POST-INJECTION SITE CARE AND SITE CLOSURE PLAN
40 CFR §146.93(a)

Brown Pelican CO_2 Sequestration Project

1.0 Facility Information

Facility name: Brown Pelican CO_2 Sequestration Project
BRP CCS1, BRP CCS2 and BRP CCS3 Wells

Facility contact: Caroline Huet, Carbon Management Certification Lead
5 Greenway Plaza Houston, TX 77046
[redacted]

Well locations: Penwell, Texas

[redacted]

2.0 Plan Overview

This Post-Injection Site Care and Site Closure (PISC) plan describes the activities that Oxy Low Carbon Ventures, LLC (OLCV) will perform on the Brown Pelican CO_2 Sequestration Project (BRP Project or Project) to meet the requirements of 40 CFR §146.93. OLCV will monitor groundwater quality and track the position of the CO_2 plume and pressure front for 50 years or for the duration of an alternative timeframe approved by the UIC Program Director pursuant to the requirements of 40 CFR §146.93(c) unless OLCV makes a demonstration under 40 CFR §146.93(b)(2) that OLCV has substantial evidence that the geologic sequestration project no longer poses a risk of endangerment to Underground Sources of Drinking Water (USDWs). Pursuant to 40 CFR §146.93(b)(3), OLCV will continue post-injection site care until the UIC Program Director approves a demonstration that no additional monitoring is needed to ensure non-endangerment of USDWs. Following approval for site closure, OLCV will plug all remaining monitoring wells and submit a site closure report and associated documentation.

3.0 Pre- and Post-Injection Pressure Differential [40 CFR §146.93(a)(2)(i)]

[redacted]

[redacted]

[redacted]

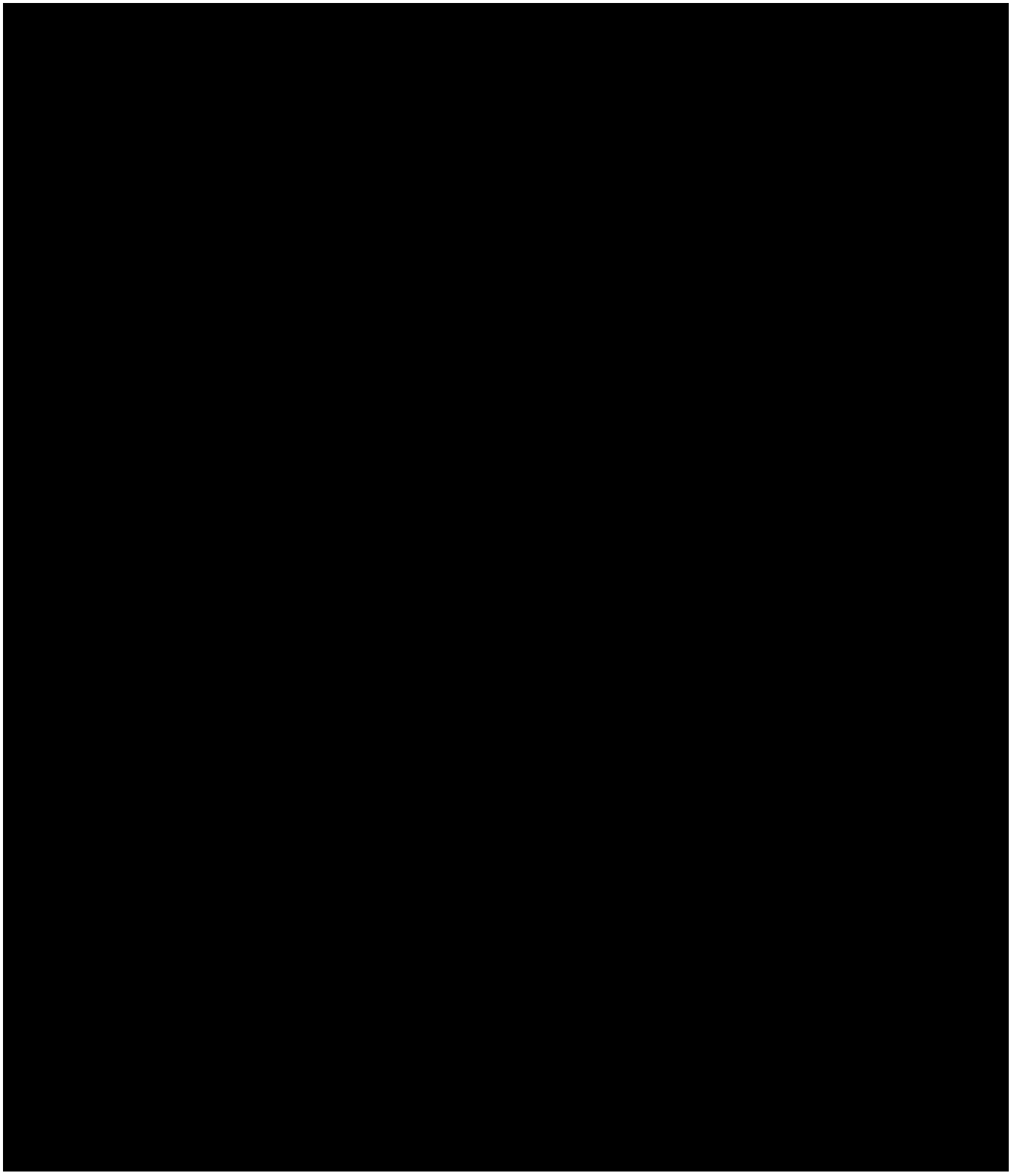
Additional information on the projected post-injection pressure declines and differentials is presented in the Area of Review and Corrective Action Plan document.

