 1999) [3] and will be consulted during operations should water quality issues be encountered.

- ***Influence of contact with storage air:*** The air entering the cavern has been filtered in the intake house and is heated above pasteurization temperatures three times before entering the cavern; it is unlikely to be a significant source of organic or inorganic contaminants. Small amounts of the air will dissolve into the compensation water through a process represented by Henry's law. This effect is only present underground as the air comes out of solution in the surface reservoir when the water is no longer subjected to the elevated pressure. The dissolution of air into the compensation water ensures that biological activity, where present, will be dominated by aerobic processes.
- ***Influence of cavern host rock:*** One of the criteria in selection of the appropriate host rock geology includes imperviousness to water; materials that dissolve in water are generally avoided. Water samples taken in situ within the cavern horizon and sent to laboratory for testing do not indicate high levels for contaminants of concern and represent a very low potential to impact the environment in the event of release (see **Attachment DR69G-1, Table DR69G-1**).

In summary, the compensation reservoir will be sourced from potable water from AVEK. After the initial fill, additional water is not anticipated to be needed. Water quality is expected to remain similar to the initial water quality with minimal influences from the cavern rock and operations. The cavern is located in low permeability bedrock where minimal loss of water to the formation will occur.

Lahontan RWQCB DR69H. *Section 5.15.5.1 Federal Laws, Ordinances, Regulations, and Standards notes that preliminary feedback from U.S. EPA Region IX indicates that an Underground Injection Control (UIC) Program permit may not be required if the system is a closed loop where the caverns and associated shafts from the surface to the caverns are lined such that there would be no fluid communication (either air or water) with the external environment. Please share the communications from U.S. EPA Region IX. This information is necessary for us to evaluate whether any injection activities warrant waste discharge requirements.*

Response: The Applicant met with United States Environmental Protection Agency (USEPA) Region 9 in late 2023 and early 2024 to discuss the non-applicability of the USEPA's Underground Injection Control (UIC) program to the project. In these verbal discussions, USEPA indicated that the UIC program presumptively did not apply to the project. The Applicant then requested written confirmation of this non-applicability and the USEPA responded with technical questions to support their concurrence. The Applicant provided responses in August and the USEPA conducted review. In October, USEPA told the Applicant that due to a differing interpretation of UIC regulations, USEPA's view is that the project is subject to UIC Class V rule. However, the Applicant and USEPA discussed how the project could be "authorized by rule" as it complies with the non-endangerment standard of 40 CFR section 144.12. The USEPA's response letter (**Attachment DR69-1**) requests a Class V permit application be submitted to formally determine if the project is authorized by rule or if a federal Class V UIC permit is required.

[2] Dougherty, M., Bayne, D., Curtis, L., Reutebuch, E., & Seesock, W. (2007). Water quality in a non-traditional off-stream polyethylene-lined reservoir. *Journal of environmental management*, *85*(4), 1015-1023.

[3] Kirmeyer, G. J. (1999). *Maintaining water quality in finished water storage facilities*. American Water Works Association.

The Applicant is preparing to submit a Class V UIC permit application and anticipates a determination from USEPA by the end of 2024.

Shaft Construction Details

The Applicant is planning on constructing shafts at the project site utilizing a blind-boring/drilling approach. This method is an efficient and cost-effective way to construct the shafts, where mechanized excavating equipment is positioned at the top of competent bedrock and drilling proceeds vertically downwards. The excavating equipment consists of a blind boring shaft drilling rig, from which a drilling head is suspended utilizing drill rods. As the drilling head incrementally reams downward into the subsurface geology, additional drill rods will be added to further advance the cutting head assembly. Each shaft will be approximately 8 feet in finished internal diameter.

Each shaft will receive a surface casing, extending down to competent bedrock, prior to the start of the blind-boring process. The purpose of the surface casing will be to prevent unconsolidated soils and weathered rocks from unraveling into the shaft, as well as prevent any communication between the shallow aquifer and shaft. The depth to competent bedrock is currently assumed to be approximately 40 to 50 feet below ground surface (bgs). For each 8-foot diameter shaft, an 11.5-foot diameter hole will be created to install surface casing using a specialized auger drill. The surface steel casing will be 0.5 inches thick at the minimum. The surface casing will be installed inside a mechanically excavated hole. The excavation and surface casing installation will be concurrently performed using a combination of a specialized auger drill and a large vibratory hammer to advance the casing through the upper soft ground down to bedrock. The annular space between the surface casing and the augered hole will be tremie-backfilled with cementitious grout to stabilize the surface casing into position while sealing casing-hole interface from any future fluid migration. The figure (**Attachment DR69H-1, Figure DR69H-1**) shows the general profile of a blind bored shaft from the surface to the subsurface cavern level, including the steel surface casing that will extend down to the competent bedrock.

In summary, the entire length of each proposed shaft will have an inner steel liner and grout barrier around it, while the shaft segments down to competent bedrock will have one additional level of protection in the form of the surface casing and the grout barrier surrounding it.

Cavern Construction Details

The cavern is sited at 2,050 to 2,100 feet bgs. The shallow aquifer (USDW) is estimated at 30 feet bgs. A 1,950-foot layer of quartz monzonite bedrock separates the cavern from USDW. The cavern is constructed using conventional, controlled detonation-based mining method at the depth – accessed via the impervious shafts. Cavern rock mass is of ultralow hydraulic conductivity -- it is hydrogeologically improbable for the cavern fluids to migrate through more than approximately 1,950 feet thick overburden to reach USDW. Only ambient compressed air and potable water are circulated in the system in the charging and discharging process. Because of this closed loop system design, there will be no interaction between the compressed air and water from either their respective shafts or the cavern with the USDW.

The roof of the cavern will be approximately 2,050 feet bgs (Refer to **Figure DR69H-1**), meaning that at least 1,950 feet thick massive Quartz Monzonite rock mass will exist between the cavern roof and the bottom of soils zone at the site. Numerous specimens obtained from multiple deep exploration boreholes across the project site indicate that the Quartz Monzonite has an average Uniaxial Compressive Strength greater than 16,000-psi. Preliminary geotechnical stability analysis has indicated that the proposed underground cavern space (40 feet width x 50 feet height) will have long term stability over 50-years of design life, in conjunction with the designed

rock reinforcement (20-foot double corrosion protection coated rock bolts, at 4 to 5-feet spacing in the cavern roof and sidewalls). Additionally, the compressed air storage pressure will enhance the overall global stability of the cavern roof and sidewalls through confinement of the rock mass surrounding the openings.

Subsurface Rock Mass Hydraulic Conductivity

Packer testing has been performed at multiple deep exploration boreholes around the project site to estimate the hydraulic conductivity of the rock mass at depths suitable for A-CAES cavern operation, as well as above and below the target cavern depths. Packers were set along the core hole length to isolate consecutive 21.8-foot intervals for testing. For each test, a small amount of water was added to the test interval after which the interval was pressurized to 80 psi above the hydrostatic pressure. Changes in the water level are then measured, first at 1-minute intervals for 5 minutes and 5-minute intervals thereafter, until the flow rate into the rock stabilized. Packer testing began at the bottom of the core holes and worked higher in elevation until a final depth of 1,800 and 1,900 feet bgs.

The recorded flow rates in core holes ZEV-CH-01-23, ZEV-CH-02-23, and ZEV-CH-03-23 are all less than 4.5 gallons-per-hour (gph), with most of the rates less than 2.0 gph (**Attachment DRH-1, Figures DR69H-2 through DR69H-6**). The hydraulic conductivity of the rock mass, which was derived from an average of three different methodologies, ranges between 1.90 x 10-8 and 8.55 x 10-7 centimeters per second (cm/s) in these three core holes (**Figures DR69H-2 through DR69H-4**). In core holes ZEV-CH-04-24 and ZEV-CH-05-24 between the elevations of 310 and 200 feet above mean sea level, higher flow rates ranging from 8 to 12 gph were measured (**Figures DR69H-5 and DR69H-6**). Above these elevations, which include the proposed cavern elevations, the flow rates are mostly less than 2 gph. The hydraulic conductivity in these core holes ranges between 1.94 x 10-8 to 2.33 x 10-6 cm/s (**Figures DR69H-5 and DR69H-6**). Packer testing in a sixth deep exploration borehole is ongoing at present, and preliminary flow rates are found to be very similar to the previous five boreholes. For reference, the cavern roof is currently proposed to be 510 feet above mean sea level, with cavern opening dimensions of 40-foot width and 50-foot height, where the hydraulic conductivities are less than 6 x 10-8 cm/s.

The derived hydraulic conductivity values can be used to infer the condition of the rock mass discontinuities according to **Attachment DR69H-2, Table DR69H-1** (Quinones-Rozo 2010)[4]. The condition of the rock mass discontinuities can therefore be classed as "Very Tight" throughout the tested depths. Detailed dual-phase numerical modeling of cyclic operational charging (compressed air ingress and water egress) and discharging (hydraulic column ingress and air egress) has indicated that the migration of cavern fluids into the rock mass will be limited to very minor distances (<10 ft) from the cavern perimeter.

Seismic Risk to Underground Caverns

The risk of damage due to earthquakes is primarily restricted to surface or very near-surface structures[5]. Sharma and Judd (1991)[6] have estimated that little real damage occurs to underground openings at depths greater than 200 to 300 ft, except where a tunnel intersects a fault (Normal Fault type) directly affected by the earthquake. No

[4] Quiñones-Rozo, C., 2010, April. Lugeon test interpretation, revisited. In Collaborative management of integrated watersheds, US Society of Dams, 30th annual conference (pp. 405-414).

[5] Dowding, C.H. and Rozan, A., 1978. Damage to rock tunnels from earthquake shaking. Journal of the Geotechnical Engineering Division, 104(2), pp.175-191.

[6] Sharma, S. and Judd, W.R., 1991. Underground opening damage from earthquakes. Engineering geology, 30(3-4), pp.263-276.

faults will intercept the proposed caverns and the nearest fault is approximately 1.3 kilometers away from the proposed caverns. According to Dowding and Rozen (1978) and confirmed by Sharma and Judd (1991) and Jaramillo (2017)[7], no damage occurs in deep rock tunnels for Peak Ground Accelerations (PGAs) less than 19% of the acceleration due to gravity (0.19g) and only minor damage occurs for PGAs between 0.19g and 0.50g. PGA is by far the most widely accepted index of ground shaking intensity and damage from earthquakes. Thus, heavy earthquake damage can be sustained by surface buildings, while any deep underground excavations could remain mostly unharmed.

The Project site is in a region where the likelihood of a damaging earthquake in the next 100 years is high. Furthermore, the PGA, with a 2% probability of exceedance in 50 years (i.e., occurs once every 2,475 years), was determined to be 0.39 g using Applied Technology Council (ATC) software for the ASCE7-16 Design Standard. This assumes a site amplification factor at PGA of 0.8 for Site Class A material. As per ASCE7-10, Site Class A material includes hard rock with shear waver velocities of > 5,000 ft/s. Based on the PGA values, earthquake damage to a cavern at the proposed cavern target depths is expected to be minor. In this case, minor damage due to shaking includes the fall of stones and the formation of new cracks.

Lahontan RWQCB DR69-I. *Section 5.4.1.4.5 Subsidence, indicates that operation of the WRESC will not involve the installation or use of any onsite wells for any purposes, while Appendix 5.11A Yeh and Associates, Inc. (2023) Geotechnical Data Report indicates that two of the mud rotary borings, 23E-05 and 23E-11, were completed as monitoring wells. What is the purpose of these monitoring wells? Is there water quality data for these wells? What are the construction details (boring logs and well completion reports)? Will these wells be retained and monitored throughout the life of the project?*

Response:The implied intent of the referenced Section 5.4.1.4.5 of the Supplemental AFC was that no onsite wells will be used for groundwater withdrawal during construction or operations. The monitoring wells referenced in the Yeh and Associates, Inc. Geotechnical Data Report (2023) are being used to monitor groundwater levels quality. Baseline water quality sampling from wells 23E-05 and 23E-11 was performed on August 21, 2024. The results are summarized on **Attachment DR69I-1, Table DR69I-1**. Boring logs and well completion details are included as **Attachment DR69I-2**.

The current well locations will be destroyed prior to construction activities based on their locations. The facility will implement a long-term monitoring program during operations.

Lahontan RWQCB 69-J: *John Morales: Please provide a more elaborate description on the type of liner planned to be used on the evaporation pond. What is the hydraulic conductivity of the liner planned to be installed on this evaporation pond? Also, what is the hydraulic head expected on this evaporation pond as a worst case scenario in the winter time when evaporation is at a minimal?*

Response: The evaporation pond will be designed to meet applicable regulations.

[7] Jaramillo, C.A., 2017. Impact of seismic design on tunnels in rock–Case histories. Underground Space, 2(2), pp.106-114.

8.0 WORKER SAFETY AND FIRE PROTECTION

8.1 Laws, Ordinances, Regulations, and Standards

8.1.1 Data Request DR70

In the Supplemental Application for Certification (supplemental application or Supplemental AFC), Sections 2.0 Project Description, 2.2.1.1 Facility Safety Design, and Section 5.17 Worker Safety, numerous sections refer to worker safety and health LORS. In some of these sections, U.S. OSHA is mentioned and in others, CAL OSHA is also included. While staff does not suggest that all relevant occupational safety and health regulations be called out, some regulations are particularly important and should be listed, described, and discussed in the outlines of both the Construction Safety and Health Plan and the Operations Safety and Health Plan as well as in the hazards analyses and LORS tables (Tables 5.17-1, 5.17-2, and 5.17-7). Also, some construction criteria are unclear from reading other sections.

DR70: *Please list the following LORS in the LORS Table, the Construction Hazard Analysis, and Construction Safety and Health Plan and provide a narrative on how these safety regulations will be implemented.*

- *Title 8 California Code of Regulations section 8403 – 8568 Tunnel Safety Orders*
  (Please include section 7091 of the Mine Safety Order addressing radioactive [in this case radon] protection by following the radiation standards of the Mine Safety and Health Administration for Metal and Non-Metallic Underground Mines, published July 31, 1969, February 25, 1970, and December 8, 1970.)
- *Title 8, California Code of Regulations section 3395 and 3396 Heat Illness Prevention outdoors and indoors*
- *Title 8, California Code of Regulations section 1200 – 1280 Compressed Air Safety Orders*
- *Title 8, California Code of Regulations section 5204 Silica Dust*
- *Title 8, California Code of Regulations section 5144.1 Protection from Wildfire Smoke*
- *Title 8, California Code of Regulations section 3314 Control of Hazardous Energy (Lock Out/Tag Out) for all sources of energy including compressed air and electrical.*
- *OSHA 26 CFR 1926.800 Underground Construction*

Response:

Table DR70-1: LORS - Construction Hazard Analysis and Construction Safety and Health Plan

Regulation	Description	Compliance Process
Title 8 California Code of Tunnel Safety Orders	Regulations section 8403 – 8568	The Applicant will comply with the regulations listed below as applicable to the topsides scope of work. A Project Specific Safety Manual will be developed prior to project execution. Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to the contractor's Standard

Regulation	Description	Compliance Process
		Operating Procedures, that are applicable to the project.
Title 8 California Code of Tunnel Safety Orders	Section 7091 of the Mine Safety Order addressing radioactive [in this case radon] protection by following the radiation standards of the Mine Safety and Health Administration for Metal and Non-Metallic Underground Mines, published July 31, 1969, February 25, 1970, and December 8, 1970.)	The Applicant will comply with the regulations listed below as applicable to the topsides scope of work. A Project Specific Safety Manual will be developed prior to project execution. Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to the contractors Standard Operating Procedures, that are applicable to the project.
Title 8, California Code of Regulations section 3395 and 3396	Heat Illness Prevention outdoors and indoors	Kiewit will comply with the regulations listed below as applicable to the topsides scope of work. A Project Specific Safety Manual will be developed prior to project execution. Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to Kiewit Standard Operating Procedures, that are applicable to the project.
Title 8, California Code of Regulations section 1200 – 1280	Compressed Air Safety Orders	Kiewit will comply with the regulations listed below as applicable to the topsides scope of work. A Project Specific Safety Manual will be developed prior to project execution. Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to Kiewit Standard Operating Procedures, that are applicable to the project.
Title 8, California Code of Regulations section 5204	Silica Dust	Kiewit will comply with the regulations listed below as applicable to the topsides' scope of work. A Project Specific Safety Manual will be developed prior to project execution.

Regulation	Description	Compliance Process
		Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to Kiewit Standard Operating Procedures, that are applicable to the project.
Title 8, California Code of Regulations section 5144.1	Protection from Wildfire Smoke	Kiewit will comply with the regulations listed below as applicable to the topsides scope of work. A Project Specific Safety Manual will be developed prior to project execution. Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to Kiewit Standard Operating Procedures, that are applicable to the project.
Title 8, California Code of Regulations section 3314	Control of Hazardous Energy (Lock Out/Tag Out) for all sources of energy including compressed air and electrical.	Kiewit will comply with the regulations listed below as applicable to the topsides scope of work. A Project Specific Safety Manual will be developed prior to project execution. Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to Kiewit Standard Operating Procedures, that are applicable to the project.
OSHA 26 CFR 1926.800	Underground Construction	The Applicant will comply with the regulations listed below as applicable to the topsides scope of work. A Project Specific Safety Manual will be developed prior to project execution. Our project initiation process includes identification of all applicable Federal, State, and Local regulations, in addition to the contractor's Standard Operating Procedures, that are applicable to the project.

8.1.2 Data Request DR71

Potential worker exposure to silica dust during construction is mentioned in Supplemental AFC section 5.17 (TN 254805). Also, in the Supplemental AFC Volume II Appendix 511A-Part I, APPENDIX 5.11A Yeh and Associates, Inc. Geotechnical Data Report (TN254829), it was stated that subsurface soil analysis showed *"The alluvium was interpreted to be derived from the underlying quartz monzonite and was encountered as loose to very dense sand with varying amounts of silt and clay (SW, SM, SC). Quartz Monzonite (qm) was encountered below the alluvium.* This is strong evidence that worker exposure to silica dust is likely.

DR71: *Please provide an outline of compliance with Title 8 California Code of Regulations section 5204 that includes use of respirators, worker and environmental monitoring, and medical surveillance.*

Response: Attachment DR71-1 presents a discussion on worker compliance involving silica dust.

8.2 Subsurface Activities

8.2.1 Data Requests DR72 through DR76

Staff needs clarification and descriptions on the subsurface activities so as to better understand the site layout and location relative to above-ground structures, the possible use of fuels by below ground equipment, emergency access and removal of injured workers, and potential maintenance of below ground equipment, as these factors all impact worker safety and health.

DR72: *Please provide the source of energy (electrical, diesel, gasoline, propane) for the cavern load-haul-dump vehicles..*

Response: The Applicant anticipates that diesel will be the source of energy for the cavern load haul-dump vehicles.

DR73: *Please describe how the cavern excavation staffing will allow for underground construction of the cavern continuing 24 h/d, 7 d/w.*

Response: Mining will be staffed by shift work. Crews work 20 days on/10 days off – 12 hours per day. Crews are rotated in and out on this schedule.

DR74: *Please provide a description of the need for any maintenance, repairs, or trouble-shooting the subsurface machinery/apparatus and if any of these activities will require worker entry into the cavern post-construction, and the safety measures used to ensure a safe entry and exit.*

Response: The cavern is designed to never be re-entered during the operational phase of the project. This is similar to hydrocarbon storage caverns, which is the basis for the A-CAES cavern designs.

DR75: *Please provide a more in-depth Emergency Action Plan.*

Response: Attachment DR75-1 presents a Draft Emergency Action Plan.

DR76: *Please provide a Construction Blasting Plan that contains a complete description of how explosives would be safely transported and used at the site, evacuation, security and fire prevention procedures, a blasting equipment list, and procedures for notification of nearby receptors. The blasting plan shall be prepared by a qualified, experienced, and licensed blasting contractor and in compliance with appropriate federal and state regulations addressing explosives and worker safety regulations, including: the Hazards Material Transportation Act (49 U.S.C. 5101 et seq. And 49 CFR Part 171-177); the Organized Crime Control Act of 1970, Title XI (Public*

Law 91- 452); BATF regulations (27 CFR Part 555), the California Fire Code Chapter 56 – sections 5603, 5604, and 5607, and Cal/OSHA regulations California Code of Regulations., tit. 8, §s 1550 through 1580 and 5236 through 5252).

Response: A controlled detonation plan will be prepared once an explosive has been selected for the Project (**Attachment DR76-1**).

8.3 Shaft Drilling Activities

8.3.1 Data Requests DR77 and DR78

Given the insufficient information about how exactly the cavern will be constructed, staff also needs clarification and documentation on how shaft drilling activities will be performed as these also impact worker safety and health.

DR77: *Please explain how the access will be provided to the shaft drilling which begins at 50-100 feet bgs by providing a discussion, and a vertical drawing plot plan.*

Response: Hydrostor is planning on constructing shafts at the project site utilizing a blind-boring/drilling approach. This method is an efficient and cost-effective way to construct the shafts, where mechanized excavating equipment is positioned at the top of competent bedrock and drilling proceeds vertically downwards. The excavating equipment consists of a blind boring shaft drilling rig, from which a drilling head is suspended utilizing drill rods. As the drilling head incrementally reams downward into the subsurface geology, additional drill rods will be added to further advance the cutting head assembly. As shown in **Figure DR77-1** below, each shaft will be approximately 8 feet in finished internal diameter.

Each shaft will receive a surface casing, extending down to competent bedrock, prior to the start of the blind-boring process. The purpose of the surface casing will be to prevent unconsolidated soils and weathered rocks from unraveling into the shaft, as well as prevent any communication between the shallow aquifer and shaft. The depth to competent bedrock is currently assumed to be approximately 40 to 50 feet from the surface. For each 8-foot diameter shaft, an 11.5-foot diameter hole will be created to install surface casing using a specialized auger drill. The surface steel casing will be 0.5 inches thick at the minimum. The surface casing will be installed inside a mechanically excavated hole. The excavation and surface casing installation will be concurrently performed using a combination of a specialized auger drill and a large vibratory hammer to advance the casing through the upper soft ground down to bedrock. The annular space between the surface casing and the augered hole will be tremie-backfilled with cementitious grout to stabilize the surface casing into position while sealing casing-hole interface from any future fluid migration. The figure below shows the general profile of a blind bored shaft from the surface to the subsurface cavern level, including the steel surface casing that will extend down to the competent bedrock.

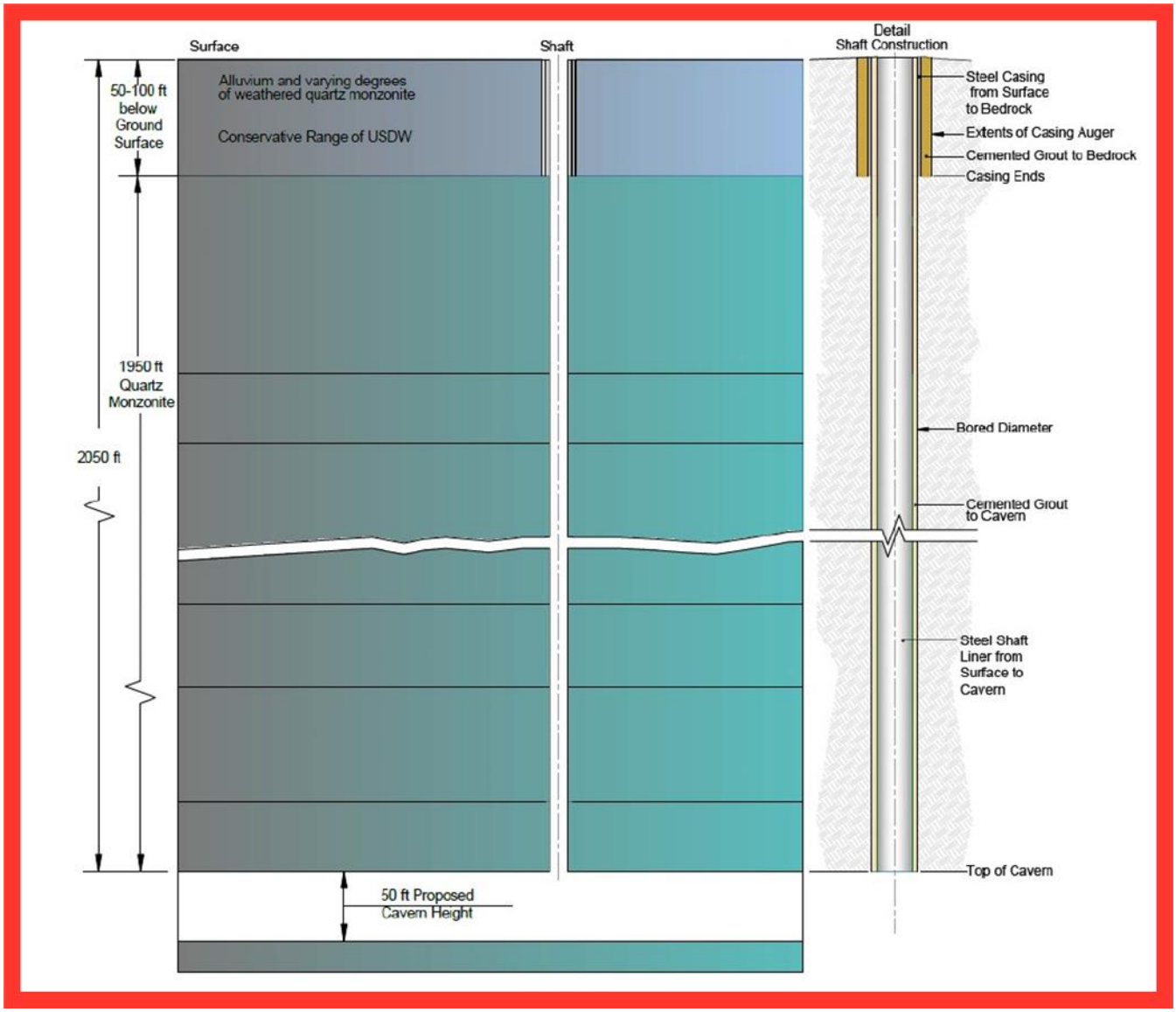


Figure DR77-1: Drill Shaft Profile

DR78: *Please provide the basis for determining that 100-ft between the ground surface and the top of the cavern is sufficient and safe to support the cavern ceiling given the soils type at the site.*

Response: The roof of the cavern will be approximately 2,050 feet bgs (Refer to Figure above), meaning that at least a 1,950-foot hick massive Quartz Monzonite rock mass will exist between the cavern roof and the bottom of soils zone at the site.

