

In December 2024, CTV provided responses to EPA’s August 2024 technical evaluation comments on the project plans in the CTV-II Class VI permit application. EPA’s evaluation of the responses is provided in red text below.

#	Section	Comment/Question for CTV	Report Section Updated	Responsible	Response
1	Att A: Operational Procedures	<i>Please revise the annulus pressures in Table 1 to meet the requirements of 40 CFR 146.88(c) such that the annulus pressures would exceed the operating injection pressures anticipated for each injection well. Additionally, please describe the annulus pressure values, clarifying if they are average pressure values and their corresponding location (i.e. surface, bottomhole, above or below the packer).</i>	Appendix 4	CTV	<p>Annulus pressure is designed to achieve 100 psi differential at the packer under max (final) injection conditions. The requirements of 40 CFR 146.88(c) state that the “operator must maintain on the annulus a pressure that exceeds the operating injection pressure” and doesn’t specify where the pressure in the annulus should exceed the tubing. CTV’s interpretation is that the most likely location of a failure is at the packer, and therefore specified 100 psi above tubing pressure at the packer; this method also reduces the stress on the system over time. The wellbore tubulars, wellhead and annular pressure monitoring system are designed to withstand 100 psi above max injection pressure from surface to the packer. Average annulus pressures are based off average injection pressure, not maximum.</p> <p>In the context of Annulus Pressure, “Downhole” refers to the pressure immediately above the injection packer in the annulus.</p> <p><b>EPA evaluation of CTV’s response:</b> CTV revised the tables in Appendix 12 to provide annulus – tubing pressure differentials that range from 181 to 303 psig, intending to maintain a minimum annulus pressure of 100 psi above tubing pressure. CTV states that these annulus pressures are based on the average injection pressure expected at the depth of the packer in each injection well. CTV interprets 40 CFR 146.88(c) such that the exceedance of injection pressure should be at the most likely place of failure, which they assert is the packer. The average downhole annulus pressure at each well exceeds the average downhole injection pressure; but this is not the case for the average surface pressures.</p> <p><b>Follow-Up Request for CTV:</b> EPA agrees that the packer is most likely at risk for failure, but 40 CFR 146.88(c) pertains to the entire length of the annulus. Since CTV asserts that the wellbore tubulars, wellhead, and annular pressure monitoring system can withstand 100 psi above the maximum injection pressure without impacting the well’s integrity, EPA requests that CTV clarify the operating plan to state that annulus pressure will be maintained at a differential above the injection pressure for the entire length of the annulus, including a differential of at least 100 psi above injection pressure at the packer. Please also revise surface annular pressure accordingly to reflect that surface annular pressure will be above surface injection pressure (e.g., add the following rows of data to the tables of Appendix 12: maximum annulus pressure – surface; average injection pressure – entire length of the tubing; and average annulus pressure – entire length of the annulus).</p>
2		<i>Please provide the proposed maximum annulus pressure for each injection well and explain how it is determined.</i>	Appendix 12	CTV	<p>Max annular pressure is specified to exceed max operational injection pressure at the injection packer by 100 psi. Surface annular pressure is back-calculated by subtracting the hydrostatic column of annular fluid from the pressure specified at the packer.</p> <p>Ending (maximum operational) Annular Pressure at packer are specified in Appendix 12 as the permitted value for annulus pressure</p> <p><b>EPA evaluation of CTV’s response:</b> Appendix 12 provides the maximum annulus pressures and their corresponding differentials; the response is acceptable.</p>

3	Injection rate and volume	<i>Please provide information (e.g., manufacturer’s specifications/stress ratings) to support the assertion that maintaining a tubing annulus pressure differential of up to 1,200 psi will not compromise the tubing or packer.</i>	N/A	CTV	<p>Appendix 4 includes the burst and collapse pressure of the tubing. The datasheet of the packer indicates a collapse pressure rating of 8400 psi and a burst rating of 8710 psi, meaning the packer can easily handle a differential pressure of 1200 psi. With a safety factor of 10%, the pressure differential the packer can handle is still beyond 7500 psi.</p> <p><b>EPA evaluation of CTV’s response:</b> While the explanation provided is sufficient for demonstrating safe operation, the burst and collapse pressures of the tubing are not included in Appendix 4.</p> <p><b>Follow-Up Question for CTV:</b> Please clarify whether the response is intended to refer to Appendix 5, which describes collapse and burst ratings of well components. Please provide supporting evidence/documentation of the collapse and burst ratings.</p>