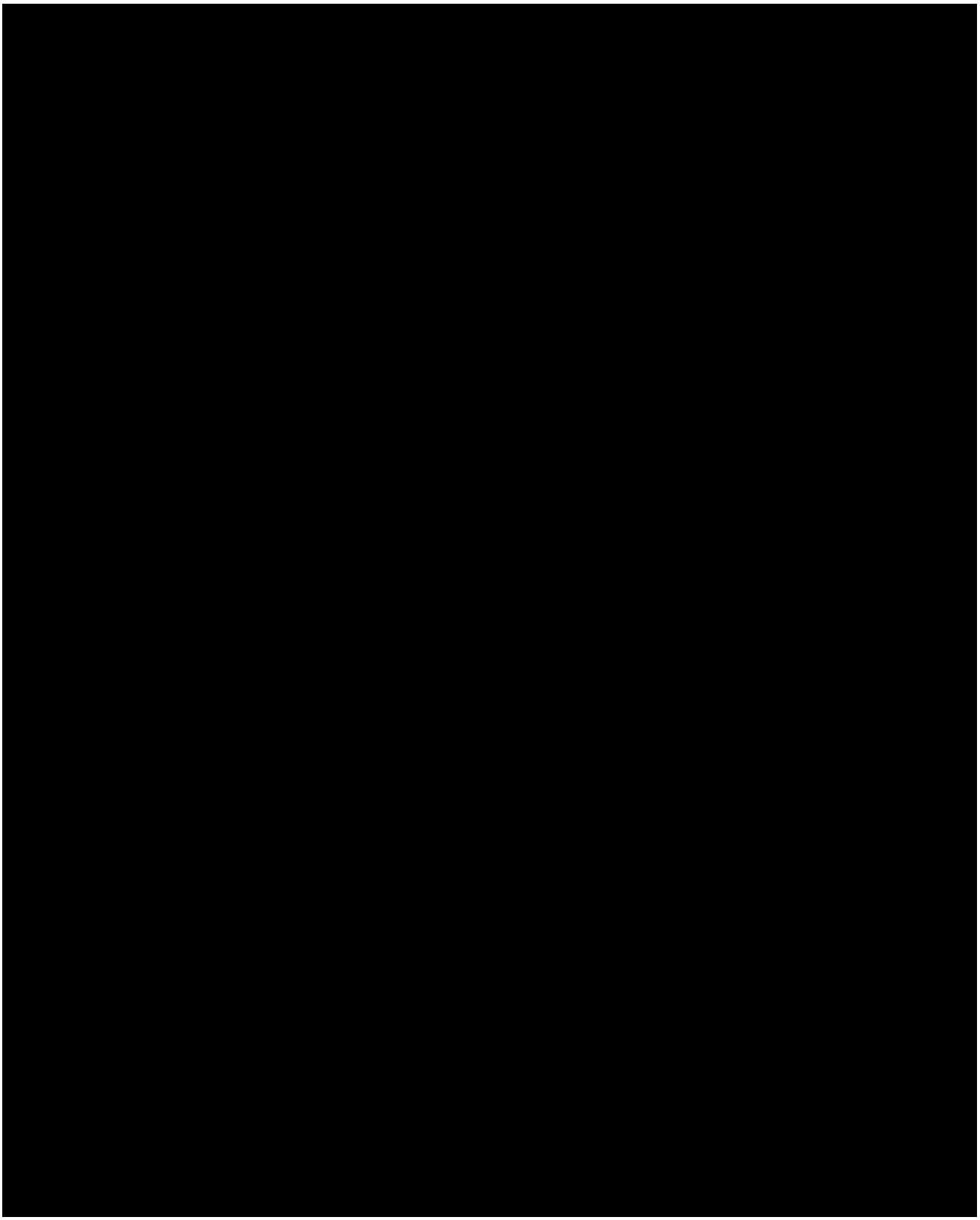
Table 1—Pressure Differential to Pre-Injection Conditions at the top of the G1 sub-zone at monitoring well locations.

