

Review of CTV’s responses to EPA’s technical questions on the site characterization narrative in their CTV-III permit application

EPA reviewed CTV’s site characterization for the CTV III Class VI project and provided technical questions to the applicant on 10/31/24. CTV responded on 2/14/25 and provided an updated narrative (V6). EPA’s evaluation of the responses is in the far-right column of the table below. Follow up requests for the applicant are provided in red.

Section	Q #	Comment/Question for CTV	Text Section Updated	Response	Evaluation of Response
Maps and Cross Sections of the AoR [40 CFR 146.82(a)(2), 146.82(a)(3)(i)]	1 (previously Q #2)	Please provide a single map that contains all of the elements required at 40 CFR 146.82(a)(2). For completeness, please include the faults around and within the AoR on Figure A-8.	Attachment A Section 2.2	Attachment A, Figure A-8 has been updated to display the project area faults.	CTV updated the map as requested.
Faults and Fractures [40 CFR 146.82(a)(3)(ii)]	2 (previously Q #5)	Please provide supporting data and calculations for the SGR and SSF analyses.	N/A	Supporting information and calculations have been added to Attachment A, Section 2.3.	<p>CTV provided supporting calculations and data to the SGR and SSF analyses in Section 2.3. Figures A-19 to A-22 were added to further represent the analysis conducted on the faults and fractures in the area. However, the SGR calculation used is relevant to multiple individual beds with varying proportions of shale or clay across the slipped interval. Calculating SGR based off a single layer does not account for interactions between other layers along the throw. Instead, it simply provides the Clay Volume of that single layer as a percentage.</p> <p>Please explain why the calculation of SGR is based on singular stratigraphic layers (i.e., in Figures A19b, A-20b, & A-21b), and how this represents the entire throw of the fault.</p> <p>Cross sections A-A’, B-B’, and C-C’ all indicate a Shale Smear Factor of >4. Cross section D-D’ (with a SSF of 1.0) can be interpreted as an outlier in the data presented, as it is further from the AoR than the other three. The average SSF across the four cross sections is just above the threshold of 5, at 5.025.</p> <p>Please provide text and/or figures displaying evidence of fault sealing from the Union Island Gas Fields to support assertions of sealing of the Stockton Fault given that the SSF value can be interpreted to be above the level that indicates high probability of fault sealing (>5).</p> <p>The SGR and SSF values reported in Revision 6 are different from those in Revision 5; however, no explanation is provided (i.e., whether the inputs reflect additional data).</p> <p>Please explain why the values for the SGR and SSF analysis results changed from Revision 5 to Revision 6.</p>

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	3 (previously Q #6)	Please clarify why pressure compartmentalization is no longer presented as evidence of sealing.	N/A	Pressure compartmentalization at the Winters level was removed because it does not provide as strong evidence of fault seal at the Mokelumne River level as the SGR/SSF analysis performed at the injection zone level.	Acknowledged. See #2.
Injection and Confining Zone Details [40 CFR 146.82(a)(3)(iii)]	4 (previously Q #10)	Please identify the formations to be evaluated by the various testing methods described in the pre-operational testing plan.	Attachment I	New Table I-1 was added to Attachment I to identify which formations will be evaluated by each of the presented testing methods. Please note that the thermal conductivity testing method was eliminated from the list as large delta temperatures are not anticipated due to the project being saline.	Table I-1 identifies the formations CTV plans to evaluate as requested. The removal of thermal conductivity testing method is acknowledged.
>> Confining Zone Properties (H&T Shale [Lower Confining Zone])	5 (previously Q #14)	What are the values from the Citizen_Green_1 well?	N/A	Attachment A, Section 2.4.3 has been updated. New Figure A-31 was added to show capillary pressure from Citizen_Green_1.	CTV provided the requested values from Citizen_Green_1, along with the corrected air-mercury capillary pressure equation used. The new Figure A-31 plots the capillary pressure versus the wetting phase saturation for core data from Citizen_Green_1 well. The response is acceptable.
Geomechanical and Petrophysical Information [40 CFR 146.82(a)(3)(iv)]	6 (previously Q #18)	Please provide documentation of the overburden gradient calculation.	Attachment A Section 2.5.2	This calculation was completed using the “Overburden Gradient Calculation” module in the software Interactive Petrophysics 5.1.0. New Figure A-38 displays the overburden gradient calculation inputs and outputs from the software. Attachment A, Section 2.5.2 has been updated with the above statement.	CTV added the figure as requested. The figure displays the software Petrophysics 5.1.0 Overburden Gradient Calculation with the inputs and outputs used for the calculation. The response is acceptable.
Seismic History [40 CFR 146.82(a)(3)(iv)]	7 (previously Q #19)	What is the model-predicted pressure increase along the normal fault, and does the fault stability analysis hold true at this pressure? There was a magnitude 3.0 earthquake in/near Discovery Bay that occurred in February 2024. Please update the seismic history section of the application with the most updated information.	Attachment A Section 2.5.3	The model-predicted pressure increase for the normal fault is included in Table A-4. This table is also referenced in Section 2.5.3 where the model-predicated pressure increase is discussed for the three bounding faults and the normal fault. The normal fault model-predicated pressure is only expected to increase to approximately 0.464 psi/ft, which is well below the required pore pressure increase, 0.68 psi/ft, to reactivate any of the faults. The earthquake that occurred in February,	CTV provided the requested discussion; no further questions at this point in the review. The magnitude 3.0 earthquake was added as requested. The responses are acceptable.

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				2024 near Discovery Bay, CA has been added to Attachment A, Section 2.6.1. Table A-12 and Figures A-42 and A-43 have also been updated	
Summarized Objectives for Pre-Operational Testing	8 (previously Q #50)	Please describe step by step procedures for the triaxial load testing.	Attachment I	A triaxial strength test procedure has been referenced in Attachment I and added as new Appendix I-1.	CTV provided step-by-step procedures for Triaxial load testing as Appendix I-1. This response is acceptable.