4		<i>Please clarify in the Operations Plan or Emergency and Remedial Response Plan what "appropriate steps" CTV would take if alarms trigger (i.e., would this invoke responses under the "Injection well or monitoring equipment failure" scenario).</i>	Appendix 4	DBS&A	<p>Sections 2.2, 3.2, 4.2, 5.2 and 6.2 in Appendix 4: Operational Procedures has been updated to define “appropriate steps” as the steps presented in the Injection Well Monitoring Equipment Failure section of Attachment F: Emergency Remedial Response Plan.</p> <p><b>EPA evaluation of CTV’s response:</b> CTV clarified in Appendix 4 that the actions that will be taken are defined in the Injection Well Monitoring Equipment Failure section of their ERR plan. The response is acceptable.</p>
5	Stimulation	<i>To avoid the need for a permit modification if stimulation were to become necessary in the future, EPA requests that CTV prepare a draft stimulation plan. EPA can provide some additional guidance about the content of the plan, but anticipates that the plan should describe:</i> <ul style="list-style-type: none"> <li>○ <i>The stimulation fluids to be used, including any additives (e.g., corrosion inhibitors, clay inhibitors, biocides, complexing agents, or surfactants) or diverting agents; and</i></li> <li>○ <i>Step-by-step procedures that would be employed during stimulation.</i></li> </ul>	Att J	CTV/DBS - Greg	<p>During the course of drilling operations, routine practices and materials can adversely impact near wellbore properties and thus CO2 injectivity. For example, cementing, perforating and drilling fluid additives will damage reservoir permeability.</p> <p>Depending on the damage mechanism, CTV will prescribe a procedure to restore reservoir permeability. The procedure could be mechanical or chemical in nature, but in no case will the procedure require exceeding 90% frac pressure.</p> <p>Appendix J (Stimulation Plan) has been added to the submission, as requested.</p> <p><b>EPA evaluation of CTV’s response:</b> The new Attachment J is consistent with EPA’s Stimulation Program template. While CTV does not explicitly state which fluids and/or additives will be used, their plan describes that industry-standard acids, additives, and diverters will be used. The generalized stimulation procedures are acceptable and include designing the stimulation program based on the specifics of the impacted well’s materials, reservoir rock and fluids, and the cause of the impact to injectivity.</p>
6	Att B: Corrective action plan	<i>Did CTV perform any physical surveys (e.g., aerial surveys) to supplement the database searches?</i>	N/A	CTV	<p>Preliminary surveys were performed to locate legacy abandoned wells, but were limited to specific expected locations and were not field-wide</p> <p><b>EPA evaluation of CTV’s response:</b> CTV’s response indicates that the physical searches they conducted were to ground-truth wells expected in specific locations. No further questions.</p>

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7		<i>Please provide evidence that the plugs planned for the Mobil Parcel X 1 and Bomberger 1 wells are of sufficient thickness to prevent fluid movement.</i>	N/A	CTV	<p>Section 2.6.3 of EPA's UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance, "EPA recommends that <b>plugs in GS settings be at least 100 feet long and extend, at a minimum, from the base of the surface casing (required to be set at some distance below the base of the lowermost USDW) up through the base of the lowermost USDW .... the EPA strongly recommends ... longer plugs, especially in critical zones such as above the injection zone.</b>" is addressing Class VI Injection wells, a conservative approach is to apply that same guidance to corrective action wells...</p> <p>Appendix 9 - CA Wellbore schematics, illustrates 4 plugs across the (1) injection/confining zone, (2) dissipation/2<sup>nd</sup> confining zone, (3) base of USDW and (4) to surface. Plugs 1 &amp; 2 are specified at, greater than 100' in length at the base of the confining layer, restoring the confining seal and providing a redundant barrier of 200+ ft of impermeable cement. Plug 3 is specified at &gt; 100' and will act as a tertiary barrier to flow up through the wellbore and into the USDW.</p> <p><b>EPA evaluation of CTV's response:</b> CTV provided the plug details in their response.</p> <p><b>Follow-Up Request for CTV:</b> EPA requests that CTV add the plug thickness information as an annotation into the schematics in Appendix 9 for clarity.</p>