8.4 Surface Activities

8.4.1 Data Requests DR79 and DR80

Staff also needs clarification and descriptions on surface activities so as to better understand hazards to worker safety.

DR79: *Please provide a safety protocol for the operation of the rock crushing facility.*

Response: A rock curshing vendor has not been selected for the project. **Attachment DR79-1** presents an example safety protocol for the operation of the rock crushing facility. A final rock crushing safety protocol will be presented after a vendor is selected and before the commencement of construction.

DR80: *Please provide a safety protocol for the operation of the concrete batch plant.*

Response: Attachment DR80-1 presents a safety protocol for the operation of the concrete batch plant.

ATTACHMENT DR42-1

Estimated Permanent and Temporary Disturbance Summary Table

Table DR42-1: Summary of Estimated Permanent and Temporary Disturbance With and Without Onsite Rock Re-use

Project Element	Disturbed Acreage Without Berm (Rock Hauled Offsite)	Disturbed Acreage With Berm (Onsite Rock Re-use)	Permanent or Temporary
Architectural Berm	0	72.8	Permanent
Main Facility	88.6	88.6	Permanent
New Access Roads	11.3	11.3	Permanent
Pull and Tensioning Sites[1]	15.0	14.6	Temporary
Site Construction Laydown and Parking	129.7	133.5	Temporary
Transmission Pole Construction Sites[2]	19.7	19.3	Temporary
Transmission Poles	0.1	0.1	Permanent
Total Permanent	100.0	172.8	Permanent
Total Temporary	164.5	167.4	Temporary

[1] Some Pull and Tensioning Sites overlap with Site Construction Laydown and Parking. The overlapping areas have been measured as Pull and Tensioning Sites.

[2] Some Transmission Pole Construction Sites overlap with Site Construction Laydown and Parking. The overlapping areas have been measured as Site Construction Laydown and Parking.

ATTACHMENT DR43-1

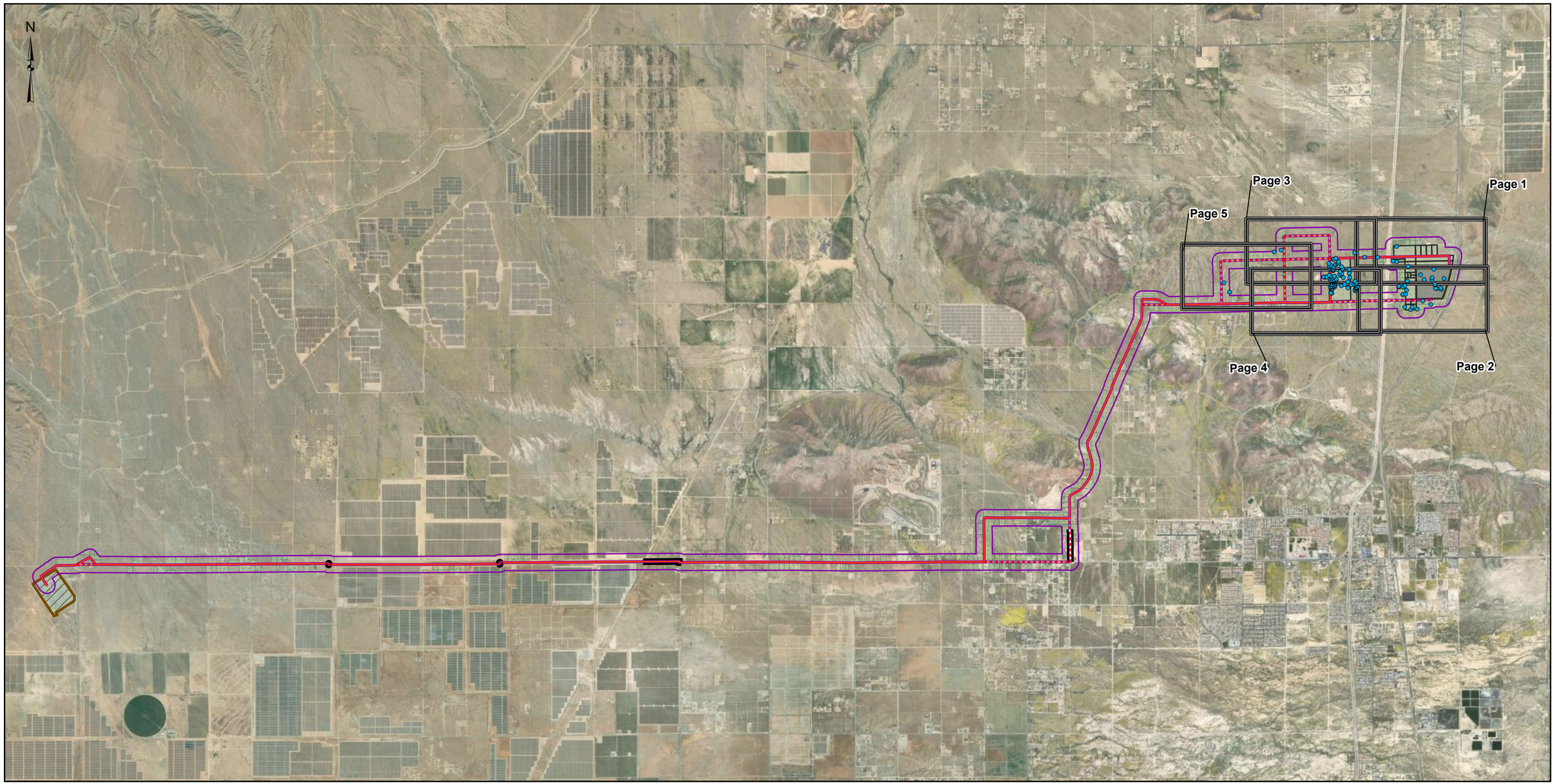
Permanent and Temporary Acreages Table

Table DR 43-1: Permanent and Temporary Acreages of Each Vegetation Community/Land Use Impact

	Disturbed Acreage			
Vegetation Community/Land Use	**Permanent Impacts Without Berm (Rock Hauled Offsite)**	**Temporary Impacts Without Berm (Rock Hauled Offsite)**	**Permanent Impacts With Berm (Onsite Rock Re-use)**	**Temporary Impacts With Berm (Onsite Rock Re-use)**
Allscale scrub	1.4	4.4	1.6	4.2
Cheesebush Scrub	13.5	1.5	14.6	0.4
Creosote bush - white bursage scrub	72.1	121.3	132.2	128.6
Creosote bush scrub	0.5	2.4	0.5	6.7
Disturbed/Developed	7.2	22.8	9.6	23.6
Non-Native Grassland and Forbes	0.0	1.4	0.0	1.4
Rubber rabbitbrush scrub	0.0	1.4	0.0	1.4
Tamarisk Thickets	0.0	0.1	0.0	0.1
White Bursage Scrub	5.2	9.2	14.3	0.9
Total	100.0	164.5	172.8	167.4

ATTACHMENT DR44-1

Silver Cholla Observations Maps



LEGEND

- Silver Cholla Observations
- Map Series Page Extent

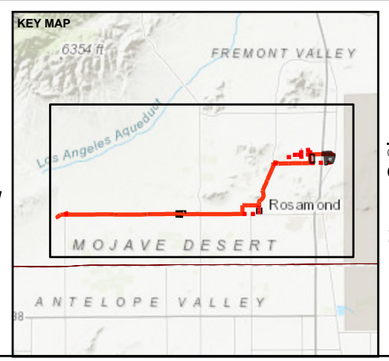
Project Components

- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Areas and Other Mapped Features

- WRESC Site
- Other Project Parcels
- SCE Whirlwind Substation
- Project ROW
- 500 ft Buffer Around Project Parcels and Transmission Line ROW
- Areas with Right of Entry

KEY MAP



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1" = 6,000 ft Miles

NOTE(S)
1. PROJECT ROW IS 62.5 FT ON EITHER SIDE OF THE PROPOSED TRANSMISSION LINE ROUTE

REFERENCE(S)
1. PROPOSED TRANSMISSION LINE: HYDROSTOR, 2024
2. CHOLLA OBSERVATIONS: WSP 2023, 2024
3. COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET
4. MAP SERVICE LAYER CREDITS: WORLD IMAGERY: EARTHSTAR GEOGRAPHICS
WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, USGS, NGA, EPA, USDA, NPS

CLIENT
GEM A-CAES LLC

CONSULTANT
wsp

YYYY-MM-DD	2024-10-23
DESIGNED	MK
PREPARED	KO
REVIEWED	NN
APPROVED	JP

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
CEC DATA REQUESTS

TITLE
SURVEYED CHOLLA WITHIN PROJECT AREA VICINITY

PROJECT NO.	PHASE	REV.	FIGURE
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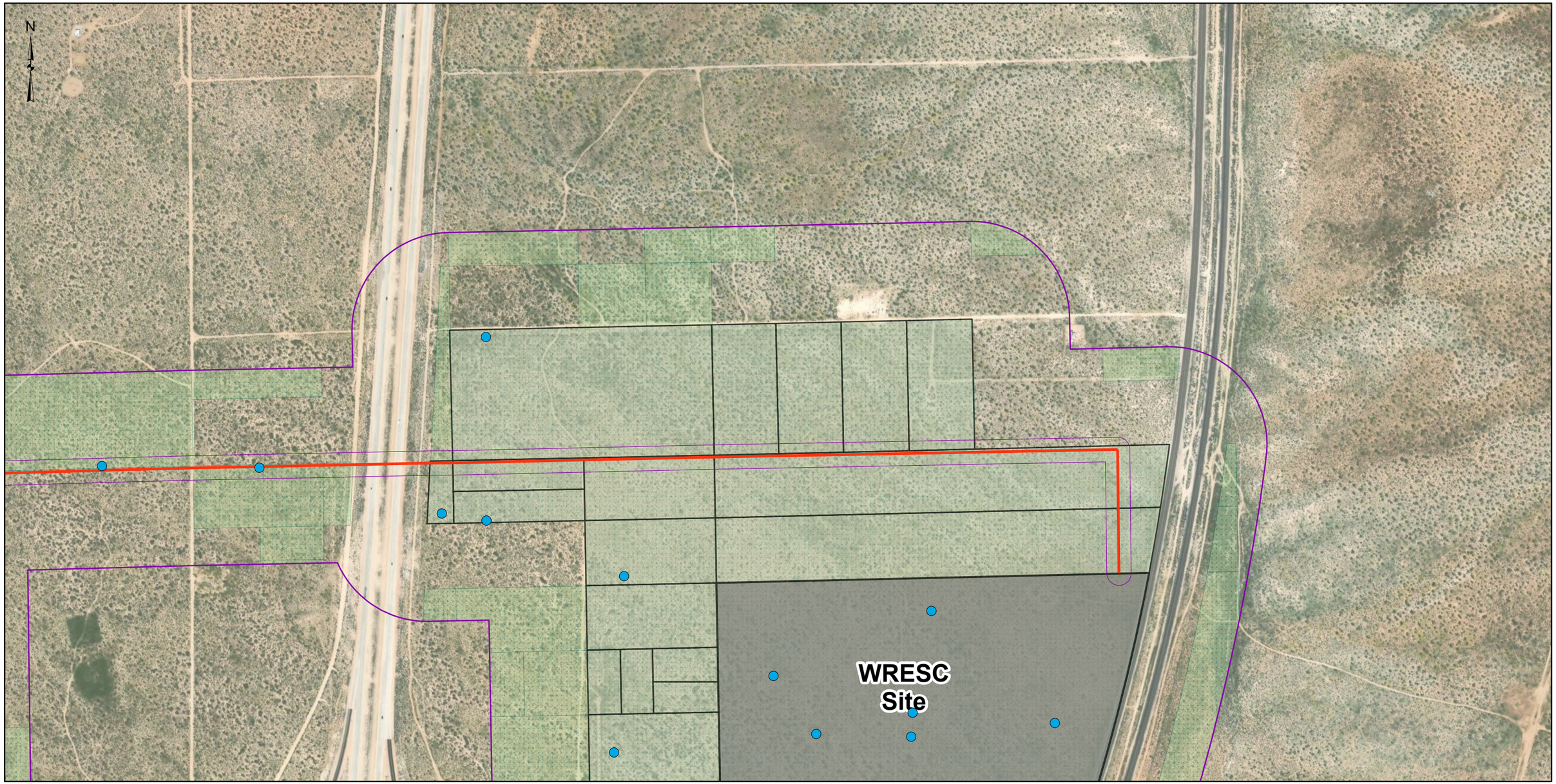

LEGEND

- Silver Cholla Observations

Project Components

- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Areas and Other Mapped Features

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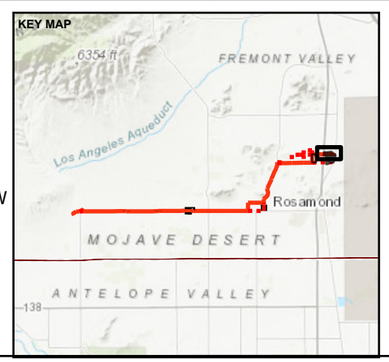

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1" = 500 ft FEET

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WORLD IMAGERY: MAXAR

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APPROVED	JP

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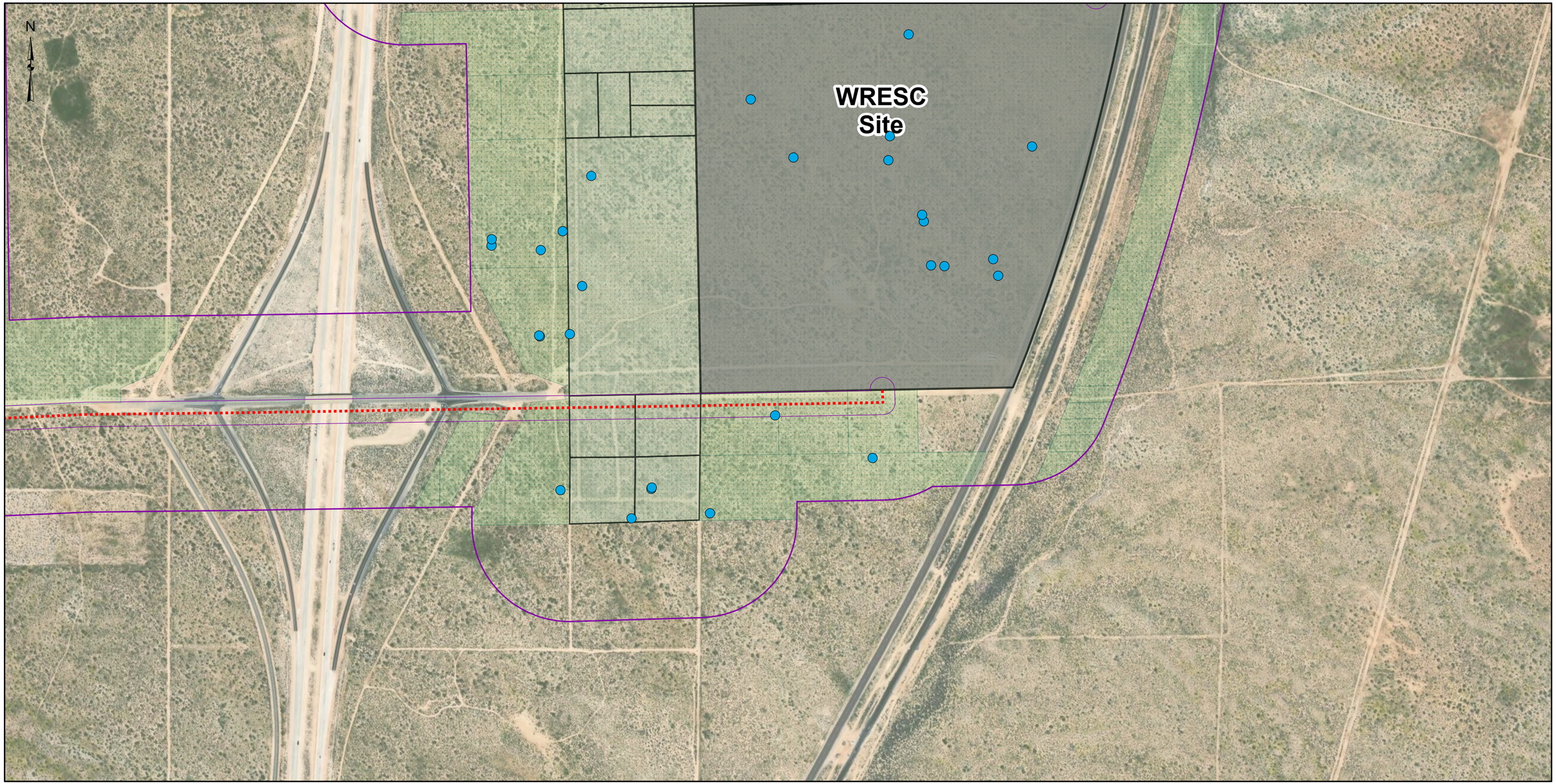

LEGEND

- Silver Cholla Observations

Project Components

- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Areas and Other Mapped Features

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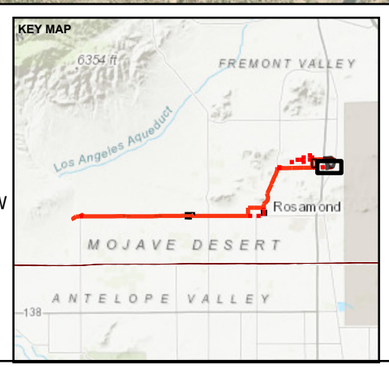

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APPROVED	JP

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LEGEND

- Silver Cholla Observations

Project Components

- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Areas and Other Mapped Features

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0 500 1,000

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LEGEND

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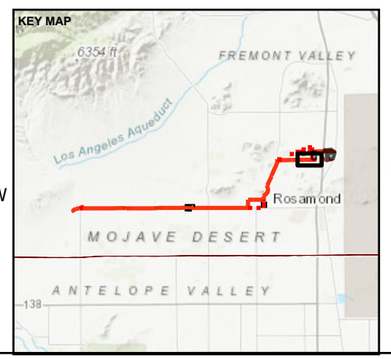

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APPROVED	JP

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LEGEND

- Silver Cholla Observations

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PROJECT NO.	PHASE	REV.	FIGURE
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ATTACHMENT DR45-1

Raven Management Plan

REPORT

Raven Management Plan

Willow Rock Energy Storage Center (WRESC)

Submitted to:

California Energy Commission

Submitted by:

WSP USA Inc.

401 B Street, Suite 1650, San Diego, California, USA 92101

October 2024

Table of Contents

TABLES

1.0 INTRODUCTION

In March, 2024 GEM A-CAES LLC submitted the Supplemental AFC in response to the direction set forth in the Committee's August 9, 2023, order (CEC Transaction Numbers (TN#) 251599, 251592), to construct and operate a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology in Kern County, California. In addition to the WRESC, the Project will include an approximate 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line to deliver energy to the Southern California Edison (SCE) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard.

This Raven Management Plan (RMP), contained herein, was prepared in response to CEC Staff Data Requests Set 3, Data Request No. 45. The objective of this Raven Management Plan is to reduce potential direct and cumulative effects of raven predation on desert tortoise and other native wildlife species with respect to the Project Area. The intent of this RMP is that it will serve as a working draft that both the CEC and the U.S. Fish and Wildlife Service (FWS) can comment on prior to its finalization. Prior to construction, a final RMP will be incorporate agency comments and be submitted to the CEC and FWS for approval.

1.1 Lead and Consulting Agencies

The Lead Agencies for the RMP are the CEC and the Common Raven Program lead by FWS. Consulting agencies are public agencies, other than the lead agencies, that may provide guidance or information needed to satisfy the requirements of the measures contained in this Plan. If the CEC deems necessary, the RMP will be distributed to consulting agencies for review. Consulting agencies identified for the project are the California Department of Fish and Wildlife (CDFW), and Kern County Natural Resources Department.

The Applicant will correspond with the Common Raven Program to identify regional raven management and monitoring program requirements. When deemed necessary by the CEC, the Applicant will make the appropriate payment to the regional raven management and monitoring program.

1.2 Location

The proposed project will be located within the southeast quarter of Section 33 of Township 10 North, Range 12 West in unincorporated Kern County (County), approximately 4 miles north of Rosamond, California. The WRESC site is located on the western portion of an approximately 112-acre parcel with Assessor's Parcel Number (APN) 431-022-13 that is bisected by Sierra Highway and the Union Pacific Railway. The WRESC site is bounded on the north and west by undeveloped property, on the east by Sierra Highway, and on the south by Dawn Road approximately 1,800 feet east of the State Route 14 corridor. Additional parcels adjacent to the WRESC site within the project boundary may be used for temporary parking, construction laydown, or construction of an architectural berm.

1.3 Raven and Raven Biology

Ravens belong to the family Corvidae (corvids) and include crows, ravens, jays, magpies, and nutcrackers. Corvids are composed of over 100 species and often play key roles in biotic communities. Corvids are omnivorous and have been observed to employ effective strategies for foraging including scavenging and predation, particularly on nests and young. Ravens are opportunistic feeders that have been observed to use anthropogenic sources of water and food (Boarman 2003). Ravens are highly adaptable to a wide range of food and habitats and have been observed to respond positively to human-altered environments. Corvid populations have dramatically increased in Western North America as a result of their adaptation abilities.

In California, ravens are known to be important predators on the eggs and young of several threatened and endangered species. Particularly, in the Mojave Desert and within the general vicinity of the Project Area, ravens are known to predate on the Desert tortoise (*Gopherus agassizii*), a threatened species protected by the Endangered Species Act (Liebezeit and George 2002).

2.0 RAVEN MANAGEMENT

The goal of this draft RMP is to outline non-lethal measures that the Project would implement to limit predation on desert tortoise within the vicinity of the Project during the facility's construction and operation phases. Raven management measures outlined in **Table 1** are based on guidance from Alternative A of the USFWS Draft Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise (USFWS 2008).

Table 1: Raven Management Measures

Raven Management Measure	Description	Timing
Reduce Access to Anthropogenic Food and Water Sources	Multiple measures can be incorporated to reduce access to anthropogenic food and water sources and can include: ▪ **Trash Management.** During construction, the project area will be kept clutter free. All debris and trash related to construction will be, to the extent feasible, promptly placed in trash bins with lids to prevent access from ravens or other opportunistic scavengers. All trash accumulated will be regularly disposed from the Site to prevent accumulation that could produce excess odors. A Worker Environmental Awareness Program will be developed and will include instructions to avoid feeding any scavengers, including ravens. As discussed in Section 5.14 Waste Management of the SAFC, nonhazardous waste generated will be disposed of in bins to limit pest infestation. ▪ **Facility Security and Fencing.** Qualified biological staff will conduct pre-construction surveys to identify biological exclusion zones and place desert tortoise exclusion fencing. During operation, the project site boundaries will be fenced to minimize site entry from scavengers that can expose trash to ravens. Entrance onto the facility will be monitored to prevent personnel and animals entering the site. ▪ **Reduce water availability.** During construction, water will be used for drilling and dust suppression. All water will be stored in closed containers or totes and maintained regularly to prevent leaks. To the extent feasible, the minimum amount of water to meet safety and air quality standards for dust suppression will be used. These practices should reduce the amount of puddling. The project components include an above ground reservoir and stormwater pond. The surface reservoir and stormwater pond will include a floating cover to prevent access from ravens.	Construction and Operation
Nest Management	▪ **Identifying and Removing Raven nests during non-breeding seasons.** Preconstruction surveys and construction monitoring will locate all active and inactive nest locations throughout the construction phase of the project. Common raven nest and raptor surveys will be conducted with qualified biologist staff that have expertise in identifying raven and desert tortoise remains. In the event that common raven nest or rapture nest it identified a buffer, as determined by USFWS, will be additionally surveyed to identify potential desert tortoise remains. Potential measures, such as removal of raven nests in off-breeding seasons, may be required and will be determined in consultation with USFWS. In addition, survey methods and buffer radius for raven and rapture surveys will be established in consultation with USFWS and any other applicable associated agency if required. Any active raven nests should be reported to the USFWS Common Raven Program Manager. Information on raven nests conveyed to the	Pre-construction and construction

Raven Management Measure	Description	Timing
	USFWS should include at a minimum the location of the nest and time of initial nest observation. The USFWS will communicate with the project owner about access for dealing with active nests. ▪ **Utility Structures.** Anthropogenic structures and gen-tie lines offer raven nesting opportunities. The proposed project involves installation of gen-tie lines on utility poles. Where feasible, the proposed project will utilize nest discouragers according to Avian Power Line Interaction Committee (APLIC) guidelines that limit establishment of raven nests (APLIC and USFWS 2005)	
Dead Animals	▪ Each day that biological monitoring is present on site, a search for prey remains and dead carcasses on Site or in nearby areas. A dead carcass observation that is large enough to support several opportunistic feeders or ravens will be reported to local animal control agency within 24 hours to minimize raven presence. Dead animals of special-status species, including the desert tortoise, will be notified to USFWS within 24 hours via phone or email.	Pre-construction and construction
Establish a Worker Environmental Awareness Program (WEAP)	▪ Worker Environmental Awareness Program will be developed to include raven management measured identified herein.	Pre-construction and construction
Raven Monitoring and Compliance	▪ Compliance reports will be submitted to the CEC and USFWS.	

