



Geologic Sequestration of Carbon Dioxide

Underground Injection Control (UIC)
Program Class VI Well Recordkeeping,
Reporting, and Data Management
Guidance for Owners and Operators

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Disclaimer

The Class VI injection well classification was established by the *Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO₂) Geologic Sequestration (GS) Wells* (75 FR 77230, December 10, 2010), referred to as the Class VI Rule, which establishes a new class of injection well (Class VI).

The Safe Drinking Water Act (SDWA) provisions and the United States Environmental Protection Agency (EPA) regulations cited in this document contain legally-binding requirements. In several sections, this guidance document makes suggestions and offers alternatives that go beyond the minimum requirements indicated by the Class VI Rule. This is intended to provide information and suggestions that may be helpful for implementation efforts. Such suggestions are prefaced by “may” or “should” and are to be considered advisory. They are not required elements of the Rule. Therefore, this document does not substitute for those provisions or regulations, nor is it a regulation itself, so it does not impose legally-binding requirements on the EPA, states, or the regulated community. The recommendations herein may not be applicable to each and every situation.

EPA and state decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. Any decisions regarding a particular facility will be made based on the applicable statutes and regulations. Mention of trade names or commercial products does not constitute endorsement or recommendation for use. This guidance may change in the future without a formal notice and comment period.

While the EPA has made every effort to ensure the accuracy of the discussion in this document, the obligations of the regulated community are determined by statutes, regulations, or other legally binding requirements. In the event of a conflict between the discussion in this document and any statute or regulation, this document would not be controlling.

Note that this document only addresses issues covered by the EPA’s authorities under SDWA. Other EPA authorities, such as Clean Air Act (CAA) requirements to report carbon dioxide injection activities under the Greenhouse Gas Reporting Program, are not within the scope of this document.

Executive Summary

The EPA's *Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO₂) Geologic Sequestration (GS) Wells*, codified in the U.S. Code of Federal Regulations (CFR) [40 CFR 146.81 *et seq.*], known as the Class VI Rule, establishes a class of injection well, Class VI, and sets minimum technical criteria for Class VI injection wells for the purposes of protecting underground sources of drinking water (USDWs). This document is one of a group of guidance documents developed to support owners or operators of Class VI wells and the UIC Program permitting authorities.

Under the Class VI Rule, owners or operators of Class VI wells are required to site, construct, and operate their wells according to the specific technical criteria that address specific GS activities: site characterization; area of review (AoR) delineation and corrective action; well construction and operation; financial responsibility; testing and monitoring; reporting and recordkeeping; post-injection site care (PISC) and site closure; and emergency and remedial response. Recordkeeping, reporting, and data management are important components of the UIC Program, helping to ensure that the activities and operations regulated under the program are conducted as planned, are compliant with the regulations and permit conditions, and, ultimately, are sufficiently protective of USDWs.

This guidance is intended to describe specific information that owners or operators of Class VI wells are required or recommended to submit during each GS activity under the Class VI Rule. It closely references other UIC Program Class VI guidance documents for technical details and its content complements the information in the *UIC Program Class VI Implementation Manual for Permitting Authorities*. This document will help owners or operators understand the type and format of information the EPA is seeking in order to make risk-based permitting decisions.

Additionally, the Class VI Rule, at 40 CFR 146.91(e), requires owners or operators of Class VI wells to submit all required reports, submittals, and notifications to the EPA in an approved electronic format. Therefore, this guidance document also provides recommendations for the use of the EPA's centralized, integrated electronic reporting and data management system, the Geologic Sequestration Data Tool (GSDT). The Introduction describes the purpose and organization of the document and provides background information on the GSDT. The GSDT provides a framework in which owners and operators should electronically submit information. Section 2 provides overarching information on the GSDT. Sections 3 through 6 describe reporting, recordkeeping, and data management activities that take place in the different phases of a Class VI project's life cycle.

Table of Contents

Disclaimer	i
Executive Summary	ii
Table of Contents	iii
List of Tables	v
List of Figures.....	v
Acronyms and Abbreviations	vi
Definitions.....	vii
1 Introduction.....	1
1.1 Purpose of Guidance.....	1
1.2 Class VI Project Phases and Reporting Requirements	3
2 Electronic Reporting and the GSDT	7
2.1 Electronic Reporting under the Class VI Rule	7
2.2 Introduction to the GSDT	8
2.3 GSDT Registration and Access	9
2.4 Project Communications and the Administrative Record	10
2.5 Recordkeeping Requirements.....	12
3 Pre-Construction Phase Reporting and Recordkeeping	13
3.1 Class VI Permit Applications	14
3.1.1 Site Characterization	16
3.1.2 AoR and Corrective Action	17
3.1.3 Financial Responsibility Demonstration	20
3.1.4 Well Construction and Operation.....	22
3.1.5 Pre-Operational Testing Program.....	23
3.1.6 Testing and Monitoring	24
3.1.7 Injection Well Plugging.....	26
3.1.8 PISC and Site Closure	26
3.1.9 Emergency and Remedial Response	28
3.2 Injection Depth Waivers	29
3.3 Aquifer Exemption Expansions.....	31
4 Pre-Operation Phase Reporting and Recordkeeping	33
4.1 Site Characterization.....	35
4.2 AoR and Corrective Action	37
4.3 Injection Well Construction.....	39
4.4 Pre-Operational Testing.....	40
4.5 Other Project Plans	41
4.6 Financial Responsibility	42

5	Injection Phase Reporting and Recordkeeping.....	44
5.1	Semi-Annual Reports of Testing and Monitoring Results	46
5.1.1	Carbon Dioxide Stream Monitoring Results	47
5.1.2	Operational Monitoring Results	48
5.1.3	Description of Exceedances or Shut-Offs	49
5.1.4	Other Testing and Monitoring Results	50
5.2	Well Testing Notifications and Results	54
5.3	Project Plan Amendments and Other Periodic Reporting	55
5.3.1	AoR Reevaluations and Corrective Action	56
5.3.2	Other Project Plan Amendments	57
5.3.3	Financial Responsibility Updates	59
5.4	Emergency and Remedial Response and Other Occasional Reporting	59
5.4.1	Emergency and Remedial Response	60
5.4.2	Notifications of Adverse Financial Conditions	61
6	Post-Injection Phase Reporting and Recordkeeping	62
6.1	Injection Well Plugging.....	64
6.1.1	Pre-Plugging Submissions.....	64
6.1.2	Well Plugging Report.....	66
6.2	PISC Reporting.....	66
6.2.1	PISC and Site Closure Plan	67
6.2.2	PISC Monitoring Results.....	67
6.2.3	Non-Endangerment Demonstration.....	68
6.3	Site Closure Reporting.....	69
6.3.1	Pre-Site Closure Submissions	69
6.3.2	Site Closure Report	71

List of Tables

Table 3-1. Summary of submittals to be made during the pre-construction phase.....	13
Table 4-1. Summary of submittals to be made during the pre-operation phase, to support the determination to authorize injection.	33
Table 5-1. Summary of submittals to be made during the injection phase.....	44
Table 6-1. Summary of submittals to be made during the post-injection phase.....	62

List of Figures

Figure 1-1. Sections of this guidance document and other supporting documentation that apply to each of the Class VI project phases.	4
Figure 2-1. The GS Data Tool registration and ESA process.....	9
Figure 2-2. The GS DT reporting modules, mapped to project phases and Class VI Rule requirements.....	11

Acronyms and Abbreviations

AoR	Area of Review
CAA	Clean Air Act
CBI	Confidential business information
CFR	Code of Federal Regulations
CROMERR	Cross-Media Electronic Reporting Regulation
CO ₂	Carbon dioxide
EPA	Environmental Protection Agency
ESA	Electronic Signature Agreement
FR	Federal Register
GIS	Geographic information system
GS	Geologic Sequestration
GS ³	Geologic Sequestration Software Suite
GSDT	Geologic Sequestration Data Tool
JRP	Joint Requirements Planning
LAS	Log ASCII Standard
MIT	Mechanical integrity test
PDF	Portable document format
PISC	Post-injection site care
PNNL	Pacific Northwest National Laboratory
PWSS	Public Water System Supervision
QA/QC	Quality assurance/quality control
QASP	Quality Assurance and Surveillance Plan
SDWA	Safe Drinking Water Act
TDS	Total dissolved solids
UIC	Underground Injection Control
USDW	Underground source of drinking water

Definitions

Key to definition sources:

- 1: Class VI Rule Preamble.
- 2: 40 CFR 144.3.
- 3: 40 CFR 146.81(d).
- 4: This definition was developed for the purposes of this document.
- 5: 40 CFR 144.6(f) and 144.80(f).

Annulus means the space between the well casing and the wall of the borehole; the space between concentric strings of casing; or, the space between casing and tubing.¹

Aquifer exemption means a process by which an aquifer or portion of an aquifer is removed from SDWA protection to allow injection that would otherwise be prohibited, where certain requirements [40 CFR 146.4] are met.⁴

Area of review (AoR) means the region surrounding the GS project where USDWs may be endangered by the injection activity. The AoR is delineated using computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide stream and displaced fluids, and is based on available site characterization, monitoring, and operational data as set forth in 40 CFR 146.84.³

Carbon dioxide plume means the extent underground, in three dimensions, of an injected carbon dioxide stream.³

Carbon dioxide stream means carbon dioxide that has been captured from an emission source (e.g., a power plant), plus incidental associated substances derived from the source materials and the capture process, and any substances added to the stream to enable or improve the injection process. This subpart [subpart H of 40 CFR 146] does not apply to any carbon dioxide stream that meets the definition of a hazardous waste under 40 CFR Part 261.³

Casing means pipe material placed inside a drilled hole to prevent the hole from collapsing. The two types of casing in most injection wells are (1) surface casing, the outer-most casing that extends from the surface to the base of the lowermost USDW and (2) long-string casing, which extends from the surface to or through the injection zone.¹

Cement means material used to support and seal the well casing to the rock formations exposed in the borehole. Cement also protects the casing from corrosion and prevents movement of injectate up the borehole. The composition of the cement may vary based on the well type and purpose; cement may contain latex, mineral blends, or epoxy.¹

Class I well means a well that injects hazardous waste, other industrial and municipal waste, and radioactive wastes beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.⁴

Class II well means a well that injects fluids (1) brought to the surface in connection with natural gas storage operations or conventional oil or natural gas production, (2) for enhanced recovery of oil or natural gas, and (3) for storage of hydrocarbons which are liquid at standard temperature and pressure.⁴

Class V well means a well designed and constructed for injection, but not included in the definitions of Class I, II, III, IV, or VI wells. Class V wells inject non-hazardous fluids into or above a USDW and are typically shallow, on-site disposal systems; however, this class also includes some deeper injection operations. There are approximately 20 subtypes of Class V wells.⁴

Class VI wells means wells that are not experimental in nature that are used for GS of carbon dioxide beneath the lowermost formation containing a USDW; or, wells used for GS of carbon dioxide that have been granted a waiver of the injection depth requirements pursuant to requirements at 40 CFR 146.95; or, wells used for GS of carbon dioxide that have received an expansion to the areal extent of an existing Class II enhanced oil recovery or enhanced gas recovery aquifer exemption pursuant to 40 CFR 146.4 and 144.7(d).⁵

Computational code refers to a series of interrelated mathematical equations solved by computer to represent the behavior of a complex system. For the purposes of GS, computational models represent, at a minimum, the flow and transport of multiple fluids and components in varying phases through porous media. Computational codes offer the ability to predict fluid flow in the subsurface using scientifically accepted mathematical approximations and theory. The use of computational codes is necessary because the mathematical formulations describing fluid flow are complicated and in many cases, non-linear. Several codes have been specifically developed or tailored for injection activities similar to GS, and can be used for this purpose.⁴

Computational model means a mathematical representation of the injection project and relevant features, including injection wells, site geology, and fluids present. For a GS project, site specific geologic information is used as input to a computational code, creating a computational model that provides predictions of subsurface conditions, fluid flow, and carbon dioxide plume and pressure front movement at that site. The computational model comprises all model input and predictions (i.e., output).⁴

Confining zone means a geologic formation, group of formations, or part of a formation stratigraphically overlying the injection zone(s) that acts as barrier to fluid movement. For Class VI wells operating under an injection depth waiver, confining zone means a geologic formation, group of formations, or part of a formation stratigraphically overlying and underlying the injection zone(s).³

Corrective action means the use of UIC Program Director-approved methods to ensure that wells within the AoR do not serve as conduits for the movement of fluids into USDWs.³

Enhanced gas recovery means the process of injecting a gas (i.e., carbon dioxide) into a gas-bearing formation to displace available gas to allow it to be produced.⁴

Enhanced oil recovery means the process of injecting carbon dioxide into an oil reservoir to thin (decrease the viscosity of) extractable oil, which is then available for recovery.⁴

