POST INJECTION SITE CARE AND SITE CLOSURE PLAN

40 CFR 146.93(a)

LAPIS ENERGY (AR DEVELOPMENT) LP
PROJECT BLUE
EL DORADO, ARKANSAS

Prepared By:
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1.0 FACILITY INFORMATION

Facility/Project Name: El Dorado Chemical Company / Lapis Energy
Project Blue Class VI Injection Well No. 1

Facility/Project Contact: Stijn Konings, Chief Geoscientist
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Well Locations: Union County
El Dorado, Arkansas
Project Blue Class VI Injection Well No. 1
Project Blue Well No. 1
Latitude Coordinate: 33.26217733
Longitude Coordinate: -92.69162567

This Post-Injection Site Care (PISC) and Site Closure plan describes the activities that Lapis Energy will perform to meet the requirements of 40 CFR 146.93. To achieve this, Lapis Energy plans to implement a PISC over a 50-year timeframe to demonstrate conformance and containment. Data will be gathered to track the position of the CO_2 plume, declining pressure front and to demonstrate that the Underground Source of Drinking Water (USDW) is not endangered, using an adaptive, sustainable, risk-based monitoring approach. Depending on project performance during the project life cycle, Lapis Energy may consider requesting an alternative PISC timeframe at a future date.

Prior to authorization for site closure, Lapis Energy will demonstrate that no additional monitoring is needed to ensure that the geologic sequestration project does not pose an endangerment to USDWs as per 40 CFR 146.93(b)(3). Following approval for site closure, Lapis Energy will plug remaining wells as needed, restore the site, and submit a site closure report and associated documentation.

2.0 PRESSURE DIFFERENTIALS

Pressure differentials at the Injection Well are presented in the following section per the 40 CFR 146.93(a)(2)(i) standard. Based on the modeling of the pressure front as part of the Area of Review (AoR) delineation, pressure at the Injection Well is expected to decrease to values approaching pre-injection levels within five years for all zones, as described below. Additional information on the projected post-injection pressure declines and differentials is presented in "*AoR and Corrective Action Plan*" submitted in Module B.

The formation pressure at the Injection Well is predicted to decline rapidly within the first several years following cessation of injection. Based on the modeling of the pressure front as part of the AoR delineation, pressure is expected to decrease below established pressure differential thresholds before the end of the 50-year PISC timeframe.

Note: initial pressures and conditions will be updated with data acquired during the testing and logging of the Injection Well. Data for initial conditions has been calculated based upon analogues and regional data for the geologic formations.

A discussion of each zone's pressure response following injection is included below [40 CFR 146.93(c)(1)(ii)].

2.1 LOWER HOSSTON INJECTION ZONE

The initial pressure in the Lower Hosston reservoir estimated at the top of the planned perforations in the Project Blue No. 1 Injection Well is 1,742 psi prior to commencement of CO_2 injection. When injection operations commence (modeled time period January 2040) the initial pressure increases to 2,219 psi, however, it drops rapidly to lower levels. The final pressure at end of the 5-year modeled injection time (year-end 2045) is 1,991 psi. This amounts to a maximum differential pressure increase of 249 psi in the Lower Hosston Injection Zone at the end of injection (over the baseline pressure at the beginning of injection).

Once CO_2 injection ceases, the pressure rapidly declines to a value of 1,761 psi within 5 years of the end of injection (year-end 2050) and slowly decreases to 1,734 psi at the end of the observation

period (2095). This overall net decrease of pressure at end of observation is an artifact of CO_2-brine interaction in the model.

The pressure decline is very rapid in the Lower Hosston due to the expected high permeability of the reservoir, which allows the pressure to dissipate quickly in the reservoir. The pressure profile for Lower Hosston top perforation for the Project Blue No. 1 Injection Well is shown in the **Figure 1.**

2.2 COTTON VALLEY INJECTION ZONE

The Cotton Valley Injection Zone is completed across three independent injection intervals for a five-year period of injection for each, each termed as CV1 (deepest), CV2, and CV3 (shallowest). There is a total of 15 years of injection into the Cotton Valley Injection Zone as a whole. The initial pressure is subsequently lower for each of the injection intervals moving up from CV1 through CV3. In the Cotton Valley Injection Zone, the pressure decay rates are discussed individually for each interval as they are designed to be perforated and completed separately. Due to the vertical proximity the initial pressures for the CV2 and CV3 intervals are above their initial reservoir pressure from the pressure front of the CV1 interval injection. Additionally, the pressure decay of the CV1 and CV2 intervals demonstrate rapid decline and then subsequential stabilization because of the overlying CV3 interval injection. Following the cessation of injection into the CV3 interval all three injection intervals continue to demonstrate pressure decay and return to near or slightly below (artifact of CO_2 and brine interaction in model) initial reservoir pressure.

The initial pressure for the CV1 at the top of the planned perforations in the Project Blue No.1 Injection Well is 2,647 psi prior to commencement of CO_2 injection. The pressure increases to a maximum value of 4,161 psi and then stabilizes to 4,088 psi at the end of the modeled five-year injection period (year-end 2030). This amounts to a maximum differential pressure increase of 1,514 psi in the CV1 injection interval at the end of injection (over the baseline pressure at the beginning of injection). Once CO_2 injection ceases, the pressure rapidly declines to a value of 2,820 psi within five years of the end of injection (year-end 2035) and gradually decreases to a value of 2,650 psi (for a net decrease of 3 psi at the wellbore) at the end of the 65 years of the observation timeframe (year end 2095). See Figure 2.

The initial pressure for the CV2 at the top of the planned perforations in the Project Blue No.1 Injection Well is 2,450 psi prior to commencement of CO_2 injection. The pressure gradually increases to 2,517 psi (year-beginning 2030) before the start of injection due to the CO_2 injection from the underlying CV1 interval. The pressure increases to a maximum value of 3,885 psi within the first year of injection and then stabilizes to 3,417 psi at the end of the modeled five-year injection period (year-end 2035). This amounts to a maximum differential pressure increase of 967 psi in the CV2 injection interval at the end of injection (over the baseline pressure at the beginning of injection). Once CO_2 injection ceases, the pressure rapidly declines to a value of 2,626 psi within five years of the end of injection (year-end 2040) and gradually decreases to a value of 2,445 psi (for a net decrease of 5 psi at the wellbore) at the end of the 60 years of the observation timeframe (year end 2095). See Figure 3.

The initial pressure for the CV3 at the top of the planned perforations in the Project Blue No. 1 injection well is 2,206 psi prior to commencement of CO_2 injection. The pressure gradually increases to 2,328 psi (year-beginning 2035) before the start of injection due to the CO_2 injection from the underlying CV1 and CV2 intervals. The pressure increases to a maximum value of 3,471 psi within the first year of injection and then stabilizes to 2,796 psi at the end of the modeled five-year injection period (year-end 2040). This amounts to a maximum differential pressure increase of 726 psi in the CV3 injection interval at the end of injection (over the baseline pressure at the beginning of injection). Once CO_2 injection ceases, the pressure rapidly declines to a value of 2,300 psi within five years of the end of injection (year-end 2045) and gradually decreases to a value of 2,210 psi (for a net decrease of 4 psi at the wellbore) at the end of the 55 years of the observation timeframe (year-end 2095). See Figure 4.

The pressure decline takes longer to reach an equilibrium value because the expected lower permeability of the Cotton Valley Injection Zone doesn't allow for as rapid a pressure equilibration as observed for the Lower Hosston Injection Zone. Additionally, the multiple completion intervals are a secondary cause for the slower rate of pressure decay in the Cotton Valley Injection Zone. The pressure profile for the Cotton Valley injection intervals combined (CV3, CV2, and CV1) at the top perforations; respectively, for the Project Blue No. 1 Injection Well are shown as a comparison in Figure 5.

3.0 PREDICTED POSITION OF PLUME AND PRESSURE AT CLOSURE

The predicted plume and pressure front at time of closure for the Project Blue site is presented in the following section per the 40 CFR 146.93(a)(2)(ii) standard.

Due to the density contrast between the free-phase CO_2 and the formation brine, CO_2 will tend to migrate to the top of the storage reservoir The following mechanisms will act to stop this migration and immobilize the CO_2 plume within the storage complex:

- Dissolution of CO_2 into unsaturated or partially saturated formation brine.
- Trapping by capillary forces at the deep/receding edge of the plume as brine invades the pore space previously occupied by CO_2 (after injection ceases).
- *In-situ* mineralization of the CO_2 dissolved in the formation water (expected to be an important mechanism over an extended timescale and ignored in the current model.