3.0 CLOSING

This Plan will be implemented following approval or concurrence by the CEC and FWS. Minor amendments or clarifications to the RMP will be implemented following receipt of email concurrence from consulting agency staff. Major amendments to this plan that may result from changes in applicable regulations, which alter the procedures outlined in this plan, will be submitted to the CEC and FWS and for concurrence prior to implementation.

4.0 REFERENCES

Avian Power Line Interaction Committee (APLIC) and US Fish and Wildlife Service (USFWS). 2005. Avian Protection Plan Guidelines

Boarman, W. I. 2002. Reducing Predation by Common Ravens on Desert Tortoises in the Mojave and Colorado Deserts. Prepared for the U. S. Bureau of Land Management. U. S. Geological Survey Western Ecological Research Center. San Diego, California.

Liebezeit, J. R. and T. L. George. 2002. A Summary of Predation by Corvids on Threatened and Endangered Species in California and Management Recommendations to Reduce Corvid Predation. Calif. Dept. Fish and Game, Species Conservation and Recovery Program Report 2002-02, Sacramento, CA. 103 pages

U.S. Fish and Wildlife Service, U.S. Department of Agriculture, U.S. Department of Defense, Bureau of Interior. 2008. Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise. Ventura Fish and Wildlife Office. Ventura, California

ATTACHMENT DR48-1

Air Conditioning Systems Listing

Table DR48-1: WRESC Proposed A/C Sysyem Specifications and Refrigerant Data

UNIT	SPACES SERVED	MANUFACTURER	BoD MODEL NUMBER	SIZE	MAX REFRIGERANT CHARGE, lbs	RECOMMENDED REFRIGERANT	# of units	Total Chrg Weight, lbs
VRF WALL MOUNT UNIT	Maintenance and Warehouse Area (109)	MITSUBISHI	MSZ-GE18NA-U1	1.5 TON	TBD	R410A	2	
HEAT PUMP OUTDOOR UNIT	Maintenance and Warehouse Area (109)	MITSUBISHI	MXZ-4B36NA	3 TON	8.813	R410A	1	8.813
DOAS	Office Storages / Cubicles (108), Break Room (107), Office (119), Office (106), Office (105), Conference Room (110), Print/Copy (104), Office (103), Hall (117), Office (114), LOTO (115), Reception (120), DCS Room (101), Control Room (102)	TRANE	OABE048	4 TON	13.7	R454B	1	13.7
DUCTED VRF UNIT	Unit 1: Office Storages / Cubicles (108) Unit 2: Break Room (107), Office (106), Office (105), Print / Copy (104), Office (103), Reception (120), Vest (100), Office (114), Men's (112), Women's (111), Office (119)	MITSUBISHI	PEAD-A24AA8	2 TON	TBD	R410A	2	
HEAT PUMP OUTDOOR UNIT	Office Storages / Cubicles (108), Break Room (107), Office (106), Office (105), Print / Copy (104), Office (103), Reception (120), Vest (100), Office (114), Men's (112), Women's (111), Office (119)	MITSUBISHI	MXZ-8C48NA	4 TON	TBD	R410A	1	
VRF CEILING CASSETTE	DCS Room (101), Control Room (102)	MITSUBISHI	SLZ-KF15NA	1.25 TON (24X24)	2.563	R410A	6	15.378
HEAT PUMP OUTDOOR UNIT	Unit 1: DCS Room (101), Unit 2: Control Room (102)	MITSUBISHI	MXZ-8B48NA	4 TON	18.7	R410A	2	37.4
VRF CEILING CASSETTE	LOTO (105)	MITSUBISHI	SLZ-KF18NA	1.5 TON (24X24)	3.563	R410A	2	7.126
INLINE EXHAUST FAN	Men's (112), Women's (111), Jan (118)	GREENHECK	SQ-97-VG	250 CFM	Not Required	Not Required	1	
HEAT PUMP OUTDOOR UNIT	Conference Room (110), LOTO (115)	MITSUBISHI	MXZ-8C36NA	3 TON	6.813	R410A	1	6.813
VRF CEILING CASSETTE	Conference Room (110)	MITSUBISHI	SLZ-KF15NA	1 TON (24X24)	2.563	R410A	2	5.126
Air Conditioner Wall Mount	Turbine Encl	ICE Mfg	CFA3180AD150A++3+1CA+B22++++++	15 Ton	TBD	R410A	3	
Air Conditioner Wall Mount	MV Encl	ICE Mfg	CFA3300AD180A++3+1CA+B22++++++	25 Ton	TBD	R410A	4	
Reverse Flow Air Conditioner W	MV Encl	ICE Mfg	CFA3300AD180A++3+2CA+B22++++++	25 Ton	TBD	R410A	1	
Wallmount	CCW Encl	Marvair	Not Specified	5 Ton	TBD	TBD	6	
Wallmount	TF Encl	Marvair	Not Specified	6 ton	TBD	TBD	6	
Air Conditioner Wall Mount	VFD Encl	ICE Mfg	CFA3180AD150A++3+1CA+B22++++++	15 Ton	TBD	R410A	4	

These selections are the current basis but are subject to change as the design progresses.

R410A, lbs **80.656**
R454B, lbs **13.7**

Brent – Our 5 Tons and less Mitsubishi splits are switching to R454B soon, but information is not available yet on charge. Should be available very soon.

R454B expected to have a higher charge

Thank you,

Alex Clemons
Systems Sales Engineer

Cell: (913) 515-3682

ATTACHMENT DR48-2

R-410A MSDS

NATIONAL REFRIGERANTS, INC.

R-410A

Safety Data Sheet

R-410A

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: R-410A
OTHER NAME: Difluoromethane, Pentafluoroethane
USE: Refrigerant Gas

DISTRIBUTOR: National Refrigerants, Inc.
661 Kenyon Avenue
Bridgeton, New Jersey 08302

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-262-0012

IN CASE OF EMERGENCY CALL:
CHEMTREC: 1-800-424-9300

2. HAZARDS IDENTIFICATION

CLASSIFICATION: **Gases under pressure, Liquefied Gas**
SIGNAL WORD: **WARNING**
HAZARD STATEMENT: **Contains gas under pressure, may explode if heated**
SYMBOL: **Gas Cylinder**
PRECAUTIONARY STATEMENT: **STORAGE: Protect from sunlight, store in a well ventilated place**

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-410A is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None known.

3. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Difluoromethane	75-10-5	50
Pentafluoroethane	354-33-6	50

COMMON NAME and SYNONYMS
R-410A; HFC410A

There are no impurities or stabilizers that contribute to the classification of the material identified in Section 2

4. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

INHALATION: Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

INGESTION: Ingestion is unlikely because of the physical properties and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a physician.

ADVICE TO PHYSICIAN: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Gas, not applicable per DOT regulations
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	>750°C
UPPER FLAME LIMIT (volume % in air):	None by ASTM D-56-82
LOWER FLAME LIMIT (volume % in air):	None by ASTM E-681
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:
Use any standard agent – choose the one most appropriate for type of surrounding fire (material itself is not flammable)

UNUSUAL FIRE AND EXPLOSION HAZARDS:

R-410A is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources.
Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Product dissipates upon release. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return to the affected area until air has been tested and determined safe, including low-lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

R-410A should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

STORAGE RECOMMENDATIONS:

Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

INCOMPATIBILITIES:

Freshly abraded aluminum surfaces at specific temperatures and pressures may cause a strong exothermic reaction. Chemically reactive metals: potassium, calcium, powdered aluminum, magnesium, and zinc.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:

Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA,

neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

EYE PROTECTION:

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

RESPIRATORY PROTECTION:

None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH-approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH-approved gas mask with organic vapor canister.

ADDITIONAL RECOMMENDATIONS:

Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Difluoromethane	None	None	*1000 ppm TWA (8hr)
Pentafluoroethane	None	None	*1000 ppm TWA (8hr)

* = Workplace Environmental Exposure Level (AIHA)

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

Hydrogen Fluoride: ACGIH TLV: 2 ppm ceiling, 0.5ppm TLV-TWA

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless liquid and vapor
PHYSICAL STATE:	Gas at ambient temperatures
MOLECULAR WEIGHT:	72.6
CHEMICAL FORMULA:	CH_2F_2, CHF_2CF_3
ODOR:	Faint ethereal odor
SPECIFIC GRAVITY (water = 1.0):	1.08 @ 21.1°C (70°F)
SOLUBILITY IN WATER (weight %):	Unknown
pH:	Neutral
BOILING POINT:	-48.5°C (-55.4°F)
FREEZING POINT:	Not determined
VAPOR PRESSURE:	215.3 psia @ 70°F 490.2 psia @ 130°F
VAPOR DENSITY (air = 1.0):	3.0
EVAPORATION RATE:	>1**COMPARED TO:** $CC1_4$ = 1
% VOLATILES:	100
ODOR THRESHHOLD:	Not established
FLAMMABILITY:	Not applicable
LEL/UEL:	None/None
RELATIVE DENSITY:	1.08 g/cm^3 at 21.1˚C
PARTITION COEFF (n-octanol/water)	Not applicable

AUTO IGNITION TEMP: >750˚C
DECOMPOSITION TEMPERATURE: >250˚C
VISCOSITY: Not applicable
FLASH POINT: Not applicable
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
The product is stable.
Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:
(Under specific conditions: e.g. very high temperatures and/or appropriate pressures) – Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically active metals: potassium, calcium, powdered aluminum, magnesium and zinc.

HAZARDOUS DECOMPOSITION PRODUCTS:
Halogens, halogen acids and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Difluoromethane:	LC_{50} : Inhalation 4 hr. (rat) - $\geq$ 520,000 ppm
Pentafluoroethane:	Cardiac Sensitization threshold (dog) $\geq$ 100,000 ppm

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:
Teratology – negative
Subchronic inhalation (rat) NOEL – 50,000 ppm

REPEATED DOSE TOXICITY:
Lifetime inhalation exposure of male rats was associated with a small increase in salivary gland fibrosarcomas.

OTHER DATA:
Not active in four genetic studies

FURTHER INFORMATION:
Acute effects of rapid evaporation of the liquid may cause frostbite. Vapors are heavier than air and can displace oxygen causing difficulty breathing or suffocation. May cause cardiac arrhythmia.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-410A is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section			

12. ECOLOGICAL INFORMATION

Degradability (BOD): R-410A is a gas at room temperature; therefore, it is unlikely to remain in water.
Octanol Water Partition Coefficient: Log P_{ow} = 1.48 (pentafluoroethane), 0.21 (difluoromethane)

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Not a hazardous waste.
If yes, the RCRA ID number is: Not applicable.

OTHER DISPOSAL CONSIDERATIONS:

Disposal must comply with federal, state, and local disposal or discharge laws. R-410A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT ID NUMBER: UN3163
US DOT PROPER SHIPPING NAME: Liquefied gas, n.o.s., (Pentafluoroethane, Difluoromethane)
US DOT HAZARD CLASS: 2.2
US DOT PACKING GROUP: Not applicable

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Components listed on the TSCA inventory

OTHER TSCA ISSUES: Subject to Section 12(b) export notification. May contain 0-10ppm Ethane, 2-chloro-1,1,1-trifluoro, CAS#75-88-7

SARA TITLE III / CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA / CERCLA RQ (lb.)	SARA EHS TPQ (lb.)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE PRESSURE

SARA 313 TOXIC CHEMICALS:

The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
No ingredients listed in this section	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:

R-410A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82.

WARNING: Do not vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered. **Contains Pentafluoroethane (HFC-125) and Difluoromethane (HFC-32),** greenhouse gases which may contribute to global warming.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

EU – EINECS # 2065578 – HFC-125

16. OTHER INFORMATION

CURRENT ISSUE DATE: January 04, 2021
PREVIOUS ISSUE DATE: April, 2018

OTHER INFORMATION: HMIS Classification: Health – 1, Flammability – 1, Reactivity – 0
NFPA Classification: Health – 2, Flammability – 1, Reactivity – 0
ANSI / ASHRAE 34 Safety Group – A1

Regulatory Standards:
1. OSHA regulations for compressed gases: 29 CFR 1910.101

2. DOT classification per 49 CFR 172.101

Toxicity information per PAFT Testing

DISCLAIMER:

National Refrigerants, Inc. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other methods or use of the product and of the information referred to herein are beyond the control of National Refrigerants. National Refrigerants expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

ATTACHMENT DR48-3

R-454B MSDS

Solstice® 454B

000000025450

SECTION 1. IDENTIFICATION

Product name	:	Solstice® 454B
Number	:	000000025450
Product Use Description	:	Refrigerant
Manufacturer or supplier's details	:	Honeywell International Inc. 115 Tabor Road Morris Plains, NJ 07950-2546
For more information call	:	800-522-8001 +1-973-455-6300(Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
	:	
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight ether-like

Classification of the substance or mixture

Classification of the substance or mixture	:	Flammable gases, Category 1 Gases under pressure, Liquefied gas Simple Asphyxiant

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word : Danger

Hazard statements : Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements : **Prevention:**
Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.

Response:
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.

Storage:
Protect from sunlight. Store in a well-ventilated place.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Mixture

Chemical name	CAS-No.	Concentration
Difluoromethane	75-10-5	68.90 %
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	31.10 %

SECTION 4. FIRST AID MEASURES

General advice	:	First aider needs to protect himself. Move out of dangerous area. Take off all contaminated clothing immediately.
Inhalation	:	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician.
Skin contact	:	Rapid evaporation of the liquid may cause frostbite. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Wash contaminated clothing before re-use. Consult a physician.
Eye contact	:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. Call a physician.
Ingestion	:	Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. If conscious, drink plenty of water. Never give anything by mouth to an unconscious person. Call a physician immediately.

Notes to physician

Indication of immediate medical attention and special treatment needed, if necessary	:	Treat frost-bitten areas as needed. Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Specific hazards during	:	Flammable gas.

firefighting		Contents under pressure. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Vapors may travel to areas away from work site before igniting/flashing back to vapor source. Fire or intense heat may cause violent rupture of packages. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. In case of fire hazardous decomposition products may be produced such as: Hydrogen fluoride Carbonyl halides Carbon monoxide Carbon dioxide (CO2)
Special protective equipment for firefighters	:	In the event of fire and/or explosion do not breathe fumes. Wear self-contained breathing apparatus and protective suit. No unprotected exposed skin areas.
Further information	:	Evacuate personnel to safe areas. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Wear self-contained breathing apparatus and protective suit. Eliminate all ignition sources if safe to do so. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. Vapors may travel to areas away from work site before igniting/flashing back to vapor source. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Avoid accumulation of vapours in low areas. Unprotected personnel should not return until air has been tested and determined safe.

Ensure that the oxygen content is >= 19.5%.

Environmental precautions	:	Prevent further leakage or spillage if safe to do so. The product evaporates readily. Discharge into the environment must be avoided.
Methods and materials for containment and cleaning up	:	Use explosion-proof equipment. No sparking tools should be used. Ventilate the area. Allow to evaporate.

SECTION 7. HANDLING AND STORAGE

Handling

Precautions for safe handling	:	Handle with care. Wear personal protective equipment. Do not breathe vapour. Avoid contact with skin, eyes and clothing. Use only in well-ventilated areas. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Follow all standard safety precautions for handling and use of compressed gas cylinders. Use authorized cylinders only. Protect cylinders from physical damage. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Do not remove screw cap until immediately ready for use. Always replace cap after use.
Advice on protection against fire and explosion	:	Container hazardous when empty. Vapours may form flammable mixture with air. Keep product and empty container away from heat and sources of ignition. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Take measures to prevent the build up of electrostatic charge. Electrical equipment should be protected to the appropriate standard. Use explosion-proof equipment. No sparking tools should be used. No smoking.

Storage

Conditions for safe storage, including any incompatibilities	:	Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas. Protect cylinders from physical damage. Store away from incompatible substances. Store in original container.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures	:	Ensure that eyewash stations and safety showers are close to the workstation location. Do not breathe vapour. Avoid contact with skin, eyes and clothing.
Engineering measures	:	Use with local exhaust ventilation.
Eye protection	:	Safety goggles
Hand protection	:	Protective gloves Gloves must be inspected prior to use. Replace when worn.
Skin and body protection	:	Avoid skin contact with leaking liquid (danger of frostbite). Wear suitable protective equipment.
Respiratory protection	:	No personal respiratory protective equipment normally required. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Use NIOSH approved respiratory protection.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. When using do not eat, drink or smoke.

Remove and wash contaminated clothing before re-use.
Keep working clothes separately.
Do not breathe vapour.
Avoid contact with skin, eyes and clothing.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
Difluoromethane	75-10-5	TWA : Time weighted average	2,200 mg/m3 (1,000 ppm)	2007	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide, as amended
Difluoromethane	75-10-5	TWA : Time weighted average	(1,000 ppm)	1994	Honeywell:Limit established by Honeywell International Inc.
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	TWA : Time weighted average	(500 ppm)	2009	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide, as amended
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	TWA : Time weighted average	(500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	STEL : Short term exposure limit	(1,500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : Liquefied gas

Color	:	colourless
Odor	:	slight ether-like
Odor threshold	:	Note: No data available
pH	:	Note: neutral
Melting point/range	:	Note: No data available
Boiling point/boiling range	:	-50.9 °C
Flash point	:	Note: Not applicable
Evaporation rate	:	> 1 Method: Compared to CCl4.
Flammability	:	Flammable gas.
Lower flammability limit	:	11.25 %(V) at 23 °C
Upper flammability limit	:	22 %(V) at 23 °C
Vapor pressure	:	1,411 kPa at 21 °C(70 °F)
Vapor density	:	2.2 Note: (Air = 1.0)
Density	:	Note: No data available
Water solubility	:	Note: No data available
Partition coefficient: n-	:	Note: No data available

octanol/water		
Ignition temperature	:	496 °C
Viscosity, dynamic	:	Note: No data available
Viscosity, kinematic	:	Note: No data available
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Hazardous polymerisation does not occur.
Conditions to avoid	:	Keep away from heat and sources of ignition. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Decomposes under high temperature. Some risk may be expected of corrosive and toxic decomposition products.
Incompatible materials	:	Alkali metals Oxidizers (e.g. peroxide residues present in insufficiently cured rubbers) Finely divided metal powders such as aluminum, magnesium, or zinc.
Hazardous decomposition products	:	In case of fire hazardous decomposition products may be produced such as: Hydrogen fluoride Carbonyl halides Carbon monoxide Carbon dioxide (CO2)

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

Difluoromethane	:	LC50: > 520000 ppm Exposure time: 4 h Species: Rat
2,3,3,3-Tetrafluoroprop-1-ene	:	LC50: > 400000 ppm Exposure time: 4 h Species: Rat Method: OECD Test Guideline 403

Skin irritation

2,3,3,3-Tetrafluoroprop-1-ene	:	Note: Not applicable study technically not feasible

Eye irritation

2,3,3,3-Tetrafluoroprop-1-ene	:	Note: Not applicable study technically not feasible

Sensitisation

Difluoromethane	:	Cardiac sensitization Species: dogs Note: No-observed-effect level >350 000 ppm
2,3,3,3-Tetrafluoroprop-1-ene	:	Dermal Note: Not applicable, as this product is a gas. study technically not feasible

Repeated dose toxicity

Difluoromethane	:	Species: Rat Application Route: Inhalation Exposure time: (90 d) NOEL: 50000 ppm Subchronic toxicity

2,3,3,3-Tetrafluoroprop-1-ene	:	Species: Rat Application Route: Inhalation Exposure time: (2 Weeks) No-observed-effect level: 50000 ppm Method: OECD Test Guideline 412 Species: Rat Application Route: Inhalation Exposure time: (4 Weeks) NOAEL (No observed adverse effect level): 50000 ppm Method: OECD Test Guideline 412 Species: Rat Application Route: Inhalation Exposure time: (13 Weeks) NOAEL (No observed adverse effect level): 50000 ppm Method: OECD Test Guideline 413 Species: Rabbit, male Application Route: Inhalation Exposure time: (28 d) No-observed-effect level: 500 ppm Method: OECD Test Guideline 412 There are no observed toxicological effects, which result in classification as a specific target organ toxicant. Species: Rabbit, female Application Route: Inhalation Exposure time: (28 d) No-observed-effect level: 1000 ppm Method: OECD Test Guideline 412 There are no observed toxicological effects, which result in classification as a specific target organ toxicant. Species: Mini-pig Application Route: Inhalation Exposure time: (28 d) NOAEL (No observed adverse effect level): 10000 ppm highest exposure tested
Genotoxicity in vitro Difluoromethane	:	Test Method: Ames test

Result: negative

2,3,3,3-Tetrafluoroprop-1-ene	:	Test Method: Ames test Result: 20% and higher, positive in TA 100 and e. coli WP2 uvrA, negative in TA98, TA100, and TA1535. Method: OECD Test Guideline 471
	:	Cell type: Human lymphocytes Result: negative Method: Mutagenicity (in vitro mammalian cytogenetic test)
	:	Test Method: Chromosome aberration test in vitro Result: negative
	:	Test Method: Chromosome aberration test in vitro Cell type: Human lymphocytes Result: negative Method: OECD Test Guideline 473 Note: Dose 760,000 ppm

Genotoxicity in vivo

Difluoromethane	:	Species: Mouse Cell type: Bone marrow Method: Mutagenicity (micronucleus test) Result: negative
2,3,3,3-Tetrafluoroprop-1-ene	:	Species: Mouse Cell type: Micronucleus Dose: up to 200,000 ppm (4 hour) Method: OECD Test Guideline 474 Result: negative
	:	Test Method: Unscheduled DNA synthesis Dose: up to 50,000 ppm (4 weeks) Method: OECD Test Guideline 486 Result: negative
	:	Species: Rat Cell type: Micronucleus Dose: up to 50,000 ppm (4 weeks) Method: OECD Test Guideline 474 Result: negative

Carcinogenicity

2,3,3,3-Tetrafluoroprop-1-ene	:	Species: Rat Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.

Teratogenicity

Difluoromethane	:	Species: Rat Dose: NOEL - 50,000 ppm Note: Did not show teratogenic effects in animal experiments. Species: Rabbit Dose: NOEL - 50,000 ppm Note: Did not show teratogenic effects in animal experiments.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity to fish

2,3,3,3-Tetrafluoroprop-1-ene	:	LC50: > 197 mg/l Exposure time: 96 h Species: Cyprinus carpio (Carp) Method: OECD Test Guideline 203 Note: No demonstrable toxic effect in saturated solution.