Enhanced recovery means either enhanced oil recovery or enhanced gas recovery.⁴

Fluid means any material or substance which flows or moves, whether in a semisolid, liquid, sludge, gas, or other form or state.²

Formation or geological formation means a layer of rock that is made up of a certain type of rock or a combination of types.¹

Geologic sequestration (GS) means the long-term containment of a gaseous, liquid, or supercritical carbon dioxide stream in subsurface geologic formations. This term does not apply to carbon dioxide capture or transport.³

Geologic Sequestration Data Tool (GSDT) means the EPA's centralized, integrated electronic reporting and data management system for Class VI projects.⁴

GS project means an injection well or wells used to emplace a carbon dioxide stream beneath the lowermost formation containing a USDW; or, wells used for GS of carbon dioxide that have been granted a waiver of the injection depth requirements pursuant to requirements at 40 CFR 146.95; or, wells used for GS of carbon dioxide that have received an expansion to the areal extent of an existing Class II enhanced oil recovery or enhanced gas recovery aquifer exemption pursuant to 40 CFR 146.4 and 144.7(d). It includes the subsurface three-dimensional extent of the carbon dioxide plume, associated area of elevated pressure, and displaced fluids, as well as the surface area above that delineated region.³

Injectate means the fluids injected. For the purposes of the Class VI Rule, this is also known as the carbon dioxide stream.¹

Injection depth waiver refers to a waiver of the Class VI injection depth requirements by the UIC Program Director and the EPA Regional Administrator pursuant to provisions at 40 CFR 146.95.⁴

Injection zone means a geologic formation, group of formations, or part of a formation that is of sufficient areal extent, thickness, porosity, and permeability to receive carbon dioxide through a well or wells associated with a GS project.³

Mechanical integrity means the absence of significant leakage within the injection tubing, casing, or packer (known as internal mechanical integrity), or outside of the casing (known as external mechanical integrity).¹

Mechanical integrity test (MIT) refers to a test performed on a well to confirm that a well maintains internal and external mechanical integrity. MITs are a means of measuring the adequacy of the construction of an injection well and a way to detect problems within the well system.¹

Model means a representation or simulation of a phenomenon or process that is difficult to observe directly or that occurs over long time frames. Models that support GS can predict the flow of carbon dioxide within the subsurface, accounting for the properties and fluid content of the subsurface formations and the effects of injection parameters.¹

Owner or operator means the owner or operator of any facility or activity subject to regulation under the UIC program.²

Packer means a mechanical device that seals the outside of the tubing to the inside of the long-string casing, isolating an annular space.¹

Phased corrective action refers to a provision of the Class VI Rule [40 CFR 146.84(b)(2)(iv)] afforded to Class VI injection well owners or operators to defer some identified corrective action needed within the AoR, but farther away from the injection well, until after injection has commenced, but prior to carbon dioxide plume and pressure front movement into that particular area.⁴

Post-injection site care (PISC) means appropriate monitoring and other actions (including corrective action) needed following cessation of injection to ensure that USDWs are not endangered, as required under 40 CFR 146.93.³

Pressure front means the zone of elevated pressure that is created by the injection of carbon dioxide into the subsurface. For GS projects, the pressure front of a carbon dioxide plume refers to the zone where there is a pressure differential sufficient to cause the movement of injected fluids or formation fluids into a USDW.³

Primacy (primary enforcement responsibility) means the authority to implement the UIC Program. To receive primacy, a state, territory, or tribe must demonstrate to the EPA that its UIC program is at least as stringent as the federal standards; the state, territory, or tribal UIC requirements may be more stringent than the federal requirements. The EPA may grant primacy for all or part of the UIC program, e.g., for certain classes of injection wells.⁴

Site closure means the point/time, as determined by the UIC Program Director following the requirements under 40 CFR 146.93, at which the owner or operator of a GS site is released from PISC responsibilities.³

Total dissolved solids (TDS) refers to the measurement, usually in mg/L, for the amount of all inorganic and organic substances suspended in liquid as molecules, ions, or granules. For injection operations, TDS typically refers to the saline (i.e., salt) content of water-saturated underground formations.¹

Tubing refers to a small-diameter pipe installed inside the casing of a well. Tubing conducts injected fluids from the wellhead at the surface to the injection zone and protects the long-string casing of a well from corrosion or damage by the injected fluids.⁴

Underground Injection Control (UIC) Program refers to the program that the EPA, or an approved state, is authorized to implement under SDWA that is responsible for regulating the

underground injection of fluids by well injection. This includes setting the federal minimum requirements for construction, operation, permitting, and closure of underground injection wells.⁴

Underground Injection Control (UIC) Program Director refers to the chief administrative officer of any state or tribal agency or the EPA Region that has been delegated to operate an approved UIC program.⁴

Underground source of drinking water (USDW) means an aquifer or its portion which supplies any public water system; or which contains a sufficient quantity of ground water to supply a public water system; and currently supplies drinking water for human consumption; or contains fewer than 10,000 mg/L TDS; and which is not an exempted aquifer.²

Well bore refers to the hole that remains throughout a geologic (rock) formation after a well is drilled.⁴

Workover refers to any maintenance activity performed on a well that involves ceasing injection or production and removing the wellhead.⁴

1 Introduction

To ensure the protection of underground sources of drinking water (USDWs), the United States Environmental Protection Agency (EPA) established minimum federal requirements for the proper management of carbon dioxide injection and storage under the authority of Part C of the Safe Drinking Water Act (SDWA) on December 10, 2010. The *Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO₂) Geologic Sequestration (GS) Wells*, found at 75 FR 77230 and hereafter referred to as the Class VI Rule, establishes a new class of injection wells, Class VI, for the injection of carbon dioxide for GS.

The Class VI Rule defines technical criteria for the safe deployment of Class VI projects, including site characterization; area of review (AoR) delineation and corrective action; well construction and operation; financial responsibility; testing and monitoring; reporting and recordkeeping; well plugging, post-injection site care (PISC) and site closure; and emergency and remedial response. It requires well owners or operators to collect, generate, and report specific information needed to inform permitting and compliance decisions related to siting, constructing, operating, monitoring, and closing a Class VI well [40 CFR 146.81 *et seq.*].

Pursuant to Section 1445 of SDWA, owners or operators subject to requirements under SDWA must establish and maintain records, conduct monitoring, and provide any information that the Administrator or a representative, such as a UIC Program Director, may require by regulation to comply with the Act. Therefore, reporting and recordkeeping are important components of the UIC Program to ensure that activities and operations regulated under the program are conducted as planned, are compliant with the regulations and permit conditions, and, ultimately, are sufficiently protective of USDWs.

1.1 Purpose of Guidance

This guidance is one of a group of guidance documents that describe Class VI well operations that are protective of USDWs and in compliance with the Class VI Rule. This document is designed to provide guidance to Class VI injection well owners or operators and their representatives regarding recordkeeping, reporting, and management of data associated with Class VI projects.

Specifically, the purpose of this guidance document is to provide:

- A comprehensive description of the reporting and recordkeeping requirements of the Class VI Rule, for each phase of a Class VI project (see Section 1.2 for a discussion of the Class VI project phases).
- A description of the reporting process, as guided by the EPA's Geologic Sequestration Data Tool (GSDT). The GSDT is an electronic reporting tool for Class VI owners, operators, and permitting authorities, developed by the EPA to facilitate compliance with 40 CFR 146.91(e).

- Information on how the reporting, recordkeeping, and data management activities will ensure USDW protection and support compliance determinations. The GS DT supports the creation and maintenance of a comprehensive administrative record for each project, which supports the EPA's permitting and compliance decisions.

The EPA recommends that this guidance document be used by owners or operators for support in navigating the reporting and recordkeeping requirements of the Class VI Rule. The tables and text boxes provided throughout the document give an overview of associated reporting processes/GS DT workflows, identify resources that owners or operators can use when developing their submissions, and can serve as a check to ensure that regulatory requirements have been met. In addition to these quick reference items, the document provides the basis for the reporting requirements of each project phase (as described in the text of this document), which is critical to ensuring efficiency in permitting and operations throughout the life of an injection project. The EPA's experience with issuing Class VI permits has informed the suggestions that are made throughout this document, and every effort has been made to maximize efficiency while adhering to the Class VI Rule and ensuring USDW protection.

As noted above, this document is one of a complementary suite of technical guidance documents that address various aspects of permitting and operating a Class VI injection well. This document focuses specifically on the reporting process for Class VI projects: *what* information to submit, *when* and *how* to submit it, and in *what format* the EPA recommends that it be submitted. Other Class VI guidance documents (see the box at right) provide recommendations for conducting the activities necessary to generate this information, and references to these other documents are noted in the text where appropriate. As they are finalized, all of the Class VI guidance documents will be made available on the EPA's website at <http://www.epa.gov/uic/class-vi-guidance-documents> and <https://www.epa.gov/uic/guidance-documents-underground-injection-control-financial-responsibilities>.

The EPA has also developed the *UIC Program Class VI Implementation Manual for Permitting Authorities*, which describes requirements and provides recommendations specific to the activities of UIC Program Directors. This Implementation Manual may also be useful to owners or operators, helping them to understand the review and oversight process that will follow their submissions, and anticipate what the permitting authority will need to inform its review.

Class VI Guidance Documents for Owners or Operators

- *UIC Program Class VI Well Site Characterization Guidance*
- *UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance*
- *UIC Program Class VI Financial Responsibility Guidance*
- *UIC Program Class VI Well Construction Guidance*
- *UIC Program Class VI Well Testing and Monitoring Guidance*
- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*
- *UIC Program Class VI Well Injection Depth Waivers Guidance*
- *UIC Program Guidance on Transitioning Class II Wells to Class VI Wells*

1.2 Class VI Project Phases and Reporting Requirements

The Class VI Rule requires owners or operators to submit information throughout the lifetime of a Class VI project to demonstrate protection of USDWs and maintain regulatory compliance. A Class VI project consists of four main phases: (1) the pre-operational phase prior to construction (also referred to as the pre-construction phase), (2) the pre-operational phase prior to operation (also referred to as the pre-operation phase), (3) the injection phase, and (4) the post-injection phase. Figure 1-1 (on the following page) illustrates these project phases, the milestones that separate them, and the sections of this guidance document that provide reporting recommendations for each. As shown in the figure, the GSDT user guides and related resources apply throughout all four phases of a Class VI project’s life cycle. The paragraphs below summarize the key activities that take place during each project phase, along with the associated requirements for reporting, recordkeeping, and data management.

The **pre-construction phase** begins with the submission of a Class VI permit application. The Class VI Rule, at 40 CFR 146.82(a), requires prospective owners or operators to submit a permit application prior to the issuance of a permit for the construction of a new Class VI well or the conversion of an existing well to a Class VI well. The permit application (see Section 3.1) is a

comprehensive collection of proposed project information, including a characterization of the site, an AoR delineation supported by computational modeling, proposed well construction and operation details, a demonstration of financial responsibility, and five project-specific plans (the AoR and Corrective Action Plan, the Testing and Monitoring Plan, the Injection Well Plugging Plan, the PISC and Site Closure Plan, and the Emergency and Remedial Response Plan). Owners or operators seeking to convert existing Class I, Class II, or Class V experimental technology wells to Class VI must demonstrate that the wells were engineered and constructed to meet the requirements at

40 CFR 146.86(a) and to ensure protection of USDWs, in lieu of requirements at 40 CFR 146.86(b) and 146.87(a).¹ Permit applicants seeking a waiver of the requirement to inject below the lowermost USDW must also submit a supplemental report as required at 40 CFR 146.95(a). This injection depth waiver application report (see Section 3.2) must be submitted concurrent with the permit application, pursuant to 40 CFR 146.82(d). In addition, owners or operators seeking to expand the areal extent of an existing aquifer exemption will need to apply to the UIC Program Director pursuant to the requirements at 40 CFR 144.7(d)(1). Recommendations for submittals associated with aquifer exemption expansions are presented in Section 3.3.

¹ While the Class VI Rule, at 40 CFR 146.81(c) and 146.82(a), specifically lists Class I, Class II, and Class V experimental technology wells as examples of wells that can transition to Class VI, EPA may also consider other types of wells (e.g., monitoring or stratigraphic test wells) for conversion to Class VI provided they meet all of the applicable regulatory requirements. When EPA considers other types of wells for conversion to Class VI, those wells are subject to the same regulatory requirements as those well types listed as examples in 40 CFR 146.81(c) and 146.82(a).