8		<i>Please clarify whether the wells in Appendix 7 that are designated as "abandon" in the "Pre-Operational Testing Requirement" column need any additional corrective action.</i>	Attachment B	CTV	<p>Added "Wells identified as "abandon" in Appendix 7 do not require additional corrective action, they will be routinely plugged back in compliance with calGEM and EPA Class VI regs." To section 3.1 of attachment B.</p> <p><b>EPA evaluation of CTV's response:</b> CTV incorporated their response to Attachment B; the response is acceptable.</p>
9		<i>What is the rationale for Plug 2 in the Bomberger 1 well?</i>	Attachment B Appendix 7	CTV	<p>Bomberger 1 is verified to not be within the AoR based on a well search in the field and has been removed from the well list.</p> <p><b>EPA evaluation of CTV's response:</b> See request below.</p> <p><b>Follow-Up Request for CTV:</b> Please provide a documentation of the well search result.</p>
10		<i>Please provide a schedule for corrective action activities.</i>	Att B Sec 3.7	DBS&A - Greg	<p>Section 3.7 discusses the Corrective Action schedule. A more specific detailed schedule will be provided to EPA prior to permit finalization.</p> <p><b>EPA evaluation of CTV's response:</b> CTV added their response to Section 3.7. The response is acceptable at this point in the permit application review.</p>
11	Att C: Testing and Monitoring Plan	<i>Please add H<sub>2</sub>O as a CO<sub>2</sub> stream analyte on Table 1 to provide information about the potential presence of free phase water.</i>	Att C Table 1	DBS&A - Greg	<p>Table 1 has been updated as requested.</p> <p><b>EPA evaluation of CTV's response:</b> Confirmed, CTV added water vapor as an analyte to be analyzed under ISBT 3.0. The response is acceptable.</p>
12		<i>Tables A-16 and A-17 of the narrative indicate that sulfur trioxide (SO<sub>3</sub>) may be a constituent of the CO<sub>2</sub> stream. Please update Table 1 of the Testing and Monitoring Plan to provide an appropriate analytical or alternative method for measuring SO<sub>3</sub> if it is determined to be a constituent of the final CO<sub>2</sub> stream.</i>	Att C Table 1	DBS&A - Greg	<p>Table 1 has been updated as requested.</p> <p><b>EPA evaluation of CTV's response:</b> Confirmed, CTV added sulfur trioxide to Table C-1, CTV states it is to be analyzed under ISBT 14.0. The response is acceptable.</p>

13	Continuous Recording of Operational Parameters	<i>Please describe the device CTV would use to measure annular fluid level in the T&amp;M Plan.</i>	N/A	CTV	<p>A fit for purpose commercial solution for annular pressure maintenance is not readily available. CTV has completed scoping and process flow design for an annular pressure maintenance system and is currently working Frontend Engineering and Design. The system is an array of surface pumps, control/relief valves and tanks designed to continuously monitor and maintain positive pressure on the annulus.</p> <p><b>EPA evaluation of CTV's response:</b> Acknowledged. CTV should provide information about the equipment with the final well construction report. The response is acceptable at this point in the permit application review.</p>
14		<i>Please describe the steps CTV would take to identify and investigate any unexpected pressure deviations, or reference that CTV would implement the procedures under "Injection well or monitoring equipment failure" in the Emergency and Remedial Response Plan.</i>	Att C Section 4.2	DBS&A	<p>Section 4.2 of Attachment C: Testing and Monitoring Plan has been updated to reference the Well Monitoring Equipment Failure section of Attachment F: Emergency Remedial Response Plan in the unexpected event of a pressure or temperature deviation.</p> <p><b>EPA evaluation of CTV's response:</b> CTV updated Section 3.2 to reference the Injection Well Monitoring Equipment Failure section of the E&amp;RR plan. The response is acceptable.</p>
15		<i>Please indicate what threshold change would trigger the SCADA alarm system.</i>	Att C Section 3.4	DBS&A - Greg	<p>Attachment C has been revised to state "Any decrease in pressure less than 100 psi or annular fluid level will be identified with the supervisory control and data acquisition (SCADA) alarming system."</p> <p><b>EPA evaluation of CTV's response:</b> CTV updated the attachment with the requested information; the response is acceptable.</p>
16	Corrosion Monitoring	<i>Please modify Table 3 to include coupons that reflect both the intermediate and long-string casing types listed in Attachment G/Appendix 5 and the table above.</i>	N/A	CTV	<p>Intermediate casing will not come into contact with CO<sub>2</sub> and thus does not need corrosion coupons.</p> <p><b>EPA evaluation of CTV's response:</b> If, per CTV's response to #39 below, the intermediate casing is the string that extends through the base of the lowermost USDW, this answer is acceptable.</p>

17		<i>Please modify Table 3 to clarify that the injectors UI-INJ-1 and UI-INJ-2 will have both N-80 and L-80 CRA coupons.</i>	Att C Table 3	DBS&A	<p>Table 3 in Attachment C: Testing and Monitoring Plan has been updated to reflect both N-80 Carbon Steel and L-80 CRA.</p> <p><b>EPA evaluation of CTV's response:</b> Table C-3 was modified to include these materials as coupons; the response is acceptable.</p>