Toxicity to daphnia and other aquatic invertebrates

2,3,3,3-Tetrafluoroprop-1-ene	:	EC50: > 83 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) Method: OECD Test Guideline 202

Toxicity to algae

2,3,3,3-Tetrafluoroprop-1-ene	:	EC50: > 100 mg/l Species: Scenedesmus capricornutum (fresh water algae) Method: OECD Test Guideline 201

Bioaccumulation

2,3,3,3-Tetrafluoroprop-1-	:	Note: Due to the distribution coefficient n-octanol/water,

ene		accumulation in organisms is not expected.
Biodegradability		
Difluoromethane	:	Note: Minimal
2,3,3,3-Tetrafluoroprop-1-ene	:	Result: Not readily biodegradable. Method: OECD Test Guideline 301F

Further information on ecology

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods	:	Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

DOT	UN/ID No.	:	UN 3161
	Proper shipping name	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, R-1234yf)
	Class		2.1
	Packing group		
	Hazard Labels		2.1
IATA	UN/ID No.	:	UN 3161
	Description of the goods	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, R-1234yf)
	Class	:	2.1
	Hazard Labels	:	2.1
	Packing instruction (cargo aircraft)	:	200
IMDG	UN/ID No.	:	UN 3161
	Description of the goods	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (DIFLUOROMETHANE, R-1234yf)
	Class	:	2.1
	Hazard Labels	:	2.1
	EmS Number	:	F-D, S-U
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL
Japan. Kashin-Hou Law List	:	On the inventory, or in compliance with the inventory
Korea. Existing Chemicals Inventory (KECI)	:	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances (IECSC)	:	On the inventory, or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	:	On the inventory, or in compliance with the inventory
TSCA 12B	:	US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D) 2,3,3,3-Tetrafluoroprop-1-ene 754-12-1

National regulatory information

SARA 302 Components	:	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards	:	Fire Hazard Sudden Release of Pressure Hazard Acute Health Hazard
California Prop. 65	:	**WARNING:**This product can expose you to chemicals, listed below, known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. Dichloromethane 75-09-2 Chloromethane 74-87-3
Massachusetts RTK	:	Dichloromethane 75-09-2
Pennsylvania RTK	:	Difluoromethane 75-10-5

SECTION 16. OTHER INFORMATION

		HMIS III	NFPA
Health hazard	:	1	2
Flammability	:	4	4
Physical Hazard	:	0	
Instability	:		0

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not

to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.
Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

ATTACHMENT DR50-1

R-410A Refrigerant Use Emissions Estimation

Table DR50-1: R-410A Refrigerant Use Emissions Estimation

Parameter	*Value*	*Comments*
Site ID:	WRESC	
System ID:	14 Units	R410A Systems in Total (Aggregated)
Data Sources:	MSDS	
Refrigerant ID:	R410A	
Sp. Gravity:	N/A	
Lbs/gal:	N/A	
System Charge (Lbs):	80.656	
Est/Known Leak Rate:	7.1	% wt/year (Note 1)
	0.071	leak rate fraction
Annual Emissions, Lbs:	5.726576	Based on Leak Rate
Annual Emissions, tons:	0.00286	Based on Leak Rate
GWP Value:	2088	https://learnmetrics.com/refrigerant-gwp-chart/
CO2e, tons/yr:	5.979	
CO2e Mtons/yr:	5.833	

Note 1: Weighted avg of residential and commercial central and window mounted units.
California High Global Warming Potential Gases EI, TSD, AQPSD, April 2016.

ATTACHMENT DR50-2

R-454B Refrigerant Use Emissions Estimation

Table DR50-2: R-454B Refrigerant Use Emissions Estimation

Parameter	*Value*	*Comments*
Site ID:	WRESC	
System ID:	1 Unit	R454B Systems Aggregated
Data Sources:	MSDS	
Refrigerant ID:	R454B	
Sp. Gravity:	N/A	
Lbs/gal:	N/A	
System Charge (Lbs):	13.7	
Est/Known Leak Rate:	7.1	% wt/year (Note 1)
	0.071	leak rate fraction
Annual Emissions, Lbs:	0.9727	Based on Leak Rate
Annual Emissions, tons:	0.00049	Based on Leak Rate
GWP Value:	466	https://learnmetrics.com/refrigerant-gwp-chart/
CO2e, tons/yr:	0.227	
CO2e Mtons/yr:	0.221	

Note 1: Weighted avg of residential and commercial central and window mounted units.
California High Global Warming Potential Gases EI, TSD, AQPSD, April 2016.

ATTACHMENT DR54-1

Satellite Accumulation Containers – Construction (submitted via Kiteworks)

ATTACHMENT DR54-2

Satellite Accumulation Containers – Operations (submitted via Kiteworks)

ATTACHMENT DR67-1

Large Generator Interconnection Agreement (submitted under a repeated Application for Confidentiality)

ATTACHMENT DR68-1

Communication between the Applicant and LADWP

July 18, 2024

Cody Niehus
Manager, Development
Hydrostor
1125 17th Street, Suite #700
Denver, CO 80202

Dear Mr. Niehus:

Subject: LADWP File P-104294 – Request to Install Underground 230kV Circuits
Rosamond, CA
Assessor's Parcel Numbers: 358-030-18, 358-030-22, and 358-030-033

The Los Angeles Department of Water and Power (LADWP) has received your request via email dated June 25, 2024, requesting to cross Transmission Lines where LADWP holds an easement.

Your request has been assigned to me. We are in receipt of formal proposal, which includes the following:

- Scope of the project, email
- Encroachment Application
- Plan and Profile drawings

The initial review process might take eight to ten weeks.

Upon completion of the initial review, I will inform you if additional information is needed to evaluate your request. If additional information is required, each resubmission of information will result in additional time to conduct a comprehensive review.

Once the final review is completed, I will inform you, in writing, if the proposed project will move forward or not. If the project is recommended to move forward, you will be informed of the next steps and the timeline associated for final approval by all appropriate parties at LADWP and/or City Council based upon the request.

I have included a set of City Ordinances. These City Ordinances are non-negotiable and are standard provisions to enter into any agreement with LADWP.

This communication shall in no way be construed as an approval of the Project.

If you have any questions, please contact me at (213) 202-0511 or by email at Asya.Hybarger@ladwp.com. You may also contact Real Estate Services at (213) 367-0564.

Sincerely,

Asya Hybarger
Real Estate Officer

AH:ag
Enclosure

ARTICLE 2 – STANDARD PROVISIONS

200. Assignment and Sublicensing

Licensee shall not assign, sublicense, or permit the use of the Licensed Area by any persons other than Licensee and its employees, or otherwise transfer (voluntarily, involuntarily, or by operation of law) all or any part of its interest in this License Agreement or the Licensed Area without the prior written consent of LADWP's Director of Real Estate, which may be withheld, conditioned, or delayed at its sole discretion. Acceptance of License Fees and/or Insurance Certificates will not constitute a waiver of the required consent of any Assignment.

201. Indemnification

Licensee has inspected the Licensed Area, knows the condition thereof, and on behalf of itself and its successors, assigns, and sub-licensees undertakes and agrees to indemnify and hold harmless the City of Los Angeles, LADWP, the Board of Water and Power Commissioners of the City of Los Angeles, and all of its officers, agents, successors in interest, insurers, assigns and/or employees (individually and collectively, "LADWP Indemnitees"), and at the option of LADWP, defend by counsel satisfactory to LADWP, LADWP Indemnitees from and against any and all liens and claims of liens, suits, causes of action, claims, administrative proceedings, charges, damages (including but not limited to indirect, consequential, and incidental), demands, judgments, civil fines, penalties, including but not limited to costs, expenses, and legal liability for environmental investigations, monitoring, containment, abatement, removal, repair, cleanup, restoration, remediation, penalties and fines arising from the violation of any local, regional, state, or federal law, or regulation, disbursements, and other environmental response costs or losses of any kind or nature whatsoever that are incurred by or asserted against the LADWP Indemnitees, for death, bodily injury or personal injury to any person, including but not limited to Licensee's employees, customers, invitees and agents, or persons who enter onto the Licensed Area, or damage or destruction or loss of use of any Licensed Area of either party hereto, or third persons in any manner arising by reason of, incidental to, or connected in any manner to: 1) this License Agreement; 2) the Licensed Area; 3) the acts or omissions of Licensee or its officers, employees, contractors, agents, or invitees; or 4) the release or spill of any legally designated hazardous material or waste, resulting from or incident to the presence upon or performance of activities by Licensee or its officers, agents, employees , contractors or sub-licensees with respect to any area/Licensed Area covered under this agreement, regardless of any negligence on the part of the LADWP Indemnitees; except for the sole negligence or willful misconduct of LADWP. This indemnity shall apply whether occurring during the term of this License Agreement and any time thereafter, and shall be in addition to any other rights or

remedies which the LADWP Indemnitees have under law or under this License Agreement.

Licensee shall neither hold LADWP liable for nor seek indemnity from LADWP for any damage to Licensee's equipment and/or improvements due to future construction or reconstruction by LADWP within the Licensed Area. LADWP shall notify Licensee of any pending construction by LADWP to enable Licensee to protect its equipment and/or improvements.

202. Insurance Requirements.

Licensee shall procure at its own expense, and keep in effect at all times during the term of this License Agreement, the types and amounts of insurance specified on the attached Exhibit C "Contract Insurance Requirements" page.

202.1 Additional Insured Status Required

The insurance shall also by scheduled endorsement(s) attached to such policies, include, the City of Los Angeles, its Department of Water and Power, its Board of Commissioners, and all of its officers, employees and agents, their successors and assigns, as Additional Insureds against the area of risk described herein as respects Licensee's acts, errors, or omissions in its performance of this License Agreement, hereunder or other related functions performed by or on behalf of Licensee. Such insurance shall not limit or qualify the liabilities and obligations of Licensee assumed under this License Agreement.

202.2 Separation of Insured's Interest and Cross Liability Required

Each specified insurance policy, as applicable, shall contain a Separation of Interest and Cross Liability clause and shall apply separately to each insured against whom a claim is made or suit is brought and a Contractual Liability Endorsement which shall also apply to liability assumed by the insured under this License Agreement with LADWP.

202.3 Primary and Non-Contributory Insurance Required

All such insurance shall be Primary and Noncontributing with any other insurance held by LADWP where liability arises out of or results from the acts, errors, or omissions of Licensee, its agents, employees, officers, assigns, or any person or entity acting for or on behalf of Licensee. Any insurance carried by LADWP which may be applicable shall be deemed to be excess insurance and Licensee's insurance is primary for all purposes despite any conflicting provision in Licensee's policies to the contrary.

202.4 Proof of Insurance for Renewal or Extension Required

Licensee shall provide evidence of the required insurance at least ten (10) days after the expiration date of any of the policies required on the attached Contract Insurance Requirements page showing that the insurance coverage has been renewed or extended and shall be filed with LADWP.

202.4.1 Submissions of Acceptable Proof of Insurance and Notice of Cancellation

Licensee shall provide proof to LADWP's Risk Manager of all specified insurance and related requirements using either an Acord certificate of insurance along with any required scheduled endorsements, or using LADWP's own endorsement form(s) or using other written evidence of insurance (i.e. self-insurance) in a form acceptable to the Risk Manager. The documents evidencing all specified coverages shall be filed with LADWP prior to Licensee or its contractor beginning operations hereunder. Said proof shall contain at a minimum, the applicable policy number, the inclusive dates of policy coverages, the date the specified endorsement for the Department of Water and Power was attached to a specific policy, and the insurance carrier's name. It shall provide that such insurance shall not be subject to cancellation, material reduction in a required coverage or non-renewal (other than for non-payment) except after written notice by first class mail or electronic mail to LADWP's Risk Management Section at least thirty (30) calendar days prior to the effective date thereof. The notification shall be sent by first class or electronic mail to:

The Risk Management Section
Los Angeles Department of Water and Power
Post Office Box 51111, JFB Room 465
Los Angeles, California 90051-0100
Email: Riskmanagement.Risky@ladwp.com

202.5 Claims-Made Insurance Conditions

Should any portion of the required insurance be on a "Claims Made" policy, Licensee, following completion of work and at the policy expiration date, shall provide evidence that the "Claims Made" policy has been renewed or replaced with a retroactive effective date to the policy in place at the inception of the contract and with the same limits, terms and conditions of the expiring policy.

202.6 Failure to Maintain and Provide Proof as Cause for Termination

After prior notices have been provided, any failure by Licensee to maintain and provide acceptable evidence of the required insurance for the required period of coverage shall constitute a breach of contract, upon which LADWP may immediately terminate or suspend this License Agreement.

202.7 Subcontractor Compliance

Licensee shall be responsible for all subcontractors' and contractors' compliance with the insurance requirements with limits applicable to the scope of work/services being performed.

202.8 Specific Requirements

See Exhibit C, "Contract Insurance Requirements," attached hereto and made a part hereof.

203. Possessory Interest

Licensee, by executing this License Agreement and accepting the benefits hereof, understands that a property right pursuant to applicable ordinances and codes under tax law, may be created known as "possessory interest" and may be subject to property taxation. Licensee will be responsible for payment of any property taxes upon such right. Licensee herewith acknowledges that notice required by Revenue and Taxation Code, Section 107.6 has been provided. For information about a specific Possessory Interest assessment, please contact the County Assessor's Office.

204. No Relocation

Licensee acknowledges that Licensee is not entitled to relocation assistance or any other benefits under the Uniform Relocation Assistance Act or any other provisions of law upon the expiration or termination of this License Agreement.

205. Prevailing Wages

205.1 California Labor Code

To the extent applicable Licensee shall pay or cause to be paid to all workers employed in connection with the construction of the improvements, not less than the prevailing rates of wages, as provided in the statutes applicable to City public work contracts, including without limitation Sections 1770-1780 of the California Labor Code.

205.2 Davis-Bacon Act

If federal funds were at any time used in the acquisition of this land or will be used in connection with the construction of any improvements, Licensee shall comply with or cause its general contractor and all subcontractors to comply with the requirements of the Davis-Bacon Act (40 U.S.C. 276 et seq.). The Davis-Bacon Act requires the payment of wages to all laborers and mechanics at a rate not less than the minimum wage specified by the Secretary of Labor in periodic wage rate determinations as described in the Federal Labor Standards Provisions (HUD-4010). In the event both State Prevailing wages and Davis-Bacon Act wages will be required, all works shall be paid at the higher of the two wages.

205.3 Pre-Construction Orientation

Prior to the commencement of construction, and as soon as practicable in accordance with the applicable schedule, Licensee shall contact the City to schedule a pre-construction orientation meeting with Licensee and with the general contractor to explain such matters as the specific rates of wages to be paid to workers in connection with the construction of the improvements, pre-construction conference requirements, record keeping and reporting requirements necessary for the evaluation of Licensee's compliance with this Section.

205.4 Licensee Enforcement of Applicable Laws

Licensee shall monitor and enforce any applicable prevailing wage requirements imposed on its contractors and subcontractors, including withholding payments to those contractors or subcontractors who violate these requirements. In the event that Licensee fails to monitor or enforce these requirements against any contractor or subcontractor, Licensee shall be liable for the full amount of any underpayment of wages, plus costs and attorney's fees, as if Licensee was the actual employer, and LADWP, the City or the State Department of Industrial Relations may withhold monies owed to Licensee, may impose penalties on Licensee in the amounts specified herein, may take action directly against the contractor or subcontractor as permitted by law, and/or may declare Licensee in default of this License Agreement and thereafter pursue any of the remedies available under this License Agreement.

205.5 Inclusion of Provisions in All Bid Specifications

Licensee agrees to include, or cause to be included, the above provisions in all bid specifications for work covered under this License Agreement.

205.6 Labor Code Compliance Indemnity

Licensee shall indemnify, hold harmless and defend (with counsel reasonably acceptable to LADWP) the City and LADWP against any claim for damages, compensation, fines, penalties or other amounts arising out of the failure or alleged failure of any person or entity (including Licensee, its contractor and subcontractors) to pay prevailing wages as determined pursuant to Labor Code Sections 1720 et seq. and implementing regulation or comply with the other applicable provisions of Labor Code Sections 1720 et seq. and implementing regulations of the Department of Industrial Relations in connection with construction of the improvements or any other work undertaken or in connection with the Licensed Area.

206. Los Angeles City Charter Requirements and Los Angeles City Ordinance-Related Provisions

206.1 Ordinances, Statutes, Permits, and Regulations

All work completed, pursuant to the terms of this License Agreement, shall be completed in accordance with the terms and conditions specified in ordinances, statutes, permits, and regulations governing such instances; and the provisions of such ordinances, statutes, permits, and regulations are, by reference, made a part hereof as though incorporated verbatim herein.

206.2 No Discrimination

Licensee agrees and obligates itself in performing this License Agreement not to discriminate against any employee or applicant for employment because of his/her race, religion, national origin, ancestry, sex, sexual orientation, age, physical handicap, marital status, domestic partner status, or medical condition.

206.3 Affirmative Action Program

Licensee agrees to comply with Section 10.8.4 of Los Angeles Administrative Code ("Affirmative Action Program"). By way of specification but not limitation, pursuant to Sections 10.8.4.E and 10.8.4.F of said Code, the failure of Licensee to comply with the Affirmative Action Program may be deemed a material breach of this License Agreement.

206.4 Child Support Assignment Orders

This License Agreement is subject to Section 10.10, Article 1, Chapter 1, Division 10, as amended, of the Los Angeles Administrative Code related to Child Support Assignment Orders. Said ordinance is incorporated by reference as though fully set forth herein. Failure to comply with this ordinance shall constitute a default of this License Agreement subjecting this License Agreement to termination where such failure shall continue for more than ninety (90) days after such notice of such failure to Licensee by LADWP or City.

206.5 Equal Benefits Provisions

This License Agreement is subject to Section 10.8.2.1, Article 1, Chapter 1, Division 10 of the Los Angeles Administrative Code ("Equal Benefits Provisions") related to equal benefits to employees. Licensee agrees to comply with the provisions of Section 10.8.2.1. By way of specification but not limitation, pursuant to Section 10.8.2.1(c) and 10.8.2.1(f) of the Los Angeles Administrative Code, the failure of Licensee to comply with the Equal Benefits Provisions of this License Agreement may be deemed to be a material breach of this License Agreement. No such finding shall be made or penalties assessed except upon a full and fair hearing after notice and an opportunity to be heard has been given to Licensee. Upon a finding duly made that Licensee has failed to comply with the Equal Benefits Provisions of this License Agreement, this License Agreement may be forthwith terminated.

206.6 Equal Employment Practices

This License Agreement is a contract with or on behalf of the City of Los Angeles for which the consideration is $1,000.00 or more. Accordingly, during the performance of this License Agreement, Licensee further agrees to comply with Section 10.8.3 of the Los Angeles Administrative Code ("Equal Employment Practices"). By way of specification but not limitation, pursuant to Sections 10.8.3(E) and 10.8.3(F) of the Los Angeles Administrative Code, the failure of Licensee to comply with the Equal Employment Practices provisions of this License Agreement may be deemed to be a material breach of this License Agreement. No such finding shall be made or penalties assessed except upon a full and fair hearing after notice and an opportunity to be heard have been given to Licensee. Upon a finding duly made that Licensee has failed to comply with the Equal Employment Practices provisions of this License Agreement, this License Agreement may be forthwith terminated.

206.7 Slavery Disclosure Ordinance

This License Agreement is subject to the applicable provisions of the Slavery Disclosure Ordinance ("SDO") (Section 10.41, et seq., of the Los Angeles Administrative Code). Unless otherwise exempt in accordance with the provision of this ordinance, Licensee certifies that it has complied with the applicable provisions of the ordinance. Under the provisions of Section 10.41.2(b) of the Los Angeles Administrative Code, LADWP has the authority, under appropriate circumstances, to terminate this License Agreement and otherwise pursue legal remedies that may be available to LADWP if LADWP determines that Licensee failed to fully and accurately complete the SDO affidavit or otherwise violated any provisions of the SDO.

206.8 Limitations on Campaign Contributions and Fundraising

Licensee, subcontractor, and their principals (if any) are obligated to fully comply with City of Los Angeles Charter Section 470(c) (12) and related ordinances, regarding limitations on campaign contributions and fundraising for certain elected City officials or candidates for elected City office if this License Agreement is valued at $100,000 or more and requires approval of a City elected official. Additionally, Licensee is required to provide and update certain information to the City as specified by law. Any Licensee subject to Charter Section 470(c) (12), shall include the following notice in any contract with a subcontractor expected to pay at least $100,000 in consideration under this License Agreement:

206.8.1 Notice Regarding Los Angeles Campaign Contribution and Fundraising Restrictions

Pursuant to City Charter Section 470(c) (12), Licensee, its principals and subcontractors are prohibited from making campaign contributions and fundraising for certain elected City officials or candidates for elected City office for twelve (12) months after this License Agreement is signed. Licensee is required to provide to LADWP the names, addresses and contact information of its principals and subcontractors, and shall update that information if it changes during the twelve (12) month time period. Licensee's principals and dub-contractor's information included must be provided to LADWP within five (5) business days. Failure to comply may result in termination of this License Agreement or any other available legal remedies including fines. Information about the

restrictions may be found at the City Ethics Commission's website at http://ethics.lacity.org or by calling (213) 978-1960.

206.8.2 Licensee Compliance with Requirements

Licensee, subcontractors, and their principals shall comply with these requirements and limitations. Violation of this provision shall entitle the City to terminate this License Agreement and pursue any and all legal remedies that may be available.

206.9 Tax Registration Certificate

This Section is applicable where Licensee engaged in business within the City of Los Angeles and Licensee is required to obtain a Tax Registration Certificate ("TRC") pursuant to one or more of the following articles (collectively "Tax Ordinances") of Chapter II of the Los Angeles Municipal Code: Article 1 (Business Tax Ordinance) [Section 21.00, et seq.], Article 1.3 (Commercial Tenant's Occupancy Tax) [Section 21.3.1, et seq.], Article 1.7 (Transient Occupancy Tax) [Section 21.7.1, et seq.], Article 1.11 (Payroll Expense Tax) [Section 21.11.1, et seq.], or Article 1.15 (Parking Occupancy Tax) [Section 21.15.1, et seq.]. Prior to the execution of this License Agreement or the effective date of any extension of the term or renewal of this License Agreement, Licensee shall provide to LADWP proof satisfactory to LADWP's Director of Real Estate that Licensee has the required TRCs and that Licensee is not then currently delinquent in any tax payment required under the Tax Ordinances. LADWP may terminate this License Agreement if LADWP determines that Licensee failed to have the required TRCs or was delinquent in any tax payments required under the Tax Ordinances at the time of entering into, extending the term of, or renewing this License Agreement. LADWP may also terminate this License Agreement at any time during the term of this License Agreement if Licensee fails to maintain required TRCs or becomes delinquent in tax payments required under the Tax Ordinances and Licensee fails to cure such deficiencies within the thirty (30) day period.

206.10 Business Tax Registration Certificates

Licensee shall obtain and keep in full force and effect during the term of this License Agreement all Business Tax Registration Certificates (BTRC) required by the City of Los Angeles Business Tax Ordinance, Article 1, Chapter II, Section 21.00 of the Los Angeles Municipal Code. For additional information regarding applicability of the City Business Tax Registration, visit the Office of Finance website at https://finance.lacity.org/.

206.11 Service Contract Worker Retention Ordinance

This License Agreement is subject to the Service Contract Worker Retention Ordinance ("SCWRO") (Section 10.36, et seq., of the Los Angeles Administrative Code). The SCWRO requires that, unless specific exemptions apply, all employers (as defined) under contracts that are primarily for the furnishing of services to or for the City of Los Angeles and that involve an expenditure or receipt in excess of $25,000 and a contract term of at least three (3) months shall provide retention by a successor contractor for a ninety-day (90-day) transition period of the employees who have been employed for the preceding twelve (12) months or more by the terminated contractor or subcontractor, if any, as provided for in the SCWRO. Under the provisions of Section 10.36.3(c) of the Los Angeles Administrative Code, LADWP has the authority, under appropriate circumstances, to terminate this License Agreement and otherwise pursue legal remedies that may be available if LADWP determines that the subject contractor violated the provisions of the SCWRO.

206.12 Living Wage Ordinance

This License Agreement is subject to the applicable provisions of the Living Wage Ordinance (LWO); Section 10.37 et seq. of the Los Angeles Administrative Code, as amended. The LWO requires that, unless specific exemptions apply, all employers (as defined) under contracts primarily for the furnishing of services to or for the City and that involves an expenditure or receipt in excess of $25,000 and a contract term of at least three (3) months; Licensee or certain recipients of City financial assistance, generally, shall provide the following:

206.12.1 Minimum Initial Wage

Payment of a minimum initial wage rate to employees as defined in the LWO.

206.12.2 Sick Leave, Vacation or Personal Necessity

Provision of compensated days off annually for sick leave, vacation or personal necessity at the employee's request, and additional days annually of uncompensated time off for sick leave as prescribed in the LWO.

206.13 Los Angeles Administrative Code

Under the provisions of Section 10.37.6(c) of the Los Angeles Administrative Code, the City shall have the authority, under appropriate circumstances, to terminate this contract and otherwise pursue legal remedies that may be available if the City determines that Licensee or financial assistance recipient violated the provisions of the referenced Code Sections. For additional information, please contact the Office of the City Administrative Officer at (213) 473-7500.

206.14 Contractor Responsibility Ordinance of the Los Angeles Administrative Code

This License Agreement is subject to the Contractor Responsibility Ordinance ("CRO") (Section 10.40, et seq., of the Los Angeles Administrative Code "LAAC") and the rules and regulations promulgated pursuant thereto as they may be updated. The CRO requires that, unless specific exemptions apply as specified in LAAC 10.40.4(a), Licensee or lessees or licensees of LADWP property who render services on the Licensed Area are covered by the CRO if any of the following applies: (1) the services are rendered on premises at least a portion of which are visited by substantial numbers of the public on a frequent basis, (2) any of the services could feasibly be performed by LADWP or its employees if the awarding authority had the requisite financial and staffing resources, or (3) designated administrative agency of LADWP has determined in writing that coverage would further the proprietary interests of LADWP. Licensee or lessees or licensees of LADWP property who are not exempt pursuant to LAAC 10.40.4 (a) or (b), unless subject to the CRO solely due to an amendment to an existing license, are required to have completed a questionnaire ("Questionnaire") signed under penalty of perjury designed to assist LADWP in determination that the licensee is one that has the necessary quality, fitness and capacity to perform the work set forth in the contract. All Licensees of LADWP property who are covered by the CRO, including those subject to the CRO due to an amendment, are required to complete the following Pledge of Compliance ("POC"):

206.14.1 Compliance with Federal State, and Local Laws and Regulations

Licensee shall comply with all applicable federal state, and local laws and regulations in the performance of the contract, including but not limited to laws regarding health and safety, labor and employment, wage and hour, and licensing laws which affect employees.