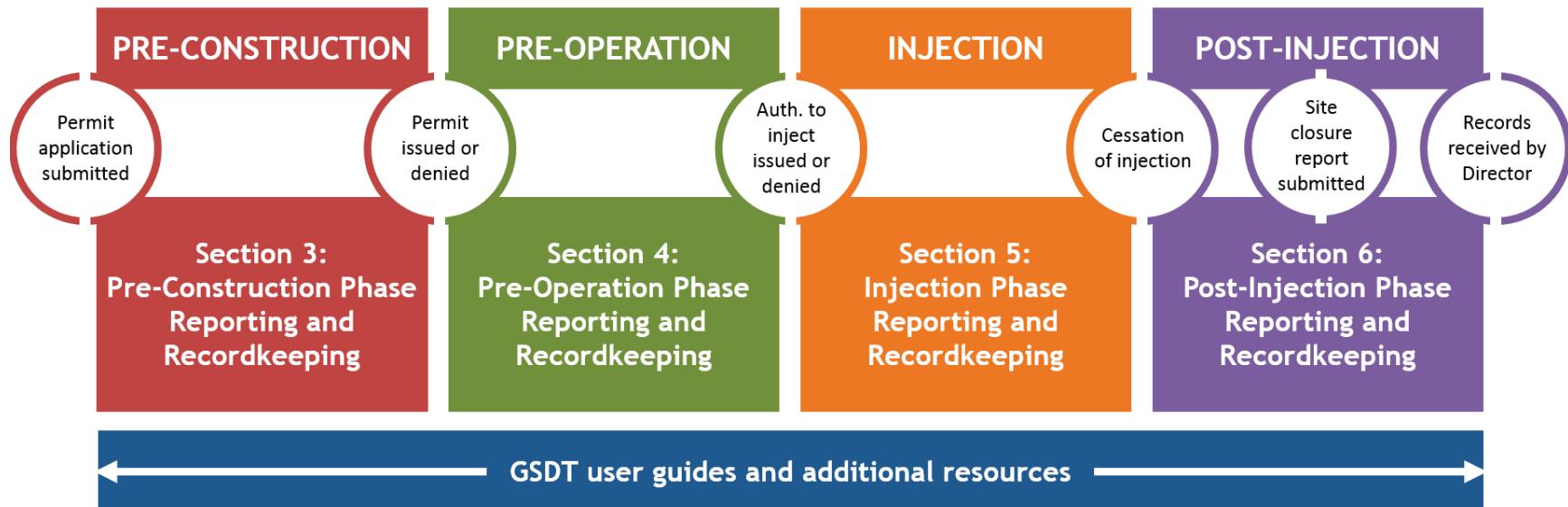


Figure 1-1. Sections of this guidance document and other supporting documentation that apply to each of the Class VI project phases.

The pre-construction phase includes an iterative evaluation process, during which permit applicants may be required to make subsequent submissions in response to requests for additional information from the UIC Program Director. These requests would be made to achieve compliance with the rule requirements and/or to provide clarification to the permitting authority; the Class VI Rule, at 40 CFR 146.82(a)(21), provides the Director discretion to request additional information to inform his or her evaluation. When all of the information identified at 40 CFR 146.82(a) has been submitted and evaluated, the UIC Program Director will evaluate it and determine whether to issue a Class VI permit that authorizes the owner or operator to construct a Class VI well (or to convert an existing well to Class VI, if applicable).

The **pre-operation phase** is the period during which the owner or operator and UIC Program Director comply with the requirements under 40 CFR 146.82(c) and previously established permit conditions. Before an owner or operator may inject carbon dioxide, the UIC Program Director must consider information generated in conjunction with drilling and construction, and the EPA expects that owners or operators will submit all of the information necessary to support the Director's review when that information has not otherwise been made available to the Director. This information, specified at 40 CFR 146.82(c), includes the results of logs, surveys, and tests conducted pursuant to 40 CFR 146.87; a final AoR delineation; site characterization updates based on data gathered during drilling and testing; final well construction information; and final project plans. In addition, updates to financial responsibility cost estimates and/or financial instruments may take place during this phase. Section 4 presents recommendations for pre-operation submittals.

Similar to the pre-construction phase, the UIC Program Director's evaluation of Class VI Rule compliance during the pre-operation phase may require an iterative process with submission of additional information and/or clarification by the owner or operator. When all of the required information has been submitted and evaluated, the UIC Program Director will determine whether to authorize injection operations. Issuance of the final decision to authorize injection marks the end of this phase.

During the **injection phase**—when the actual injection operation takes place—owners or operators are required to submit information at certain intervals to demonstrate compliance with the Class VI requirements. Pursuant to 40 CFR 146.91(a)-(d), owners or operators must submit semi-annual reports of testing and monitoring results; 30-day advance notifications of well tests; well test results within 30 days of each test; and notifications of emergency situations within 24 hours of their occurrence.

Pre-Operation Phase Reporting

- Site characterization updates
40 CFR 146.82(c)(2)-(3)
- Amended AoR and Corrective Action Plan, including final AoR delineation and corrective action status
40 CFR 146.82(c)(1), (6), (9)
- Injection well construction updates
40 CFR 146.82(c)(3), (5)
- Pre-operational testing results
40 CFR 146.82(c)(4), (7), (8)
- Amendments to other project plans
40 CFR 146.82(c)(9)
- Any other information requested by the UIC Program Director
40 CFR 146.82(c)(10)
- Financial responsibility updates
40 CFR 146.85

Injection Phase Reporting

- Semi-annual reports of testing and monitoring results
40 CFR 146.91(a)
- Well test notifications and results
40 CFR 146.91(b), (d)
- Project plan amendments and other periodic reporting
40 CFR 146.84(e)(4); 146.85; 146.90(j); 146.93(a)(4); 146.94(d)
- Emergency and remedial response and other occasional reporting
40 CFR 146.85(d); 40 CFR 146.88(f)(4)-(5), 146.91(c), 146.94(b)-(c)

Periodically throughout the injection phase, owners or operators must reevaluate the project's AoR and, if necessary, amend one or more of their project plans [40 CFR 146.84(e), 146.90(j), and 146.94(d)]. Owners or operators must also update financial responsibility information annually and under certain other conditions [40 CFR 146.85(a)(5)(ii)]. See Section 5 of this document for recommendations related to injection phase submittals.

The **post-injection phase** begins with the cessation of injection activities. During this phase, owners or operators must plug the injection well, perform post-injection monitoring activities, demonstrate that no additional monitoring is needed to ensure that the site does not pose an

endangerment to USDWs, and close the site, pursuant to 40 CFR 146.92 and 146.93. Because injection wells may be converted to monitoring wells after injection has ceased, injection well plugging is not required to take place at the beginning of the post-injection phase. However, pursuant to 40 CFR 146.93(f)(1), the site closure report must include documentation of appropriate injection well and monitoring well plugging as specified in 40 CFR 146.92 and 146.93(e) regardless of when the injection well plugging took place.

As necessary during the post-injection phase, the owner or operator will also perform AoR reevaluations and potentially amend the associated project plans, provide updates on financial responsibility, and conduct emergency and remedial response activities. Reporting associated with this phase of the Class VI project is

described in Section 6 and includes: submitting a notice of intent to plug the well; submitting an injection well plugging report; submitting an amended PISC and Site Closure Plan; reporting the results of PISC monitoring; performing a non-endangerment demonstration; and submitting a site closure report. The post-injection phase ends when the site is closed and the UIC Program Director receives the site closure report; owners or operators must also deliver post-injection records to the UIC Program Director following a 10-year retention period, as required by 40 CFR 146.93(h).

Post-Injection Phase Reporting

- Injection well plugging submissions
40 CFR 146.92(c)-(d)
- PISC submissions, including the non-endangerment demonstration
40 CFR 146.93(a)-(b)
- Site closure submissions
40 CFR 146.93(d), (f)

2 Electronic Reporting and the GS DT

Under the Class VI Rule at 40 CFR 146.91(e), owners or operators are required to submit data generated and collected during the lifetime of a Class VI project directly to the EPA in an approved electronic format. The EPA developed the GS DT to facilitate compliance with this electronic reporting requirement. The requirement applies regardless of whether the project is located in a jurisdiction with primary enforcement responsibility (primacy) for Class VI wells, and UIC Program Directors of primacy states, tribes, and territories are encouraged to use the GS DT to eliminate duplicative reporting for owners and operators. The following subsections provide more information about electronic reporting in the context of the Class VI program, the key components and capabilities of the GS DT, and the recordkeeping requirements of the Class VI Rule.

2.1 Electronic Reporting under the Class VI Rule

Given the complex nature of Class VI well operations and the more comprehensive requirements of the Class VI Rule compared to those for other UIC well classes, a centralized and integrated reporting system that is managed by the EPA is essential for effective oversight of Class VI projects and management of GS data.

Centralized electronic reporting and data management offers several advantages, including:

- Reducing the burden on permit applicants/owners or operators for data submittal while also assisting with recordkeeping.
- Creating an instantaneous submission process, which is essential for the time-sensitive reporting required under the Class VI Rule, such as 24-hour emergency notifications.
- Facilitating collaboration among owner or operator project team members and between owners or operators and permitting authorities.
- Supporting consistency and continuity for projects with long lifetimes.
- Developing a complete, accurate, and reproducible administrative record for project permitting and compliance decisions.
- Reducing the burden on permitting authorities that receive and manage data.

In addition, centralized electronic reporting and recordkeeping facilitates transparency and supports the EPA's ability to respond to information requests from Congress, the public, and other interested parties. This characteristic is consistent with the recommendations of the *Report of the Interagency Task Force on Carbon Capture and Storage*: "State UIC primacy agencies' efforts could be aided by a national data system that would promote regulatory certainty, efficiency, and accountability, while allowing transparency of all geologic sequestration related information."²

² Interagency Task Force on Carbon Capture and Storage. 2010. *Report of the Interagency Task Force on Carbon Capture and Storage*, p. C-8. Available on the Internet at: <http://www.epa.gov/climatechange/Downloads/ccs/CCS-Task-Force-Report-2010.pdf>.

To determine the optimal way to address these electronic reporting needs, the EPA conducted a Joint Requirements Planning (JRP) process in 2011. During a JRP process, stakeholders and content experts participate in structured meetings to collaboratively identify, define, create, and refine user requirements. The EPA held JRP stakeholder meetings with participants from two groups: potential EPA users (particularly those from the EPA regional offices) and potential state and owner or operator users. The EPA then developed an Alternatives Analysis and conducted a cost-benefit evaluation of data system alternatives based on the information received from these stakeholders. Ultimately, the EPA determined that the most cost-effective alternative with the greatest operational value was a tool that relied on an existing system called the Geologic Sequestration Software Suite (GS³), which was developed by the Pacific Northwest National Laboratory (PNNL). The GS³ was developed using GS³ as a starting point.

2.2 Introduction to the GS³T

The Class VI Rule is organized according to key UIC Program elements, such as AoR and corrective action, financial responsibility, testing and monitoring, etc. Owners or operators of Class VI wells will submit information for these various topic areas throughout the life of their projects, as described in Section 1.2. To facilitate the efficient submittal of Class VI information, the GS³T utilizes a modular structure for reporting that corresponds to topic areas within the Class VI Rule (see the box below). The GS³T modules are structured to reflect the Class VI

Rule requirements (as shown in Figure 2-2 in Section 2.4), and Sections 3 through 6 of this guidance document refer to the GS³T modules to describe information requirements and associated recommendations for information type and format.

GS³T Reporting Modules for Owners or Operators

- Project Information Tracking
(for submitting/organizing general project data and permit applications)
- AoR and Corrective Action
- Financial Responsibility Demonstration
- Pre-Operational Testing
- Project Plan Submissions
- Alternative PISC Timeframe Demonstration
- Injection Depth Waivers and Aquifer Exemption Expansions
- Non-Endangerment Demonstration
- Injection and Post-Injection Phase Reporting
- Information Request
(for responding to permitting authority requests for additional information)

Class VI permit applicants, owners, and operators all access the GS³T through a centralized landing page, from which they can launch each of the reporting modules. The modules themselves consist of structured electronic forms that reflect the Class VI Rule requirements. Within the GS³T reporting modules, owners or operators provide information in three main ways: selections via check boxes, radio buttons, or drop-down menus; direct entry into text fields; and file uploads.

In some modules, the GS³T also provides templates that users can download, populate, upload, and submit. This helps users ensure that they have included all the necessary information to fulfill the applicable Class VI Rule requirements, while providing them the flexibility to tailor submissions to their particular projects.

Each reporting module has a user guide that describes the specific technical procedures necessary to populate and submit data using that module. These user guides can be downloaded

from within the modules and accessed from the operator landing page of the GS DT. Permitting authorities can also provide copies of the user guides to permit applicants/owners or operators. Because the GS DT modules may be updated over time (e.g., in response to user feedback), this guidance document focuses on the *content* and *timing* of submittals, with more specific technical recommendations described in the GS DT user guides and other resources. For the most up-to-date information on particular fields/actions within the GS DT, owners or operators should refer to the user guides or contact their permitting authority.