18		<i>Please indicate in the plan that CTV will record the baseline condition of the coupons to support future evaluations.</i>	Attachment C Section 4.1	CTV	<p>As a matter of practice, the baseline mass of a corrosion coupon is recorded at installation. Subsequent measurements are relative to the baseline mass.</p> <p><b>EPA evaluation of CTV's response:</b> CTV clarified in Section 4.1 of Attachment C that the mass of each coupon will be recorded at installation; the response is acceptable.</p>
19	Above Confining Zone Monitoring	<i>What threshold above or below baseline values for temperature, pressure, or water quality would trigger action? Please add this information to Testing and Monitoring Plan.</i>	Att C Section 5.7	DBS&A - Greg	<p>Section 5.7 was added to Attachment C with trends indicative of potential leakage adopted from the EPA Testing and Monitoring Guidance (Section 4.3).</p> <p><b>EPA evaluation of CTV's response:</b> CTV noted several trends that would indicate the need for action as based on EPA's Testing and Monitoring Guidance. They do not provide specific values above or below the baseline that would trigger action.</p> <p><b>Follow-Up Request for CTV:</b> EPA requests that CTV provide information about the baseline values and the action threshold (e.g., a percent change or a change relative to a standard deviation above a mean value).</p>

20		<i>EPA recommends that CTV document in the AoR reevaluation schedule (Section 4.1 of the AoR and Corrective Action Plan) that updates to the testing and monitoring plan may include additional USDW monitoring wells (e.g., if pressure increases are detected in the Mokelumne River Formation or USDW) or additional plume and pressure front monitoring.</i>	None	DBS&A - Greg	<p>If monitoring results indicate deviation from the modeled plume, additional plume and pressure front monitoring will be considered in consultation with EPA at that time. If the leakage risk profile changes, the testing and monitoring plan will be updated to address those changes. Attachment B Section 4.1 already includes appropriately broad commitment to include all monitoring data in AoR reevaluations. CTV does not agree that adding a reference to potential additional monitoring points is required in the AoR and Corrective Action Plan.</p> <p><b>EPA evaluation of CTV's response:</b> CTV acknowledges that AoR reevaluations include valuations of monitoring data and may require changes to planned testing and monitoring. While there is no requirement to directly reference additional monitoring in the AoR and Corrective Action Plan, EPA recommends this be added to provide clarity and reassure the public regarding the steps that could be taken should monitoring results deviate from predictions (per the response above).</p>
21	External Mechanical Integrity Testing	<i>What deviations in the temperature log would indicate a mechanical integrity issue?</i>	Attachment C Section 7.1	CTV	<p>A baseline temperature survey will be pulled while injecting at a constant rate and subsequent surveys pulled through time, post shut-in. The premise of temperature logging is that the wellbore fluid should warm back to a (constant) geothermal temperature gradient over time. Depending on the fluid profile behind pipe, the temperature could increase or decrease due to a hole in the casing. Any temperature anomalies will be analyzed to determine if it could be indicative of a failure in casing integrity. If analysis is inconclusive, then additional surveys would be prescribed.</p> <p><b>EPA evaluation of CTV's response:</b> CTV clarified that they will analyze any deviations from the baseline temperature log and will conduct additional surveys if the analyses are inconclusive. The response is acceptable.</p>
22	Pressure Fall Off Testing	<i>Please clarify in the T&amp;M Plan that a pressure fall-off test will be conducted prior to injection operations.</i>	Attachment C Section 8	CTV	<p>Change made to Section 8 of Att C.</p> <p><b>EPA evaluation of CTV's response:</b> CTV clarified in Section 8 that pressure fall-off tests will be conducted in the injection wells once prior to injection operations; the generalized FOT procedures are acceptable at this point in the permit application review. However, CTV must submit proposed specific procedures for all FOT activities to the Director in writing at least 30 days in advance, per 40 CFR 146.90(f). Within the 30-day notice period, EPA may deny or, approve the FOT as proposed, or approve the FOT with conditions. CTV must carry out the FOT procedures, including any conditions, as approved or set forth by EPA.</p>