Based on the dynamic modeling, which considers dissolution of CO_2 into formation brine and capillary trapping (but not mineralization), it is expected that the plume will remain within the storage complex, and away from potential leak paths (such as regional faults or legacy wellbores), in each of the Injection Zones, as shown in Figures 6 thru 9.

Note that the Lower Cretaceous Sequence Boundary (LCSB) Confining Zone is expected to act as a barrier to CO_2 migration. This will be verified via data acquisition activities (in particular – estimation of capillary entry pressure).

Figures 6 thru 9 show the predicted extent of the plume front at the end of the 50-year PISC timeframe (year-end 2095), representing the maximum extent of the plume front, for each of the Injection Zones. These maps are based on the final AoR delineation and modeling results (submitted in Module B) pursuant to 40 CFR 146.84.

4.0 POST-INJECTION MONITORING PLAN

Lapis Energy will perform monitoring of the Project Blue site as described in the following section during the post-injection phase to meet the requirement 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 date of cessation of injection operations, as described in Section 4.3 below.

A key focus of the post-injection monitoring plan will be to verify that the CO_2 plume and pressure front develop in accordance to model predictions. These models will have been calibrated to the monitoring data and updated regularly (at least every five years) during the injection phase of the project. Confirming that the updated model provides a good guide to future plume and pressure behavior (good conformance) will enable it to be used to support a longer-term prediction of plume and pressure, and hence demonstration of expected containment and non-endangerment of USDW. To further verify the expected performance of the storage site, additional monitoring activities post-injection include:

- CO_2 plume and pressure front tracking.
- Monitoring as close as possible to the above confining zone.

An overview of these monitoring activities is provided in sections 4.1 and 4.2.

Depending on the outcome of the data evaluation, additional monitoring activities may be implemented to verify that there is no endangerment to USDW (e.g., collection of fluid samples for laboratory analyses).

Lapis Energy will follow QA/QC procedures for post-injection monitoring to ensure representative, defensible, and reliable data are collected. Please refer to the quality assurance and surveillance plan (QASP) provided in Appendix 1 to the "*E.1 - Testing and Monitoring Plan*" submitted in Module E.

Lapis Energy plans to implement a PISC over a 50-year timeframe to demonstrate conformance and containment. This will be demonstrated using two In-Zone (IZ) Monitoring Wells, located up

and down dip of the plume, and one Above Confining Zone (ACZ) Monitoring Well for the following PISC monitoring plan.

Additionally, shallow water supply wells (WSW) located on the El Dorado Chemical Company (EDCC) Facility and within the surrounding area, are completed into the Sparta Aquifer System. These wells will also be utilized as part of the PISC monitoring plan. Data will be gathered to track the position of the CO_2 plume and pressure front and to demonstrate that the USDW is not endangered, using an adaptive, and risk-based monitoring approach. Depending on project performance during the project life cycle, Lapis Energy may consider an Alternative PISC at a future date if supported by operational data.

4.1 MONITORING ABOVE THE CONFINING ZONE

The post-injection monitoring plan includes a dedicated ACZ Monitor Well (into the saline Tokio Formation) as outlined in the TMP. This well will also be used in the post-injection monitoring period to collect continuous daily bottomhole pressures during the first year of the PISC observation period. Frequency for following years will be determined based on data evaluation collected during the first-year post-injection. This plan will ensure that any vertical pressure changes above the confining zone (nearest the point of injection) are monitored, as well as confirm there is no unexpected pressure breach out of the confining zone.

Table 1 below presents the monitoring methods, locations, and frequencies for monitoring above the confining zone.

Table 1: Monitoring of ground water quality and geochemical changes above the confining zone

Target Formation	Monitoring Activity	Monitoring Location(s)	Spatial Coverage	Frequency
Tokio Formation	Downhole Pressure/Temperature Monitoring	1 ACZ Monitor Wells	Near point of injection	Adaptive
	Geochemical testing signal is observed/triggered			

Depending on data collected and evaluated from the in-well gauge and CO_2 plume and pressure tracking, additional investigations might be initiated. Groundwater quality monitoring would occur in the ACZ Monitoring Well for the first permeable layer above the Confining Zone (the saline Tokio Formation). Additionally, groundwater quality monitoring of one of the shallow USDW's (Sparta Aquifer System) could be sampled from a WSW on the EDCC Facility property. Sampling, chain of custody, analysis procedures and quality assurance for the post-injection groundwater quality monitoring will follow the protocols detailed in the Testing and Monitoring Plan (TMP) and the Quality Assurance and Surveillance Plan (QASP).

As mentioned previously, an emphasis will be placed to identify a potential loss of containment as early as possible; hence, the focus placed on monitoring the Tokio Formation, as close as possible to the top of the Confining Zone. In case there is a need to take fluid samples, the potential parameters to be analyzed are planned to be aligned with those listed in Table 2.

Table 2: Summary of potential analytical and field parameters for ground water samples

Parameters	**Analytical Methods**
Tokio and Sparta Formations	
Cations: Al, Ba, Mn, As, Cd, Cr, Cu, Pb, Sb, Se, Sr, and Tl	ICP-MS, EPA Method 6020B
Cations: Ca*, Fe, K*, Mg*, Na*, and Si	ICP, EPA Method 6010D
Anions: Br*, Cl*, F, NO_3, and SO_4*	Ion chromatography, EPA Method 300.0
Alkalinity (total and bicarbonate)*	SM 2320B
Total dissolved solids*	SM 2540C
Water density (lab)	SM 2710F
Water density (field)*	Calculated from Salinity, Temperature, and Pressure
pH (lab)*	SM 4500 H+B
pH (field)*	Standard Method 4500-H+ B-2000
Specific conductance (field)*	Standard Method 2510 B-1997
Temperature (field)*	Thermistor, Standard Method 2550 B-2000
Turbidity (field)*	Nephelometric - Optical, 90° Scatter
Oxidation-Reduction Potential (field)*	Platinum Button; Ag/AgCl Reference
Dissolved Oxygen (field)*	ASTM Method D888-09 (C)

Parameters	Analytical Methods
Dissolved Inorganic Carbon (DIC)*	SM 5310B
Isotopic composition of selected major or minor constituents (e.g., $^{228}Ra/^{226}Ra$, $^{87}Sr/^{86}Sr$)	EPA Method 901.1, ICP-MS
$\delta^{18}O$ and $\delta^{2}H$ of H_2O	Analyzed via CRDS
$\delta^{13}C$ of DIC	Gas Bench/CF-IRMS
^{14}C of DIC	AMS
Dissolved CO_2, N_2, Ar, O_2, He, C1-C6+, by headspace*	In-house Lab SOP, similar to RSK-175
$\delta^{13}C$ of dissolved Methane, Ethane, Propane, and CO_2, $\delta^{2}H$ of Methane	High precision (offline) analysis via Dual Inlet IRMS

In the event that monitoring detects the presence and migration of fluids from below the confining zone, actions detailed in the "*E.4 - Emergency and Remedial Response Plan*" submitted in Module E will be initiated.

4.2 CO_2 PLUME AND PRESSURE FRONT TRACKING

Lapis Energy will employ direct and indirect plume and pressure front monitoring as described in the following sections during the post-injection phase to adhere to 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 date on which injection ceases, as described under "Schedule for Submitting Post-Injection Monitoring Results" below. All Monitoring Well locations will be fixed points and will allow for access to sample and results will be compared to baseline data.

Post-injection monitoring will evaluate the pressure differential between the pre-injection and predicted post-injection pressures within the targeted Injection Zones (Lower Hosston and Cotton Valley Formations). Predicted post-injection pressures will be derived from the most up to date AoR model results and will be compared to measured/observed pressure readings. Pressure measurements will be continuously monitored via IZ Monitoring Wells. The monitoring system design will consist of a downhole system (to be decided) that will provide pressure measurements during the injection and post-injection lifetime of the project. Potential future technology at the time of closure will also be considered and the PISC plan and Monitoring Wells will be updated accordingly. The IZ Monitoring Wells will be located up and down dip of the project plume path.

However, with the cessation of injection operations, pressures in each of the Injection Zones are expected to dissipate rapidly within the first five years, and then continuing to decline at slower rates as presented in Section 2.0.