[redacted]

Table 2—Pressure Differential to Pre-Injection Conditions at the top of the Holt sub-zone at monitoring well locations.

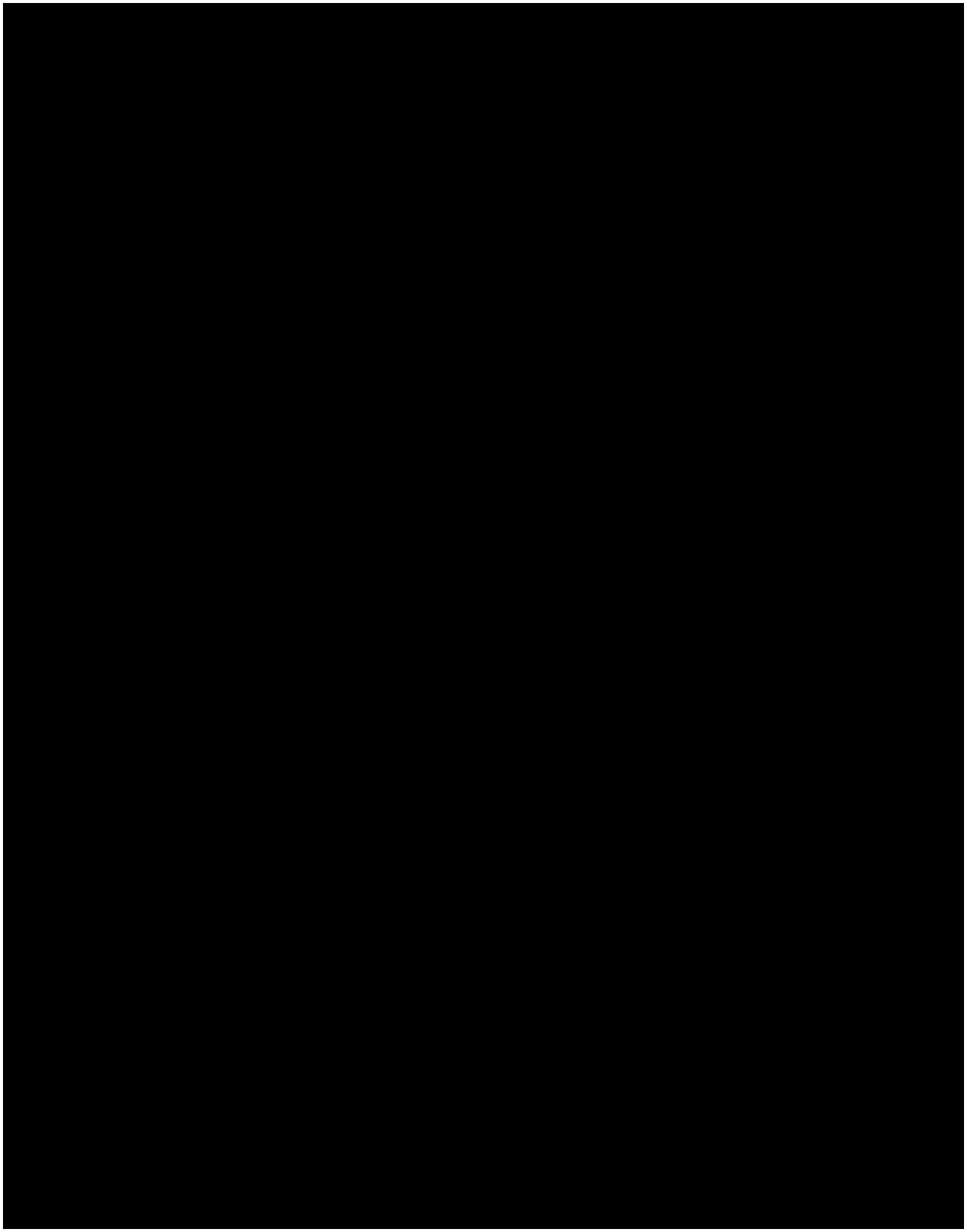
Figure 1 and 2 show the simulated pressure vs. time for the BRP CCS1, CCS2 and CCS3 and monitoring well locations at the top of the G1 sub-zone and the top of the Holt sub-zone, respectively.