23	Carbon Dioxide Plume and Pressure Front Tracking	<i>Please describe the pulsed neutron logging procedures for plume monitoring.</i>	Att C Section 9.2	DBS&A - Greg	<p>General PNL procedures have been added to the Testing and Monitoring Plan, as requested.</p> <p><b>EPA evaluation of CTV's response:</b> CTV provided information about PNL logging procedures in Section 9.2. The response is acceptable.</p>
24		<i>Please include the sampling and recording frequencies for continuous pressure monitoring (i.e., to be consistent with Table 3 of the PISC/SC Plan).</i>	Att C Table C-4	DBS&A	<p>Attachment C, Table C-4 has been updated to define the injection-phase sampling and recording frequencies for continuous pressure and temperature monitoring to be consistent with Attachment E, Table 3.</p> <p><b>EPA evaluation of CTV's response:</b> CTV added a note under Table C-4 to specify that the minimum sampling and recording frequency is 5 hours for continuous monitoring wells, which is consistent with Attachment E. The response is acceptable.</p>
25		<i>Please clarify or specify what threshold temperature and pressure changes would indicate signs of leakage that would warrant fluid sampling in Brooks 10-1 RD1.</i>	Att C Section 9.3.	DBS&A – Greg	<p>Brooks 10-1 RD1 is now M-2 in Eastern Fault Block (Lathrop Fault Zone Monitoring). Text has been added to Section 9.3 to clarify the changes that warrant fluid sampling.</p> <p><b>EPA evaluation of CTV's response:</b> CTV clarified in Section 9.3 that signs of leakage would include increasing pressure and/or decreasing temperature trends over a period of three to six months that constitute at least a 10 percent change over baseline conditions. The response is acceptable.</p>

26		<i>Can CTV provide any preliminary information about the location of the seismometers to demonstrate coverage throughout the AoR?</i>	Attachment C 10.3	CTV - geophysics	<p>Section 10.3 Network Design and Figure C-4 have been added to the application to provide information on the preliminary network design</p> <p><b>EPA evaluation of CTV’s response:</b> CTV provided a preliminary seismic monitoring network design. CTV proposes to repurpose four wells planned for abandonment (by adding three-component geophones into the wellbores above the cement plugs) and drill three new shallow borehole wells and install geophones. The four repurposed wells and preliminary locations for the three new wells are depicted in Figure C-3. Shallow Borehole 1 is located to the west of the AoR, Shallow Borehole 2 is located north of the AoR, and Shallow Borehole 3 is located east of the AoR on the eastern fault block. The four repurposed wells are evenly distributed across the AoR. CTV indicates that the design of the seismic monitoring network is subject to change, but the final design will provide full AoR coverage. At this stage of the permitting process, the response is acceptable.</p>
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27		<i>Please explain how the combination of pulsed neutron logging, pressure/temperature monitoring, and seismic monitoring via geophones at the planned locations would provide a complete description of the plume and pressure front movement throughout the AoR that meets the goals of 40 CFR 146.90(g). Your response should address the lack of data coverage within the injection interval to the north, including consideration of an additional injection zone monitoring well (e.g., Mobil Parcel X1).</i>	Attachment C	CTV – geophysics	An additional injection zone monitoring well “M-3” has been added to the Testing & Monitoring plan to address the data coverage on the north side of the AoR.  <b>EPA evaluation of CTV’s response:</b> CTV added the above statement to the Testing and Monitoring Plan. The response is acceptable.
28		<i>On pages 13-14, where CTV proposes that, “if the plume development is not consistent with computation modeling results, CTV will assess whether additional monitoring of the plume is necessary,” please add a statement that, if CTV detects evidence of USDW endangerment, it will implement the Emergency and Remedial Response Plan (Attachment F of the permit).</i>	Attachment C Section 9.1	CTV	Added “if CTV detects evidence of USDW endangerment, CTV will implement the Emergency and Remedial Response Plan”  <b>EPA evaluation of CTV’s response:</b> CTV added the above statement to Section 9.1. The response is acceptable.
29	Surface Air and/or Soil Gas Monitoring	<i>If, based on the results of planned pre-operational testing, uncertainties about the geologic setting are identified, the need for surface air and/or soil gas monitoring will be reconsidered.</i>	N/A	CTV	CTV understands. No question related, no response required.  <b>EPA evaluation of CTV’s response:</b> N/A.
30	Quality Assurance Procedures	<i>Please include H<sub>2</sub>O in Table 4 of the QASP.</i>	Appendix 11 Table 4	DBS&A - Greg	This table has been updated as requested.  <b>EPA evaluation of CTV’s response:</b> CTV added water vapor to the table in the QASP. The corresponding columns for water vapor are appropriate; the response is acceptable.