In light of the nearly universal use of computerized systems (particularly for wells as technically complex as Class VI wells), the EPA anticipates that most owners or operators will be able to submit data electronically using the GS DT. However, the EPA recognizes that there may be some circumstances where it will be necessary to submit data non-electronically or via an alternative electronic method. For example, the GS DT is not designed to receive confidential business information (CBI). Owners or operators who would like to claim information as CBI or otherwise discuss the possibility of submitting data outside of the GS DT should contact their permitting authority for further information and instructions. If any owners or operators cannot submit the required data using the GS DT, they should work with their UIC Program Director to identify an appropriate alternate reporting format or procedure to ensure regulatory compliance.

2.3 GS DT Registration and Access

The GS DT is for authorized users only and requires registration in compliance with the EPA's Cross-Media Electronic Reporting Regulation (CROMERR) and 40 CFR 144.32(a), under which UIC permit applications or other submittals by corporations must be signed by a responsible corporate officer or other authorized personnel. For permit applicants/owners or operators, there is a three-step process for establishing access to the GS DT (see Figure 2-1). This process includes establishing an Electronic Signature Agreement (ESA) to designate the authorized personnel who will submit information via the GS DT over the life of a Class VI well.

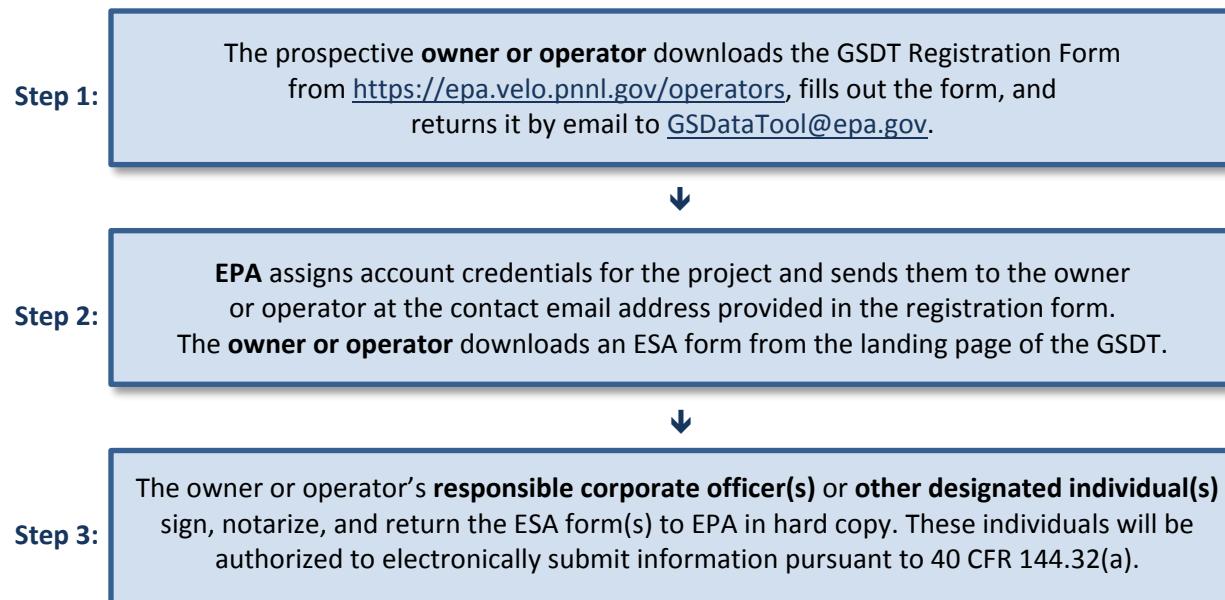


Figure 2-1. The GS Data Tool registration and ESA process.

GSDT accounts are issued on a per-project basis, meaning that there is one set of credentials for each project. This also means that data associated with a project is managed collectively regardless of the number of injection wells proposed for the project. (However, pursuant to 40 CFR 144.33, each injection well must be permitted separately with distinct Class VI permit numbers, and each well will be issued a unique UIC permit.) The project-level approach within the GSDT allows permit applicants/owners or operators to efficiently submit combined information that applies to all wells within a project (e.g., computational modeling results for AoR delineation).

Because only one set of credentials will be issued to an organization for a particular project, it is the owner or operator's responsibility to make sure that only appropriate individuals have access to the credentials. All users authorized by the owner or operator organization will need to establish an ESA with the EPA before they can make submissions using the GSDT.

2.4 Project Communications and the Administrative Record

An administrative record is a collection of documents that forms the basis for an EPA decision, including the provisions of a draft or final permit where the EPA is the permitting authority (see 40 CFR 124.9 and 124.18). The administrative record for a Class VI permit decision will include all components of the permit application—including any supporting documentation or responses to requests for additional information—once the permit is issued. By capturing and preserving all submissions, the GSDT supports the development of this record in an efficient and transparent manner. The EPA continues to build the record throughout the life of a Class VI project to document all of the materials that support compliance and oversight decisions.

The EPA encourages permit applicants/owners or operators to communicate with their permitting authorities throughout the lifetime of a Class VI project and acknowledges that different modes of communication (such as email, conference calls, etc.) may be appropriate in different situations. Note that any information supporting the permitting decision (e.g., files sent in response to questions or requests for additional information from the permitting authority) is considered to be part of the administrative record by the EPA. For this reason, the EPA recommends using the GSDT for all submissions of permitting- and compliance-related materials. The Information Request module of the GSDT was designed specifically to facilitate this type of information sharing in a way that preserves a clear and complete record while tracking the submission of additional information by owners or operators.

Most modules within the GSDT are designed to be used during multiple Class VI project phases (see Figure 2-2). This allows owners or operators to come back to modules that they have already populated and provide updated information when necessary. For example, an owner or operator who needs to submit annual financial responsibility updates will only need to update those fields in the Financial Responsibility Demonstration module that have changed since the last submission. All submissions are time-stamped and preserved by the system so that the GSDT contains a comprehensive log for the administrative record.

Class VI Project Phases and Associated Reporting Activities

GS Data Tool Reporting Module	Pre-Construction	Pre-Operation	Injection	Post-Injection
Project Information Tracking	Permit application <i>40 CFR 146.82(a)</i>	Permit application updates and other pre-operation information <i>40 CFR 146.82(c)</i>	Updates to basic project information N/A	Updates to basic project information N/A
AoR and Corrective Action	Proposed AoR and Corrective Action Plan, including AoR delineation and corrective action information <i>40 CFR 146.82(a)(4); 146.84(c)</i>	Amended AoR and Corrective Action Plan, including final AoR delineation and corrective action status <i>40 CFR 146.82(c)(1),(6),(9)</i>	AoR reevaluations and associated AoR and Corrective Action Plan amendments <i>40 CFR 146.84(e)</i>	AoR reevaluations and associated AoR and Corrective Action Plan amendments <i>40 CFR 146.84(e)</i>
Financial Responsibility Demonstration	Financial responsibility demonstration, including cost estimate and financial instruments <i>40 CFR 146.82(a)(14); 146.85(a)(5)(i)</i>	Financial responsibility cost estimate and instrument updates <i>40 CFR 146.85(a)(5)(ii), (c)(2)-(4), (e)</i>	Financial responsibility cost estimate and instrument updates <i>40 CFR 146.85(a)(5)(ii), (c)(2)-(4), (e)</i>	Financial responsibility cost estimate and instrument updates <i>40 CFR 146.85(a)(5)(ii), (c)(2)-(4), (e)</i>
Project Plan Submissions	Other proposed project plans <i>40 CFR 146.82(a)(15)-(17), (19); 146.84(b); 146.90; 146.92(b); 146.93(a)</i>	Other project plan amendments <i>40 CFR 146.82(c)(9)</i>	Other project plan amendments <i>40 CFR 146.90(j); 146.93(a)(4); 146.94(d)</i>	Other project plan amendments <i>40 CFR 146.92(c); 146.93(a)(3)-(4), (d); 146.94(d)</i>
Alternative PISC Timeframe Demonstration	Alternative PISC timeframe demonstration, as part of a proposed PISC and Site Closure Plan <i>40 CFR 146.82(a)(18); 146.93(c)</i>	Updated alternative PISC timeframe demonstration, as part of an amended PISC and Site Closure Plan <i>40 CFR 146.82(c)(9)</i>	Updated alternative PISC timeframe demonstration, as part of an amended PISC and Site Closure Plan <i>40 CFR 146.93(a)(4)</i>	Updated alternative PISC timeframe demonstration, as part of an amended PISC and Site Closure Plan <i>40 CFR 146.93(a)(4)</i>
Pre-Operational Testing	Proposed pre-operational logging and testing program <i>40 CFR 146.82(a)(8)</i>	Schedule of pre-operational logging and testing activities <i>40 CFR 146.87(f)</i>	Semi-annual reports of testing and monitoring results <i>40 CFR 146.91(a)</i>	PISC monitoring results <i>40 CFR 146.93(b)</i>
Injection and Post-Injection Phase Reporting			Well test notification and results <i>40 CFR 146.91(b),(d)</i>	Well plugging/site closure notifications and reports <i>40 CFR 146.92(c)-(d); 146.93(d), (f)</i>
Non-Endangerment Demonstration			Emergency and remedial response reporting <i>40 CFR 146.88(f)(4)-(5); 146.91(c); 146.94(b)-(c)</i>	Emergency and remedial response reporting <i>40 CFR 146.88(f)(4)-(5); 146.91(c); 146.94(b)-(c)</i>
Injection Depth Waivers and Aquifer Exemption Expansions	Injection depth waiver application <i>40 CFR 146.82(d); 146.95(a)</i>	Aquifer exemption expansion request <i>40 CFR 144.77(d); 146.4(d)</i>		Non-endangerment demonstration <i>40 CFR 146.93(b)(2)-(3)</i>

Figure 2-2. The GSDT reporting modules, mapped to project phases and Class VI Rule requirements.

2.5 Recordkeeping Requirements

Under the requirements outlined at 40 CFR 146.91(f), owners or operators of Class VI injection wells must retain records as follows:³

- All data collected under 40 CFR 146.82 for a Class VI permit application must be retained throughout the life of the Class VI project and for 10 years following site closure.
- Data on the nature and composition of all injected fluids collected under 40 CFR 146.90(a) must be retained until 10 years after site closure. The UIC Program Director may require the owner or operator to deliver the records at the conclusion of the retention period.
- All other monitoring data collected under 40 CFR 146.90(b) through (i) must be retained for 10 years after it is collected.
- Well plugging reports, post-injection data (including, if applicable, data and information used to develop the alternative PISC timeframe demonstration), and site closure reports, must be retained for 10 years following site closure.

The UIC Program Director also has the authority, pursuant to 40 CFR 146.91(f)(5), to require the owner or operator to retain records for longer than 10 years after site closure.

In compliance with CROMERR, materials submitted to the GSDT are time-stamped and preserved in a read-only format. These processes allow the EPA to build a comprehensive administrative record for each Class VI project (see Section 2.4) and support recordkeeping for both the owner or operator and the permitting authority. However, note that owners or operators must still comply with the recordkeeping requirements of the Class VI Rule, i.e., they must retain copies of all submittals as required by 40 CFR 146.91(f).

While the GSDT maintains a record of all previous submittals, allowing the permitting authority to build a comprehensive administrative record, the reporting modules available to owners or operators only display the current version of each submittal. In other words, owners or operators will only be able to access their most recently submitted information via the GSDT modules, and they cannot go back to review older submissions within the GSDT. Independent recordkeeping by owners or operators will ensure that they have access to the content of all previous submissions that may have been superseded by newer information.

³ For the purposes of the recordkeeping requirements discussed throughout this section, “data collected” is inclusive of both submitted data and data that support a permit applicant’s decision-making process.

3 Pre-Construction Phase Reporting and Recordkeeping

Prospective owners or operators (i.e., permit applicants) must submit certain information before receiving a permit to begin construction of a new Class VI well or the conversion of an existing Class I, Class II, or Class V experimental technology well to a Class VI well [40 CFR 146.82(a)]. This submittal, which makes up the Class VI permit application, includes information related to site characterization, AoR delineation, corrective action, injection well construction, operating information, and other topic areas. In addition to the permit application, owners or operators seeking a waiver of the injection depth requirement must also concurrently submit a waiver application report [40 CFR 146.95(a)]. Owners or operators of existing Class II wells that have made the business decision to transition to Class VI and that are operating under an aquifer exemption may also need to submit information requesting the expansion of the areal extent of that aquifer exemption [40 CFR 144.7(d)].

The submittals to be made during this project phase are summarized in Table 3-1 and described in more detail in the subsections below. Note that, pursuant to 40 CFR 146.91(f)(1), all data collected for Class VI permit applications must be retained throughout the life of the Class VI project and for 10 years following site closure. While not required, the EPA recommends that owners or operators retain associated information related to injection depth waivers for the same timeframe. Additionally, where an owner or operator received a Class VI aquifer exemption expansion, the EPA recommends that the owner or operator retain aquifer exemption-related documents⁴ indefinitely, particularly where the exempted aquifer may be used for injection in the future.