206.14.2 Notification of Investigation by Governmental Agency

Licensee shall notify the awarding authority within thirty (30) calendar days after receiving notification that any government agency has initiated an investigation that may result in a finding that the licensee did not comply with Subsection (1) above in the performance of the license;

206.14.3 Notification of Violation of Federal State, and Local Laws and Regulations

Licensee shall notify the awarding authority within thirty (30) calendar days of all findings by a government agency or court of competent jurisdiction that the lessee or licensee has violated Subsection 206.14.1 above in the performance of the License Agreement;

206.14.4 Pledge of Compliance

Licensee shall ensure within thirty (30) days (or such shorter time as may be required by the awarding authority) that subcontractors working on the Licensed Area submit a POC to the awarding authority signed under penalty of perjury; and ensure that subcontractors working on the Licensed Area abide by the requirements of the POC and the requirement to notify the awarding authority within thirty (30) calendar days that any government agency or court of competent jurisdiction has initiated an investigation or has found that the subcontractor has violated Subsection (206.14.1) above in the performance of the License Agreement.

206.14.5 Compliance with Contractor Responsibility Ordinance

Licensee shall ensure that their subcontractors meet the criteria for responsibility set forth in the CRO and any rules and regulations promulgated thereto. Licensee may not use any subcontractor that has been determined or found to be a non-responsible contractor by LADWP. The listing of non-responsible contractors may be obtained from the City's Bureau of Contract Administration. Subject to approval by the awarding authority, Licensee may substitute a non-responsible subcontractor with another subcontractor with no change in the consideration for this License Agreement. Licensee shall submit to LADWP a Pledge of Compliance for each subcontractor listed by Licensee in its Questionnaire,

as performing work on this License Agreement within thirty (30) calendar days of execution of this License Agreement, unless the Department of General Services requires in its discretion the submission of a Pledge of Compliance within a shorter time period. The signature of Licensee on this License Agreement shall constitute a declaration under penalty of perjury that Licensee shall comply with the POC.

207. Other Governmental Requirements

207.1 Compliance with Low Impact Development (LID) Ordinances

All developments or redevelopments within the Licensed Area are required to comply with the City of Los Angeles' Ordinance No. 183833 (City's LID Ordinance) or, when applicable, the County of Los Angeles' Code Title 12, Chapter 48 (County's LID Code). Licensee is responsible for the purchasing, installation, and maintenance of any required devices under the City's LID Ordinance or the County's LID Code for the duration of the License Agreement. Licensee is also responsible for the removal of any installed devices prior to the surrender of the Licensed Area. At Licensee's expense, Licensee shall be responsible for obtaining all required permits and environmental reviews required by federal, state, local, and municipal laws, rules, orders, regulations, statues, ordinances, codes, decrees, or requirements of any government regulating authority.

207.2 Utility Services Fees

Licensee shall pay for all costs, fees, or charges for the application, installation, maintenance, use, or removal of any utilities or services required in the exercise of the permission herein given. Licensee shall not use any existing utility system prior to the transfer of financial responsibility to Licensee with the appropriate utility company supplying existing service.

207.3 Zoning Demands and Variances

Licensee shall not use LADWP's property to satisfy any zoning demands, zoning variances, open space or parking requirements, and any other governmentally imposed conditions for building plans and permits.

208. Estoppel Certificate

Licensee hereby acknowledges and agrees that LADWP shall at no time during the term of this License Agreement be responsible for or be required to provide

an Estoppel Certificate of any kind for any reason. LADWP does not make any representation or any rights other than those expressly granted herein.

209. Miscellaneous

209.1 Los Angeles Municipal Code Section 121

During the term of this License Agreement, Licensee shall comply with Los Angeles Municipal Code Section 121, relating to water conservation as to the Licensed Area.

209.2 License Agreement Will Not Be Recorded.

Licensee agrees that this License Agreement will not be recorded.

209.3 Counterparts

This License Agreement may be executed in two or more counterparts, each of which will be deemed an original, but all of which taken together will be one and the same instrument.

209.4 No Third-Party Beneficiary.

The parties do not intend to create rights in or grant remedies to any third party as a beneficiary of this License or of any duty, covenant, obligation, or undertaking established under this License.

209.5 License Governed by the State of California Law.

This License Agreement shall be interpreted, governed by, and construed under the laws of the State of California and venue shall lie in the County of Los Angeles.

209.6 No Waiver

Any waiver at any time by either party of its rights with respect to a default under this License Agreement, or with respect to any other matter arising in connection with this License Agreement, shall not be deemed a waiver with respect to any subsequent default or other matter arising in connection therewith. Any delay in assessing or enforcing any right, shall not be deemed to be a waiver of such right, provided that all applicable contractual and statutory periods of limitation shall apply.

ATTACHMENT DR69-1

UIC Applicability Letter

REGION 9
SAN FRANCISCO, CA 94105

October 11, 2024

Sent via email only

Laurel Lees
Senior Director, Permitting Development
Hydrostor Inc.
333 Bay Street, Suite 520
Toronto, ON, M5H 2R2, Canada

Re: Request for Underground Injection Control (UIC) Program Applicability Determination, Hydrostor Willow Rock Energy Storage Center Project

Dear Laurel Lees:

On August 26, 2024, the United States Environmental Protection Agency, Region 9 (EPA), received Hydrostor's response to EPA's July 3, 2024 request for information about the Willow Rock Energy Storage Project – a proposed compressed air energy storage (CAES) project near the City of Rosamond, California. After reviewing Hydrostor's response, EPA determined that the CAES project is subject to the Underground Injection Control (UIC) Class V rule.

Background

Hydrostor introduced EPA to its CAES project during a meeting on March 29, 2024. At the meeting and in subsequent communications, Hydrostor stated its perspective that the CAES project is not subject to EPA's UIC authority and asked EPA to confirm that understanding. To make such a determination, EPA requested from Hydrostor more information about its proposed project, and as noted above, Hydrostor recently responded to EPA's information request.

EPA's Determination

To protect underground sources of drinking water, the UIC rules prohibit any unauthorized "underground injection," which means "well injection," which in turn means "subsurface emplacement of fluids through a well." 40 CFR §§ 144.11, 144.3.[1] Hydrostor's CAES project would involve "underground injection," under the UIC rules, because it would inject compressed air and water underground, into a geologic formation, through vertical shafts.

[1] *See also* 40 CFR § 144.3 (defining "well" as "a bored, drilled, or driven shaft whose depth is greater than the largest surface dimension; or, a dug hole whose depth is greater than the largest surface dimension; or, an improved sinkhole; or, a subsurface fluid distribution system"); *id.* (defining "fluid" as "any material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state").

Hydrostor states that its CAES project does not fall under any of the six UIC well classes. That may be true for Classes I through IV and VI, but Class V is a catch-all for injection wells not otherwise categorized. 40 CFR § 144.80(e). Hydrostor focuses on the regulatory description of Class V wells as "shallow wells used to place a variety of fluids directly below the land surface." *See id*. But the rule qualifies that as only "typically"—i.e., not always—the case. Hydrostor also observes that CAES is not listed in the rule's examples of Class V wells. *See id.* § 144.81. That list is illustrative, however, not exhaustive. In fact, EPA has issued UIC Class V experimental technology injection well permits for other CAES projects.

Hydrostor adds that its CAES project is a closed-loop system not subject to the UIC rules. However, EPA generally considers a closed-loop system to be one that circulates fluids entirely within closed pipes and related infrastructure, which prevents the circulating fluids from contacting subsurface geologic formations. EPA does not consider Hydrostor's CAES system "closed," in this sense, because it would involve injecting compressed air and water into an underground geologic formation.

Based on the discussion above, EPA determined that Hydrostor's CAES project is subject to the UIC Class V rule. Injection activity that is subject to the UIC Class V rule may be regulated via a Class V UIC permit or in some instances may be "authorized by rule" and primarily required to meet the UIC regulations' non-endangerment standard at 40 CFR section 144.12.

Next Steps

EPA requests that Hydrostor develop and submit to EPA a UIC Class V permit application for its CAES project, per the instructions outlined in EPA Form 7520-6 Underground Injection Control Permit Application for a Class V Well.[2] Once EPA receives and evaluates Hydrostor's permit application, EPA will decide whether to authorize the proposed Class V well by rule or require Hydrostor to obtain a federal Class V UIC permit.

If you have any questions about this letter, please contact Calvin Ho at (415) 972-3262, or call me at (415) 972-3971.

Sincerely,

David Albright
Manager, Groundwater Protection Section

cc (via email): Samrat Mohanty, Hydrostor Inc.
Chris Jones, CalGEM Central District
Alex Olsen, Central Valley Regional Water Quality Control Board

[2] https://www.epa.gov/sites/default/files/2019-05/documents/owner_or_operator_permit_application_for_a_class_v_well_form_7520-6_class_v.pdf

ATTACHMENT DR69A-1

Rock Characterization Results

Table DR69A-1: Rock Characterization Results

	Sample ID:	IC_UNALT_01	IC_UNALT_02	IC_ALT_03	IC_ALT_04
	Sample Date:	6/17/2024	6/17/2024	6/17/2024	6/17/2024
Analyte	**Units**				
Antimony (WET)	mg/L	<0.004	<0.004	0.00676	0.00621
Antimony, total (3050)	mg/Kg	<0.202	<0.2	0.398	0.205
Arsenic (WET)	mg/L	0.00412	0.00349	0.0618	0.0562
Arsenic, total (3050)	mg/Kg	1.09	1.42	42.7	33.4
Barium (WET)	mg/L	0.711	0.617	0.16	0.249
Barium, total (3050)	mg/Kg	156	122	49.5	62.5
Beryllium (WET)	mg/L	0.00291	0.00587	0.0149	0.013
Beryllium, total (3050)	mg/Kg	0.371	0.316	0.716	0.902
Cadmium (WET)	mg/L	<0.0005	<0.0005	0.000548	<0.0005
Cadmium, total (3050)	mg/Kg	<0.0253	0.0958	0.146	0.132
Chromium (WET)	mg/L	<0.2	<0.2	<0.2	<0.2
Chromium, total (3050)	mg/Kg	3.3	2.39	<2	2.37
Chromium, Trivalent Total	mg/Kg	3	2	<2	2
Cobalt (WET)	mg/L	<0.2	<0.2	<0.2	<0.2
Cobalt, total (3050)	mg/Kg	55.6	31.1	32.6	30.1
Copper (WET)	mg/L	0.163	<0.1	<0.1	<0.1
Copper, total (3050)	mg/Kg	1.22	<1	5.21	<1
Lead (WET)	mg/L	0.0221	0.0269	0.0786	0.0871
Lead, total (3050)	mg/Kg	2.81	2.23	7.56	7.59
Mercury (WET)	mg/L	<0.004	<0.004	<0.004	<0.004
Mercury by Direct Combustion AA	ng/g	25.7	16	113	136
Molybdenum (WET)	mg/L	<0.2	<0.2	<0.2	<0.2
Molybdenum, total (3050)	mg/Kg	<2.02	<2	<2	<2
Nickel (WET)	mg/L	<0.08	<0.08	<0.08	<0.08
Nickel, total (3050)	mg/Kg	<0.808	<0.8	<0.8	<0.8
Selenium (WET)	mg/L	<0.001	<0.001	<0.00110	<0.001

	Sample ID:	IC_UNALT_01	IC_UNALT_02	IC_ALT_03	IC_ALT_04
	Sample Date:	6/17/2024	6/17/2024	6/17/2024	6/17/2024
Analyte	**Units**				
Selenium, total (3050)	mg/Kg	<0.0505	<0.05	<0.05	<0.05
Silver (WET)	mg/L	<0.001	<0.001	<0.001	<0.001
Silver, total (3050)	mg/Kg	0.0523	0.0517	0.0926	<0.05
Thallium (WET)	mg/L	0.00146	0.00159	<0.001	<0.001
Thallium, total (3050)	mg/Kg	0.232	0.192	0.122	<0.0833
Vanadium (WET)	mg/L	<0.1	<0.1	<0.1	<0.1
Vanadium, total (3050)	mg/Kg	42.9	37.6	20.9	38.6
Zinc (WET)	mg/L	0.437	<0.2	<0.5	<0.2
Zinc, total (3050)	mg/Kg	76.9	68	60.4	69.3
Solids, Percent	%	99.8	99.8	99.9	99.8
Chromium, Hexavalent (3060)	mg/Kg	<1	<1	<1	<1
Fluoride (WET)	mg/L	0.38	0.41	<0.15	<0.15
Notes: mg/L = milligrams per Liter; mg/Kg = milligrams per kilogram					

ATTACHMENT DR69A-2

AVEK RO Reject Quality

ESTIMATED STREAM QUALITIES

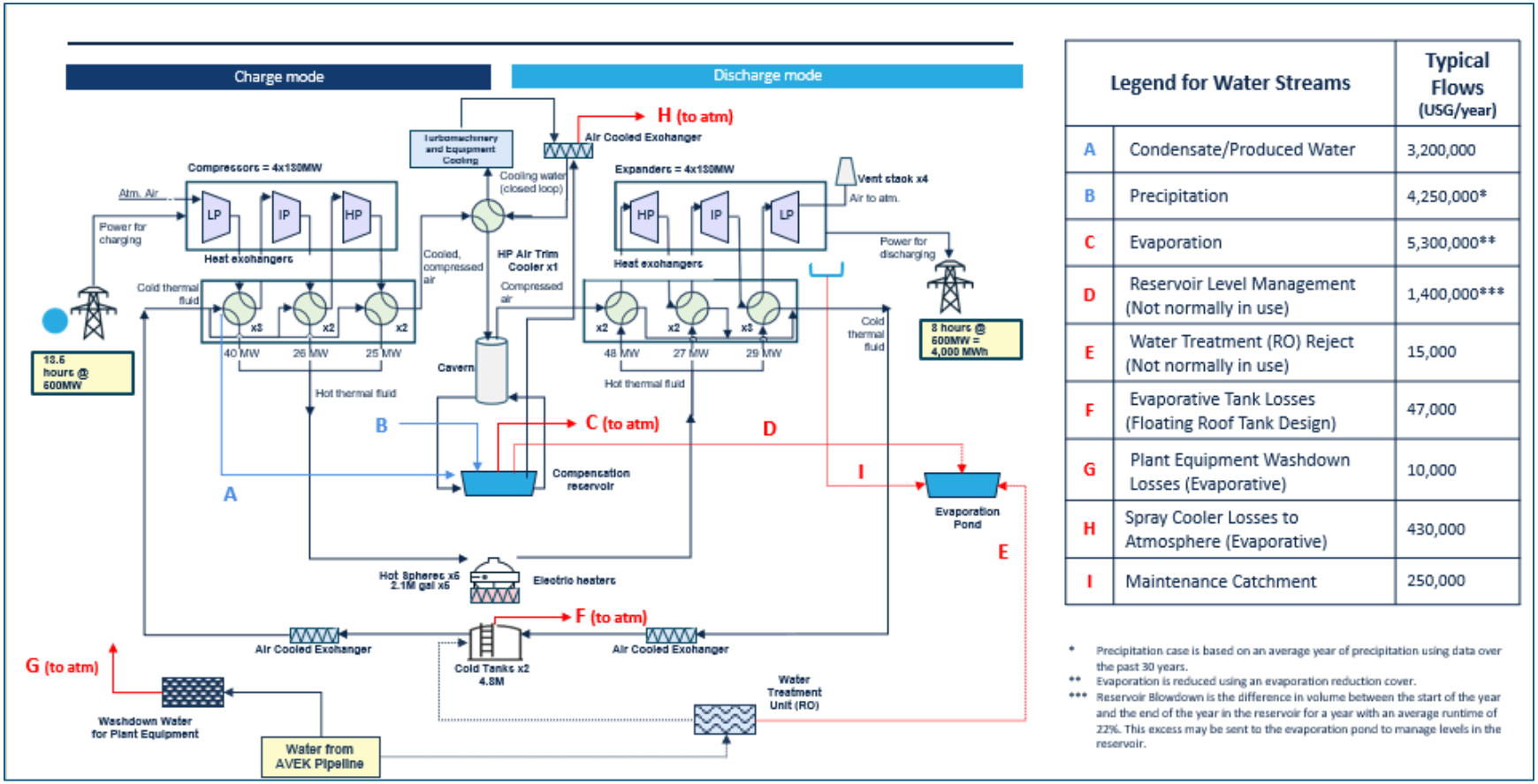
	STREAM DESCRIPTION			AVEK PIPELINE		RO PERMEATE		RO REJECT	
	CONSTITUENT	CONVERT	UNITS	AS SUCH	AS CaCO3	AS SUCH	AS CaCO3	AS SUCH	AS CaCO3
CATIONS	CALCIUM, Ca	2.50	ppm	63.0	157.3	0.6	1.6	231.4	577.9
	MAGNESIUM, Mg	4.12	ppm	9.7	39.9	0.1	0.4	35.6	146.7
	SODIUM, Na	2.18	ppm	46.0	100.1	0.5	1.0	169.0	367.8
	POTASSIUM, K	1.28	ppm						
	TOTAL		ppm		297.4		3.0		1,092.4
ANIONS	M-ALKALINITY, M-ALK		ppm		114.8		1.1		421.7
	BICARBONATE, HCO3	0.82	ppm	140.0	114.8	1.4	1.1	514.2	421.7
	CARBONATE, CO3	1.67	ppm						
	HYDROXIDE, OH	2.94	ppm						
	P-ALK		ppm						
	SULFATES, SO4	1.04	ppm	60.0	62.5	0.6	0.6	220.4	229.6
	CHLORIDES, Cl	1.41	ppm	78.2	110.4	0.8	1.1	287.3	405.5
	NITRATES, NO3	0.81	ppm	11.1	8.9	0.1	0.1	40.7	32.8
	PHOSPHATE, PO4	1.58	ppm						
	FLUORIDE, F	2.63	ppm	0.3	0.7	0.0	0.0	1.0	2.7
	TOTAL		ppm		297.4		3.0		1,092.4
	CARBON DIOXIDE, CO2	1.14	ppm						
	SILICA, SiO2	0.83	ppm						
	TOTAL HARDNESS		ppm		197.3		2.0		724.6
	Mg (ppm) x SiO2 (ppm)								
	pH			7.6		4.2		8.6	
	SPECIFIC CONDUCTIVITY		µS/cm	518.7		5.2		1,905.2	
	TOTAL DISSOLVED SOLIDS, TDS		ppm	337.2		3.4		1,238.4	
	OIL / GREASE		ppm						
	TOTAL SUSPENDED SOLIDS, TSS		ppm						
	TURBIDITY		NTU	0.1		0.0		0.2	
	AMMONIA, NH3		ppm						
	NITRITE, NO2		ppm						
	TOTAL KJELDAHL NITROGEN, N		ppm						
	PHOSPHORUS, P		ppm						
	CYANIDE, CN		ppm						
	SULFIDE, S		ppm						
	MBAS		ppm						
	TOTAL ORGANIC CARBON, TOC		ppm						
	BIOLOGICAL OXYGEN DEMAND, BOD		ppm						
	CHEMICAL OXYGEN DEMAND, COD		ppm						
	FAT / OIL / GREASE, FOG		ppm						
TRACE METALS	ALUMINUM, Al		ppb	140.0		1.4		514.2	
	ANTINOMY, Sb		ppb						
	ARSENIC, As		ppb	3.6		0.0		13.2	
	BARIUM, Ba		ppb	58.0		0.6		213.0	
	BERYLLIUM, Be		ppb						
	BORON, B		ppb						
	CADMIUM, Cd		ppb						
	CHROMIUM, Cr		ppb	5.1		0.1		18.7	
	CHROMIUM (HEX), Cr(+6)		ppb	5.8		0.1		21.3	
	COBALT, Co		ppb						
	COPPER, Cu		ppb						
	IRON, Fe		ppb						
	LEAD, Pb		ppb						
	LITHIUM, Li		ppb						
	MANGANESE, Mn		ppb						
	MERCURY, Hg		ppb						
	MOLYBDENUM, Mo		ppb						
	NICKEL, Ni		ppb						
	SELENIUM, Se		ppb						
	SILVER, Ag		ppb						
	STRONTIUM, Sr		ppb						
	THALLIUM, Tl		ppb						
	TIN, Sn		ppb						
	TITANIUM, Ti		ppb						
	VANADIUM, V		ppb						
	ZINC, Zn		ppb	450.0		4.5		1,652.9	
	AVAILABLE CHLORINE, FREE		ppm						
	RESIDUAL CHLORINE, TOTAL		ppm						
	LANGELIER-SATURATION INDEX (LSI)								
	RYZNER STABILITY INDEX (RSI)								
	PUCKORIUS SCALING INDEX (PSI)								

NOTES

1. WATER QUALITY IS SUBJECT TO CHANGE BASED ON ADDITIONAL SOURCE WATER QUALITY ANALYSES.
2. CHEMICAL ADDITIONS MAY IMPACT THE CONSTITUENT CONCENTRATIONS BUT THIS HAS NOT BEEN FACTORED IN.
3. ION BALANCE FOR AVEK PIPELINE IS ACHIEVED BY ADDING 24.2 PPM CHLORIDE (AS SUCH) AND FOR THE RESERVOIR BY ADDING 31.5 PPM SODIUM (AS SUCH).
4. RO REJECT QUALITY ASSUMES AVEK PIPELINE FLOWRATE OF 500 GPM FOR INITIAL FILL.

ATTACHMENT DR69B-1

Process Flow Chart



Legend for Water Streams		Typical Flows (USG/year)
A	Condensate/Produced Water	3,200,000
B	Precipitation	4,250,000*
C	Evaporation	5,300,000**
D	Reservoir Level Management (Not normally in use)	1,400,000***
E	Water Treatment (RO) Reject (Not normally in use)	15,000
F	Evaporative Tank Losses (Floating Roof Tank Design)	47,000
G	Plant Equipment Washdown Losses (Evaporative)	10,000
H	Spray Cooler Losses to Atmosphere (Evaporative)	430,000
I	Maintenance Catchment	250,000

* Precipitation case is based on an average year of precipitation using data over the past 30 years.

** Evaporation is reduced using an evaporation reduction cover.

*** Reservoir Blowdown is the difference in volume between the start of the year and the end of the year in the reservoir for a year with an average runtime of 22%. This excess may be sent to the evaporation pond to manage levels in the reservoir.

Figure DR69B-1: Process Flow Chart

ATTACHMENT DR69B-2

AVEK Water Quality Report

Antelope Valley-East Kern Water Agency
2022 Annual Water Quality Report - Kern County System

The Antelope Valley-East Kern Water Agency provides treated surface water and treated groundwater as our sources of drinking water.
Treatment technique: Conventional
EPA Turbidity Performance Standards: Turbidity of the filtered water must:

1. Be less than or equal to 0.30 NTU in 95% of measurements in a month.
2. Not exceed 1 NTU at any time.

Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1: **100%**
Highest single turbidity measurement during the year: **0.19 NTU**
Percentage of samples < 0.30 NTU: **100%**
The number of violations of any surface water treatment requirements: **NONE**
Turbidity (measured in NTU) is a measurement of the cloudiness of water and is a good indicator of water quality and filtration performance. Turbidity results which meet performance standards are considered to be in compliance with filtration requirements.

The Antelope Valley-East Kern Water Agency also provides chlorinated groundwater as an alternative source of drinking water.
Treatment technique: Chlorination
EPA Groundwater Rule: AVEK meets the requirements of the Groundwater Rule by providing a minimum of 4-log reduction of viruses by continously providing a minimum free chlorine residual of 0.5 mg/L leaving the clearwell.

Lowest single free chlorine residual measurement during the year: **0.89**
Number of violations of the Groundwater Rule: **NONE**

MICROBIOLOGICAL CONTAMINANTS

Type of Sample(s)	Parameter	Sampling Frequency	MCL	No. of Months in Violation	System Results Range	System Results Average
Distribution	Total Coliform Bacteria	56 - 70 / mo	5% positive	None	0%	0%
Distribution	E. coli	56 - 70 / mo	1 pos. with 2 TC pos.	None	0%	0%

INORGANIC CONTAMINANTS

RESULTS

					Rosamond Plant				Water Bank			
					Plant Effluent (CWR)		Raw Influent (Sources)		Effluent (CWR)		Wells	
Parameter	Units	MCL	DLR	PHG	Range	Average	Range	Average	Range	Average	Range	Average
Aluminum	µg/L	1000	50	600	93-250	130	ND	ND				
Antimony	µg/L	6	6	1		ND	ND	ND				
Arsenic	µg/L	10	2	0.004		3.6	3.2-8.1	5.0	2.5-7.3	5.5	2.2-12	5.2
Barium	µg/L	1000	100	2000		58	30-58	44				
Beryllium	µg/L	4	1	1		ND	ND	ND				
Cadmium	µg/L	5	1	0.04		ND	ND	ND				
Chromium (Total)	µg/L	50	10			5.1	5.1-15	11				
Chromium (Hexavalent)	µg/L	*	1	0.02		5.8	5.4-14	8.6				
Cyanide	µg/L	150	100	150		ND	ND	ND				
Fluoride	mg/L	2	0.1	1		0.28	0.29-0.36	0.32				
Mercury	µg/L	2	1	1.2		ND	ND	ND				
Nickel	µg/L	100	10	12		ND	ND	ND				
Nitrate (as N)	mg/L	10	0.4	10		2.5	1.2-2.5	1.9			1.2-4.5	2.5
Nitrite (as N)	mg/L	1	0.4	1		ND	ND	ND			ND	ND
Nitrate+Nitrite (as N)	mg/L	10		10		2.5	ND-2.5	0.83			1.5-3.4	2.2
Perchlorate	µg/L	6	2	1		ND	ND	ND			ND	ND
Selenium	µg/L	50	5	30		ND	ND	ND				
Thallium	µg/L	2	1	0.1		ND	ND	ND				

*There is currently no MCL for hexavalent chromium. The previous MCL of 0.010 mg/L was withdrawn on September 11, 2017.