Indirect monitoring of the CO_2 plume will continue to build upon a proposed time-lapse seismic survey method that will be performed during injection operations.

Lapis Energy will employ direct and indirect methods to track the extent of the carbon dioxide plume and the presence or absence of elevated pressure in accordance with 40 CFR 146.93(a)(2)(iii). Table 3 presents the direct and indirect methods that Lapis Energy will use to monitor the CO_2 plume, including the activities, locations, and frequencies which will be employed.

Table 3: Post-injection phase plume monitoring

Target Formation	Monitoring Activity	Monitoring Location(s)	Spatial Coverage	Frequency
DIRECT PLUME MONITORING				
All Injection Zones: - Lower Hosston - Cotton Valley	Geochemical Fluid Sampling	North and South IZ Monitoring Wells	AoR – Up and Down dip of injection operations	Adaptive
All Injection Zones: - Lower Hosston - Cotton Valley	Saturation Log (Pulsed-Neutron Log)	North and South IZ Monitoring Wells	AoR – Up and Down dip of injection operations	Adaptive
INDIRECT PLUME MONITORING				
All Injection Zones: - Lower Hosston - Cotton Valley	Seismic method designed for plume tracking, also to detect any CO_2 above sequestration complex	Potentially North and South IZ Monitoring Wells. In case of sparse array seismic, there will be no well access required.	Azimuthal coverage of the plumes	Adaptive

Monitoring of the CO_2 plume will be accomplished by collecting saturation logs in the North and South IZ Monitoring Wells periodically and through seismic data acquisition within the AoR during the 50-year PISC timeframe.

Table 4 presents the direct monitoring methods that Lapis Energy will employ to monitor the pressure front, including the activities, locations, and frequencies for the Project Blue site. Monitoring of pressure and temperature for both injection zones will include a system design (to be determined) within the IZ Monitoring Wells that will be robust and lasting through the injection and post-injection lifetime. Lapis Energy will also consider the potential future technology at the time of closure that may be available, and the PISC plan and Monitoring Wells designs would be updated accordingly. Pressure monitoring results will be compared to modeling and simulation forecast predictions of expected pressure behavior for each zone. If there are significant deviations, the modeling will be updated to match the observed pressure data post-injection.

Table 4: Post-injection phase direct pressure-front monitoring

Target Formation	Monitoring Activity	Monitoring Location(s)	Spatial Coverage	Frequency
All Injection Zones: - Lower Hosston - Cotton Valley	IZ Pressure and Temperature Monitoring	North and South IZ Monitor Wells	AoR – Up and down dip of injection operations	Adaptive

Plume and pressure front monitoring information regarding equipment used *(i.e.* logging procedures) is detailed in the TMP and in the QASP. If a deviation from the predicted plume and or pressure front behavior occurs, protocols detailed in the "*E.4 - Emergency and Remedial Response Plan*" submitted in Module E will be implemented.

4.3 SCHEDULE FOR SUBMITTING POST-INJECTION MONITORING RESULTS

All post-injection site care monitoring data and monitoring results collected using the methods described above will be submitted to EPA in annual reports, within 60 days following the anniversary date on which injection operations ceased. The reports will contain information and data generated during the reporting period, *i.e.* well-based monitoring data, sample analysis, and the results from updated site models.

At any time during the life of the injection project if a change to the post-injection site care plan is deemed necessary, a request will be submitted to the UIC Program director at least 30 days prior to making the change.

5.0 ALTERNATIVE PISC TIMEFRAME

Lapis Energy is not currently requesting an Alternative PISC timeframe as part of this initial submittal. Depending on project performance, consideration will be given to an alternative PISC timeframe at a future date.

6.0 USDW NON-ENDANGERMENT DEMONSTRATION CRITERIA

Prior to approval of the end of the post-injection phase, Lapis Energy will submit a demonstration of non-endangerment of USDWs to the UIC Program Director, per 40 CFR 146.93(b)(2) or (3).

Lapis Energy will issue a report to the UIC Program Director. This report will make a demonstration of USDW non-endangerment based on the evaluation of the site monitoring data used in conjunction with the project's computational model. The report will detail how the non-endangerment demonstration evaluation uses site-specific conditions to confirm and demonstrate non-endangerment. The report 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 report 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 "*E.1-Testing and Monitoring Plan*" (submitted in Module E) 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 [40 CFR 146.91(e)], 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 pre-injection data collected during site characterization (consideration will also be given to potential factors that might lead to changes compared to pre-injection data and which

are not related to the proposed CO_2 injection project).

6.3 SUMMARY OF COMPUTATIONAL MODELING HISTORY

The modeling is intended to present a conservative estimate of pressure build-up and plume extent over the injection and post injection life of the project. The data used in the model is derived from regional data, and from wells in near proximity to the project site. Until information is obtained from the site-specific wells, input data is used to create a conservative estimate (larger) of pressure build-up and plume extent. The current model represents a preliminary scenario for computational modeling at the Lapis Energy Project Blue site and will be updated to a final simulation scenario following acquisition of additional data from the Injection Well.

6.4 EVALUATION OF RESERVOIR PRESSURE

The current model assumes an initial reservoir pressure for each injection zone based upon a calculated pore pressure fracture gradient prediction. Initial static pressures will be obtained in the Injection Well and Monitoring Wells for the Project Blue site. The original static pressures will be collected in all targeted Injection Zones; the Lower Hosston and Cotton Valley. The pre-injection pressures will be used as a comparison during injection and post-closure operations.

Annual reservoir pressures will be collected during MIT for the Injection Well and evaluated against the initial static pressures in the Injection Zones and compared to the computational modeling results. The collected reservoir pressure data will be used to update and re-evaluate the model at the required five-year intervals to provide an operational model and a new projected modeled pressure for a future time-series and post-closure period.

6.5 EVALUATION OF CO_2 PLUME

The location and migration rate of the CO_2 plume will be monitored indirectly using seismic geophysical methods (repeat VSP or surface seismic such as SASSA as applicable). Following-on from the injection phase plume monitoring philosophy, the timing of each survey will be adaptive, and will be determined in response to the previous surveys, the updated AoR model and updated risk assessment (e.g. subsequent repeats planned to ensure timely identification of the plume

reaching any identified risks). Additional repeats may be triggered in response to anomalous monitoring data (e.g. anomalous pressures or surveys, samples from ACZ or IZ Monitor Wells).

As a minimum, sufficient geophysical repeats will be performed to demonstrate the migration rate of the plume at the end of the PISC period (or lack of continuing migration) and confirm a lack of seismic indicators for leaked CO_2 within the overburden. All monitoring data will be used to calibrate the dynamic model and reduce predictive uncertainty. After calibration (history matching) the model will be used to update its predictions of the development of the AoR, declining pressure and CO_2 plumes. Since the current model is conservative and uses a "worst-case" scenario approach, the actual predicted pressure data is expected to be less than the modeled pressure. The collected reservoir pressure data will be used to update and re-evaluate the model at the required five-year intervals to provide an operational model and a new projected modeled pressure for a future time-series and post-closure period.

The final models will be used to support non-endangerment of the USDW, demonstrating that pressure has declined below that which is required to push brine up an open conduit into the USDW and that the plume has either stopped or slowed to a rate at which it will not reach any potential leak pathway to a USDW within a reasonable timeframe.

6.6 EVALUATION OF EMERGENCIES OR OTHER EVENTS

Lapis Energy has developed a plan to evaluate emergencies related to the Project Blue site as detailed in "*E.4 – Emergency and Remedial Response Plan*" submitted in Module E. This plan accounts for potential emergencies and events at three phases of the project: 1) during the construction of the Injection Well, 2) during the operation of the Injection Well, and 3) during the site closure and post closure monitoring of the site.

This includes, but is not limited to, adaptive (triggered) sampling analysis of the USDW and other groundwater systems within the AoR.

6.7 NEAREST POTENTIAL CONDUITS

There are no faults or other geologic features that would permit the vertical migration of CO_2 or formation fluids into USDWs. All artificial penetrations (active/abandoned) contained within the

modeled pressure and plume containment, were evaluated as to the adequacy of construction, and plugging to determine the potential of the penetration to convey fluid from an injection zone into the overlying USDWs (non-endangerment) and the potential of the penetration to convey injected effluent out of the injection zone (no migration) [40 CFR 146.84 (c)(3)].