The EPA recommends that all prospective owners or operators contact their permitting authority before preparing a Class VI permit application, both to establish access to the GS DT (including its templates and other resources) and to discuss any project-specific considerations that may affect the preparation or review of the permit application.

Table 3-1. Summary of submittals to be made during the pre-construction phase.

Reporting Requirement	Relevant GS DT Modules	Recommended Format	Timing and Frequency
Class VI permit application [40 CFR 146.82(a)]	Project Information Tracking module (which contains a checklist of other modules to use for more detailed submissions; see subsections below)	Basic project information - directly entered into the module Permit application narrative - uploaded file, with supplemental uploaded items as necessary (see below) Detailed data submissions - other GS DT modules (see below)	Prior to well construction or conversion, per 40 CFR 146.82(a)

⁴ The regulatory authority is an additional resource for aquifer-exemption records, retaining them indefinitely.

Reporting Requirement	Relevant GSDT Modules	Recommended Format	Timing and Frequency
Class VI permit application [40 CFR 146.82(a)], <i>continued</i>	Project Information Tracking module (which contains a checklist of other modules to use for more detailed submissions; see subsections below)	Additional information requested by the UIC Program Director - uploaded file(s)	Prior to well construction or conversion, per 40 CFR 146.82(a)
Injection depth waiver application [40 CFR 146.82(d)]	Injection Depth Waivers and Aquifer Exemption Expansions module	A combination of uploaded files and references to previously submitted materials	Concurrent with the permit application, per 40 CFR 146.95(a)
Application to expand the areal extent of an aquifer exemption [40 CFR 144.7(d) and 146.4(d)]	Injection Depth Waivers and Aquifer Exemption Expansions module	A combination of uploaded files and references to previously submitted materials	Concurrent with the permit application (recommended)

3.1 Class VI Permit Applications

Permit application requirements for Class VI wells are specified at 40 CFR 146.82(a) and are summarized in the box below. To fulfill these requirements, a Class VI permit application must include multiple types of information with varying levels of technical complexity. Ideally, when considered together, the components of a Class VI permit application will present an integrated, site-specific strategy for demonstrating site suitability and USDW protection. Recommendations for submitting each of these components are provided in the following subsections.

The Project Information Tracking module of the GSDT helps prospective owners or operators to successfully navigate the Class VI permit application process. To reduce the potential for redundancy and to organize permit application components in a manner that facilitates efficient review by the permitting authority, the EPA recommends that Class VI permit applicants submit both:

1. A narrative describing characterization of the proposed site and project, overall strategies for project operations, and other general project information (compiled into a single file and submitted using the Project Information Tracking module of the GSDT).
2. Specific, detailed information required by certain Class VI Rule provisions (submitted using other GSDT modules, which are tailored to the applicable Class VI Rule requirements).

The Project Information Tracking module provides a narrative template that permit applicants can download, complete, and upload back to the module. The EPA strongly recommends that permit applicants use the template, which includes specific instructions and examples for each section of the narrative. The Project Information Tracking module also provides a checklist of other GSDT modules to be populated during the permit application process. Information submitted with these other modules does not need to be repeated in the narrative, and the

narrative template includes placeholders indicating where certain rule requirements can be fulfilled directly in the GSDT. Because of this, the EPA recommends that permit applicants review the relevant GSDT modules and/or user guides described below before developing the narrative, to avoid duplicating efforts or information.

While the GSDT modules associated with the permit application can be submitted in any order, the EPA recommends the following process. First, permit applicants should complete the general project information sections of the Project Information Tracking module (including the project name, contact information, list of existing permits, etc.). Second, they should populate and submit the modules used to provide detailed information. This includes both the modules associated with the required permit application components, such as the AoR and Corrective Action module, and (if applicable) any optional modules, such as the Alternative PISC Timeframe Demonstration module. Third, they should finish populating the 40 CFR 146.82(a) section of the Project Information Tracking module (by uploading the narrative and filling out the checklist) and submit it.

For ease of submission and to facilitate the permitting authority's evaluation, the EPA recommends that the 40 CFR 146.82(a) narrative be provided as a single portable document format (PDF) file. Supplemental materials that accompany the narrative but are not compatible with this format, such as tabular data, high-resolution images, or geographic information system (GIS) files like shapefiles, may be provided separately, using the module field designated for "any other information requested by the UIC Program Director."

Pursuant to 40 CFR 146.82, owners or operators of Class I, Class II, or Class V experimental technology wells that are converting to Class VI may incorporate pre-existing information into their permit applications by reference. However, to be compliant with this regulatory requirement and the requirement to electronically report information pursuant to 40 CFR 146.91(e), this referenced information must be current, readily available to the UIC Program Director, sufficiently identified to allow retrieval, and available in an electronic format. For example, certain maps and cross-sections included with a well's original permit application may already be on file; if they meet the requirements at 40 CFR 146.82 and 146.91(e), these materials could be referenced in the Class VI permit application

Permit Application Requirements

- Basic project information
40 CFR 146.82(a)(1), (20)
- Site characterization information
40 CFR 146.82(a)(2)-(3), (5)-(6)
- Proposed AoR and Corrective Action Plan and associated modeling data
40 CFR 146.82(a)(4), (13)
- Financial responsibility demonstration
40 CFR 146.82(a)(14)
- Injection well construction data
40 CFR 146.82(a)(9), (11), (12)
- Proposed pre-operational testing program
40 CFR 146.82(a)(8)
- Proposed operating data
40 CFR 146.82(a)(7), (10)
- Proposed Testing and Monitoring Plan
40 CFR 146.82(a)(15)
- Proposed Injection Well Plugging Plan
40 CFR 146.82(a)(16)
- Proposed PISC and Site Closure Plan
40 CFR 146.82(a)(17), (18)
- Proposed Emergency and Remedial Response Plan
40 CFR 146.82(a)(19)
- Any other information requested by the UIC Program Director
40 CFR 146.82(a)(21)

instead of being re-submitted. The EPA encourages applicants interested in referencing information from previous permits to consult with their permitting authority and to consider the benefits of ensuring a complete record of the project within the GS DT for the duration of a Class VI project.

The EPA considers a permit application to be submitted when all associated components have been received in a way that complies with 40 CFR 146.91(e). Because of the technical complexity of a Class VI permit application, the EPA expects that the permitting process will be an iterative one. Permitting authorities may need to ask clarifying questions, request additional information, or discuss the content of the application with prospective owners or operators. (As described in Section 2.4, the GS DT's Information Request module will facilitate written communications between permit applicants and permitting authorities during this process.) Permit applicants should contact their permitting authority with any specific questions about the Class VI permit application review process.

3.1.1 Site Characterization

Site characterization information required under 40 CFR 146.82(a) includes information on the geologic, geomechanical, and hydrogeologic characteristics of the proposed storage site (including the proposed injection zone and overlying formations), as well as baseline geochemical data and other information on USDWs in the AoR. This information is used to demonstrate that the site meets the minimum criteria for suitability specified at 40 CFR 146.83,

and it also serves as the foundation, informing plans for site operation, computational modeling, testing and monitoring, and other aspects of the project.

Site Characterization Submissions

Class VI Rule requirements:

- 40 CFR 146.82(a)(2)-(3), (5)-(6)
- 40 CFR 146.83

Relevant GS DT modules:

- Project Information Tracking module
- AoR and Corrective Action module

Reference documents:

- *UIC Program Class VI Well Site Characterization Guidance*

Electronic resources:

- 40 CFR 146.82(a) narrative template
- GS DT user guides

Preparing the site characterization component of a Class VI permit application generally involves both desktop analysis of secondary information and the collection of primary data in the field, such as ground water sampling or geophysical surveying. Some of these analyses may be supported with literature reviews and summaries of existing information about the site. The *UIC Program Class VI Well Site Characterization Guidance* presents recommendations for gathering necessary data and demonstrating the suitability of a proposed GS site.

The site characterization material can be incorporated into the 40 CFR 146.82(a) narrative template,

available in the Project Information Tracking module of the GS DT. The narrative should integrate the information specified under 40 CFR 146.82(a)(2)-(3) and (5)-(6) to demonstrate a clear and data-driven understanding of the site and show how the site meets the criteria at 40 CFR 146.83. When the narrative is complete, it should be submitted using the Project Information Tracking module as part of the permit application. Note that certain site-related information will also be provided as part of the AoR delineation submission in the AoR and Corrective Action module (see Section 3.1.2).

As stated above, the EPA recommends that the 40 CFR 146.82(a) narrative be provided as a single PDF file, with supplemental materials provided separately using the module field designated for “any other information requested by the UIC Program Director.” Supplemental materials, such as legacy data, historical maps, or similar materials should be legible and clear (e.g., contour lines are unambiguous, legends are visible, acronyms are defined, images have an appropriate scale, etc.). If secondary data are used, sources should be clearly cited to support an evaluation of this information. For primary data, relevant reference information—such as the date/time, location/depth, method name, test conditions, assumptions, limitations, quality assurance (QA) protocols, etc.—associated with a sampling event should be included. This reference information is particularly important for baseline data, such as that required by 40 CFR 146.82(a)(6), because it will be used as a point of comparison for future monitoring results. If calculations or experimental results are provided in the permit application, the permitting authority will likely ask for documentation of assumptions and methods used to interpret the results.

The Class VI Rule recognizes that project sites will have varying levels of pre-existing information and that some data submitted with a permit application will be preliminary. As part of the site characterization narrative, the EPA recommends discussing data gaps and uncertainties that will be addressed through the formation testing program and other activities conducted after well construction/conversion, but before receiving authorization to inject (see Section 3.1.5 and Section 4). The ultimate goal of the site characterization information is to demonstrate that the site is suitable, pursuant to 40 CFR 146.83; the EPA encourages permit applicants to include any additional information they deem necessary to support this demonstration even if it is not explicitly identified in the rule.

Because many of the Class VI Rule requirements are designed to be site-specific, site characterization information forms the foundation for several other components of the permit application. Therefore, site characterization materials should be consistent with related permit application components. For example, site parameters entered into the AoR and Corrective Action module for the critical pressure calculation should not conflict with the content of the narrative. More broadly, the site characterization submission should support the other site-specific aspects of the permit application, such as the proposed well construction procedures, the injection and post-injection phase testing and monitoring strategies, the Emergency and Remedial Response Plan, etc.

Permit applicants should contact their permitting authority if questions arise about whether a certain type of information is necessary or if the recommended level of detail is unclear. The EPA recommends discussion of how certain Class VI Rule requirements apply to an individual project (e.g., whether a secondary confining zone is necessary) before permit application submittal.

3.1.2 AoR and Corrective Action

The Class VI Rule, at 40 CFR 146.84(a), requires that the well’s AoR be delineated using computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide stream, based on available site characterization, monitoring, and operational data. The purpose of this effort is to delineate a project area where USDWs may be

endangered due to the injection activity. AoR delineation also supports other components of the permit application and the project as a whole, such as defining the area where corrective action may be needed, determining financial responsibility cost estimates, developing project-specific testing and monitoring strategies for the injection and post-injection phases, and supporting alternative PISC timeframe demonstrations.

In the pre-construction phase, delineation of the AoR relies on existing site data and proposed project information. As new information becomes available throughout the lifetime of the project, the AoR will need to be reevaluated pursuant to 40 CFR 146.84(e). Therefore, permit applicants must submit an AoR and Corrective Action Plan that proposes site-specific procedures for delineating the AoR and periodically reevaluating this delineation, as well as for performing any necessary corrective action [40 CFR 146.84(b)]. In addition, 40 CFR 146.82(a)(4) specifically requires permit applicants to provide a tabulation of wells in the AoR to support the corrective action evaluation.

The computational modeling effort is the primary focus of the AoR and corrective action components of the permit application. However, in addition to the modeling information, well data (e.g., from state oil and gas databases) and proposed procedures for conducting AoR reevaluations and performing corrective action must also be submitted to fulfill Class VI Rule requirements under 40 CFR 146.84. Detailed information on model development and AoR delineation can be found in the *UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance* and recommendations for developing project plans is presented in the *UIC Program Class VI Well Project Plan Development Guidance*.

The AoR and Corrective Action Plan and the detailed information that supports it (e.g., computational modeling data such as simulator information and model input, assumptions, output, etc., and the tabulation of wells in the AoR) can all be submitted using the AoR and Corrective Action module. This module contains a plan template that can be downloaded, populated, and uploaded back to the module. Recommendations for compiling and providing each component of the AoR and corrective action submittal are provided in the subsections below.