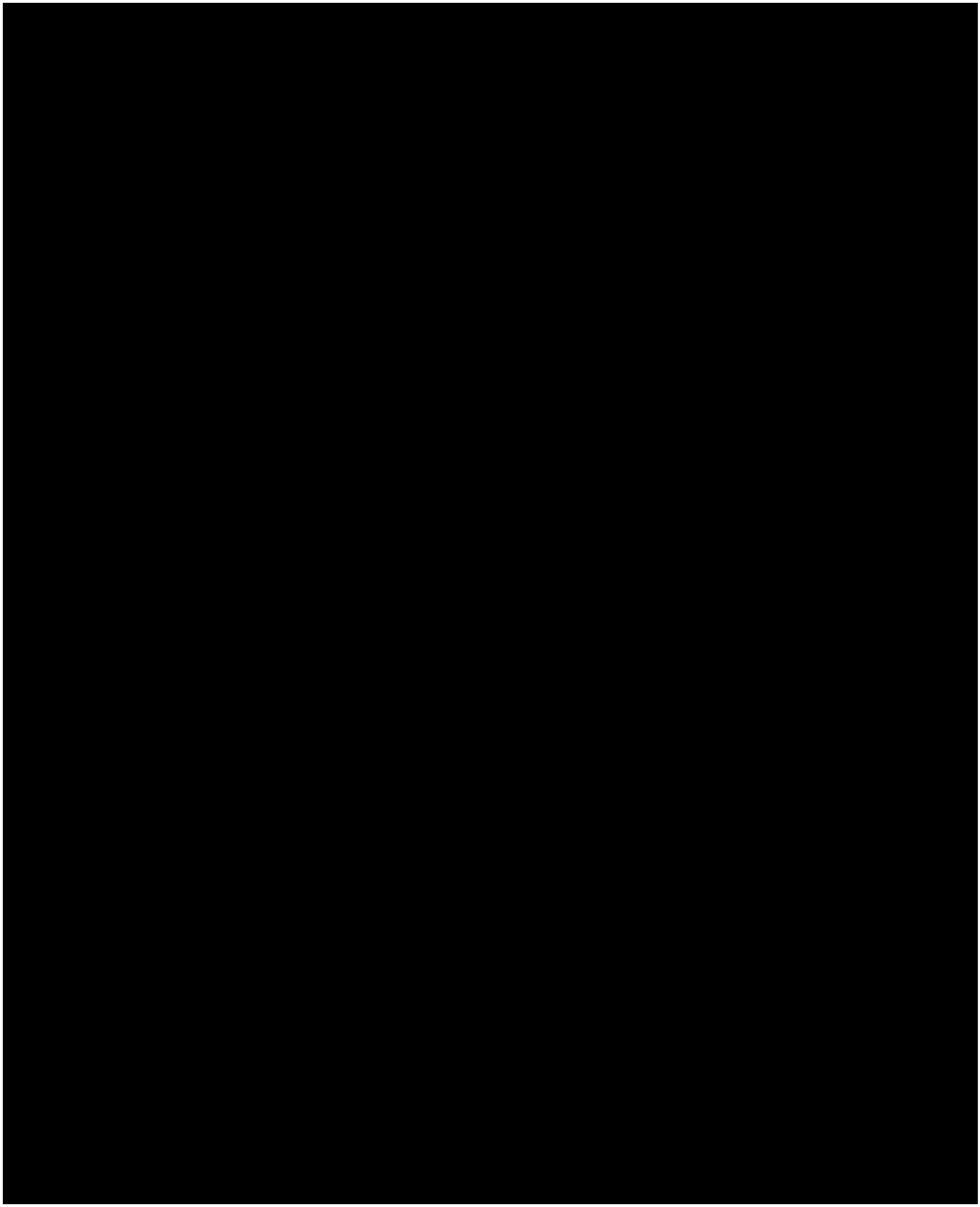


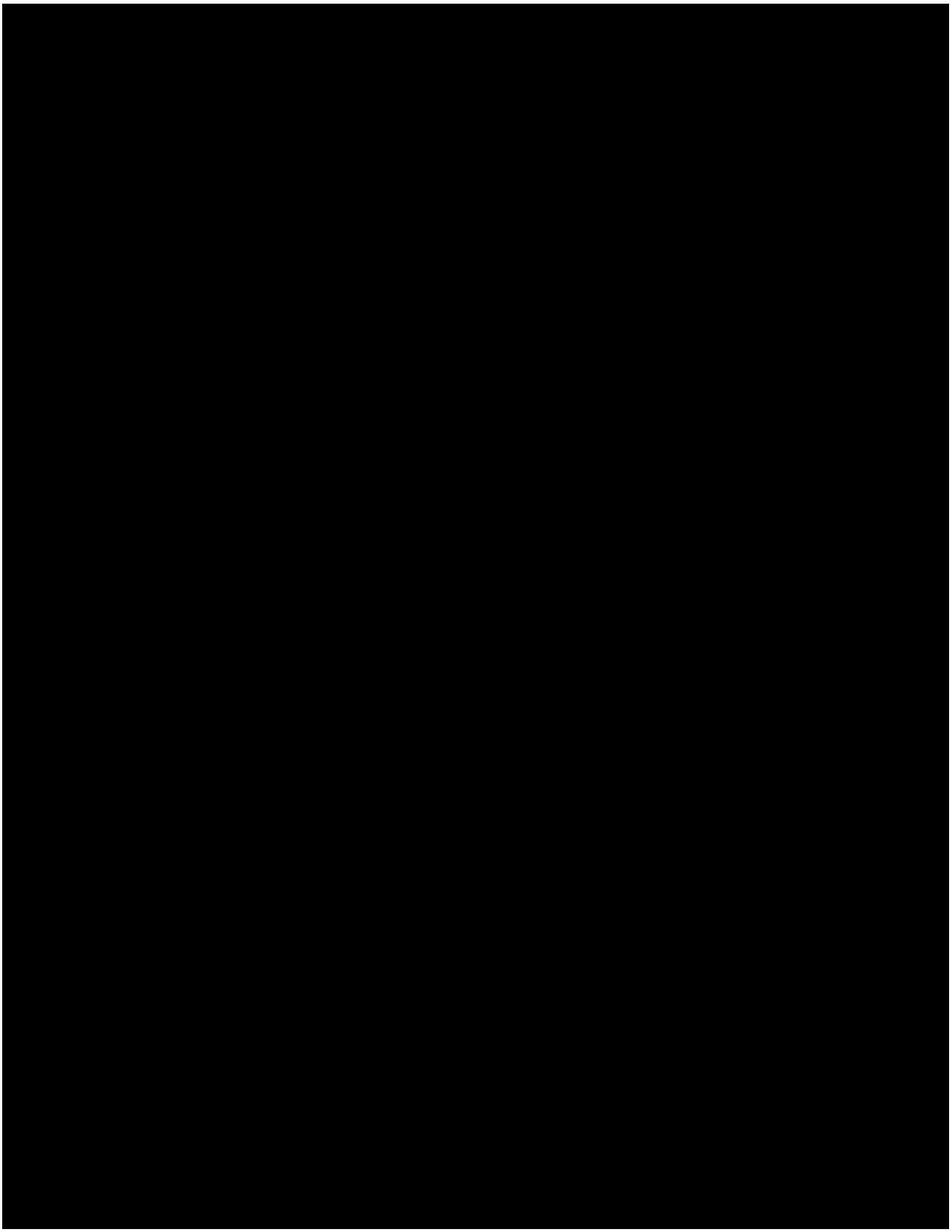


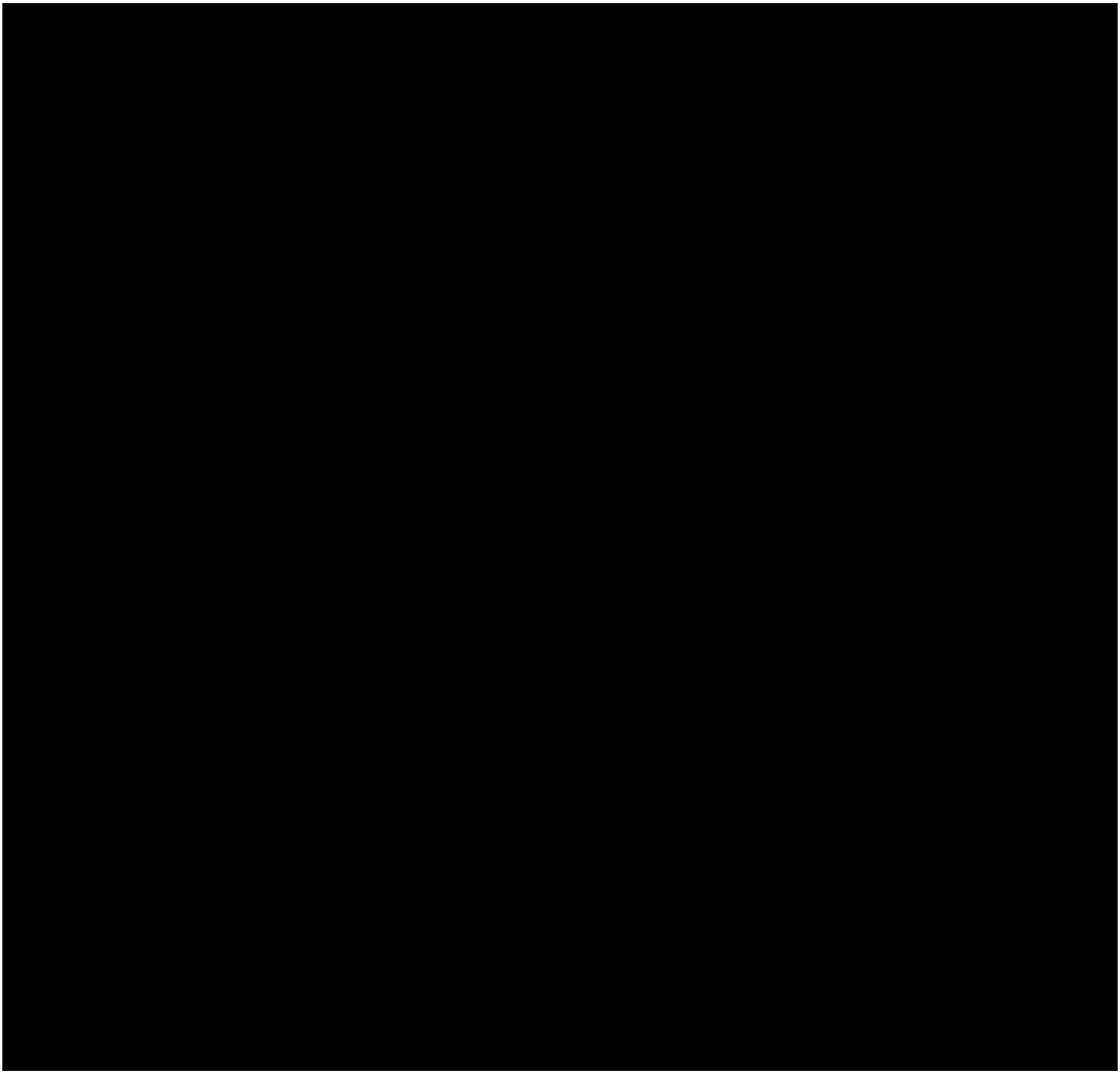
4.0 Predicted Position of the CO_2 Plume and Associated Pressure Front at Site Closure [40 CFR §146.93(a)(2)(ii)]