The artificial penetrations in the delineated AoR have been evaluated per the protocol outlined in the "*Area of Review and Corrective Action Plan*" submitted in Module B. No artificial penetrations within the plume extent penetrate deep enough to act as a potential conduit for CO_2 as they do not intersect the plume vertically, and do not pose a threat for migration out of the authorized zones.

The AoR model during injection operations will be regularly updated and calibrated to the monitoring data (minimum every five years). The artificial penetration risk assessment and required corrective measures will likewise be updated in line with each update to the pressure and plume prediction, and adjustments made to the TMP, PISC, and injection schedule to ensure project goals (e.g. non-endangerment of USDW) are continued to be met.

7.0 SITE CLOSURE PLAN

Lapis Energy will conduct site closure activities to meet the requirements of 40 CFR 146.93(e) as described below. Lapis Energy will submit a final Site Closure Plan and notify the permitting agency at least 120 days prior of its intent to close the site. Once the permitting agency has approved closure of the site, Lapis Energy will plug the Monitoring Wells and submit a site closure report to EPA. The activities, as described below, represent the planned activities based on information provided to the 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

Prior to the plugging and abandonment of Monitoring Wells, the bottomhole pressure will be determined using the in-hole pressure monitoring device(s). Should the in-hole pressure device(s) be damaged, then a slickline pressure gauge will be run in the hole to measure the bottomhole pressure.

Examination of internal and external well integrity using appropriate tools will be carried out before well plugging. This will include an examination of the cement quality using cement bond logs and an examination of casing using a radioactive tracer log or temperature logs, pressure testing, and/or also casing caliper log. Usage of available technologies to examine well integrity at the time of the plugging will also be considered.

Well plugging is considered pass when it meets the objective of well plugging which is minimizing the chance of leak to environment and unintended flow of fluid underground. The verification objective is to assess the sealing effectiveness and required position of a permanent isolation. Verification of meeting the objective will be conducted at the end of each plugging operation.

It is recommended to plug the Monitoring Wells using up to 3 plugs per well as per the following:

1- 100 - 200-foot cement plug at the top of the monitoring interval and upwards into a containment layer for the IZ Monitoring Wells using acid resistant cement, (and across the Tokio Formation within the ACZ Monitor Well).

2- 100 - 200-foot cement plug across or below the base of USDW and across the surface casing shoe.

3- 25-foot cement surface plug.

Prior to plugging Monitoring Wells, Lapis Energy will consider the operational and monitoring history of the sequestration project and identify whether any information or events warrant amendment of the original well plugging plan.

Well specific plugging plans will be designed based upon the "as-built" construction of the Monitoring Wells and adhere to State of Arkansas for plugging standards. These wells will be plugged at the end of the PISC timeframe (year-end 2095) using general plugging procedures as outline below.

7.1.1 Plugging Procedures.

In compliance with 40 CFR 146.92(c), notify the EPA UIC Program Director at least 60 days before plugging the well and provide updated plugging plan.

1. Bottom hole reservoir pressure will be obtained prior to well plugging.
2. Well will be flushed or circulated with brine to displace all in well fluids. Normally the well is flushed/circulated by pumping 2 times well volume brine at pressure lower than 80% of frac pressure
3. Temperature log will be run and compared with the baseline temperature log in addition to temperature logs during injection and post-injection to determine external mechanical integrity. In addition, either a noise log or oxygen activation log could also be run and evaluated for external mechanical integrity.

   Note: If the external well integrity was found to be poorer than expected then a proper risk assessment will be conducted to assess if 3 plugs are sufficient to meet well plugging objectives or not.
4. Pull out/remove tubing and packer from the well
5. Run and set a permanent mechanical bridge plug at the caprock above the monitoring zone

6. Run in hole to tag top of the plug.
7. Rig up cementing equipment and pump a fluid spacer, followed by standard cement (Class A or G) mixed at a minimum density of 15.6 pounds per gallon (lb/gal) into the work string while stung into the cement retainer.

   NOTE: acid-resistant cement will be used across any open hole /perforations that are in any injection zone. These plugs will be at least 100 feet thick and extend across the open portion and up into the overlying confining layer.
8. Displace the cement on top of the mechanical plug.
9. After waiting for enough time for the cement to harden, locate the top of the cement plug and pressure test the cement plug to 1,500 psi to verify its competency.
10. Displace the wellbore with fluid of a minimum density of 9.5 ppg.
11. Repeat the above for the 2nd cement plug.
12. Repeat the above for the 3rd/surface cement plug.
13. Remove wellhead, cut the casing three feet below the ground surface, and weld steel plate on top.
14. Erect a permanent marker on the well with the permit number, date of plugging and company name identified on the marker.
15. In accordance with the requirements of 40 CFR 146.92(d), within 60 days of plugging and closure, a plugging report will be submitted to the UIC director. This report will be certified as accurate by the owner or operator, and by the person who has performed the plugging operations. The owner / operator will retain the well plugging report for 10 years following the site closure.

7.1.2 Site Restoration

After the plugging of the Monitoring Wells, the wellhead and surface equipment shall be decommissioned and removed from the site. The well pad will be cleaned, and the access road will be left in place.

7.2 SITE CLOSURE REPORT

A site closure report will be prepared and submitted within 90 days following site closure, documenting the following

- Plugging of the Monitoring Wells (and the Injection Well if it has not previously been plugged),
- Location of sealed Injection Well on a survey plat that has been submitted to the local zoning authority,
- Notifications to state and local authorities as required at 40 CFR 146.93(f)(2),
- Records regarding the nature, composition, and volume of the injected CO_2, and
- Post-injection monitoring records.

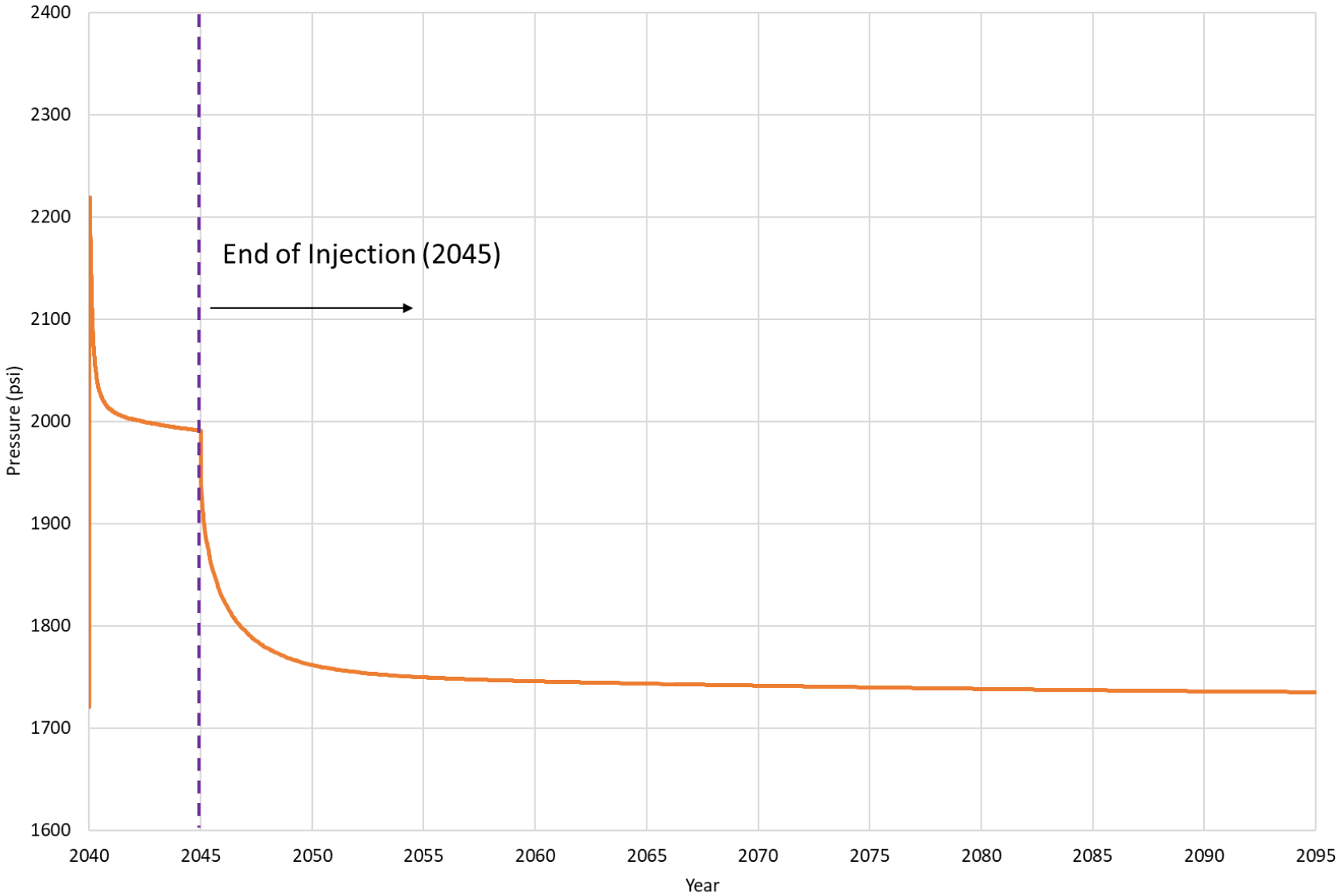
Lapis Energy will record a notation to the property's deed on which the Injection Well was located that will indicate the following**:**

- That the property was used for carbon dioxide sequestration,
- The name of the local agency to which a survey plat with the Injection Well location was submitted,
- The volume of fluid injected,
- The formation(s) 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 period for a period of 10 years after which these records will be delivered to the UIC Program Director.