It may be helpful for permit applicants to discuss any questions related to data files and formats with their permitting authority prior to entering the information into the AoR and Corrective Action module. The EPA recommends that applicants work with their permitting authority to identify the best approach for submitting project-specific modeling information; this will also help the permitting authority determine the most efficient and effective process to evaluate this information. Following successful submission of information in the AoR and Corrective Action

AoR and Corrective Action Submissions

Class VI Rule requirements:

- 40 CFR 146.82(a)(4), (13)
- 40 CFR 146.84

Relevant GS DT modules:

- Project Information Tracking module
- AoR and Corrective Action module

Reference documents:

- *UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- AoR and Corrective Action Plan template
- GS DT user guides

module, the relevant boxes in the Project Information Tracking module can be checked. Note that the permitting authority's evaluation depends on the submission of complete, accurate, and consistent information and cannot be completed before the full set of information is submitted.

AoR and Corrective Action Plan

The detailed computational modeling and corrective action data submitted via the AoR and Corrective Action module represent essential supporting information for the AoR and Corrective Action Plan. However, it is the plan itself that will be incorporated into the Class VI permit and will become directly enforceable per 40 CFR 146.84(b). In the plan, permit applicants should explain how they will demonstrate compliance with the Class VI requirements relevant to AoR delineation, corrective action, AoR reevaluation, and the plan itself. The EPA recommends that the plan consist of a narrative that describes procedures for delineating the AoR using computational modeling, addressing all deficient artificial penetrations within the AoR, and reevaluating the AoR periodically throughout the life of the project.

The EPA recommends that the AoR and Corrective Action Plan be provided as a single PDF file, uploaded to the AoR and Corrective Action module. As noted above, a template is available in the module to guide development of this document. The template was designed to help ensure that the plan meets all the Class VI Rule requirements while allowing for project-specific flexibility. Within the standardized format of the template, applicants are encouraged to tailor their plans to the needs of their particular projects. Information submitted elsewhere in the AoR and Corrective Action module may be referenced in the narrative (e.g., in the context of describing how the information is used in the delineation process, how it supports the proposed strategies for the corrective action or AoR reevaluation, etc.). Cross-references to other GS DT submittals are also encouraged wherever appropriate.

Pursuant to 40 CFR 146.84(b), the requirement to maintain and implement the AoR and Corrective Action Plan is directly enforceable regardless of whether that requirement is a condition of the Class VI permit. Supplemental or supporting material that informs evaluation of the plan but is not intended to become an enforceable requirement for the project (e.g., reference documents, descriptions of alternative methods considered for AoR delineation, etc.) should not be incorporated into the plan file but should be submitted elsewhere in the module.

Detailed Computational Modeling and Corrective Action Data

The EPA recommends that permit applicants submit all information that the UIC Program Director would need for an independent evaluation of the AoR delineation and the associated corrective action strategy. The AoR and Corrective Action module of the GS DT provides a structured approach to submitting (and, later, updating) the detailed data that support the narrative portion of the modeling information. This information serves to benchmark the AoR delineation at this phase, to provide continuity in decision making and support AoR reevaluations and the non-endangerment demonstration in later phases of the project.

The AoR and Corrective Action module facilitates submission of the following categories of information: model domain, processes modeled, rock properties, boundary conditions, initial conditions, operational information, model output, AoR pressure front delineation, and corrective

action. The module prompts users to provide information in several formats, including image files, tabular data, and short written descriptions. The EPA recommends following the instructions in the module itself and in the associated user guide to ensure that the appropriate type of information is submitted. Explanations for all data files, either in the file itself or in the description/comment fields of the module, should be submitted so that the data can be understood and evaluated appropriately. Explanations should include a description of what is included in each file, how the data are formatted, and any necessary identifying information (e.g., model domain coordinates, simulation duration, etc.). Because an important component of the permitting authority’s review is evaluating the degree to which the model simulates actual conditions, all site-related information should be clearly presented and consistent with the site characterization narrative.

The EPA recognizes that some Class VI permit applications may rely on proprietary models, software, or inputs. Users should submit only non-proprietary information with the GSDT. The AoR and Corrective Action module does not necessitate user submittal of actual models or code—only the parameters, assumptions, results, and other supporting information that will allow the permitting authority to fully evaluate the AoR delineation are required. Also, remember that the GSDT is not designed to accept CBI. If permit applicants would like to claim information as CBI or otherwise discuss the possibility of submitting data outside of the GSDT, they should contact their permitting authority for further information and instructions.

In addition to the actual modeling data, the module includes a section for corrective action data. Users are encouraged to submit the population of wells in the AoR either in a tabular format (e.g., .CSV) or as a GIS file (e.g., shapefile). The well construction/plugging information required by 40 CFR 146.82(a)(4)—well type, construction, date drilled, depth, record of plugging and/or completion—can also be included directly in this file (e.g., as metadata associated with a shapefile).

Permit applicants should contact their permitting authority if they have questions about how to submit modeling information, e.g., to determine if certain file types are acceptable or for clarification on how to format output data. It may also be helpful to discuss how to most efficiently submit related information, such as modeling information associated with an alternative PISC timeframe demonstration. While the AoR and Corrective Action module provides flexibility in choosing the file formats for submission, the EPA recommends that permit applicants discuss which file formats to use, as well as any other questions they may have, with their permitting authority. This communication can help determine the best approach(es) for submitting this information and will facilitate the technical evaluation conducted by the permitting authority.

3.1.3 Financial Responsibility Demonstration

The Class VI Rule, at 40 CFR 146.85, requires owners or operators of Class VI wells to demonstrate and maintain financial responsibility for performing corrective action, injection well plugging, PISC, site closure, and emergency and remedial response. The purpose of the financial responsibility demonstration submitted with the permit application, required by 40 CFR 146.82(a)(14), is to ensure that sufficient resources exist to carry out activities related to closing and (if necessary) remediating GS sites so that they do not endanger USDWs.

The financial responsibility demonstration in the permit application has two main components: cost estimates for the applicable project activities and financial instruments sufficient to cover those costs. Pursuant to 40 CFR 146.85(c), the cost estimate must reflect costs of hiring a third party to perform the required activities; as a result, the EPA expects that the cost estimate provided as part of the permit application will be an independent estimate generated by an organization that is not within the corporate structure of the owner or operator. Most financial instruments will be generated by a financial institution, but this depends on the instrument type. More detailed information on developing the financial responsibility demonstration is given in the *UIC Program Class VI Financial Responsibility Guidance*. Additional EPA resources that may be helpful for permit applicants are available at <http://www.epa.gov/uic/financial-responsibilities-underground-injection-well-owners-or-operators>.

Financial Responsibility Submissions

Class VI Rule requirements:

- 40 CFR 146.82(a)(14)
- 40 CFR 146.85

Relevant GSĐT modules:

- Project Information Tracking module
- Financial Responsibility Demonstration module

Reference documents:

- *UIC Program Class VI Financial Responsibility Guidance*

Electronic resources:

- Online materials at <http://www.epa.gov/uic/financial-responsibilities-underground-injection-well-owners-or-operators>
- GSĐT user guides

Both the cost estimate and the financial instruments are submitted using the Financial Responsibility Demonstration module. For the cost estimate, permit applicants should enter the costs for each covered activity and upload the independent cost estimate. Applicants may also include supplemental materials, such as engineering reports, that support the estimate.

Similarly, for the financial instruments, owners or operators should make the selections on the appropriate tab(s) and upload copies of the instrument(s) and/or documents that prove the third-party instrument or self-insurance is in place and sufficient to cover the estimated costs. Because banks, insurers, or other financial institutions may not provide the specific instruments until the applicant is prepared to purchase them, the initial permit application may only contain information about the types of financial instruments to be used rather than the instruments themselves. For insurance policies, the EPA recommends that a copy of the

policy be included in addition to the certificate of insurance, when it is available. Some instruments have special requirements; for example, the owner or operator must document the financial strength of the provider pursuant to 40 CFR 146.85(a)(6)(ii) for third-party instruments. The instructions within the Financial Responsibility Demonstration module guide the submission of information to fulfill these requirements.

Permit applicants should contact their permitting authority if they have questions about what information is necessary to include in the financial responsibility demonstration. It may be appropriate to request a preliminary, informal review of one or more aspects of the cost estimate before finalizing decisions about which financial instrument(s) to obtain. The Financial Responsibility Demonstration module is designed to accommodate this review by allowing cost estimate and financial instrument submissions to be made at different times. However, note that the permit application (as a whole) will not be considered complete until all components

(including either copies of financial instruments or descriptions of the instruments to be secured) are successfully submitted.

3.1.4 Well Construction and Operation

As part of the permit application, prospective owners or operators must submit proposed construction and operating data for the Class VI project, including:

- Proposed operational parameters and injectate characteristics [40 CFR 146.82(a)(7)].
- Proposed stimulation program, if applicable [40 CFR 146.82(a)(9)].
- Proposed operating procedures, outlining the steps necessary to conduct injection operation [40 CFR 146.82(a)(10)].
- Schematics or other appropriate drawings of injection well construction [40 CFR 146.82(a)(11)].
- Proposed injection well construction procedures [40 CFR 146.82(a)(12)].

These materials must meet the requirements at 40 CFR 146.86 (to demonstrate that the planned well construction is adequate to prevent movement of fluids into USDWs or other unauthorized zones) and at 40 CFR 146.88 (to demonstrate that the proposed operational procedures will be protective of USDWs). Refer to the *UIC Program Class VI Well Construction Guidance* for information on designing and constructing an injection well that meets the Class VI Rule requirements.

Permit application components associated with these requirements will likely be a combination of narrative description (including tables, charts, etc.) and figures/illustrations (such as from computer-aided design programs). This material can be incorporated into the 40 CFR 146.82(a) narrative, using the template provided in the Project Information Tracking module. As noted above, the EPA recommends that the 40 CFR 146.82(a) narrative be provided as a single PDF file. Supplemental materials that accompany the narrative but are not compatible with this format

(such as high-resolution images) may be provided separately, using the module field designated for “any other information requested by the UIC Program Director.” Regardless of whether schematics and other images are incorporated into the narrative or provided separately, they should be legible and clear (e.g., legends and scales included, labels visible, etc.).

Specifically, the EPA recommends that the well schematics/drawings include the following elements: the wellhead; the surface casing, long-string casing, and any intermediate casings;

Well Construction and Operation Submissions

Class VI Rule requirements:

- 40 CFR 146.81(c)
- 40 CFR 146.82(a)(7), (9)-(12)
- 40 CFR 146.86
- 40 CFR 146.88

Relevant GSDT modules:

- Project Information Tracking module

Reference documents:

- *UIC Program Class VI Well Construction Guidance*

Electronic resources:

- 40 CFR 146.82(a) narrative template
- GSDT user guides

cement placement; the tubing and packer; the type and location of the safety valve(s) and any landing nipples, if used; and proposed completion details, including perforated zones and construction materials to be used. Examples of other documentation that may be submitted to demonstrate compliance with the construction requirements include: copies of construction specifications, references to any standards or best management practices to be followed during construction, and manufacturer specifications on materials used for well construction (e.g., corrosion and temperature resistance ratings or material strengths).

Pursuant to 40 CFR 146.81(c), owners or operators of Class I, Class II, or Class V experimental technology wells transitioning to Class VI do not need to meet the specific construction requirements at 40 CFR 146.86(b). Instead, they must demonstrate that their wells were engineered and constructed to meet the requirements at 40 CFR 146.86(a) and to ensure protection of USDWs. For example, an owner or operator might demonstrate adequate materials strength by providing computations showing calculated down-hole stresses on the casing, tubing, cement, and packer. Because this demonstration will be specific to each individual well, the EPA recommends that affected owners or operators communicate with their permitting authorities before submitting a Class VI permit application, to determine what information will be necessary to make the demonstration.

The EPA also recommends pre-construction discussions between permit applicants and permitting authorities if site- or project-specific considerations may require alternative construction procedures. For example, if cement cannot be recirculated to the surface, the UIC Program Director may approve an alternative method of cementing; if this is the case, owners or operators must submit logs to demonstrate that the cement does not allow fluid migration behind the well bore, pursuant to 40 CFR 146.86(b)(4). Appropriate communication with the permitting authority in the pre-construction stage will help ensure a more efficient permitting process. Additionally, this communication can help streamline the pre-operational testing process (see Section 4) because it provides an opportunity for permitting authorities and owners or operators to discuss whether any additional or alternative methods may be necessary to meet the requirements at 40 CFR 146.87.

3.1.5 Pre-Operational Testing Program

With the permit application, the prospective owner or operator must submit a proposed pre-operational well and formation testing program to verify proper construction of the well and obtain an analysis of the chemical and physical characteristics of the injection zone(s) and confining zone(s) [40 CFR 146.82(a)(8)]. This proposed program must meet the requirements at 40 CFR 146.87, which include elements related to both site characterization (to reduce uncertainties associated with site characterization and the AoR delineation) and well integrity (to demonstrate that the well itself will not create a pathway for fluid migration into USDWs). The resulting data from these logs and tests will form the foundation of the pre-operation submissions under 40 CFR 146.82(c), as described in Section 4.