31		<i>Please correct the following minor errors in the QASP: ○ Table 2 of the QASP states that fluid sampling in the lowermost USDW monitoring wells will be conducted in the Tulare Formation, rather than the undifferentiated non-marine sediments. ○ Section B.1.a of the QASP describes the Capay Shale as the confining layer and Domengine Formation as a pressure monitoring zone.</i>	Appendix 11	DBS&A	Table 2 has been updated to list “undifferentiated non-marine sediments” as the lowermost USDW. Section B.1.a has been updated to list the “Starkey-Sawtooth” shale as the confining layer and the “Mokelumne River Formation” as the dissipation zone.  <b>EPA evaluation of CTV’s response:</b> CTV made both requested corrections. The response is acceptable.
32	Att E: Post Injection Site Care/Site Closure Plan	<i>Please add the sampling and recording frequency of temperature monitoring to Table 3.</i>	Attachment E Table 3	DBS&A	Temperature monitoring has been added to Table 3 in Attachment E: Post-Injection Site Care and Site Closure Plan.  <b>EPA evaluation of CTV’s response:</b> CTV added information about temperature monitoring frequencies to the table. This response is acceptable.
33		<i>Do the sampling and recording frequencies described in Table 3 of the PISC/SC Plan apply to all of the USDW monitoring wells? Do these frequencies apply to continuous monitoring in the Mokelumne River Formation and Winters Formation as well? If so, please update Table 3 accordingly.</i>	Attachment E Table 3	DBS&A	Yes, Table 3 was updated to clarify which wells are being monitored.  <b>EPA evaluation of CTV’s response:</b> CTV updated Table E-3 to mention which wells were being monitored in which formations. Their response is acceptable.
34	Site Closure Plan	<i>Please adjust the first sentence of section 7 to refer to 40 CFR 146.93(d).</i>	Attachment E Section	DBS&A	The first sentence has been updated as requested.  <b>EPA evaluation of CTV’s response:</b> CTV updated Section 6 (formerly Section 7) to refer to 40 CFR 146.93(d). The response is acceptable.

35		<i>Please indicate that the monitoring wells will be plugged as described in the Proposed Abandonment Schematics in Appendix 5.</i>	Attachment E	DBS&A	<p>Section 7 of Attachment E: Post-Injection Site Care and Site Closure Plan has been updated as requested.</p> <p><b>EPA evaluation of CTV's response:</b> CTV updated Section 6 (formerly Section 7) to state that it will plug the wells in accordance to Appendix 5. The response is acceptable.</p>
36		<i>Please clarify that CTV will retain the site closure report and records collected during the post-injection site care period for 10 years following site closure pursuant to 40 CFR 146.93(f) and 40 CFR 146.93(h).</i>	Attachment E	DBS&A	<p>Section 7 of Attachment E: Post-Injection Site Care and Site Closure Plan has been updated as requested.</p> <p><b>EPA evaluation of CTV's response:</b> CTV updated Section 6 (formerly Section 7) to state that CTV will retain the report and records for 10 years following closure pursuant to 40 CFR 146.93(f) and 40 CFR 146.93(h). The response is acceptable.</p>
37	Att F: Proposed ERRP	EPA has suggested revisions/recommendations to sections of this document	Attachment F	CTV/DBS	<p>Suggestions for edits to Induced or Natural Seismic Event section have been included in the updated document</p> <p><b>EPA evaluation of CTV's response:</b> These edits were incorporated into Section 4.5 and Table F-2; the response is acceptable.</p>
38	Att G: Well Construction and Plugging Plans	<i>The packer setting depth provided in the corresponding table and well schematic of the 'Injection and Monitoring Well Schematics' document is not consistent for UI Inj 1 and UI Inj 2. Please clarify.</i>	Appendix 5, Attachment G4, G5	DBS&A	<p>Appendix 5 well schematics for UI-INJ-1 and UI-INJ-2, and Table 2 in Attachment G4 and G5 have been updated to reflect the correct packer setting depths.</p> <p><b>EPA evaluation of CTV's response:</b> The well schematics and corresponding Table 2 in the well construction plans for INJ-1 and INJ-2 have been updated with the packer details. The response is acceptable.</p>