FIGURES

Geostock Sandia



Lower Hosston		
Year	Observation Time (years)	Pressure (psi)
2040	0	1742
2045	0	1991
2050	5	1761
2055	10	1749
2065	20	1745
2075	30	1739
2085	40	1736
2095	50	1734

Max Pressure (*January 2040*) = 2,219 psi
Pressure Differential at end of injection (*2045*) = 249 psi
Max Pressure Differential = 477 psi

Start Injection (green)
Stop Injection (yellow)

End of 50-year Observation

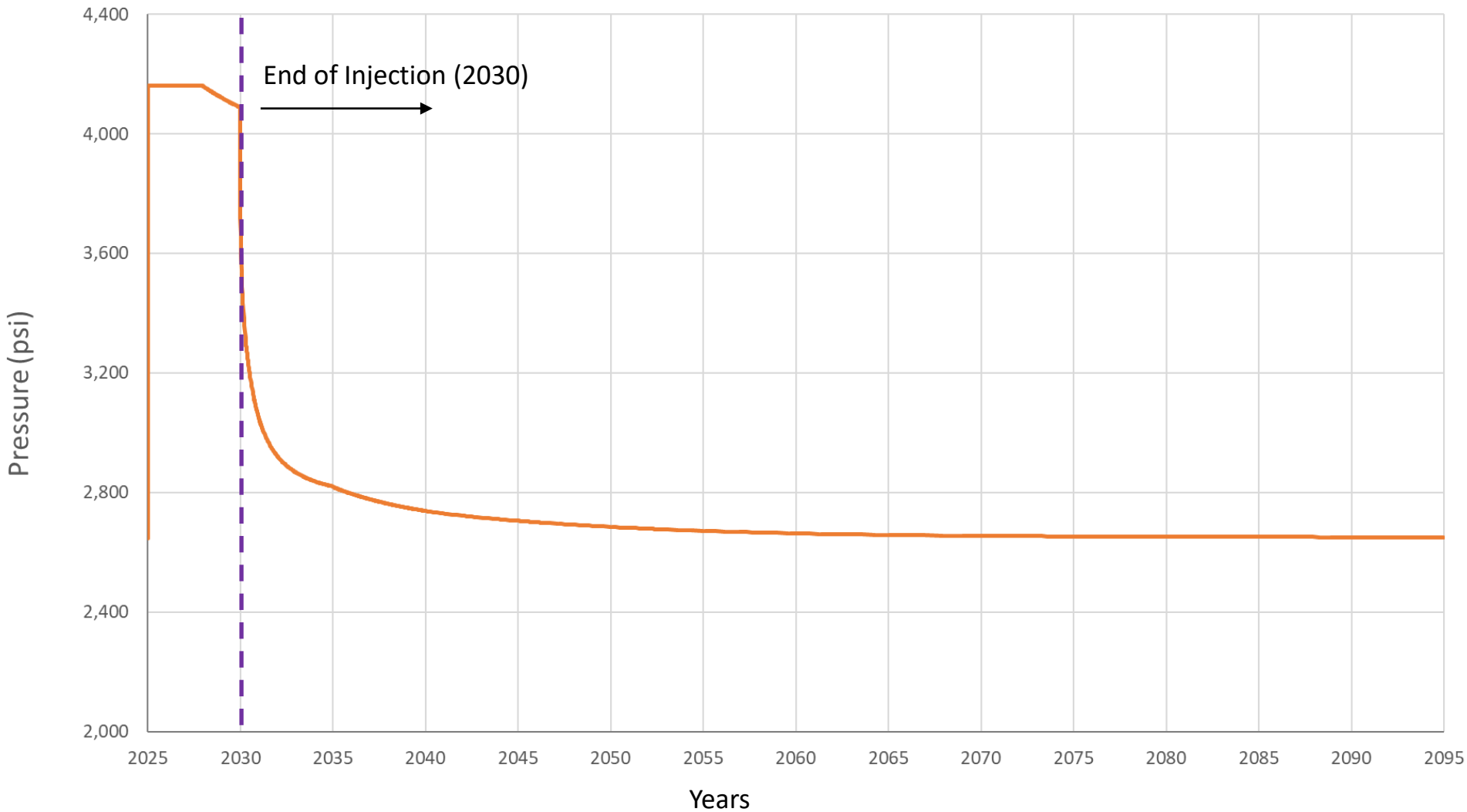
Lapis Energy

Figure 1

Pressure Differential and Decay Graph
Lower Hosston Injection Zone

PROJECT INFO: Union County Arkansas		SCALE INFO: N/A	
DATE: DEC 2022	PROJECT NAME: 220080LEE	BY: GKS CHECK BY: GKS	SHEET 1 OF 1

Geostock Sandia



Cotton Valley (CV1)		
Year	Observation Time (years)	Pressure (psi)
2025	0	2647
2030	0	4088
2035	5	2820
2040	10	2738
2045	15	2705
2055	25	2671
2065	35	2658
2075	45	2653
2085	55	2651
2095	65	2650

Start Injection (green)
Stop Injection (yellow)

End of 60-year Observation

Max Pressure (*Jan 2025 – Nov 2027*) = 4,161 psi
Pressure Differential at end of injection (*2030*) = 1,514 psi
Max Pressure Differential = 1,441 psi