The Class VI Rule, at 40 CFR 146.87, specifies certain minimum requirements or options for the pre-operational testing program. Beyond that, owners or operators have the flexibility to design a program that will collect sufficient information about the well's integrity and the geology of the site to inform a determination that USDWs will be protected. Both the *UIC Program Class VI*

Well Site Characterization Guidance and the *UIC Program Class VI Well Construction Guidance* provide recommendations for this process.

The EPA recommends that the description of the proposed pre-operational testing program be submitted as a single PDF containing the necessary narrative description, tables/charts, maps, etc. While this submission is part of the permit application, it is uploaded separately in the Pre-Operational Testing module. This module will be used during the pre-operation phase to provide the results of the logging and testing (see Section 4); using the same module for the proposed activities and their results helps to ensure that all necessary materials are easily accessible for review (both by the owner or operator, when submitting the logging and testing results, and by the permitting authority, during evaluation of this material). The box indicating the submission of the pre-operational testing program in the Project Information Tracking module should be checked when finalizing the permit application submission.

Permit applicants should contact their permitting authority with questions about what materials to include in the pre-operational testing program submission. The Class VI Rule, at 40 CFR

147.87(a)(5), allows permit applicants to use alternative logging and testing methods that provide equivalent or better information, provided that they are approved by the UIC Program Director. The UIC Program Director may also require the use of alternative methods. The EPA recommends discussing the potential use of alternative methods with the permitting authority prior to submitting a permit application.

Pre-Operational Testing Program Submissions

Class VI Rule requirements:

- 40 CFR 146.82(a)(8)
- 40 CFR 146.87

Relevant GS DT modules:

- Project Information Tracking module
- Pre-Operational Testing module

Reference documents:

- *UIC Program Class VI Well Site Characterization Guidance*
- *UIC Program Class VI Well Construction Guidance*

Electronic resources:

- GS DT user guides

Owners or operators of existing wells transitioning to Class VI must demonstrate that the wells were engineered and constructed to meet the requirements at 40 CFR 146.86(a) and to ensure protection of USDWs, in lieu of conducting the logs/tests specified at 40 CFR 146.87(a). As with the construction requirements, the EPA recommends that owners or operators discuss the content of this demonstration with their permitting authorities to determine what, if any, information may be needed, e.g., results of

previous mechanical integrity tests (MITs) or data that may have been collected during the construction of the well. Note that owners or operators of transitioning wells are responsible for meeting all other requirements at 40 CFR 146.87.

3.1.6 Testing and Monitoring

The Class VI Rule, at 40 CFR 146.82(a)(15) requires permit applicants to submit a Testing and Monitoring Plan describing how they will meet the requirements at 40 CFR 146.90. The Testing and Monitoring Plan describes the permit applicant's strategies for identifying potential endangerment of USDWs, demonstrating that the well is maintaining mechanical integrity, that

the project is operating as planned, and that the carbon dioxide plume and pressure front are behaving as predicted.

Testing and monitoring results are the primary method of assessing the performance of the project and provide points of comparison for modeled predictions. As a result, the Testing and Monitoring Plan should present data collection methods sufficient to support AoR reevaluations, demonstrations of whether project plan amendments or financial responsibility cost estimate updates are needed, and the non-endangerment demonstration that will be made before site closure. The *UIC Program Class VI Well Testing and Monitoring Guidance* and the *UIC Program Class VI Well Project Plan Development Guidance* provide recommendations for developing a plan that will meet the rule requirements and lead to the collection of the necessary data.

A template for the Testing and Monitoring Plan is available in the Project Plan Submissions module. Like the templates for the other Class VI project plans, this template was designed to help ensure that the plan meets all the Class VI Rule requirements while allowing for project-specific flexibility; within the standardized format of the template, applicants are encouraged to tailor their plans to the needs of their particular projects. The EPA recommends that the plan be provided as a single PDF that includes the Quality Assurance and Surveillance Plan (QASP) required by 40 CFR 146.90(k). Upload the completed plan to the Project Plan Submissions module. The box indicating the submission of the Testing and Monitoring Plan in the Project Information Tracking module should be checked when finalizing the permit application submission.

Pursuant to 40 CFR 146.90, the requirement to maintain and implement the Testing and Monitoring Plan is directly enforceable regardless of whether that requirement is a condition of the Class VI permit. There may be supplemental or supporting material that would inform evaluation of the submission but does not need to be in the enforceable plan (e.g., reference documents or example specifications from equipment vendors). These materials can instead be uploaded through the designated field in the module.

Permit applicants should contact their permitting authority if they have questions about what to include in the Testing and Monitoring Plan or QASP (including which information to include in the QASP rather than in the body of the plan). It may also be appropriate to discuss whether alternative/additional monitoring activities (e.g., surface air and/or soil gas monitoring, seismicity monitoring, alternative MITs, etc.) may be necessary for a given project.

Testing and Monitoring Submissions

Class VI Rule requirements:

- 40 CFR 146.82(a)(15)
- 40 CFR 146.90

Relevant GSDT modules:

- Project Information Tracking module
- Project Plan Submissions module

Reference documents:

- *UIC Program Class VI Well Testing and Monitoring Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- Testing and Monitoring Plan template
- GSDT user guides

3.1.7 Injection Well Plugging

Class VI permit applicants must submit an Injection Well Plugging Plan that describes how the owner or operator will meet the requirements at 40 CFR 146.92 [40 CFR 146.82(a)(16)]. As described at 40 CFR 146.92(b), the plan includes information such as planned tests or measures to determine bottom-hole reservoir pressure and ensure external mechanical integrity; the type and number of plugs to be used; the planned placement of each plug; the type, grade, and quantity of material to be used in plugging; and the proposed method for plug placement.

Injection Well Plugging Submissions
<u>Class VI Rule requirements:</u>
<ul style="list-style-type: none">• 40 CFR 146.82(a)(16)• 40 CFR 146.92
<u>Relevant GSDT modules:</u>
<ul style="list-style-type: none">• Project Information Tracking module• Project Plan Submissions module
<u>Reference documents:</u>
<ul style="list-style-type: none">• <i>UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance</i>• <i>UIC Program Class VI Well Project Plan Development Guidance</i>
<u>Electronic resources:</u>
<ul style="list-style-type: none">• Injection Well Plugging Plan template• GSDT user guides

Similar to the injection well construction component of the permit application, the EPA recommends that the Injection Well Plugging Plan consist of narrative description and schematics or other illustrations. As with the other Class VI project plans, a recommended template is provided in the Project Plan Submissions module of the GSDT. The template can be tailored as appropriate to reflect project-specific considerations and uploaded after completion to the Project Plan Submissions module. Any supplemental or supporting material should be submitted in the designated field, and the associated box in the Project Information Tracking module should be checked.

Permit applicants should contact their permitting authority if they have questions about what to include in the Injection Well Plugging Plan or if they wish to

discuss whether alternative/additional activities (e.g., alternative MITs) may be appropriate for a given project.

3.1.8 PISC and Site Closure

The Class VI Rule, at 40 CFR 146.82(a)(17), requires permit applicants to submit a PISC and Site Closure Plan that proposes post-injection monitoring strategies, describes how non-endangerment of USDWs will be ensured throughout the post-injection phase, and provides procedures for site closure in compliance with 40 CFR 146.93. Proper post-injection monitoring and site closure procedures ensure that neither the injectate nor any mobilized fluids/increased pressures endanger USDWs. The applicant may also submit a request for a PISC timeframe other than the 50-year default, pursuant to 40 CFR 146.82(a)(18).

Both the PISC and Site Closure Plan and the alternative PISC timeframe demonstration (if applicable) rely on predictions from the AoR modeling effort to support decisions about post-injection activities. As a result, narrative descriptions in these submissions should be accompanied by charts, graphs, tables, maps, and/or other materials showing the relevant results from the AoR delineation modeling process. Refer to the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance* and the *UIC Program Class VI Well Project*

Plan Development Guidance for recommendations on preparing the PISC and Site Closure Plan and proposing an appropriate alternative PISC timeframe.

Like the other Class VI project plans, the PISC and Site Closure Plan can be completed using a template available in the Project Plan Submissions module. Pursuant to 40 CFR 146.93(a)(2)(v), the plan must state the duration of the PISC timeframe and demonstrate that this timeframe provides for an adequate duration of post-injection monitoring to ensure that the carbon dioxide plume and pressure front will not endanger USDWs. However, because of the specificity and technical complexity of the requirements for this demonstration, the EPA has designed a separate GSĐT module to guide permit applicants through submitting the detailed data required to support an alternative PISC timeframe request. Permit applicants may refer to material submitted using this Alternative PISC Timeframe Demonstration module in their plans to meet the requirements at 40 CFR 146.93(a)(2)(v). Considerations for submitting both of these items are provided below.

PISC and Site Closure Submissions

Class VI Rule requirements:

- 40 CFR 146.82(a)(17)-(18)
- 40 CFR 146.93

Relevant GSĐT modules:

- Project Information Tracking module
- Project Plan Submissions module
- Alternative PISC Timeframe Demonstration module

Reference documents:

- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- PISC and Site Closure Plan template
- GSĐT user guides

When finalizing the permit application submission in the Project Information Tracking module, the box indicating submittal of a PISC and Site Closure Plan and (if applicable) an alternative PISC timeframe demonstration should be checked.

PISC and Site Closure Plan

While the PISC and Site Closure Plan must include the components specified by 40 CFR 146.93(a), the Class VI Rule allows for substantial flexibility regarding the post-injection testing and monitoring program. The PISC and Site Closure Plan template available for download in the Project Plan Submissions module provides a general structure for the plan, but it should be tailored to the needs of a particular project. In addition to the items specified in the Class VI Rule, the EPA encourages permit applicants to include criteria for the non-endangerment demonstration so that expectations for this demonstration are established from the beginning of the project.

As with other Class VI project plans, the EPA recommends that the PISC and Site Closure Plan be provided as a single PDF, with supplemental or supporting material not intended to be part of the enforceable plan uploaded separately in the designated GSĐT module field. Any schematics or other images (e.g., for modeling results or monitoring well plugging) should be legible and clear. The EPA also recommends that permit applicants either include a copy of the QASP from the Testing and Monitoring Plan in the PISC and Site Closure Plan, or incorporate it into the PISC and Site Closure Plan by reference.

Permit applicants should contact their permitting authority if they have questions about what to include in the PISC and Site Closure Plan (e.g., how best to incorporate AoR modeling results or how to refer to information submitted with the Alternative PISC Timeframe Demonstration module) or if they wish to discuss the development of appropriate non-endangerment demonstration criteria.

Alternative PISC Timeframe

As stated above, the GSDT includes a separate module for the detailed data that support an alternative PISC timeframe demonstration. It can be used as a guide to ensure that all necessary information is provided to inform the permitting authority's decision-making process. Several of the requirements at 40 CFR 146.93(c) are related to other components of the permit application, such as site characterization and AoR delineation modeling. The Alternative PISC Timeframe Demonstration module allows users to submit a combination of new information and cross-references to materials submitted using other GSDT modules. Provided that the references are sufficiently specific and that the referenced material fulfills the specified requirement, no duplicate information needs to be submitted as part of the alternative PISC timeframe demonstration.

Some projects may not have sufficient data available in the pre-construction (or pre-operation) phase to demonstrate that an alternative PISC timeframe will be protective of USDWs. However, pursuant to 40 CFR 146.93(b)(2), an owner or operator may make a non-endangerment demonstration before the end of the timeframe specified in the PISC and Site Closure Plan, regardless of whether an alternative timeframe has been approved during permitting. The EPA recommends that, where possible, permit applicants and permitting authorities discuss this possibility at the outset of a project (for this reason, the EPA encourages owners or operators to identify criteria for the non-endangerment demonstration at the time of the permit application). Also, permit applicants should contact their permitting authority if they wish to discuss any

project-specific considerations related to the alternative PISC timeframe, such as whether additional site-specific factors will need to be included in the demonstration per 40 CFR 146.93(c)(xi).

3.1.9 Emergency and Remedial Response

The Emergency and Remedial Response Plan is required by 40 CFR 146.82(a)(19). Emergency and remedial response planning pursuant to 40 CFR 146.94 helps ensure an expeditious and appropriate response to protect USDWs from endangerment in the event of an emergency during the lifetime of a Class VI project.

The Class VI Rule, at 40 CFR 146.94(a), does not specify the content of the Emergency and Remedial Response Plan; instead, the permit applicant must

Emergency and Remedial Response Submissions

Class VI Rule requirements:

- 40 CFR 146.82(a)(19)
- 40 CFR 146.94

Relevant GSDT modules:

- Project Information Tracking module
- Project Plan Submissions module

Reference documents:

- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- Emergency and Remedial Response Plan template
- GSDT user guides

provide appropriate site-specific information. The EPA anticipates that the Emergency and Remedial Response Plan will be a narrative report that may be supported by data sets and maps or other images (e.g., of potentially affected environmental resources or infrastructure such as public water system drinking water supply wells). The *UIC Program Class VI Well Project Plan Development Guidance* provides further recommendations for developing the plan.