39	Corrosion of Well Construction Materials	<i>Please revise the planned construction of INJ-1 and INJ-2 to include surface casing that is cemented below the lowermost USDW, per 40 CFR 146.86(b)(2).</i>	Appendix 5	DBS&A	<p>Per 40 CFR 146.86(b)(2), "Surface casing must extend through the base of the lowermost USDW and be cemented to the surface through the use of a single or multiple strings of casing and cement." Due to a project area precedent, a dedicated shallow freshwater casing (above the USDW) is included in the well schematics for the new drill wells, and is listed as the "surface" casing. Because of this, CTV named the secondary surface casing (cemented to the surface and extends through the base of the lowermost USDW) as "intermediate". To avoid confusion, and to meet the naming convention listed in 40 CFR 146.86(b)(2), CTV has changed the "intermediate" casing name to "surface 2".</p> <p><b>EPA evaluation of CTV's response:</b> The injection well schematics show Surface 1 (to 600 feet, to seal off the base of freshwater), Surface 2 (to 5550 ft and below the USDW at 2337 ft), and long string casing to total depth. Surface 2 is fully cased to the surface and meets the requirement of 146.86(b)(2). The response is acceptable.</p>
40		<i>Please describe how the construction of the existing wells meets the goals for Class VI well construction, particularly the requirement at 40 CFR 146.86(b)(2) that surface casing must extend through the base of the lowermost USDW and be cemented to the surface.</i>	N/A	CTV	<p>Sonol Securities 4 (IZ) – USDW @ 2379', 8-5/8" 36# K55 @ 5440' cement to surface  Yamada Bros 2 (IZ) – USDW @ 2517', 9-5/8" 43.5# N80 @ 5800' cement to surface  Sonol 2 (AZ) - USDW @ 2539', 9-5/8" 36# K55 @ 3423' cement to surface  Phillips Yamada Bros 1 (AZ) - USDW @ 2480', 9-5/8" 43.5# N80 @ 6004' cement to surface</p> <p>All four repurposed wells have a dedicated casing string cemented to surface.</p> <p><b>EPA evaluation of CTV's response:</b> CTV changed the naming convention on these to show a Surface Casing 2 in place of the Intermediate casing. The response is acceptable.</p>

41		<i>Please provide evidence as to why the noted casing damage and “junk” discovered in the hole of Sonol Securities 3 will not be a concern for usage at the site.</i>	N/A	CTV	<p>Plan to replace Sonol Securities 3 with a new drill injector well rather than repurpose</p> <p><b>EPA evaluation of CTV’s response:</b> This well replacement will eliminate any uncertainty from the issues encountered with Sonol Securities 3. The response is acceptable.</p>
42		<i>For wells Sonol Securities 1-A, Sonol Securities 3, and Pool B-2, please revise the casing material details on Table 1 so they are consistent with the well schematics in Appendix 5.</i>	Attachment G, Appendix 5	DBS&A	<p>Sonol Securities 1-A, Sonol Securities 3, and Pool B-2 are no longer being repurposed for injection wells. These wells have been replaced with UI-INJ-4, UI-INJ-5, and UI-INJ-3, respectively. Attachment G: Well Construction and Plugging Plans and Appendix 5: Injection and Monitoring Well Schematics for the injection wells are consistent.</p> <p><b>EPA evaluation of CTV’s response:</b> The construction details described in Attachments G1 through G3 are consistent with the Appendix 5 well schematics for INJ-3, INJ-4, and INJ-5. The response is acceptable.</p>
43		<i>For well Sonol Securities 1-A and Pool B-2, please revise the packer details (e.g., depth) on Table 3 so they are consistent with the well schematics in Appendix 5.</i>	Attachment G, Appendix 5	DBS&A	<p>Sonol Securities 1-A and Pool B-2 are no longer being repurposed for injection wells. These wells have been replaced with UI-INJ-4 and UI-INJ-3, respectively. Attachment G: Well Construction and Plugging Plans and Appendix 5: Injection and Monitoring Well Schematics for the injection wells have been updated and are now consistent.</p> <p><b>EPA evaluation of CTV’s response:</b> See the previous response evaluation. The response is acceptable.</p>
44		<i>Please confirm EPA’s understanding of which monitoring wells are new and which are existing wells to be converted to monitoring wells.</i>	N/A	DBS&A	<p>New monitoring wells to be drilled include the proposed Injection Zone monitoring wells M-1 and M-3, the newly proposed Fault Zone monitoring well M-2, and all USDW monitoring wells. All remaining monitoring wells are previously existing and are to be repurposed.</p> <p><b>EPA evaluation of CTV’s response:</b> The response is acceptable.</p>