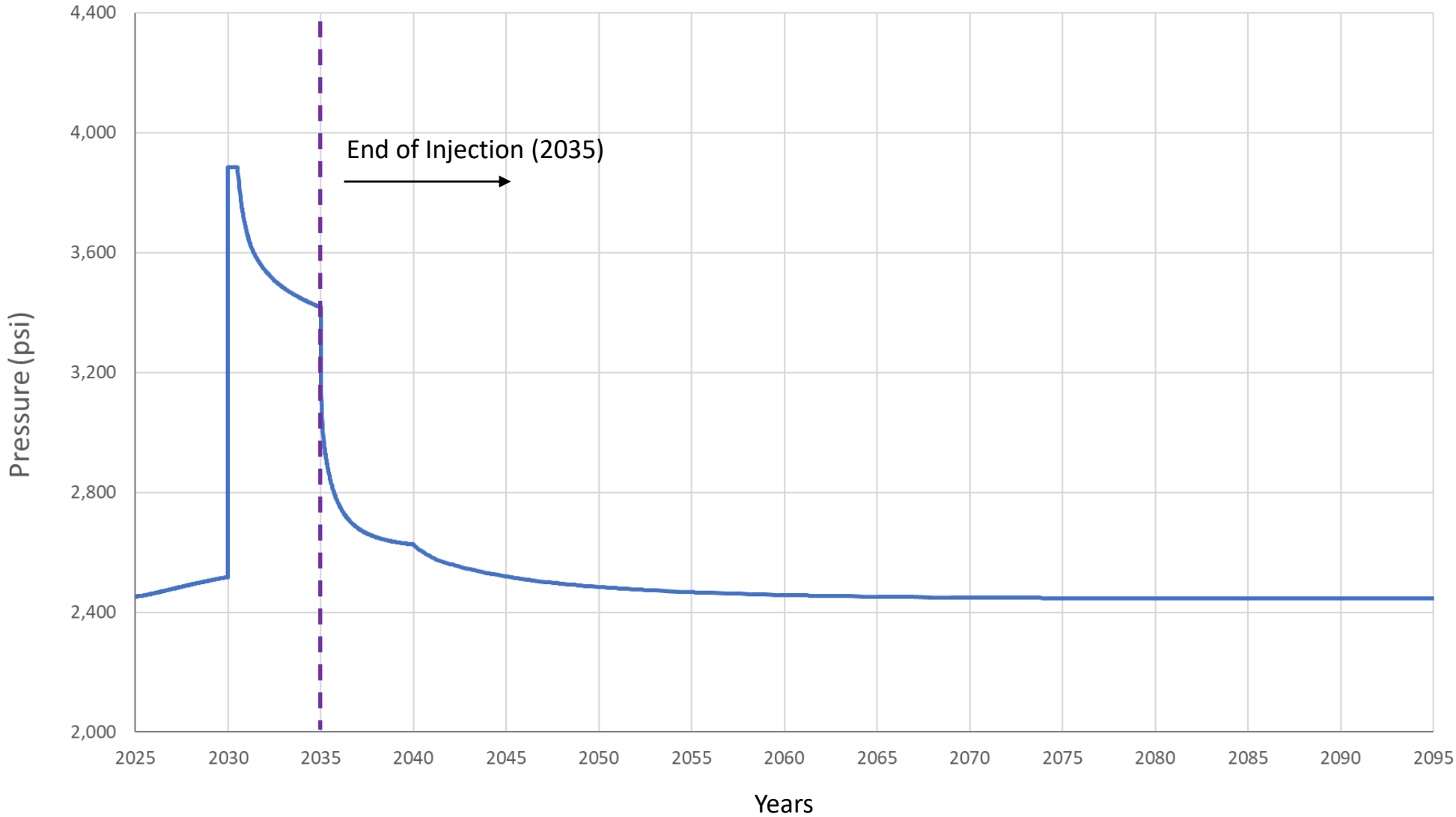
Lapis Energy

Figure 2

Pressure Differential and Decay Graph
Cotton Valley (CV1) Injection Interval

PROJECT INFO: Union County Arkansas		SCALE INFO: N/A	
DATE: DEC 2022	PROJECT NAME: 220080LEE	BY: GKS CHECK BY: GKS	SHEET 1 OF 1

Geostock Sandia



Cotton Valley (CV2)		
Year	Observation Time (years)	Pressure (psi)
2025	N/A	2450
2030	0	2517
2035	0	3417
2040	5	2626
2045	10	2519
2055	20	2466
2065	30	2451
2075	40	2447
2085	50	2445
2095	60	2445

Max Pressure (*Jan-Jul 2030*) = 3,885 psi
Pressure Differential at end of injection (*2035*) = 967 psi
Max Pressure Differential = 1,435 psi

Start Injection (green)
Stop Injection (yellow)

End of 60-year Observation

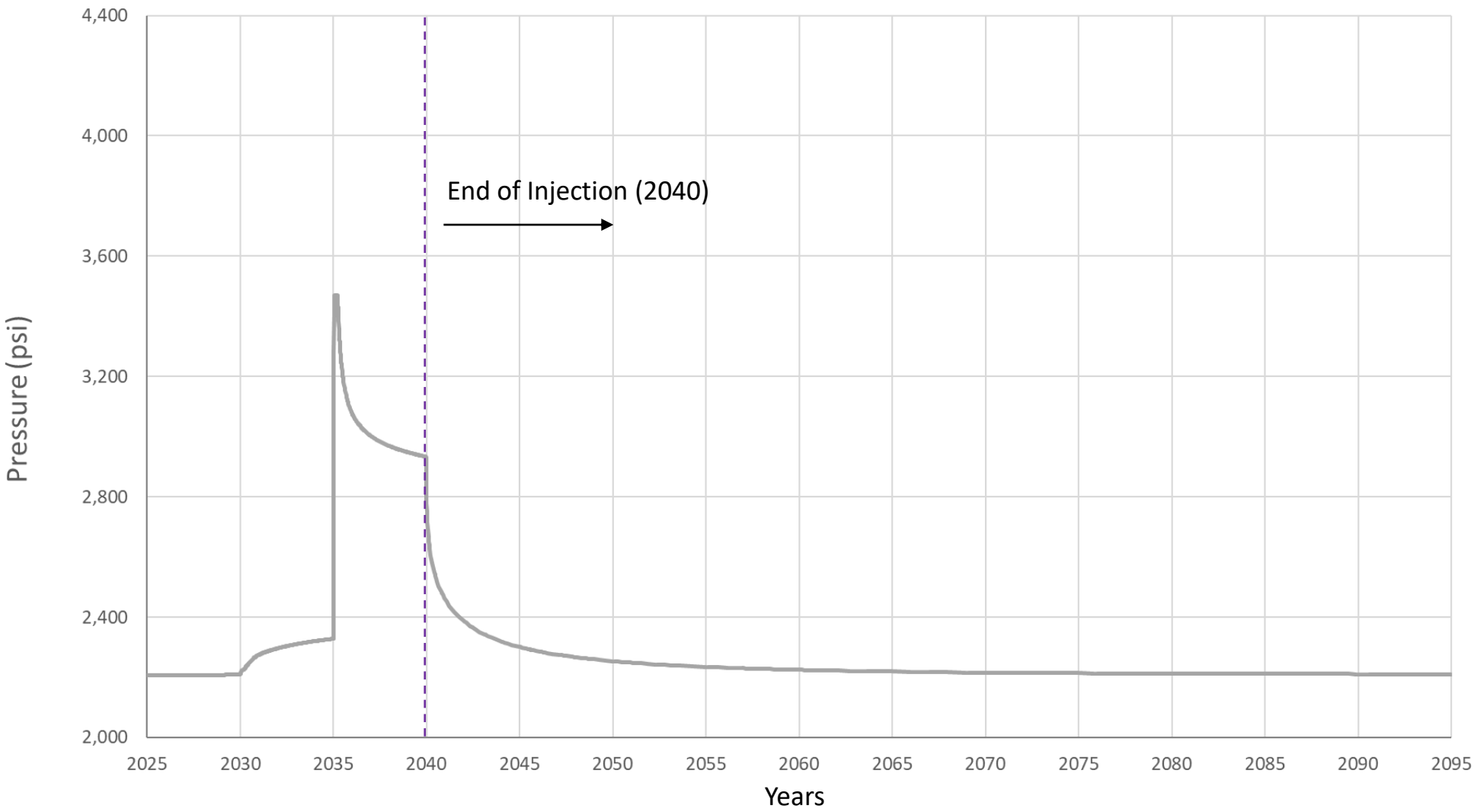
Lapis Energy

Figure 3

Pressure Differential and Decay Graph
Cotton Valley (CV2) Injection Interval

PROJECT INFO: Union County Arkansas		SCALE INFO: N/A	
DATE: DEC 2022	PROJECT NAME: 220080LEE	BY: GKS CHECK BY: GKS	SHEET 1 OF 1

Geostock Sandia



Cotton Valley (CV3)		
Year	Observation Time (years)	Pressure (psi)
2025	N/A	2206
2030	N/A	2209
2035	0	2328
2040	0	2932
2045	5	2300
2055	15	2234
2065	25	2219
2075	35	2213
2085	45	2211
2095	55	2210

Max Pressure (*February 2035*) = 3,471 psi
Max Differential at end of injection (*2040*)= 726 psi
Max Pressure Differential = 1,265 psi

Start Injection (green)
Stop Injection (yellow)