Antelope Valley-East Kern Water Agency
2022 Annual Water Quality Report - Kern County System

GENERAL PHYSICAL AND SECONDARY STANDARDS

RESULTS

Parameter	Units	MCL	DLR	Rosamond Plant				Water Bank			
				Plant Effluent (CWR)		Raw Influent (Sources)		Effluent (CWR)		Wells	
				Range	Average	Range	Average	Range	Average	Range	Average
Aluminum	µg/L	1000	50	93-250	140	ND	ND				
Calcium	mg/L	no standard			63	63-97	74				
Chloride	mg/L	250			54	40-53	47				
Color	Units	15		<5	<5	<5	<5				
Copper	µg/L	1000	50		ND	ND	ND				
Foaming Agents (MBAS)	mg/L	0.5			ND	ND	ND				
Hardness (Total) as CaCO3	mg/L	no standard			200	91-200	140				
Iron	µg/L	300	100		ND	ND	ND				
Magnesium	mg/L	no standard			9.7	5.7-9.7	8.3				
Manganese	µg/L	50	20		ND	ND	ND				
Odor @ 60 C	Units	3	1	<1	<1	<1	<1				
pH	Units	no standard		7.3-7.9	7.6	7.7-8.6	8.0				
Silver	µg/L	100	10			ND	ND				
Sodium	mg/L	no standard			46	ND-44	15				
Specific Conductance	µmhos	900			580	420-580	500				
Sulfate	mg/L	250	0.5		60	47-58	53				
Thiobencarb (Bolero)	µg/L	1	1		ND	ND	ND				
Methyl tert-Butyl Ether (MTBE)	µg/L	5	3		ND	ND	ND				
Total Dissolved Solids	mg/L	500			330	240-320	290				
Turbidity	Units	5		0.01-0.20	0.05	0.02-1.1	0.10				
Zinc	µg/L	5000	50		450	ND	ND				
Total Alkalinity (as CaCO3)	mg/L	no standard			140	120-150	140				
Bicarbonate Alkalinity(as HCO3)	mg/L	no standard			140	ND-150	50				
Carbonate (as CO3)	mg/L	no standard			ND	ND	ND				
Hydroxide (as OH)	mg/L	no standard			ND	ND	ND				

RADIOLOGICAL CONTAMINANTS

RESULTS

Parameter	Units	MCL	DLR	PHG	Rosamond Plant Raw Influent Sources		Water Bank Wells	
					Range	Average	Range	Average
Gross Alpha	pCi/L	15	3					
Gross Beta	pCi/L	50	4			ND		
Strontium 90	pCi/L	8	2	0.35				
Tritium	pCi/L	20,000	1,000	400				
Uranium	pCi/L	20	1	0.43		3.5		
Radium 228	pCi/L		1	0.019		ND		
Radium 226	pCi/L		1	0.05		ND		

VOLATILE ORGANIC CONTAMINANTS

RESULTS

Parameter	Units	MCL	DLR	PHG	Rosamond Plant Raw Influent (Sources)		Water Bank Wells	
					Range	Average	Range	Average
1,1,1-Trichlorethane (1,1,1-TCA)	µg/L	200	0.5	1000	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	1	0.5	0.1	ND	ND	ND	ND
1,1,2-Trichloroethane (1,1,2-TCA)	µg/L	5	0.5	0.3	ND	ND	ND	ND
1,1-Dichloroethane (1,1-DCA)	µg/L	5	0.5	3	ND	ND	ND	ND
1,1-Dichloroethylene (1,1-DCE)	µg/L	6	0.5	10	ND	ND	ND	ND
1,2,4-Trichlorobenzene	µg/L	5	0.5	5	ND	ND	ND	ND
1,2-Dichlorobenzene (o-DCB)	µg/L	600	0.5	600	ND	ND	ND	ND

Antelope Valley-East Kern Water Agency
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Parameter	Units	MCL	DLR	PHG	Rosamond Plant Raw Influent (Sources) Range	Rosamond Plant Raw Influent (Sources) Average	Water Bank Wells Range	Water Bank Wells Average
1,2-Dichloroethane (1,2-DCA)	µg/L	0.5	0.5	0.4	ND	ND	ND	ND
1,2-Dichloropropane	µg/L	5	0.5	0.5	ND	ND	ND	ND
1,3-Dichloropropene (Total)	µg/L	0.5	0.5	0.2	ND	ND	ND	ND
1,4-Dichlorobenzene (p-DCB)	µg/L	5	0.5	6	ND	ND	ND	ND
Benzene	µg/L	1	0.5	0.15	ND	ND	ND	ND
Carbon tetrachloride	µg/L	0.5	0.5	0.1	ND	ND	ND	ND
cis-1,2-Dichloroethylene (c-1,2-DCE)	µg/L	6	0.5	100	ND	ND	ND	ND
cis-1,3-Dichloropropene	µg/L				ND	ND	ND	ND
Dichloromethane (Methylene Chloride)	µg/L	5	0.5	4	ND	ND	ND	ND
Ethylbenzene	µg/L	300	0.5	300	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	µg/L	13	3	13	ND	ND	ND	ND
Monochlorobenzene (Chlorobenzene)	µg/L	70	0.5	70	ND	ND	ND	ND
Styrene	µg/L	100	0.5	0.5	ND	ND	ND	ND
Tetrachloroethylene (PCE)	µg/L	5	0.5	0.06	ND	ND	ND	ND
Toluene	µg/L	150	0.5	150	ND	ND	ND	ND
trans-1,2-Dichloroethylene (t-1,2-DCE)	µg/L	10	0.5	60	ND	ND	ND	ND
trans-1,3-Dichloropropene	µg/L				ND	ND	ND	ND
Trichloroethylene (TCE)	µg/L	5	0.5	1.7	ND	ND	ND	ND
Trichlorofluromethane (Freon11)	µg/L	150	5	1300	ND	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	µg/L	1200	10	4000	ND	ND	ND	ND
Vinyl Chloride (VC)	µg/L	0.5	0.5	0.05	ND	ND	ND	ND
Xylenes (Total)	µg/L	1750	0.5	1800	ND	ND	ND	ND

SYNTHETIC ORGANIC CHEMICALS

RESULTS

Parameter	Units	MCL	DLR (DL)	PHG	Raw Influent (Sources) Range	Raw Influent (Sources) Average	Water Bank Wells Range	Water Bank Wells Average
Alachlor	µg/L	2	1	4	ND	ND		
Atrazine	µg/L	1	0.5	0.15	ND	ND		
Bentazon	µg/L	18	2	200	ND	ND		
Benzo(a)pyrene	µg/L	0.2	0.1	0.007	ND	ND		
Carbofuran	µg/L	18	5	0.7	ND	ND		
Chlordane	µg/L	0.1	0.1	0.03	ND	ND		
2,4-D	µg/L	70	10	20	ND	ND		
Dalapon	µg/L	200	10	790	ND	ND		
Dibromochloropropane (DBCP)	µg/L	0.2	0.01	0.0017	ND	ND		
Di(2-ethylhexyl)adipate	µg/L	400	5	200	ND	ND		
Di(2-ethylhexyl)phthalate	µg/L	4	3	12	ND	ND		
Dinoseb	µg/L	7	2	14	ND	ND		
Diquat	µg/L	20	4	6	ND	ND		
Endothall	µg/L	100	45	94	ND	ND		
Endrin	µg/L	2	0.1	0.3	ND	ND		
Ethylene Dibromide (EDB)	µg/L	0.05	0.02	0.01	ND	ND		
Glyphosate	µg/L	700	25	900	ND	ND		
Heptachlor	µg/L	0.01	0.01	0.008	ND	ND		
Heptachlor Epoxide	µg/L	0.01	0.01	0.006	ND	ND		
Hexachlorobenzene	µg/L	1	0.5	0.03	ND	ND		
Hexachlorocyclopentadiene	µg/L	50	1	2	ND	ND		
Lindane	µg/L	0.2	0.2	0.032	ND	ND		
Methoxychlor	µg/L	30	10	0.09	ND	ND		
Molinate	µg/L	20	2	1	ND	ND		
Oxamyl	µg/L	50	20	26	ND	ND		
Pentachlorophenol	µg/L	1	0.2	0.3	ND	ND		
Picloram	µg/L	500	1	166	ND	ND		

Parameter	Units	MCL	DLR (DL)	PHG	Raw Influent (Sources) Range	Raw Influent (Sources) Average	Water Bank Wells Range	Water Bank Wells Average
Polychlorinated Biphenyls	µg/L	0.5	0.5	0.09	ND	ND		
Simazine	µg/L	4	1	4	ND	ND		
Thiobencarb (Bolero)	µg/L	70	1	42	ND	ND		
Toxaphene	µg/L	3	1	0.03	ND	ND		
2,3,7,8-TCDD (Dioxin)	pg/L	30	5	0.05	ND	ND		
2,4,5-TP (Silvex)	µg/L	50	1	3	ND	ND		
1,2,3-Trichloropropane	µg/L	0.005	0.005	0.0007	ND	ND		

DISINFECTION RESIDUAL, PRECURSORS, and BYPRODUCTS

Type of Sample(s)	Parameter	Units	MCL/MRDL	DLR	MRDLG	RESULTS Range	RESULTS Average
Distribution	Chlorine (as total Cl2)	mg/L	4.0**		4	0.26-1.48	1.07
Treated Water	Total Organic Carbon (TOC)	mg/L	Treatment Requirement	0.3		0.4-0.9	0.6
Source Water	Total Organic Carbon (TOC)	mg/L	Treatment Requirement	0.3		0.5-0.9	0.6
Distribution	Stage 2 D/DBP Rule Total Trihalomethanes	µg/L	80**			14-25	20 #
Distribution	Stage 2 D/DBP Rule Total Haloacetic Acids	µg/L	60**			2.2-7.2	2.1 #
Treated Water	Bromate	µg/L	10[+]	1.0		ND	ND

** Running Annual Average of distribution system samples. The MCLs are based upon Running Annual Averages.
Stage 2 D/DBP Rule Total THMs and Total HAAs compliance is based upon Locational Running Annual Averages.

Location with the highest TTHM average

[+] Compliance is based on the running annual average computed quarterly, of monthly samples, collected at the entrance to the distribution system.

DEFINITIONS and FOOTNOTES:

Plant Effluent, CWR, is finished, treated drinking water.
Raw Water is the Source Water, the California Aqueduct or wells, prior to treatment.
Units: mg/L = milligrams per liter, parts per million (ppm)
µg/L = micrograms per liter, parts per billion (ppb)
pg/L = picograms per liter, parts per quadrillion (ppq)
µmhos = micromhos, a measure of specific conductance
pCi/L = pico Curies per liter
< = less than
> = greater than
ND = none detected above the DLR
NTU = nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.
MCL: Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. MCLs are set by the US Environmental Protection Agency or the State Water Resources Control Board as close to the PHGs and MCLGs as is economically or technologically feasible.
MRDL: Maximum Residual Disinfectant Level. The level of a disinfectant added for water treatment that may not exceeded at the consumer's tap.
DLR: Detection Limit for purposes of Reporting.
(DL): Detection limit determined by the Laboratory when no DLR has been established.
MCLG: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.
MRDLG: Maximum Residual Disinfectant Level Goal. The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs are set by the US Environmental Protection Agency.
PHG: Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Office of Environmental Health Hazard
Primary Drinking Water Standard: Primary MCLs, specific treatment techniques adopted in lieu of primary MCLs, and monitoring and reporting requirements for MCLs that are specified in regulations.
Assessment.
Secondary Standards: Aesthetic standards established by the State Water Resources Control Board.
All analyses performed by ELAP certified laboratories: AVEK Water Agency, Eurofins Eaton Analytical Laboratories, or Eurofins subcontract lab.

ATTACHMENT DR69G-1

Cavern/Compensation Reservoir Water Quality

Table DR69G-1: Cavern/Compensation Reservoir Water Quality

Constituent	Result (ND = Not Detected)
General Chemistry	
Calcium	26 mg/L
Magnesium	3600 ug/L
Sodium	87 mg/L
Bicarbonate Alkalinity as CaCO3	170 mg/L
Carbonate Alkalinity as CaCO3	21 mg/L
Chlorides	55 mg/L
Flouride	0.51 mg/L
Nitrate	ND
Sulfate	65 mg/L
pH	8.9
TDS @180 C	410 mg/L
MBAS	0.16 mg/L
Total Cyanide	0.0017 mg/L
Nitrite as N	0.0079 mg/L
Perchlorate	ND
Metals	
Hexavalent Chromium	0.00026 mg/L
Total Recoverable Aluminum	130 ug/L
Total Recoverable Antimony	ND
Total Recoverable Arsenic	ND
Total Recoverable Beryllium	ND
Total Recoverable Boron	150 ug/L
Total Recoverable Cadmium	ND
Total Recoverable Chromium	17 ug/L
Total Recoverable Copper	6.0 ug/L
Total Recoverable Iron	3800 ug/L
Total Recoverable Manganese	190 ug/L
Total Recoverable Mercury	ND
Total Recoverable Nickel	5.9 ug/L
Total Recoverable Selenium	ND
Total Recoverable Silver	ND
Total Recoverable Thallium	ND
Total Recoverable Zinc	1400 ug/L

ATTACHMENT DR69H-1

Blind Bored Shaft Profile and Flow Rate Figures

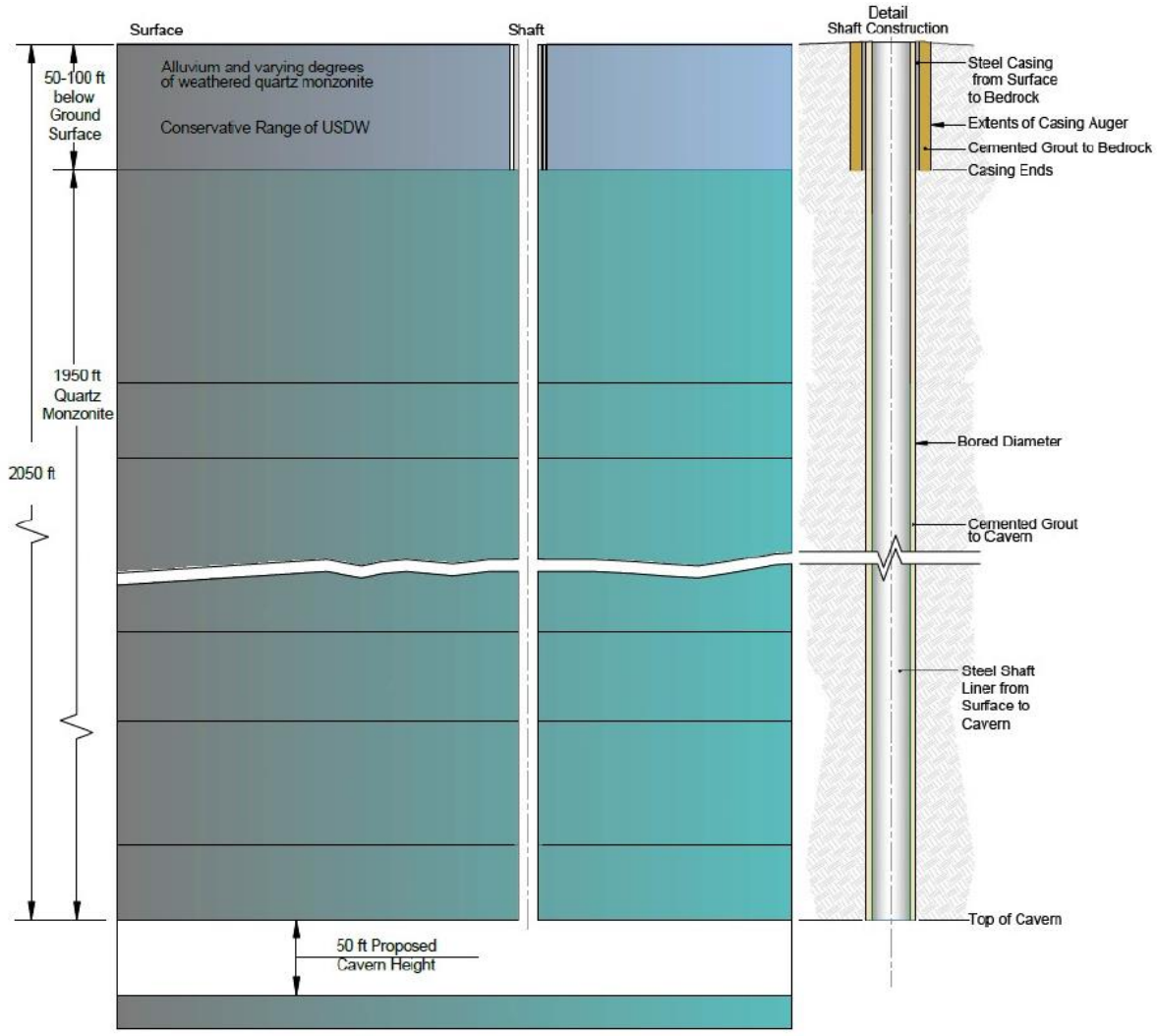


Figure DR69H-1: Blind Bored Shaft Profile

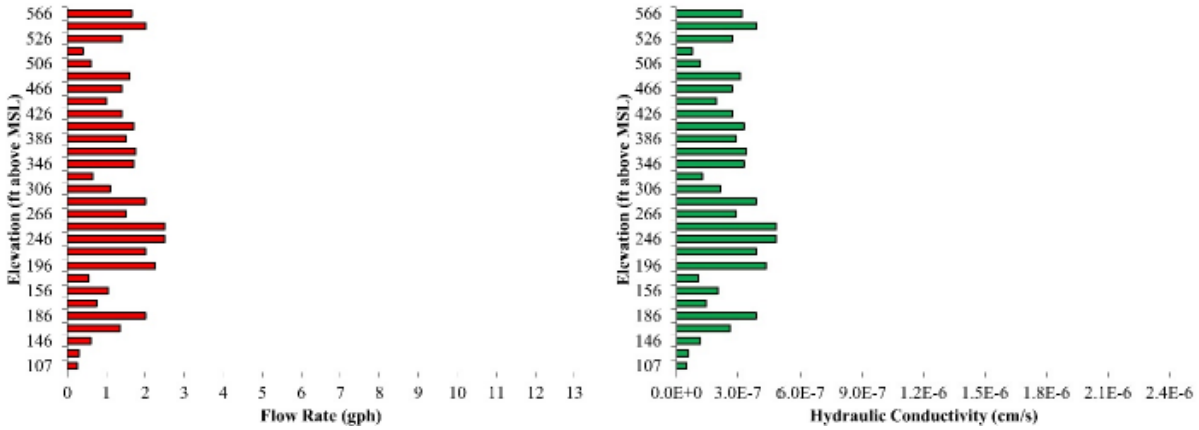


Figure DR69H-2: Packer Flow Rate and Hydraulic Conductivity at Subsurface Elevations in ZEV-CH-01-23

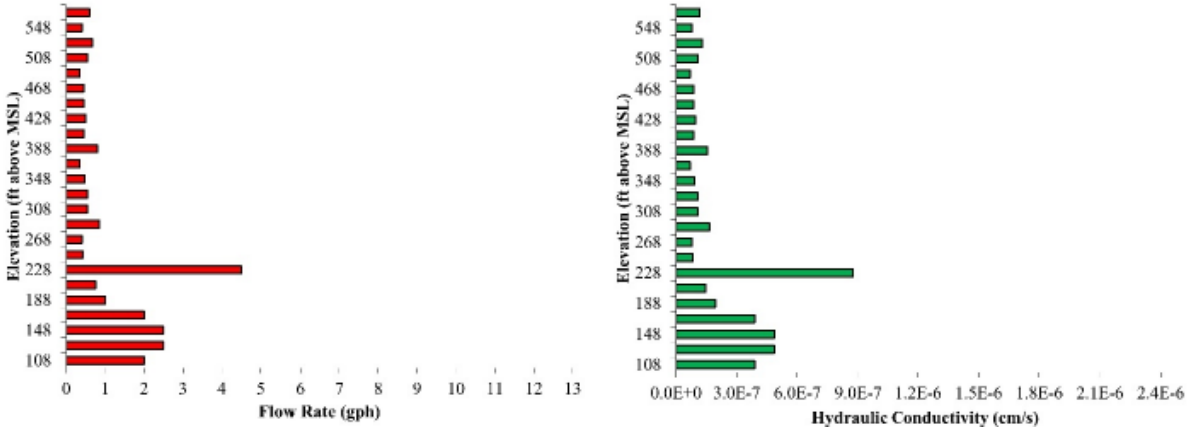


Figure DR69H-3. Packer Flow Rate and Hydraulic Conductivity at Subsurface Elevations in ZEV-CH-02-23

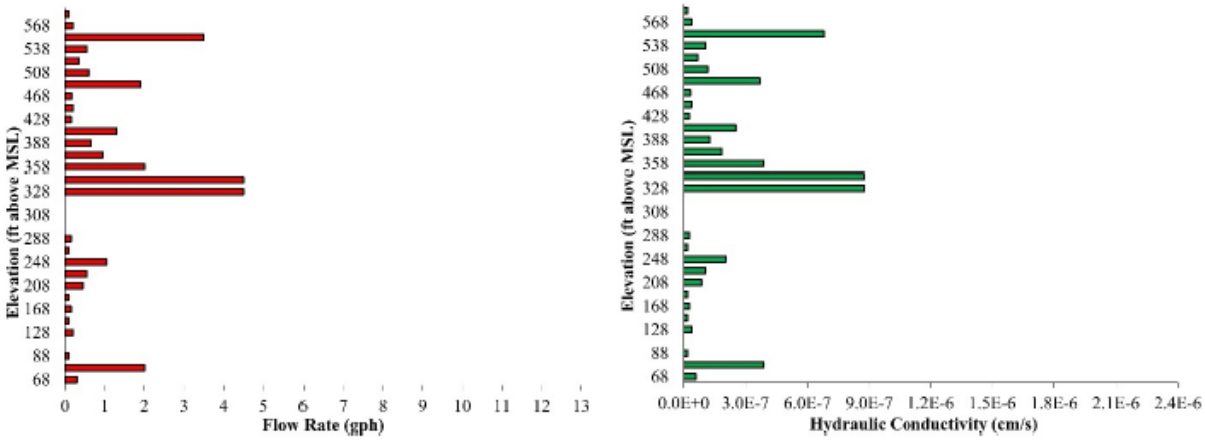


Figure DR69H-4. Packer Flow Rate and Hydraulic Conductivity at Subsurface Elevations in ZEV-CH-03-23

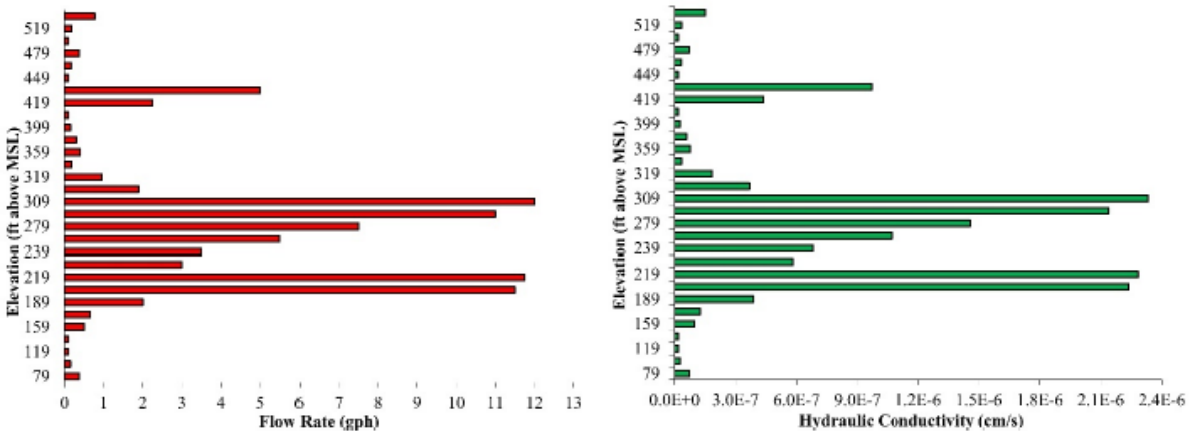


Figure DR69H-5. Packer Flow Rate and Hydraulic Conductivity at Subsurface Elevations in ZEV-CH-04-24