The map in Figure 5 is based on the final AoR delineation modeling results submitted pursuant to 40 CFR §146.84.









5.0 Post-Injection Monitoring Plan [40 CFR §146.93(b)(1)]

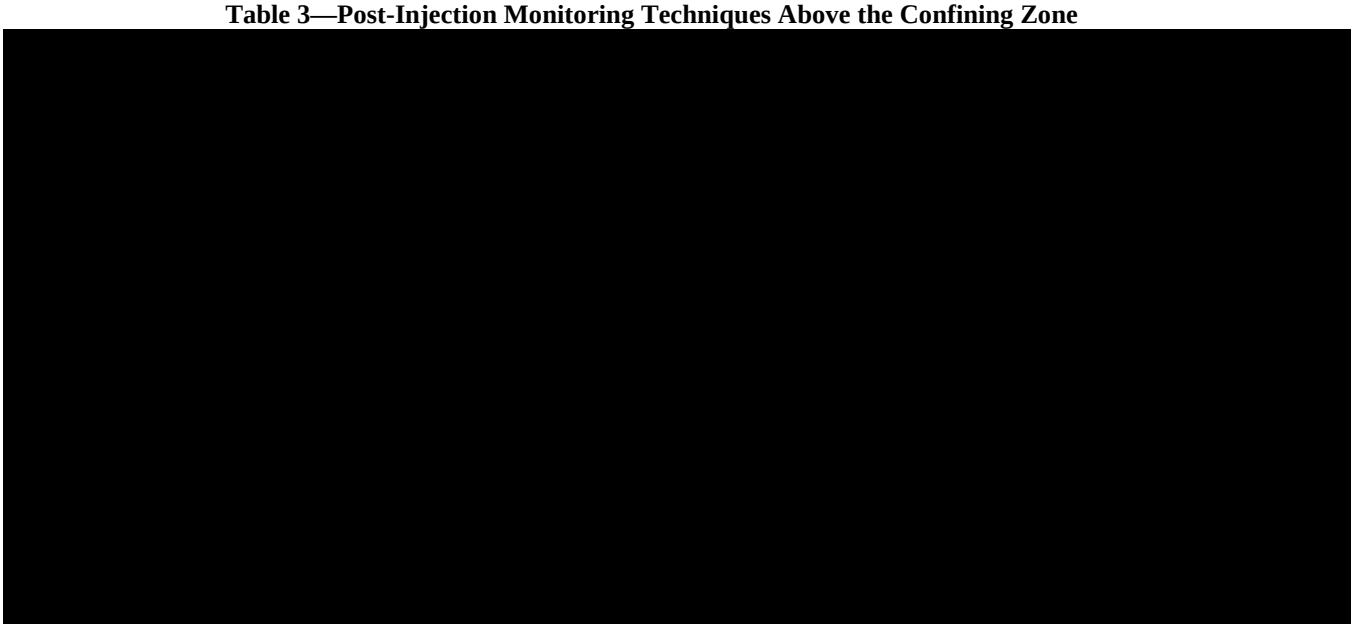
As described in the following sections, groundwater quality monitoring and plume and pressure-front tracking during the post-injection phase will meet the requirements of 40 CFR §146.93(b)(1). The results of all post-injection phase testing and monitoring will be submitted annually, within 60 days of the anniversary of the date that injection ceases, as described below under Section 5.3 Schedule for Submitting Post-Injection Monitoring Results [40 CFR §146.93(a)(2)(iv)]. Please refer to the Testing and Monitor Plan and Quality Assurance and Surveillance Plan (QASP) document included as part of this application for additional details on testing and monitoring activities during the Post-Injection phase.