End of 55-year Observation

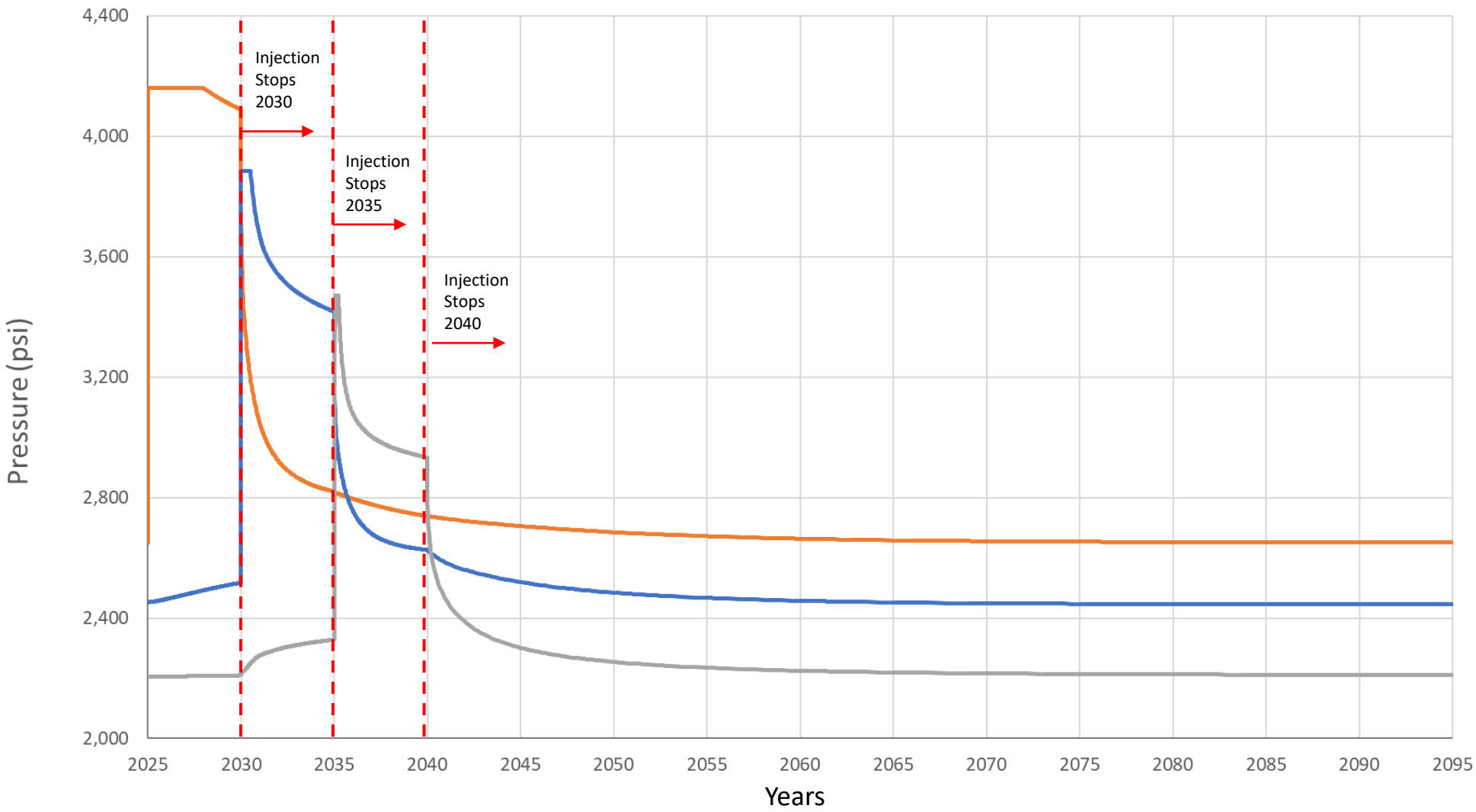
Lapis Energy

Figure 4

Pressure Differential and Decay Graph
Cotton Valley (CV3) Injection Interval

PROJECT INFO: Union County Arkansas		SCALE INFO: N/A	
DATE: DEC 2022	PROJECT NAME: 220080LEE	BY: GKS CHECK BY: GKS	SHEET 1 OF 1

Geostock Sandia



CV1 Interval

CV2 Interval

CV3 Interval

Figure 5

Pressure Differential and Decay Graph
Cotton Valley Injection Zone

PROJECT INFO: Union County Arkansas		SCALE INFO: N/A	
DATE: DEC 2022	PROJECT NAME: 220080LEE	BY: GKS CHECK BY: GKS	SHEET 1 OF 1

AOI - PROJECT BLUE

AOR: CONE OF INFLUENCE (COI)

T16S R16W

T16S R15W

T17S R16W

T17S R15W

Union

Hosston 2095

LSB ACREAGE

EDC 1 (PROPOSED DEEP MONITOR WELL)

PROPOSED SHALLOW MONITOR WELL

PROPOSED WELL 1 (CLASS VI)

PROPOSED DEEP MONITOR WELL

AP108 AP106 AP102 AP159 AP105 AP97 AP96 AP98 APA98 AP99 AP104 APA105 AP101 APB101 APA101 AP100 AP103 AP9 APA9 AP1A AP1 AP3 APA4 AP95 AP10 AP15 AP11 AP12 APA12 APA11 APA16 AP16 AP13 AP1B AP2 AP6 AP7 APA6 AP92 AP17 APA17 AP4 AP94 AP18 AP20 AP22 AP5 AP8 AP24 AP23 AP29 AP25 APA26 AP26 AP27 AP31 AP91 AP89 AP90 APA33 APA85 AP87 AP88 AP85 AP21 AP19 AP28 AP30 AP32 AP52 AP42 AP43 AP33 AP65 AP51 AP67 AP69 AP68 AP69 AP63 APA40 AP40 AP66 AP61 APA62 AP62 AP64 APA64 AP60 AP35 AP37 AP39 AP70 AP80 AP74 AP71 AP83 AP81

LEGEND

WELL LOCATIONS F_STATCODE

ABD, AGW, AOW, D&A, DAO, DIS, DRL, EXP, GAS, INJ, J&A, LOC, M-O, MOG, N/A, OIL, P&A, SER, SUS, SWD, T&A, WTR

KEY (MODEL SATURATION PLUMES)

Hosston_MaxPlumePSI_2095

KEY (PROPOSED WELLS)

PROPOSED CLASS VI WELL

PROPOSED MONITOR WELLS

DEEP MONITOR (IZ)

SHALLOW MONITOR (ACZ)

VICINITY INSET MAP

Coordinate System: NAD 1927 StatePlane Arkansas South FIPS 0302
Projection: Lambert Conformal Conic
Datum: North American 1927
False Easting: 2,000,000.0000
False Northing: 0.0000
Central Meridian: -92.0000
Standard Parallel 1: 33.3000
Standard Parallel 2: 34.7667
Latitude Of Origin: 32.6667
Units: Foot US

N

0 1,500 3,000 6,000 9,000 Feet

0 0.2 0.4 0.8 1.2 1.6 Miles

KEY

PROPOSED CLASS VI WELL

AOR: CONE OF INFLUENCE (COI)

Lapis Energy - Project Blue (Union Co., AR)
NOTE: O&G Well Locations based from data licensed from ENVERUS, TOBIN, IHS, and AOGC and QC'd for final well locations 11/2022; within AR: Union Parish ONLY.

Lapis Energy

PISC E.3 - FIGURE 6
MAX SATURATION PLUME FRONT
LOWER HOSSTON INJECTION ZONE
(YEAR-END 2095)

UNION CO.,ARKANSAS

GEODETIC DATUM: NAD27 SP AR S PROJECTION: LAMBERT CONFORMAL CONIC GRID UNITS: FEET	SCALE: SEE SCALEBAR 1" = 3000' (1:36K) PRINT SIZE: 17" x 11" (Ledger)

DATE: 12/29/2022	PROJECT NAME: 220031-LEE	MAP BY: ESSJ (GKS) CHECK BY: DC (GKS)	SHEET: 1 OF 1

Geostock Sandia

AOI - PROJECT BLUE

AOR: CONE OF INFLUENCE (COI)

T16S R16W

T16S R15W

T17S R16W

T17S R15W

Union

LSB ACREAGE

EDC 1 (PROPOSED DEEP MONITOR WELL)

PROPOSED SHALLOW MONITOR WELL

PROPOSED WELL 1 (CLASS VI)

PROPOSED DEEP MONITOR WELL

CV1 2095

CV1 2095

KEY (MODEL SATURATION PLUMES)

CV1_MaxPlumePSI_2095

LEGEND

WELL LOCATIONS F_STATCODE

ABD, AGW, AOW, D&A, DAO, DIS, DRL, EXP, GAS, INJ, J&A, LOC, M-O, MOG, N/A, OIL, P&A, SER, SUS, SWD, T&A, WTR

KEY (PROPOSED WELLS)

PROPOSED CLASS VI WELL

PROPOSED MONITOR WELLS

DEEP MONITOR (IZ)

SHALLOW MONITOR (ACZ)

VICINITY INSET MAP

Arkansas

Louisiana

AOI Union

Coordinate System: NAD 1927 StatePlane Arkansas South FIPS 0302
Projection: Lambert Conformal Conic
Datum: North American 1927
False Easting: 2,000,000.0000
False Northing: 0.0000
Central Meridian: -92.0000
Standard Parallel 1: 33.3000
Standard Parallel 2: 34.7667
Latitude Of Origin: 32.6667
Units: Foot US

N

0 1,500 3,000 6,000 9,000 Feet

0 0.2 0.4 0.8 1.2 1.6 Miles

KEY

PROPOSED CLASS VI WELL

AOR: CONE OF INFLUENCE (COI)

Lapis Energy - Project Blue (Union Co., AR)
NOTE: O&G Well Locations based from data licensed from ENVERUS, TOBIN, IHS, and AOGC and QC'd for final well locations 11/2022; within AR: Union Parish ONLY.