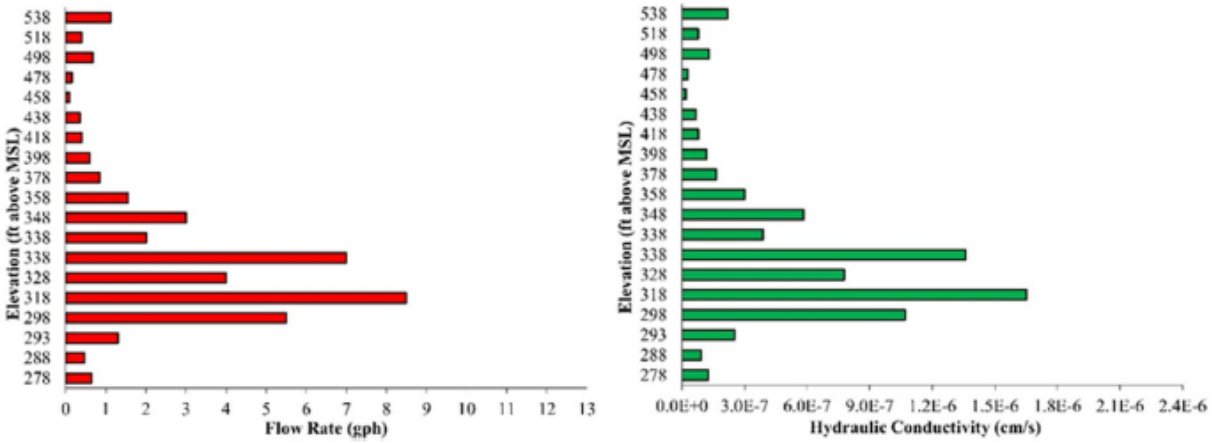


Figure DR69H-6. Packer Flow Rate and Hydraulic Conductivity at Subsurface Elevations in ZEV-CH-05-24

ATTACHMENT DR69H-2

Condition of Rock Mass Discontinuities Table

Table DR69H-1: Condition of Rock Mass Discontinuities Associated with Different Hydraulic Conductivities

Hydraulic Conductivity Range (cm/s)	Condition of Rock Mass Discontinuities
$<1 \times 10^{-5}$	Very Tight
1×10^{-5} to 6×10^{-5}	Tight
6×10^{-5} to 2×10^{-4}	Few Partly Open
2×10^{-4} to 6×10^{-4}	Some Open
6×10^{-4} to 1×10^{-3}	Many Open
$>1 \times 10^{-3}$	Open Closely Spaced or Voids

ATTACHMENT DR69I-1

Groundwater Results Table

Table DR69I-1: Groundwater Results

		Sample ID	23E-05A	23E-05B	23E-11A	23E-11B
Analyte	**RL**	**Units**	**8/21/2024**	**8/21/2024**	**8/21/2024**	**8/21/2024**
Bromide	0.40	mg/L	1.8	1.8	0.83	0.84
Chloride	0.40	mg/L	550	550	260	270
Fluoride	0.40	mg/L	0.45	0.49	1.0	1.1
Nitrate as N	0.40	mg/L	6.2	8.2	9.8	7.6
Nitrite as N	0.40	mg/L	ND	ND	ND	ND
Sulfate	0.40	mg/L	310	330	150	170
Mercury	0.00020	mg/L	ND	ND	ND	ND
Aluminum	0.20	mg/L	3.5	2.8	0.58	0.66
Antimony	0.050	mg/L	ND	ND	ND	ND
Arsenic	0.040	mg/L	ND	ND	ND	ND
Barium	0.080	mg/L	0.11	0.11	0.11	0.11
Beryllium	0.010	mg/L	ND	ND	ND	ND
Boron	0.16	mg/L	0.17	0.17	0.59	0.57
Cadmium	0.0050	mg/L	ND	ND	ND	ND
Calcium	0.40	mg/L	270	270	110	100
Chromium	0.010	mg/L	ND	ND	ND	ND
Cobalt	0.010	mg/L	ND	ND	ND	ND
Copper	0.020	mg/L	ND	ND	ND	ND
Iron	0.40	mg/L	3.7	3.7	0.59	0.64
Lead	0.010	mg/L	0.014	0.015	0.012	0.015
Magnesium	0.050	mg/L	54	53	28	27
Manganese	0.010	mg/L	0.18	0.25	0.11	0.12
Molybdenum	0.010	mg/L	ND	ND	ND	ND
Nickel	0.010	mg/L	ND	ND	ND	ND
Potassium	0.50	mg/L	9.3	9.4	3.4	3.2
Selenium	0.050	mg/L	ND	ND	ND	ND
Silica (SiO2)	0.80	mg/L	40	36	46	44
Silver	0.010	mg/L	ND	ND	ND	ND
Sodium	1.2	mg/L	93	93	100	99
Strontium	0.010	mg/L	2.2	2.2	0.83	0.80
Thallium	0.020	mg/L	ND	ND	ND	ND
Vanadium	0.050	mg/L	ND	ND	ND	ND
Zinc	0.050	mg/L	ND	ND	ND	ND
Hardness as CaC03	0.21	mg/L	900	900	390	370
pH @ 25 C	0.10	pH Units	7.74	7.64	7.91	7.64
Specific Conductance (EC) @ 25 C	2.0	uhmhos/cm	2300	2300	1300	1300
Total Alkalinity, CaCO3	20	mg/L	75	73	83	80
Bicarbonate, CaCO3	20	mg/L	75	73	83	80

		Sample ID	23E-05A	23E-05B	23E-11A	23E-11B
Analyte	**RL**	**Units**	**8/21/2024**	**8/21/2024**	**8/21/2024**	**8/21/2024**
Carbonate, CaC03	20	mg/L	ND	ND	ND	ND
Hydroxide, CaCO3	20	mg/L	ND	ND	ND	ND
Ammonia as N	0.14	mg/L	ND	ND	ND	ND
Chemical Oxygen Demand	20	mg/L	140	150	29	31
Ferrous Iron	50.0	ug/L	149	ND	ND	117
Total Organic Carbon	0.50	mg/L	ND	ND	ND	ND
Orthophospate as P	0.025	mg/L	0.84	0.92	0.24	0.30
Phosporus-Total as P	0.025	mg/L	ND	ND	0.29	0.34
Turbidity	0.10	NTU	450	550	75	60
Total Dissolved Solids	10	mg/L	1800	1800	900	800
Total Suspended Solids	10	mg/L	1000	380	120	87
Notes: RL = reporting limit; mg/L = milligrams per Liter						

ATTACHMENT DR69I-2

Boring Logs and Well Completion Details

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
H. Brake	9/14/23	9/15/23	Automatic, 140 lbs	23E-05
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			34.9115°/-118.1530°	2547.0 ft
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
Rotary Wash, 4-inch diameter, HQ Coring			--	sunny, warm
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
Gregg Drilling			See plate 1	Monitoring well
DRILL RIG			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Fraste Multi-Drill			N/A / 40.8 ft on 10-23-23	71.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample or Run Location	Sample or Run Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Well Diagram	Well Description	Remarks
	0		CLAYEY SAND (SC); medium dense; pale brown; dry; fine to medium SAND; (ALLUVIUM).		B			100							Traffic-rated vault 3' Steel mount riser 2" PVC pipe	CP ($\gamma_{D,MAX}$ = 124 pcf, w_{OPT} = 10%), TR
2545	2															
	3				24	11 16 28	44	100		8	97					
2543	4															
	5				25	22 43 50	93	100		3	98					-200 (2% G, 74% S, 24% F)
2541	6		IGNEOUS ROCK (QUARTZ MONZONITE); light gray to white with black grains; intensely weathered to decomposed; very soft; fractured; (SILTY SAND (SM); dense; moist; medium to coarse SAND; mica grains); (QUARTZ MONZONITE).													
	7															
2539	8															
	9															
2537	10		Increasing quality of coarse grained material; iron staining.		26	48 50/4"	50/4"	50								
	11															
2535	12															
	13															
2533	14															
	15				27	30 50/5"	50/5"	50							Bentonite chips	
2531	16															
	17															
2529	18															
	19															
2527	20				28	50/3"	50/3"	11							#3 sand	
	21															
2525	22														2" PVC pipe, 0.01" slots	
	23															
2523	24															
	25															

(continued)

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	
Hydrostor Zevsar Energy Storage	
PROJECT NUMBER	
223-202	
BORING NUMBER	
23E-05	
REVISION DATE	SHEET
11/16/2023	1 of 3

5 BR - STANDARD WITH MONITORING WELL 223-202 ES HYDROSTOR ZEVSAR ENERGY STORAG_GINT.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 11/16/23

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample or Run Location	Sample or Run Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Well Diagram	Well Description	Remarks
	25		IGNEOUS ROCK (Quartz Monzonite) *(continued)*.		29	50/4"	50/4"	17								
2521	26															
	27															
2519	28															
	29															
2517	30				30	50/2"	50/2"	0								
	31															
2515	32															
	33															
2513	34															
	35		Rig chatter.													
2511	36															Rig chatter. Driller noted harder drilling
	37															
2509	38															
	39															
2507	40				31	50/4"	50/4"	22								
	41															
2505	42															
	43															
2503	44															
	45															
2501	46															
	47															
2499	48															
	49															
2497	50				32	50/1"	50/1"	6								
			45 degree joint.		R1			100	67							Switched to HQ Coring Start time:847 End time:854
	51		Moderately weathered; moderately hard to hard; slightly fractured. Moderately to intensely weathered.		R2			84	15							Start time:857 End time:903
2495	52															
			40 degree joint.													
	53		55 degree joint. 35 degree joint.													
2493	54		45 degree joint.		R3			98	0							Start time:908 End time:917
	55															

(continued)

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME: **Hydrostor Zevsar Energy Storage**
PROJECT NUMBER: **223-202**
BORING NUMBER: **23E-05**
REVISION DATE: **11/16/2023**
SHEET: **2 of 3**

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample or Run Location	Sample or Run Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Well Diagram	Well Description	Remarks
	55			R3			98	0							UC
2491	56	50 degree joint.		R4			100	20							Start time:925 End time:931
	57	60 degree joint.													UC
2489	58														
	59	Fresh to slightly weathered. 70 degree joint.		R5			100	60							Start time:940 End time:944
2487	60	60 degree joint. 45 degree joint.													
	61	55 degree joint. 85 degree joint.		R6			100	64							Start time:947 End time:1003
2485	62	Fresh; hard; moderately fractured; 75 degree joint. 55 degree joint.													
	63														
2483	64	50 degree joint. 50 degree joint. 50 degree joint.													
	65	30 degree joint. 60 degree joint.													UC
2481	66	65.5 degree joint. 70 degree joint.		R7			100	88							Start time:1010 End time:1020
	67	Intensely weathered; 30 degree joint, 20 degree joint. 65 degree joint.													
2479	68														
	69	28 degree joint.													
2477	70	75 degree joint (half inch apart).													
	71	Bottom of borehole at 71.0 ft bgs												Bottom cap	
2475	72														
	73	This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.													
2473	74														
	75														
2471	76														
	77														
2469	78														
	79														
2467	80														
	81														
2465	82														
	83														
2463	84														
	85														

5 BR - STANDARD WITH MONITORING WELL 223-202 ES HYDROSTOR ZEVSAR ENERGY STORAG_GINT.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 11/16/23

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Hydrostor Zevsar Energy Storage**
PROJECT NUMBER	**223-202**
BORING NUMBER	**23E-05**
REVISION DATE	**11/16/2023**
SHEET	**3 of 3**

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
H. Brake	10/3/23	10/3/23	Automatic, 140 lbs	23E-11
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			34.9126°/-118.1566°	2567.3 ft
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
Rotary Wash, 4-inch diameter, HQ Coring			--	sunny, warm
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
Gregg Drilling			130 yards east of drill pad 3 and 100 yards south of access road	Monitoring well
DRILL RIG			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Fraste Multi-Drill			N/A	61.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample or Run Location	Sample or Run Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Well Diagram	Well Description	Remarks
	0														Traffic-rated vault	
	1		CLAYEY SAND (SC); loose; brown; dry; (ALLUVIUM).												3' Steel mount riser 2" PVC pipe	
2565	2															
	3		IGNEOUS ROCK (QUARTZ MONZONITE); llight brown with black grains; intensely weathered; very soft; fractured; (Well-graded SAND (SW); dense; moist; medium to coarse SAND; iron staining); (QUARTZ MONZONITE).		65	11 14 35	49	100		6	106					
2563	4															
	5				66	32 50/4"	50/4"	56		5	80					
2561	6															
	7															
2559	8															
	9															
2557	10				67	50/5"	50/5"	28								Driller noted hard drilling
	11															
2555	12															
	13															
2553	14															
	15				N/A										Bentonite chips	
2551	16															
	17															
2549	18															
	19															
2547	20				68	50 50/1"	50/1"	39							#3 sand	
	21															
2545	22														2" PVC pipe, 0.01" slots	
	23															
2543	24															
	25															

(continued)

5 BR - STANDARD WITH MONITORING WELL 223-202 ES HYDROSTOR ZEVSAR ENERGY STORAG_GINT.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 11/16/23

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	Hydrostor Zevsar Energy Storage
PROJECT NUMBER	223-202
BORING NUMBER	23E-11
REVISION DATE	11/16/2023
SHEET	1 of 3

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample or Run Location	Sample or Run Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Well Diagram	Well Description	Remarks
	25		IGNEOUS ROCK (Quartz Monzonite) *(continued)*.		69	50/4"	50/4"	22								
2541	26															
	27															
2539	28															
	29															
2537	30		IGNEOUS ROCK (QUARTZ MONZONITE) thickly bedded; QUARTZ MONZONITE; light brown with black grains; intensely weathered; very soft; moderately fractured; light brown with black grains. Fracture, slickensided and pink.		R1			100	0							Start time:1600 End time:1602
	31				R2			6	0							Start time:1629 End time:1633
2535	32															
	33															
2533	34															
	35				R3			0	0							Start time:1645 End time:1648 poor recovery. very fast drilling Start time:0747 End time:0749
2531	36															
	37															
2529	38				R4			0	0							
	39															
2527	40															
	41															
2525	42															
	43															
2523	44				R5			47	0							Start time:0751 End time:0753
	45															
2521	46				R6			48	0							Start time:0800 End time:0805
	47															
2519	48															
	49															
2517	50															
	51		Moderately weathered; very soft; unfractured; 70 degree joint, moderately soft sections.		R7			40	17							Start time:0807 End time:0812
2515	52															
	53															
2513	54															
	55															

(continued)

5 BR - STANDARD WITH MONITORING WELL 223-202 ES HYDROSTOR ZEVSAR ENERGY STORAG_GINT.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 11/16/23

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME: **Hydrostor Zevsar Energy Storage**
PROJECT NUMBER: **223-202**
BORING NUMBER: **23E-11**
REVISION DATE: **11/16/2023**
SHEET: **2 of 3**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample or Run Location	Sample or Run Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Well Diagram	Well Description	Remarks
	55				R7			40	17							
2511	56				R8			40	27							Start time:0815 End time:0820 UC
	57		Slightly weathered; hard; moderately fractured.													
2509	58															
	59				R9			77								Start time:0855 End time:0900
2507	60		Moderately soft to moderately hard; moderately to intensely fractured; iron staining, 2- 25 degree joint.													
	61		Bottom of borehole at 61.0 ft bgs												Bottom cap	
2505	62															
	63		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.													
2503	64															
	65															
2501	66															
	67															
2499	68															
	69															
2497	70															
	71															
2495	72															
	73															
2493	74															
	75															
2491	76															
	77															
2489	78															
	79															
2487	80															
	81															
2485	82															
	83															
2483	84															
	85															

5 BR - STANDARD WITH MONITORING WELL 223-202 ES HYDROSTOR ZEVSAR ENERGY STORAG_GINT.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 11/16/23

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Hydrostor Zevsar Energy Storage**
PROJECT NUMBER	**223-202**
BORING NUMBER	**23E-11**
REVISION DATE	**11/16/2023**
SHEET	**3 of 3**

ATTACHMENT DR71-1

Crystalline Silica in the Workplace

October 14, 2024

Re: Crystalline Silica in the Workplace – Willow Rock ACAES Project

There is the potential for worker exposure to crystalline silica within the underground workings of the cavern excavation associated with the above referenced project. All local, state and federal rules and regulations related to silica dust will be adhered to during the execution of this project, including but not limited to ***Title 8 California Code of Regulations Section 5204***.

Sincerely,
Stephen Cormier
VP Construction
Lane Power and Energy Solutions, Inc.

ATTACHMENT DR75-1

Draft Emergency Action Plan

Lane Power and Energy Solutions, Inc.

Emergency Preparedness Plan

During Remediation Work

Emergency Preparedness Plan

_____

On-Site Environmental Health & Safety Contact

_____

On Site Project Manager

_____

Corporate Project Manager

_____

Project Manager

Date:

Table of Contents

1. Introduction

Lane Power Energy Solutions, Inc. (LPES) has prepared an Emergency Prevention and Preparedness Plan (Plan) for all employees and personnel when working underground. The Plan includes a number of situations and LPES's policy when introduced with a given situation. Different stages of work shall be utilized to create

numerous scenarios to prepare employees and personnel for emergency evacuation.

All employees should anticipate the effect of a major emergency or disaster in their operations and plan a course of action that will minimize personal injury and property damage in the event of any fire, flood, loss of ground, or natural disaster. The following actions are recommended insofar as they are applicable to a particular situation. Additional measures may be taken as the situation warrants.

Remember; NEVER PUT YOURSELF OR OTHERS IN JEOPARDY. At no time during an emergency should property be considered before people. The safety of employees and visitors must always come first.

THIS PLAN IS TO BE USED IN CONJUNCTION WITH THE CRISIS MANAGEMENT PLAN.

2. Emergency Situations and Procedures

2.1 Power Outage

Procedures:

- **Both hoists do not work because the power is out** – Stop work below. Start the 250 kilo-watt (kW) generator and utilize the auxiliary hoist to evacuate the crew from below.

2.2 Power Outage, 250 kW Generator won't start

Procedures:

- **If the power is out, and the 250 kW generator won't start** – Call All Crane & Equipment Rental Corp., 6540 MacCorkle

Avenue SW, St. Albans, WV (304) 766-0300 for a back-up rough terrain (RT) crane. Utilize the work cage to rescue people from below, using the same procedures for each situation as previously discussed. (See FIGURE 1 in the Appendix).

2.3 Auxiliary Cage is stuck in the 3' shaft with Occupants

Procedure:

- **If the Auxiliary Cage becomes stuck in the 3' shaft** – The employee(s) in the cage will notify the surface that they are stuck. The Site Manager will assess the situation and decide if the hoist will be fixed, or if a rescue operation should be initiated.

  If it is determined that a rescue is needed, an RT crane will be mobilized to the site. The ball will be sent down the shaft and hooked up to the escape cage. After the weight of the cage is transferred to the RT crane, the escape cage rigging will be disconnected. The rope and rigging will be pulled out of the shaft using the 966 loader. Once the auxiliary rope and rigging are out of the way, the RT crane will lift the auxiliary cage up out of the shaft. (See FIGURE 2 in the Appendix)

  - *All employees and personnel shall ride in the top cage of the escape hoist when riding alone in the 3' shaft.*

  - *The hoist is designed to accept an RT ball.*

2.4 Water Inflow

Procedures:

- **Minor Water Inflow** – Notify shift superintendent. Check for methane in the area of inflow. Develop remedial action as required, in conjunction with Marathon.

- **Extreme Water Inflow** – Shut down the source of the inflow if possible. If the inflow is from the ground, evacuate immediately. Shut down all electrical power to equipment. Check methane levels during evacuation.

2.5 Sirens at Chemical Plants Sound

Procedure:

- **Sirens going off** – The surface will notify the underground by radio to stop working and initiate immediate evacuation. Workers should evacuate using the main hoist, if operable or the auxiliary hoist if the main hoist is inoperable. Steps to take upon reaching the surface:

1. Head upwind or cross-wind. Look at the wind sock mounted on the north side of the jobsite entry gate for reference.

2. Do not head to a low area, head uphill if possible.

3. Meet in the parking lot for a head count if safe to do so. The Site Manager or Site Safety Person will notify Marathon Security (xxx.xxx.xxxx) at the Plant that all personnel have been accounted for and have evacuated the site.

4. All personnel should meet at the Home Depot at Exit 18 on I-64 and check in so they can receive further instruction.

The plant's emergency siren is sounded by the Control Room operator when plant evacuation is necessary. The signal for evacuation is the continuous sounding of the siren. The siren is tested for a 15 second interval at 2:00 p.m. on the fourth Sunday of each month.

2.6 Ventilation System Down

Procedure:

- In the event the ventilation system ceases to function, the cavern will be evacuated as quickly as possible using the main hoist.

2.7 Fire Underground

Procedures:

- **Fire in an Entry North of the Main Crosscut** – If a fire occurs in any of the north entries, the smoke and fire gases will be forced by the blowing ventilation system toward, and up, the main shaft.

  1. The air split from the point of the fire all the way to the surface will be contaminated. For example, if a fire occurred in B entry, B, C, D, and E entries would be exposed to smoke and fumes, as well as the Main Shaft. A', A, F, G, H, I, J, and K entries would be smoke free.

  2. Fighting the fire would be accomplished by approaching the fire from it's smoke free side. In the case of a fire in B entry, the approach to fight the fire would be from the A entry side of the main crosscut. Fighting a fire in this manner has the disadvantage of isolating the firefighters from the main shaft and possibly the escape cage (depending on actual fire location).

  3. The option of reversing the fan is available. By doing so, the main shaft will become a source of fresh air and the fire's smoke and fumes will flow toward A' or K entries to enter the exhaust tubing and exit the cavern. Fire fighters

will then be able to battle the fire with fresh air, and the main shaft, to their backs.

- **Fire in an Entry South of the Main Crosscut** – This scenario is essentially the same as the previous.

    1. However, several of the south entries contain fuel, oil, and other flammable material.

    2. Thus, the potential for a more intense fire is present given the additional sources of fuel.

    3. It should also be noted that the main electrical power centers are located on the south side.

- **Fire in the Main Crosscut** – A major fire in the main crosscut has the potential to cut personnel completely off from escape.

    1. Smoke and fire gases will flow toward the main shaft

    2. Heat from the fire may prevent travel past the fire.

- **Fire in or near the Main Shaft** – A fire in this location may potentially be the most challenging.

    1. It will likely block off access to the main shaft.

    2. Even if the fan is reversed, escape via the main shaft would still be blocked.

    3. The only alternative is to utilize the escape capsule in the F south entry.

    4. If the escape capsule is to be used, it would be unwise to reverse the fan.

2.8 Underground Emergency Procedures Requiring Rescue Efforts

This document addresses the correct action for dealing with underground emergencies that fall into the following categories:

- Fire or other event resulting in the need to contact a rescue team
- Cave-in or other entrapment of personnel underground

The intent of this document is to define, in detail, how the requirements of OSHA regulations with respect to rescue teams are complied with:

1926.800(g)(5)(ii)

On jobsites where less than 25 employees work underground at one time, the employer shall provide (or make arrangements in advance with locally available rescue services to provide) at least one 5-person rescue team to be either on the jobsite or within one-half hour travel time from the entry point.

1926.800(g)(5)(iii)

Rescue team members shall be qualified in rescue procedures, the use and limitations of breathing apparatus, and the use of firefighting equipment. Qualifications shall be reviewed not less than annually.

PB Energy has made arrangements for a rescue team which meets the full requirements of 1926.800(g)(5)(ii) and has, in addition, developed procedures to deal with entrapment events resulting from roof failures which go above and beyond that required under OSHA.

Rescue Team Identification: The rescue team for the Marathon #2 Cavern is, by letter agreement:

Kenova Volunteer Fire Department

Rescue Team Qualifications: The selected team is, as required by OSHA, trained in the use of breathing apparatus and fire fighting equipment, and rescue procedures. Rescue team qualifications shall be reviewed every 6 months by the Site Safety Manager. In addition, underground training drills with the rescue team shall be held at least once every 6 months and consist of a realistic simulation of a rescue event.

Rescue Team Events: A rescue team shall be called whenever there is a probability that additional help is required to assure the safety of underground personnel and equipment. These situations may include (but are not limited to):

- Fire
- Injury
- Equipment accident or malfunction where there is a likelihood of a fire
- Noxious or irrespirable atmosphere underground
- Health condition (ie: heart attack, etc)
- Other circumstances deemed by the Site Manager to require rescue assistance

At the first indication that a situation exists that may require a rescue team, personnel shall contact the Site Manager or his designee. The Site Manager will then make a determination if a rescue team is needed. If so:

- The rescue team will be contacted immediately
- The Site Manager shall implement the Crisis Management Plan

Upon arrival at the site, the rescue team shall:

- Be assembled and briefed on the situation:
    - Meet in a centralized location (the conference room)

- Be shown applicable plans and maps to properly orient to the task at hand
- Advised of the type of situation:
  - Type of event (fire, etc)
  - Number of personnel affected (or missing)

- Develop an action plan.
- Determine personnel assignments and responsibilities to implement the action plan.
- Determine the materials needed to accomplish their task and be provided said material by the site.
- Be escorted to the shaft.
- Double check all communications with the surface.
- Enter the cavern and begin their mission.
- Communicate to the surface every 5 minutes or less on their status and the conditions encountered underground.

Cave-In Without Personnel Entrapment: In the event of a cave-in without any personnel entrapment, standard safety stand-down and investigative procedures will be followed without calling out the rescue team.