A summary of key components of the PISC plan is as follows:

5.1 Monitoring Above the Upper Confining Zone

Table 3 presents the monitoring methods, locations, and frequencies for monitoring above the Upper Confining Zone.

Table 3—Post-Injection Monitoring Techniques Above the Confining Zone



5.2 Carbon Dioxide Plume and Pressure Front Tracking [40 CFR §146.93(a)(2)(iii)]

OLCV will employ direct and indirect methods to track the extent of the CO_2 plume and the presence or absence of elevated pressure. Table 4 presents the direct and indirect methods that OLCV will use to monitor the CO_2 plume, including the activities, locations, and frequencies. Fluid sampling, sampling handling and custody, quality control, and quality assurance will be performed as described in the QASP.

Table 4—Post-Injection Monitoring Techniques Plume and Pressure Front Tracking

5.3 Schedule for Submitting Post-Injection Monitoring Results [40 CFR §146.93(a)(2)(iv)]

During the PISC period, the monitoring reports will be prepared annually and submitted to the EPA Region 6 UIC Branch Office within 60 days of the anniversary of the date that injection ceases. These reports will summarize methods and results of groundwater quality monitoring, CO_2 storage zone pressure tracking, and indirect geophysical monitoring for CO_2 plume tracking.

The PISC and Site Closure Plan will be reviewed every five years during the PISC period. Results of the plan review will be included in the PISC monitoring reports. The operational and monitoring results will be reviewed for adequacy in relation to the objectives of the PISC. The monitoring locations, methods, and schedule will be analyzed in relation to the size of the CO_2 storage zone,

pressure front, and protection of USDWs. In case of changes to the PISC plan, a modified plan will be submitted to the EPA Region 6 UIC Branch Office within 30 days of such changes.

6.0 Non-Endangerment Demonstration Criteria

Prior to approval of the end of the post-injection phase, OLCV will submit a demonstration of non-endangerment of USDWs to the UIC Program Director, per 40 CFR §146.93(b)(2) and (3). This demonstration of USDW non-endangerment will be based on the evaluation of the site monitoring data used in conjunction with the project's computational model. The demonstration will include all relevant monitoring data and interpretations upon which the non-endangerment demonstration is based, model documentation and all supporting data, and any other information necessary for the UIC Program Director to review the analysis. The demonstration will include the following sections:

6.1 Introduction and Overview

A summary of relevant background information will be provided, including the operational history of the injection project, the date of the non-endangerment demonstration relative to the post-injection period outlined in this PISC and Site Closure Plan, and a general overview of how monitoring and modeling results will be used together to support a demonstration of USDW non-endangerment.

6.2 Summary of Existing Monitoring Data

A summary of all previous monitoring data collected at the site, pursuant to the Testing and Monitoring Plan document and this PISC and Site Closure Plan, including data collected during the injection and post-injection phases of the project, will be submitted to help demonstrate non-endangerment. Data submittals will be in a format acceptable to the UIC Program Director, and will include a narrative explanation of monitoring activities, including the dates of all monitoring events, changes to the monitoring program over time, and an explanation of all monitoring infrastructure that has existed at the site. Data will be compared with baseline data collected during site characterization.

6.3 Summary of Computational Modeling History

The computational modeling results used for the AoR delineation will be compared to monitoring data collected during the operational and PISC periods. Monitoring data will also be compared with baseline data collected during the site characterization required under 40 CFR §146.82(a)(6) and §146.87(d)(3). The data will be used to update the computational model and monitor the site and will include both direct and indirect geophysical methods. Direct methods include

[redacted]

Data generated during the PISC period will be used to show that the computational model accurately represents the storage site and can be used as a proxy to determine the plume's properties and size. OLCV will demonstrate this degree of accuracy by comparing the monitoring data obtained during the PISC period with the model's predicted properties (i.e., plume location, rate of movement, and pressure decay). Statistical methods will be employed to correlate the data and confirm the model's ability to represent the storage site accurately. The validation of the computational model with the large quantity of measured data will be a significant element to support the non-endangerment demonstration. Further, the validation of the complete model over the entire area, and at the points where direct data collection has taken place, will ensure confidence in the model for those areas with no direct observation wells where the surface infrastructure precludes geophysical data collection.

6.4 Evaluation of Reservoir Pressure

OLCV will demonstrate non-endangerment to USDWs by showing that the pressure within the Injection Zone will rapidly decrease to levels near its pre-injection static reservoir pressure during the PISC period. Because increased pressure is the primary driving force for fluid movement that could endanger a USDW, the decay in the pressure differential provides strong justification that the injectate will no longer pose a risk to any USDWs.