#	Section	Comment/Question for CTV	Report Section Updated	Responsible	Response
45		<i>Please provide cement specifications for the monitoring wells.</i>	Appendix 5	CTV	<p>Cement specifications were added to Appendix 5.</p> <p><b>New Drill:</b>  <u>M-1 (IZ)</u> – 5-1/2” cmt’d w/ a Portland cmt volume required to fill the annulus from the casing shoe to surface</p> <p><b>Repurposed:</b>  <u>Sonol Securities 4 (IZ)</u> – 5-1/2” cmt’d w/ 217 sx neat cement premixed with 0.75% CFR-2, 0.01% HR-7 and 343 sx neat cement premixed with 0.75% CFR-2, 0.02% HR-7</p> <p><u>Yamada Bros 2 (IZ)</u> – 5-1/2” cmt’d w/ 1147 ft3 1:1 Pozmix, 2% Gel, 0.75% CFR-2, 0.1% HR-7 and 311 ft3 Class ‘G’ with 0.75% CFR-2, 0.1% HR-7</p> <p><u>Sonol 2 (AZ)</u> - 7” cmt’d w/ 350 sacks neat cement premixed with 0.1% CFR-2 and 0.2% HR-7 and 380 sacks neat cement premixed with 0.1% CFR-2 and 0.2% HR-7  - 5” cmt’d w/ 63 sacks neat cement premixed with 1% CFR-2 and 0.25% HR-7.</p> <p><u>Phillips Yamada Bros 1 (AZ)</u> - 9-5/8” cmt’d w/ 700 ft3 1:1 Pozmix with 3% gel and 370 ft3 Class ‘G’ premixed with 0.75% friction reducer  5-1/2” cmt’d w/ 392 ft3 1:1 Pozmix with 4% gel, 0.75% CFR2, and 0.4% HR7 and 270 ft3 Class ‘G’ premixed with 0.75% CFR2 and 0.4% HR7</p> <p><b>EPA evaluation of CTV’s response:</b> The above cement specifications are included on the updated Appendix 5 well schematics. Although not listed in the above response, the cement details were also added to the M-3 well schematic. The response is acceptable.</p>
46		<i>Please discuss an approach for corrosion modeling over the timescale of the CTV II project to demonstrate the adequacy of CTV’s planned materials. The corrosion modeling should take into account site specific chemistry, including the CO<sub>2</sub> stream and the formation fluids, and consider possible stress cases, in addition to normal operations, among other relevant factors.</i>	N/A	CTV	<p>Site specific corrosion modeling would incorporate well design, injectate composition and reservoir fluid/conditions. The water solubility of the injectate composition is evaluated at various representative conditions and water fraction confirmed comfortably below that limit. An industry accepted simulator (like OLI) is used to determine the susceptibility to corrosion and embrittlement at operating conditions for the material selected. Critical loads, representing expected maximum temperature, pressure and injectate impurities are evaluated to confirm the design is within an acceptable limit. Modeling yields a predicted pH and anticipated corrosion rate profile. An acceptable corrosion rate will result in tubular wall thickness that satisfies casing design strength parameters.</p> <p><b>EPA evaluation of CTV’s response:</b> The above modeling approach is acceptable.</p> <p><b>Follow-Up Request for CTV:</b>  Please provide a copy of the corrosion model results for reference.</p>
47	Injection Well Plugging and Abandonment	<i>What is the rationale for the placement of Plug 2 within the injection well plugging plan?</i>	N/A	CTV	<p>Plug 2 is placed at the top of the Mokelumne River formation, the dissipation zone for this project. The idea is that in the event CO<sub>2</sub> reaches the dissipation zone, it cannot corrode through the casing of the well and travel up the wellbore to the USDW</p> <p><b>EPA evaluation of CTV’s response:</b> While this response provides an acceptable explanation of the rationale, EPA notes that any UIC permits issued for this project will not “authorize” CO<sub>2</sub> dissipation zones and movement of formation fluids or CO<sub>2</sub> into the Mokelumne River formation would likely represent a permit violation.</p>

48		<i>Please clarify that the final MIT will be approved for Class VI wells, e.g., a temperature or noise log.</i>	N/A	CTV	<p>The final MIT for the well will be a temperature, Oxygen activation or noise log for external mechanical integrity</p> <p><b>EPA evaluation of CTV’s response:</b> The response is acceptable.</p>
49	Pre-operational Testing Plan	<i>Please confirm that deviation checks for the new injection wells will be completed every 120 ft as indicated in the pre-operational section of the construction and plugging plans.</i>	Attachment I	CTV	<p>Added “All deviation checks will be completed at least every 120 ft” to Attachment I, Section 3.</p> <p><b>EPA evaluation of CTV’s response:</b> Deviation check details have been added to the updated Attachment I, Section 3. The response is acceptable.</p>
50		<i>Aside from MIT, please describe any pre-operational testing that will be performed on the monitoring wells.</i>	Attachment I Section 7	DBS&A - Greg	<p>Baseline geochemistry, pressure and temperature will be obtained from all monitoring wells. M-2 will collect pressure data (RFT) in Winters and Lathrop. Attachment I has been updated.</p> <p><b>EPA evaluation of CTV’s response:</b> Attachment I has been updated with the above information. The response is acceptable.</p>