Cave-In With Personnel Entrapment: If personnel entrapment occurs:

- The Site Manager or his designee shall be notified immediately.
- The following information, where available, shall be relayed:
  - Type of incident (i.e.: roof fall)
  - Location
  - Extent of fall
  - Number of personnel known to be: missing, injured, deceased.

- Current status of the fall (stable, spreading, etc)

- The Site Manager shall implement the Crisis Management Plan.

- Note: In the event the Site Manager is not available, the next person in the management structure at the project shall assume command. In the event all supervisory personnel are entrapped the Hoist Operator shall immediately contact the Project Manager. Failing that, he shall continue to contact persons listed in the Crisis Management Plan until a management member has been reached and assumes control over the incident. Due to the possibility that all key personnel may become trapped underground, the Hoist Operator shall be fully trained in all aspects of the Crisis Management Plan. The Top Lander will be similarly trained, to act as backup and support to the Hoist Operator.

- The rescue team will be contacted to assist in rendering medical care and transporting personnel to the surface.
- All personnel will be accounted for (present or missing)

- The Site Manager (or his designee) shall consult with key personnel and develop a rescue and recovery action plan. These personnel shall consist of:

  - Site Safety Manager: If not available the Corporate Safety Manager shall fill this duty. If available, an ARCADIS representative shall participate.

  - Site Agapito representative: If entrapped underground, the following actions will occur:

    - An Agapito representative will be contacted by phone and be in constant contact with the operation, rendering advice regarding roof control and fall cleanup procedures.

    - Another Agapito representative will be dispatched to the site via the most timely transportation available.

  - Site subcontractor representative: If entrapped underground, the following actions will occur:

    - A subcontractor representative will be contacted by phone and be in constant contact with the operation, rendering advice regarding roof control and fall cleanup procedures and

assisting in determining and procuring rescue/recovery supplies

- Another subcontractor representative will be dispatched to the site via the most timely transportation available.
- The subcontractor representative shall contact an adequate

number of skilled underground personnel to immediately travel to the site and assist in rescue/recovery operations. This number will be determined in joint discussions with the Site Manager.

- The following work types will be assigned to and executed by the site subcontractor:
    - ✓ Inspect and make secure the approach to the roof collapse.
    - ✓ Install roof support (bolts, timbers, jacks, cribs) as needed to make the roof safe during the rescue/recovery operation.
    - ✓ Clean up any fallen material blocking access to entrapped personnel. Establish a safe access way to the entrapped personnel, and lead the rescue team to recover said personnel.

- The designated rescue team leader.

- Key elements of the rescue and recovery plan will include:
    - A description of how subcontractor personnel will secure the roof on the approach to the fall. This will be site-specific, tailored to the unique circumstances for the subject incident. Included in this plan will be identification of temporary and permanent support required, by type, installation method, and spacing.
    - The anticipated methodology for cleaning up the fall to reach entrapped individuals.
    - Expected personnel extraction methods to be employed by the subcontractor, and the equipment required to achieve success.

- An identification of the risks inherent in the rescue and recovery operation and the procedures that will be employed to mitigate those risks.

- The rescue and recovery plan will be forwarded to PB Energy's Project Manager for review and handling, and it will be simultaneously implemented on site. The Site Manager will assign a person to monitor and update the rescue/recover plan as time progresses.

- As the recue/recovery operation progresses, the provisions of the Crisis Management Plan will be followed.

3. Communications

An underground communications system is in-place and is independent of the underground power supply.

Three types of communication methods are available:

1. Leaky Feeder – radio system which can reach the surface and office;
2. Mine Phones – at the shaft bottoms, to the top of the shaft; and
3. Phone Lines (pending) – landline to the underground offices once installed.

CONTACT INFORMATION FOR SUBCONTRACTORS

Contact numbers of subcontractors would be listed here.

RESCUE TEAM LETTERS

FROM :KOFD FAX NO. :7817790 Oct. 29 2008 08:20AM P2

KENOVA VOLUNTEER FIRE DEPARTMENT
P.O.BOX 186
KENOVA, WV 25530
304-453-4153

Dear Ric,

After reviewing the OSHA requirements1926.800 for a rescue team that you faxed me there is no problem in us meeting the requirements.

All of the requirements are for training that we already due as a fire and rescue provider, the 30 minute response should not be a issue.

Once again I want to stress that we are not a mine rescue team and if there would be a collapse our department is not equipped or trained for that type of incident. We would respond to the incident and assist anyway we could above ground, but would not enter the cavern under collapse conditions.

If you have any questions feel free to contact me anytime.

Steve Henderson, Chief

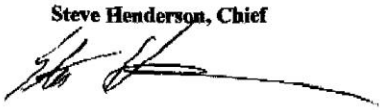
KENOVA VOLUNTEER FIRE DEPARTMENT
P.O.BOX 186
KENOVA, WV 25530
304-453-4153

Dear Ric Elam, **11/03/08**

This letter is to confirm our discussion from earlier today in regards to our response to a collapse. We will respond and would go down to the shaft area of the cavern to triage and package any injured that would be brought from the collapse area.

Also if needed we would call for mutual aid from other agencies to assist us in performing the rescues.

Steve Henderson, Chief



GMS
P O Box 2446
Oakland, Md.
21550
Phone 301-334-8186
Fax 301-334-8186

Steve Cormier, PB Energy
Brian Lafreniere Marathon Oil

RE: Cavern Collapse Rescue

Dear Steve & Brian,

GMS is prepared to assist PB Energy in the event of a roof fall or fire at your Marathon Cavern #2 located near Huntington, WV that may or may not trap miners in the mine.

GMS will send all available qualified and trained miners to secure the site and make it safe for the Kenova VFD to enter the cavern to extract any injured miners in the event that the qualified miners working in the cavern are unable to secure the event.

If fall recovery and cleanup is required, GMS will provide the trained roof bolting and mucking personnel necessary.

Emergency supplies to secure a roof fall (posts, cribs, or jacks) are located on site along with fire fighting equipment. GMS has qualified miners within 65 miles of Marathon Cavern #2 that would be available.

Sincerely,
Courtland Helbig President

AGAPITO ASSOCIATES, INC.
Mining & Civil Engineers & Geologists

715 HORIZON DRIVE
SUITE 340
GRAND JUNCTION, CO 81506
USA
VOICE 970.242.4220
www.agapito.com

CHICAGO OFFICE
630.792.1520

GOLDEN OFFICE
303.271.3750

Date: November 4, 2008

To: PB Energy
Marathon Petroleum

Subject: Marathon Cavern #2 Emergency Plan

Agapito Associates, Inc. has reviewed the *Underground Emergency Procedures* document dated November 3, 2008. We agree to the following actions in the event that the site Agapito representative should become entrapped underground:

- An Agapito representative will be contacted by phone and be in constant contact with the operation, rendering advice regarding roof control and fall cleanup procedures.
- Another Agapito representative will be dispatched to the site via the most timely transportation available.

For Agapito Associates, Inc.

G.L. Skaggs, Principal

APPENDIX

FIGURE 1

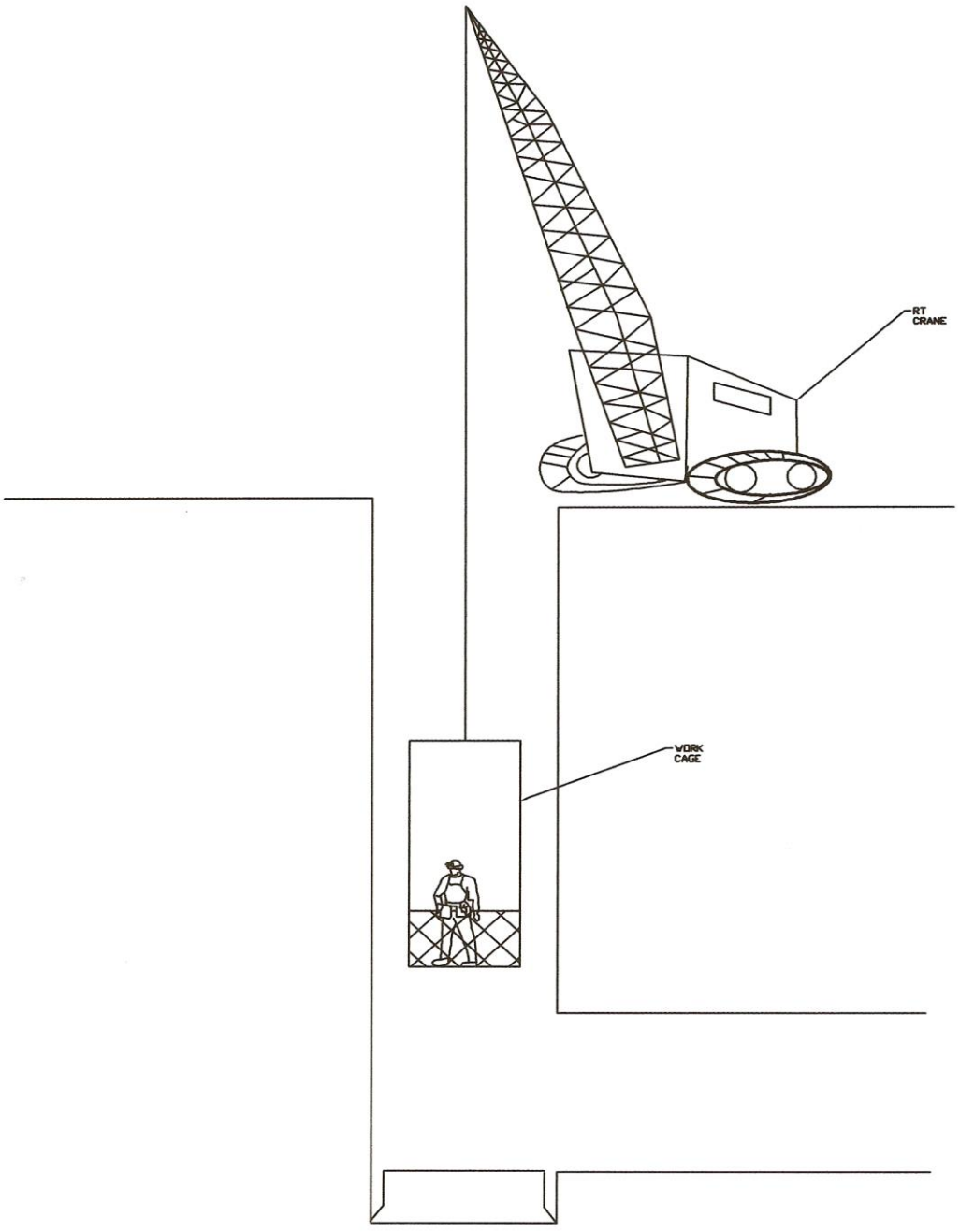
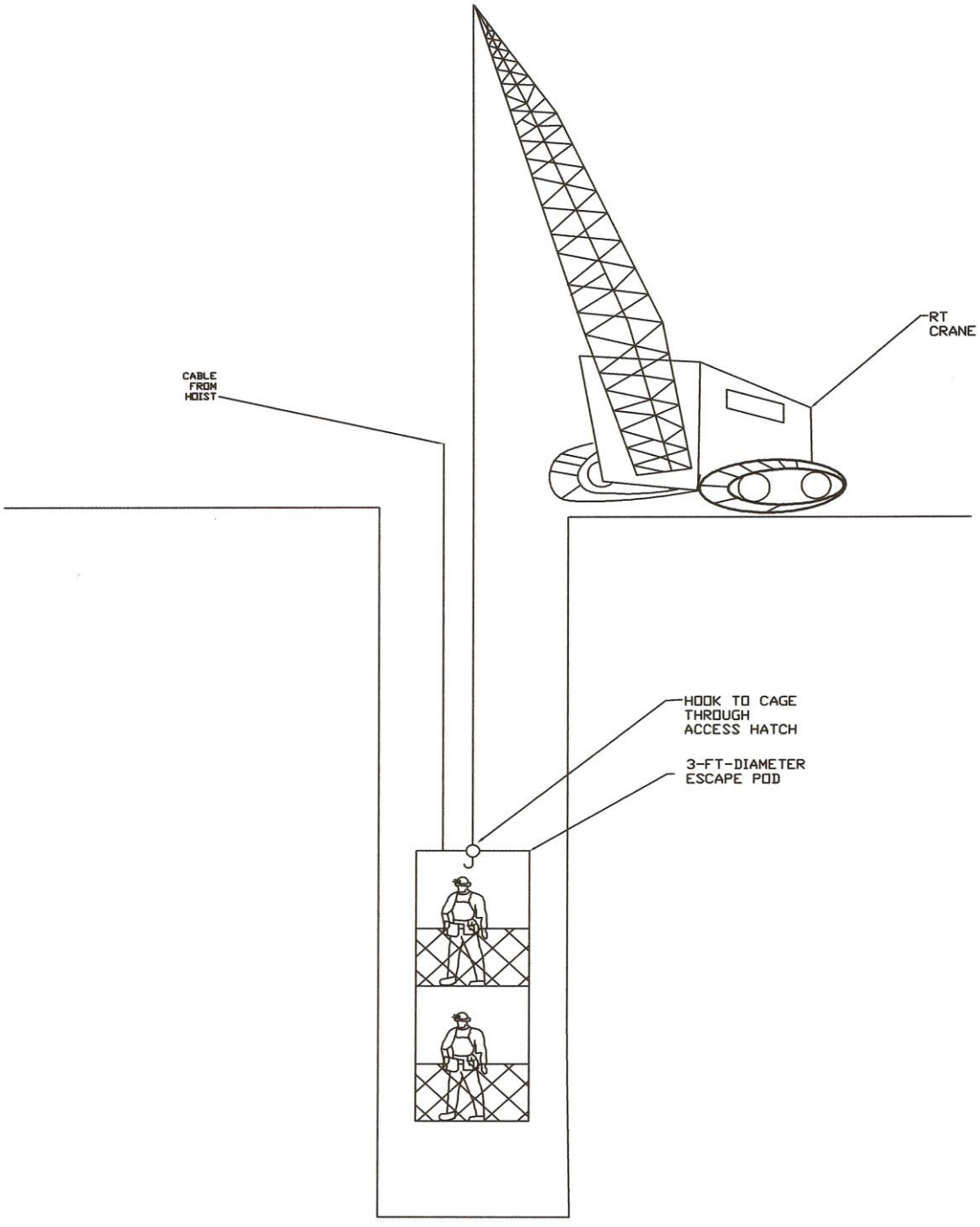


FIGURE 2


RT
CRANE
CABLE
FROM
HOIST
HOOK TO CAGE
THROUGH
ACCESS HATCH
3-FT-DIAMETER
ESCAPE POD

ATTACHMENT DR76-1

Transportation, Storage and Handling of Explosives

October 15, 2024

Re: Transportation, Storage and Handling of Explosives – Willow Rock ACAES Project

Explosives will be used on the above referenced project. They will be required for the excavation of the subsurface works. At this time the selection of the type of explosives has not been made. That will occur during the detailed design process. During construction, explosives will be transported to the site via a third party vendor/supplier. Storage, handling and use will be performed onsite by our mining subcontractor. All local, state and federal rules and regulations related to explosives will be adhered to during the execution of this project, including but not limited to The State of California – Cal/OSHA Title 8 Regulations and the Federal Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) regulations.

Sincerely,
Stephen Cormier
VP Construction
Lane Power and Energy Solutions, Inc.

ATTACHMENT DR79-1

Rock Crusher Safety

NORTH AMERICAN RECYCLING AND CRUSHING, LLC

SITE-SPECIFIC INJURY AND ILLNESS PREVENTION PROGRAM MANUAL

SITE NAME, MANAGER AND TYPE:

SITE NAME:_____ ☐ AGGREGATES ☐ RMC

MANAGER:_____ ☐ HMA ☐ OTHER:_____

DATE: _____

EMERGENCY EVACUATION PLAN:

☐ MAP IS POSTED AT: _____

SEE SECTION 7.1.4 FOR EVACUATION GUIDELINES

☐ ASSEMBLY AREA FOR THIS LOCATION IS: _____

SITE-SPECIFIC PROGRAMS AT THIS LOCATION INCLUDE:

☐ MSHA PART 46 TRAINING PLAN	☐ WRITTEN LOTO/BO PROCEDURES FOR MOBILE EQUIPMENT
☐ EMERGENCY ACTION PLAN	☐ RESPIRATORY PROTECTION PROGRAM
☐ FIRST AID / CPR PROVIDERS LIST	☐ BEST SAFETY PRACTICES FOR QUALIFIED ELECTRICAL PERSONNEL
☐ REPAIR-MAINTENANCE FIELD MANUAL	☐ DRILLING AND BLASTING STANDARDS
☐ WRITTEN ELECTRICAL LOTO PROCEDURES FOR FIXED EQUIPMENT	☐ OCCUPATIONAL ERGONOMIC PLAN

ARE THERE ANY ADMINISTRATIVE CONTROLS CURRENTLY IN EFFECT AT THIS SITE?

☐ NO ☐ YES, CONTROLS ARE POSTED AT THE FOLLOWING LOCATIONS:

_____

ARE THERE ANY PERMIT-REQUIRED CONFINED SPACES AT THIS SITE?

☐ NO ☐ YES, SEE LIST POSTED AT:_____

SEE SECTION 7.3.2 FOR RESCUE PLAN

To view the currently effective Drug and Alcohol policy for this site, refer to the NOAM Employee Handbook.

TABLE OF CONTENTS

Safety Toolbox Talk
Rock Crusher

The jaw crusher squeezes rock between two surfaces, one of which opens and closes like a jaw. Rock enters the jaw crusher from the top. Pieces of rock, that are larger than the opening at the bottom of the jaw, lodge between the two metal plates of the jaw. The opening and closing action of the movable jaw against the fixed jaw continues to reduce the size of lodged pieces of rock until the pieces are small enough to fall through the opening at the bottom of the jaw.

Ask a few questions:

1. Has a Job Hazard Analysis (JHA) been developed specifically for the operation?
2. Have individuals operating the crusher been trained in its operation and emergency shut-down procedures?
3. Are all guards in place to protect individuals from moving parts?

*Discuss this with your crew and ask them to identify 5 hazards and precautions associated with crushers**, then flip the page over and see if they were able to identify similar hazards**. Challenge them to identify the hazards before flipping this over.*

Name 5 Hazards and Precautions associated with Crushers

Hazards	Precautions

Craft Involvement Makes us Safer

Recap

Project:		Supt:	
Date:		Foreman:	

Topic: Crushers

How did we do? Check your answers against these. Circle the items identified by your crew and review the ones they didn't.

Hazards	Precaution
Noise	If you are exposed to greater than 90dB you will need to use some type of hearing protection depending on how long you will be exposed. If you have to shout to be heard by someone 3' away you will need to wear hearing protection.
Dust	Dust from crushing concrete is not only a nuisance but may also contain silica. Stay out of the dust cloud. Wetting the pile will help reduce the amount of dust being produced. Depending on the amount of dust it may be required to wear a respirator. You must have a medical screening, fit test, and training to wear a respirator.
Caught Between	Identify areas where vehicles and equipment could possibly come together and crush someone. Barricade areas where vehicles will be delivering material to the crusher and keep all foot traffic out of the area.
Pinch Points	Make sure you identify all potential pinch points , not just those to your hands. Check all guards to ensure they are properly installed and secure.
Moving Parts	Crushers have belts that move the crushed material. These belts, as well as other eternal parts, **must be protected by guards at all times** when in operation. Remove all jewelry and loose clothing that may become caught in a moving part. Keep long hair tied to the back and away from moving parts.

Crew Members' Signatures

Craft Involvement Makes us Safer

ATTACHMENT DR80-1

Concrete Batch Plant Safety Protocols

LANE
POWER & ENERGY SOLUTIONS, INC.

Concrete Batch Plant Saftey Protocols

LANE POWER & ENERGY SOLUTIONS, INC.
2900 North Loop West Suite 1210 • Houston, TX 77092
www.lanepes.com

SAFETY SERVICES COMPANY

Tailgate/Toolbox Safety Training

Safety Services Company-Safety Meeting Division, PO Box 6408 Yuma, AZ 85366-6408 Toll Free (866) 204-4786

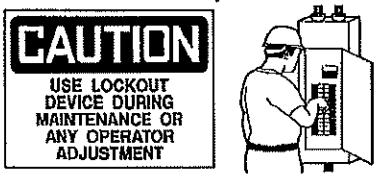
Company Name: _____ Job Site Location: _____

Date: _____ Start Time: _____ Finish Time: _____ Foreman/Supervisor: _____

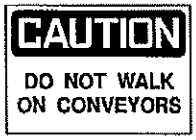
Topic 494: Concrete Batch Plant (Part A)

Introduction: Concrete batch plants can be permanently located or constructed at a job site. When large quantities of concrete are needed in one location, transporting it from a permanent batch plant is sometimes impractical, requiring a batch plant to be constructed at the job site. Personnel working at both of these types of concrete batch plants face the same hazards. Following are safety guidelines for concrete batch plant personnel:

- ***Control operators must*** always be aware of the location of other employees that are working at the batch plant. Control operators have the ability to start several different conveyors, mixers, drums, and ramps. The ability to move and operate many different components at the plant from a central control station is a necessity that requires all employees to know when one of those components will start to operate.
- ***Flashing lights*** and sirens are often used to warn employees that a component is running, or is about to start running.
- ***Employees must have*** an ensured means of communication such as radios. When excessive noise, or long distances between ground workers and control operators limit communication abilities, some means of positive communication must be employed for the safety of all employees and personnel at the batch plant. When control operators are not able to see employees that are working near, or on equipment, safe communication will ensure that the equipment will not be started until all employees are ready. Avoid being exposed to excessive noise levels for prolonged periods.
- ***Never climb, sit, ride, or step*** onto or under conveyors when they are in operation. Conveyers and other equipment must be locked and tagged before attempting any maintenance work. Always keep hands and feet away from moving pulleys, chains, gears, shafts, and belts.
- ***Employees*** must keep hair tied back and avoid wearing jewelry or clothing that may accidentally become caught in moving equipment.
- ***Ramps and walkways*** used to inspect and maintain equipment at elevated levels on the plant must be fitted with railings and toe boards. Employees must be protected from falling into moving equipment while they are on ramps and walkways. Toe boards must be used to keep tools from falling or being kicked off of ramps and walkways endangering employees at lower levels of the plant.
- ***Personal fall protection must*** be employed when working on portions of the plant where railings are impractical or the danger of a fall is increased due to special repair or maintenance operations.
- ***Tools and other equipment*** used to repair and maintain the batch plant must be returned to tool rooms where they will not cause obstructions on ramps and walkways. Employees attempting to maneuver on walkways and ramps must have unobstructed paths to avoid accidental trip and fall accidents.



- ***Keep clear of electrical*** equipment when working near the batch plant operating systems. Concrete batch plants operate many of the controlling and mixing components with very high voltage electricity. Employees must be made aware of all locations where high voltage electricity is present at the plant, and what hazards are associated with those locations. Always deenergize electrical equipment before attempting to perform repair or replacement jobs. Stand on a dry insulated mat when performing an electrical disconnect in wet areas.
- ***Report hazards as soon as*** they are recognized. Concrete plants are very dynamic places where many things are occurring at any given time. Employees must learn to recognize hazards and potential hazards, and report them before an injury occurs. When a hazardous condition is caused by faulty or broken equipment, the equipment must be replaced or repaired immediately in order to eliminate the danger to employees.



- ***Sand and gravel piles must*** be properly maintained. Sand and gravel that is scattered throughout the plant area will become an obstacle to the safe plant operation. Personnel and equipment must be able to move freely through the plant without becoming obstructed by spilled sand and gravel.
- ***Pathways*** that have become littered with spilled sand and gravel are hazardous to employees attempting to navigate through the plant.
- ***Vehicle paths must remain clear*** of tools, equipment, personnel and debris. Employees must always watch for moving vehicles when on the plant site. Mixing trucks and other vehicles are constantly moving in and out of the plant. Always avoid standing or working behind mixing trucks that are staged at the plant. These vehicles may have back-up alarms but background noise at the plant may muffle the sound of the alarm.
- ***Employees performing maintenance*** work must take every precaution to ensure that it is safe to perform the work. Never attempt to lubricate conveyor belts while the belts are moving, unless a spray applicator is being used to apply the lubricant. Employees must always lockout and tagout equipment before starting maintenance operations. Always wear gloves when putting hands on steel cables and never touch cables that are moving.
- ***Personal protective equipment (PPE)*** must be worn by all personnel and employees at the concrete batch plant. The correct PPE to be used at a batch plant will include a hard hat, ear plugs, ear muffs, safety glasses, face shield, dust mask, respirator, protective clothing, personal fall protection, and safety boots.

Conclusion: Concrete batch plants require employees and personnel to remain alert at all times. Many workers have been killed or injured while working with concrete. Always utilize these safety guidelines when repairing, performing maintenance, or working at a concrete batch plant.

Work Site Review

Work-Site Hazards and Safety Suggestions: _____

Personnel Safety Violations: _____

Employee Signatures: *(My signature attests and verifies my understanding of and agreement to comply with, all company safety policies and regulations, and that I have not suffered, experienced, or sustained any recent job-related injury or illness.)*

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Foreman/Supervisor's Signature: _____

These guidelines do not supercede local, state, or federal regulations and must not be construed as a substitute for, or legal interpretation of, any OSHA regulations.

wsp.com