OLCV will monitor the downhole reservoir pressure at various locations and intervals using a combination of surface and downhole pressure gauges. The measured pressure at a specific depth interval will be compared with the pressure predicted by the computational model, which was previously shown in Figure 1, Figure 2, and Figure 3. Agreement between the actual and predicted values will validate the accuracy of the model and further demonstrate non-endangerment.

6.5 Evaluation of Carbon Dioxide Plume

OLCV will use a combination of monitoring data, logs, geophysical surveys, and seismic methods to locate and track the movement of the CO_2 plume. The data produced by these activities will be compared with the modeled predictions (previously shown in Figure 7) using statistical methods to validate the model's ability to represent the storage site accurately. PISC monitoring data will be used to show the stabilization of the CO_2 plume as the reservoir pressure returns to its near-pre-injection state. The risk to USDWs will decrease when the extent of pure-phase CO_2 ceases to grow either laterally or vertically. The stabilization of the CO_2 plume combined with the lack of

unmitigated Artificial Penetrations in the confining formation will be significant factors in the Project's demonstration of non-endangerment.

Project monitoring wells located above the Upper Confining Zone may be used to determine aqueous-phase CO_2 concentrations and mobilized constituents to assess USDW endangerment. If a demonstration can be made that the majority of the CO_2 has been immobilized via trapping mechanisms, then there is strong evidence that the risk to USDWs posed by the CO_2 plume has decreased. Modeling results, including sensitivity analyses, may also be used to demonstrate that plume migration rates are negligible based on available site characterization, monitoring, and operational data.

6.6 Evaluation of Emergencies or Other Events

In addition to the CO_2 plume, mobilized fluids may also pose a risk to USDWs, as the reservoir fluids include brines [redacted]
The geochemical data collected from monitoring wells will be used to demonstrate that no mobilized fluids have moved above the Upper Confining Zone and therefore would not pose a risk to USDWs after the PISC period. Monitoring data indicating steady or decreasing trends of potential drinking water contaminants below actionable levels (e.g., secondary, and maximum contaminant levels) will be used for this demonstration.

[redacted]

Corrective action will be performed on Artificial Penetrations identified to be potential leak pathways. Based on this information, the potential for fluid movement through artificial penetrations of the confining formation does not present a risk of endangerment to any USDWs.

7.0 Site Closure Plan

OLCV will conduct site closure activities to meet the requirements of 40 CFR §146.93(e) as described below. OLCV will submit a final Site Closure Plan and notify the permitting agency at least 120 days in advance of its intent to close the site. Once the permitting agency has approved closure of the site, OLCV will plug the monitoring wells and submit a site closure report to EPA within 90 days of site closure. The activities described below represent the planned activities based on information provided to EPA. The actual site closure plan may employ different methods and

procedures. A final Site Closure Plan will be submitted to the UIC Program Director for approval with the notification of the intent to close the site.

7.1 Plugging Monitoring Wells

Upon receiving authorization for site closure from the Director, all monitoring wells will be plugged within 90 days of site closure. All Injection Zone monitoring wells at the site will be plugged and abandoned using best practices to prevent any upward migration of the CO_2 or communication of fluids between the Injection Zone and USDWs. The deep monitoring wells in the Injection Zone have a direct connection between the injection formation and the ground surface; therefore, the well plugging program is specifically designed to prevent communication between the Injection Zone and USDWs. Details of the Plugging Program are located in the Plugging Plan document.

Before the wells are plugged, the internal and external integrity of the wells will be confirmed by conducting a pressure test and a cement and casing inspection log. The results of this logging and testing will be reviewed and approved by the appropriate regulatory agencies before plugging the wells.

Infrastructure removal and site restoration efforts will comply with applicable state and local requirements

7.2 Site Closure Report

A Site Closure Report (SCR) will be prepared and submitted to the Director within 90 days after site closure. The SCR will document the following aspects of the site closure process:

- Plugging of all injection, water withdraw and monitoring wells;
- Details of site restoration activities;
- Location of the sealed injection well on a survey plat submitted to the local zoning authority, a copy of which will be sent to the Regional Administrator for EPA Region 6;
- Notifications sent to state and local authorities;
- Records regarding the nature, composition, and volume of CO_2 injected;
- Records of pre-injection, injection, and post-injection monitoring; and
- Certifications that all injection and storage activities have been completed.

OLCV will record a notation on the deed of the property on which the injection well was located, which will include the following:

- An indication that the property was used for carbon dioxide sequestration,
- The name of the local agency to which the survey plat with injection well location was submitted,
- The volume of fluid injected,
- The Injection Zone or zones into which the fluid was injected, and
- The period over which the injection occurred.

The site closure report will be submitted to the permitting agency and maintained by the owner or operator for a period of 10 years following site closure. Additionally, the owner or operator will maintain the records collected during the post-injection site care period for a period of 10 years after which these records will be delivered to the UIC Program Director.