Lapis Energy

PISC E.3 - FIGURE 7
MAX SATURATION PLUME FRONT
COTTON VALLEY (CV1) INJECTION ZONE
(YEAR-END 2095)

UNION CO.,ARKANSAS

GEODETIC DATUM: NAD27 SP AR S
PROJECTION: LAMBERT CONFORMAL CONIC
GRID UNITS: FEET

SCALE: SEE SCALEBAR
1" = 3000' (1:36K)
PRINT SIZE: 17" x 11" (Ledger)

DATE: 12/29/2022	PROJECT NAME: 220031-LEE	MAP BY: ESSJ (GKS) CHECK BY: DC (GKS)	SHEET: 1 OF 1

Geostock Sandia

AOI - PROJECT BLUE

AOR: CONE OF INFLUENCE (COI)

T16S R16W

T16S R15W

T17S R16W

T17S R15W

Union

LSB ACREAGE

EDC 1 (PROPOSED DEEP MONITOR WELL)

PROPOSED SHALLOW MONITOR WELL

PROPOSED WELL 1 (CLASS VI)

PROPOSED DEEP MONITOR WELL

CV2_2095

AP108 AP106 AP102 AP159 AP105 AP97 AP96 AP98 APA98 AP99 AP104 APA105 AP101 APB101 APA101 AP100 AP103 AP9 APA9 AP1A AP1 AP3 APA4 AP95 AP10 AP15 AP11 AP12 APA12 APA11 APA16 AP16 AP13 AP2 AP7 AP6 AP1B APA6 AP92 AP4 AP94 AP17 APA17 AP5 AP8 AP18 AP22 AP20 AP24 AP23 AP29 AP25 APA26 AP26 AP27 AP31 AP91 AP89 AP90 APA33 APA85 AP87 AP88 AP85 AP21 AP19 AP28 AP30 AP32 AP33 AP65 AP67 AP69 AP68 AP51 AP63 AP52 AP42 AP43 APA40 AP40 AP66 AP61 APA62 AP64 APA64 AP62 AP60 AP35 AP37 AP39 AP70 AP80 AP74 AP71 AP83 AP81

LEGEND

WELL LOCATIONS
F_STATCODE

- ABD
- AGW
- AOW
- D&A
- DAO
- DIS
- DRL
- EXP
- GAS
- INJ
- J&A
- LOC
- M-O
- MOG
- N/A
- OIL
- P&A
- SER
- SUS
- SWD
- T&A
- WTR

KEY (MODEL SATURATION PLUMES)

CV2_MaxPlumePSI_2095

KEY (PROPOSED WELLS)

PROPOSED CLASS VI WELL

PROPOSED MONITOR WELLS

DEEP MONITOR (IZ)

SHALLOW MONITOR (ACZ)

VICINITY INSET MAP

Clark, Dallas, Cleveland, Lincoln, Desha, Little River, Hempstead, Nevada, Ouachita, Calhoun, Bradley, Drew, Arkansas, Miller, Lafayette, Columbia, AOI, Union, Ashley, Chicot, Caddo, Bossier, Webster, Claiborne, Union, Morehouse, West Carroll, East Carroll, Louisiana, Lincoln, Bienville, Jackson, Ouachita, Richland, Madison

Coordinate System: NAD 1927 StatePlane Arkansas South FIPS 0302
Projection: Lambert Conformal Conic
Datum: North American 1927
False Easting: 2,000,000.0000
False Northing: 0.0000
Central Meridian: -92.0000
Standard Parallel 1: 33.3000
Standard Parallel 2: 34.7667
Latitude Of Origin: 32.6667
Units: Foot US

N

0 1,500 3,000 6,000 9,000 Feet

0 0.2 0.4 0.8 1.2 1.6 Miles

KEY

PROPOSED CLASS VI WELL

AOR: CONE OF INFLUENCE (COI)

Lapis Energy - Project Blue (Union Co., AR)
NOTE: O&G Well Locations based from data licensed from ENVERUS, TOBIN, IHS, and AOGC and QC'd for final well locations 11/2022; within AR: Union Parish ONLY.

Lapis Energy

PISC E.3 - FIGURE 8
MAX SATURATION PLUME FRONT
COTTON VALLEY (CV2) INJECTION ZONE
(YEAR-END 2095)

UNION CO.,ARKANSAS

GEODETIC DATUM: NAD27 SP AR S PROJECTION: LAMBERT CONFORMAL CONIC GRID UNITS: FEET	SCALE: SEE SCALEBAR 1" = 3000' (1:36K) PRINT SIZE: 17" x 11" (Ledger)

DATE: 12/29/2022	PROJECT NAME: 220031-LEE	MAP BY: ESSJ (GKS) CHECK BY: DC (GKS)	SHEET: 1 OF 1

Geostock Sandia

AOI - PROJECT BLUE

AOR: CONE OF INFLUENCE (COI)

T16S R16W

T16S R15W

T17S R16W

T17S R15W

Union

LSB ACREAGE

EDC 1 (PROPOSED DEEP MONITOR WELL)

PROPOSED SHALLOW MONITOR WELL

PROPOSED WELL 1 (CLASS VI)

PROPOSED DEEP MONITOR WELL

CV3 2095

KEY (MODEL SATURATION PLUMES)

CV3_MaxPlumePSI_2095

KEY (PROPOSED WELLS)

PROPOSED CLASS VI WELL

PROPOSED MONITOR WELLS

DEEP MONITOR (IZ)

SHALLOW MONITOR (ACZ)

LEGEND

WELL LOCATIONS

F_STATCODE

ABD, AGW, AOW, D&A, DAO, DIS, DRL, EXP, GAS, INJ, J&A, LOC, M-O, MOG, N/A, OIL, P&A, SER, SUS, SWD, T&A, WTR

VICINITY INSET MAP

Arkansas: Clark, Dallas, Cleveland, Lincoln, Desha, Little River, Hempstead, Nevada, Ouachita, Calhoun, Bradley, Drew, Miller, Lafayette, Columbia, Union (AOI), Ashley, Chicot

Louisiana: Caddo, Bossier, Webster, Claiborne, Union, Morehouse, West Carroll, East Carroll, Lincoln, Bienville, Ouachita, Richland, Madison, Jackson

Coordinate System: NAD 1927 StatePlane Arkansas South FIPS 0302
Projection: Lambert Conformal Conic
Datum: North American 1927
False Easting: 2,000,000.0000
False Northing: 0.0000
Central Meridian: -92.0000
Standard Parallel 1: 33.3000
Standard Parallel 2: 34.7667
Latitude Of Origin: 32.6667
Units: Foot US

N

0 1,500 3,000 6,000 9,000 Feet

0 0.2 0.4 0.8 1.2 1.6 Miles

KEY

PROPOSED CLASS VI WELL

AOR: CONE OF INFLUENCE (COI)

Lapis Energy - Project Blue (Union Co., AR)
NOTE: O&G Well Locations based from data licensed from ENVERUS, TOBIN, IHS, and AOGC and QC'd for final well locations 11/2022; within AR: Union Parish ONLY.

Lapis Energy

PISC E.3 - FIGURE 9
MAX SATURATION PLUME FRONT
COTTON VALLEY (CV3) INJECTION ZONE
(YEAR-END 2095)

UNION CO.,ARKANSAS

GEODETIC DATUM: NAD27 SP AR S PROJECTION: LAMBERT CONFORMAL CONIC GRID UNITS: FEET	SCALE: SEE SCALEBAR 1" = 3000' (1:36K) PRINT SIZE: 17" x 11" (Ledger)

DATE: 12/29/2022	PROJECT NAME: 220031-LEE	MAP BY: ESSJ (GKS) CHECK BY: DC (GKS)	SHEET: 1 OF 1

Geostock Sandia