The EPA recommends that permit applicants download the plan template from the Project Plan Submissions module, populate it with project-specific information, and submit it through the same module as a single PDF. As with the other Class VI project plans, applicants are encouraged to tailor their submissions to the needs of their particular projects; this is particularly important given the flexibility in the Class VI Rule requirements for emergency and remedial response. Any supplemental or supporting material not intended to be part of the enforceable plan can be uploaded separately in the designated GSDT module field.

Permit applicants should contact their permitting authority to discuss any questions related to the content of the Emergency and Remedial Response Plan or how proposed emergency and remedial response procedures may affect other aspects of the permit application.

3.2 Injection Depth Waivers

The Class VI Rule, at 40 CFR 146.95(a), requires owners or operators seeking a waiver of the Class VI injection depth requirements to submit additional information for a comprehensive assessment of site suitability to inject into a non-USDW above or between USDWs. Owners or operators must submit a waiver application report concurrent with the Class VI permit application [40 CFR 146.82(d) and 146.95(a)].⁵ The waiver application report is a separate submittal which complements the Class VI permit application.

The EPA expects that the waiver application report will contain some information that is similar to (or references) information submitted in the permit application. However, the submittal must be tailored to demonstrate that all USDWs—above and below the injection zone—will be protected. There are also additional requirements that apply only to owners or operators requesting injection depth waivers. For more information, see the *UIC Program Class VI Well Injection Depth Waivers Guidance*.

The EPA recommends that injection depth waiver applications contain the same information

Injection Depth Waiver Requirements

- Suitability of the injection and confining zones
40 CFR 146.95(a)(1)-(2)
- Computational modeling information
40 CFR 146.95(a)(3)
- Injection well construction information
40 CFR 146.95(a)(4)
- Testing and monitoring information
40 CFR 146.95(a)(5)
- Water resource information
40 CFR 146.95(a)(6)
- Any other information requested by the UIC Program Director to support the EPA Regional Administrator's evaluation
40 CFR 146.95(a)(7)

⁵ Should a USDW be identified below the injection zone after a Class VI project is permitted or operational, the requirements at 40 CFR 146.95 would apply and this section would remain applicable to such submittals.

types/data formats as Class VI permit applications, including narrative descriptions, tabular data, maps (in flat images and/or GIS files such as shapefiles), charts/graphs, construction schematics, and other types of visual information. As with all Class VI submissions, the files should be legible and clear (e.g., contour lines unambiguous, legends visible, acronyms defined, images have an appropriate scale, etc.). Sources of secondary data should be clearly cited. Primary data should include relevant reference information such as the date/time, location/depth, method name, test conditions, assumptions, limitations, QA protocols, etc., associated with a sampling event.

Injection depth waiver application reports are submitted using the Injection Depth Waiver and Aquifer Exemption Expansion module of the GS DT. In recognition that some aspects of the waiver application report may be the same as components of the permit application, the module allows users to submit a combination of new information and cross-references to materials

submitted using other GS DT modules. Cross-references should point specifically to the relevant parts of the permit application (e.g., references to particular pages or subsections, rather than to an entire project plan) to facilitate the review. Also, referenced material should be sufficient to meet the applicable requirements for both the permit application and the injection depth waiver application report. When finalizing the permit application in the Project Information Tracking module, the owner or operator should check the box indicating application for an injection depth waiver.

Pursuant to 40 CFR 146.95(b)-(d), the determination to grant an injection depth waiver for a given Class VI project is the responsibility of the EPA Regional Administrator (even in states with primacy for implementing the Class VI program). This

determination is based not only on information provided by the permit applicant but also on consultation with the Public Water System Supervision (PWSS) Director(s) of the state(s) and/or tribe(s) in the AoR. Therefore, submitting a complete injection depth waiver application report via the GS DT is not a guarantee that a waiver will be granted.

The EPA recommends that owners or operators contact their permitting authorities before submitting an injection depth waiver application report to discuss any site-specific factors that may affect the development of the report. For example, the Class VI Rule, at 40 CFR 146.95(a)(7), gives the UIC Program Director the discretion to request any other information needed to inform the EPA Regional Administrator's decision to issue a waiver. This may include a subset of the information listed at 40 CFR 146.95(b). Discussing what additional information may be necessary to submit at the beginning of the process will help support efficiency and reduce the need for additional information requests after the report is submitted.

3.3 Aquifer Exemption Expansions

No new aquifer exemptions will be granted for Class VI wells [40 CFR 144.7(a)]. However, if an owner or operator of a Class II enhanced recovery well injecting into an exempted aquifer makes the business decision to transition to Class VI, the owner or operator may request an expansion of the areal extent of the previously approved aquifer exemption [40 CFR 144.7(d)], provided they demonstrate that the area to be exempted meets all of the requirements at 40 CFR 146.4(d).

The Class VI Rule, at 40 CFR 144.7(d)(1), requires aquifer exemption expansion requests to define (by narrative description, illustrations, maps, or other means) and describe, in clear and definite geographic and/or geometric terms (such as vertical/lateral limits and gradient), all aquifers or parts thereof that fall under the request. The *UIC Program Guidance on Transitioning Class II Wells to Class VI Wells* contains additional information about aquifer exemption expansions, including recommendations for the content to be submitted.

Aquifer Exemption Expansion Requirements

The area to be exempted:

- Does not currently serve as a source of drinking water
40 CFR 146.4(d)(1)
- Has a TDS content more than 3,000 mg/L and less than 10,000 mg/L
40 CFR 146.4(d)(2)
- Is not reasonably expected to supply a public water system
40 CFR 146.4(d)(3)

Owners or operators may submit various types of information to support this demonstration, such as tabular data, maps (in flat images and/or GIS files), charts/graphs, reports developed by public water systems, etc. As with all Class VI submissions, files should be legible and clear (e.g., contour lines unambiguous, legends visible, acronyms defined, images have an appropriate scale). Sources of secondary data should be clearly cited. Primary data should include relevant reference information such as the date/time, location/depth, method name, test conditions, assumptions, limitations, QA protocols, etc., associated with each sampling event, particularly for total dissolved solids (TDS) measurements.

Aquifer Exemption Expansion Submissions

Class VI Rule requirements:

- 40 CFR 144.7(d); 146.4(d)

Relevant GSDT modules:

- Project Information Tracking module
- Injection Depth Waivers and Aquifer Exemption Expansions module

Reference documents:

- *UIC Program Guidance on Transitioning Class II Wells to Class VI Wells*

Electronic resources:

- GSDT user guides

Aquifer exemption expansion requests are submitted using the Injection Depth Waiver and Aquifer Exemption Expansion module of the GSDT. The Class VI Rule does not specify when a request must be submitted, but the EPA recommends that it be submitted at the same time as the Class VI permit application to allow sufficient time for review. Pursuant to 40 CFR 144.7(d), such requests must be treated as a revision to the applicable federal UIC Program under 40 CFR 147 or as a substantial revision to a state/tribal program under 40 CFR 145.32, and will not be final until approved by the EPA (even in states with primacy for implementing the Class VI program). Therefore, submitting a

complete aquifer exemption expansion request via the GSDT is not a guarantee that the request will be granted.

Like injection depth waiver submissions, some aspects of the request may be the same as components of the permit application, and the Injection Depth Waivers and Aquifer Exemption Expansions module allows users to submit a combination of new information and cross-references to materials submitted using other GSDT modules. Cross-references should point specifically to the relevant parts of the permit application (e.g., references to particular pages or subsections, rather than to an entire project plan) and the referenced material should be sufficient to meet all of the applicable requirements. When finalizing the permit application in the Project Information Tracking module, the owner or operator should check the box indicating a request for an aquifer exemption expansion.

The EPA encourages owners or operators to communicate with their permitting authorities prior to submitting an aquifer exemption expansion request. In particular, demonstrating that the aquifer is not reasonably expected to supply a public water system [40 CFR 146.4(d)(3)] requires a tailored, site-specific response, and the EPA recommends discussing this requirement with the permitting authority.

4 Pre-Operation Phase Reporting and Recordkeeping

Before receiving approval for the operation of a Class VI well, owners or operators must conduct certain pre-operational activities (as specified by 40 CFR 146.87) and submit the results to the EPA. The Class VI Rule, at 40 CFR 146.82(c), also requires the UIC Program Director to consider certain types of information before authorizing injection, and the EPA expects that owners or operators will submit all of the information necessary to support the Director's review when that information has not otherwise been made available to the Director.

Much of this pre-operation phase information serves to update or supplement the components of the permit application submitted pursuant to 40 CFR 146.82(a), though some is new and specific to the current phase. Overall, the purpose of the information specified by 40 CFR 146.82(c) is to demonstrate that the injection project will not endanger USDWs. The new data considered by the UIC Program Director address uncertainties identified in the permit application process and ensure that all of the planned project activities appropriately reflect the necessary site-specific considerations.

Like the components of a Class VI permit application, the pre-operation information includes data related to site characterization, AoR delineation, corrective action, injection well construction, operating information, and other topic areas. While the Class VI Rule does not specify any pre-operation phase submittals related to injection depth waivers or aquifer exemption expansions, owners or operators may also need to submit information related to these items if requested by the UIC Program Director. See Sections 3.2 and 3.3 for recommendations related to submitting injection depth waiver and aquifer exemption expansion materials.

The information relevant to the pre-operation phase is summarized in Table 4-1, and it is described in more detail in the subsections below. Submitting complete, accurate, and consistent information that clearly demonstrates compliance with the Class VI Rule requirements will support timely authorization to inject, provide information to inform the public and address any concerns about the project, support continuity in decision-making for the project, and facilitate the development of an administrative record documenting permitting authority decisions. As with information collected for a Class VI permit application, 40 CFR 146.91(f)(1) requires that information collected to support 40 CFR 146.82(c) be retained throughout the life of the Class VI project and for 10 years following site closure.

Table 4-1. Summary of submittals to be made during the pre-operation phase, to support the determination to authorize injection.

Reporting Requirement	Relevant GS DT Modules	Recommended Format	Timing and Frequency
Information for the UIC Program Director to consider before granting authorization to inject [40 CFR 146.82(c) and 146.85]	Project Information Tracking module (which contains a checklist of other modules to use for more detailed submissions; see subsections below)	Basic project information - directly entered into the module	Information for the UIC Program Director to consider before granting authorization to inject [40 CFR 146.82(c) and 146.85]

Reporting Requirement	Relevant GSDT Modules	Recommended Format	Timing and Frequency
Information for the UIC Program Director to consider before granting authorization to inject [40 CFR 146.82(c)] <i>continued</i>	Project Information Tracking module (which contains a checklist of other modules to use for more detailed submissions; see subsections below)	Detailed data submissions - other GSDT modules (see below) Additional information requested by the UIC Program Director - uploaded file(s)	Information for the UIC Program Director to consider before granting authorization to inject [40 CFR 146.82(c) and 146.85]

The information specified by 40 CFR 146.82(c), which is summarized in the box below, is similar to that required under 40 CFR 146.82(a) with respect to the topic areas covered and the type/format of the information. The reporting process is also similar; like the permit application, the EPA recommends that owners or operators submit both:

1. A narrative summarizing the changes to site characterization, strategies for site operation, etc., as a result of pre-operational testing results (compiled into a single file and submitted using the Project Information Tracking module of the GSDT).
2. Specific, detailed information required by certain Class VI Rule provisions (submitted using other GSDT modules, which are tailored to the applicable rule requirements).

As with the 40 CFR 146.82(a) narrative, owners or operators should use the Project Information Tracking module to download a 40 CFR 146.82(c) narrative template, then upload the completed file to the module along with any supplemental materials. For ease of submission and to facilitate the permitting authority's evaluation, the EPA recommends that the 40 CFR 146.82(c) narrative be provided as a single PDF file. Supplemental materials that accompany the narrative but are not compatible with this format (such as tabular data, high-resolution images, or GIS shapefiles) may be provided separately, using the module field designated for "any other information requested by the UIC Program Director."

When owners or operators submit detailed information using the other GSDT modules, they will generally be updating previous submissions made during the pre-construction phase, either by entering new information directly into the module or by uploading updated files. This process is intended to streamline the reporting process as well as facilitate the permitting authority's review. One exception is the Pre-Operational Testing module, which is used to submit the results of the logging and testing activities required by 40 CFR

Pre-Operation Phase Requirements

- Site characterization updates
40 CFR 146.82(c)(2), (3)
- Amended AoR and Corrective Action Plan, including final AoR delineation and corrective action status
40 CFR 146.82(c)(1), (6), (9)
- Injection well construction updates
40 CFR 146.82(c)(3), (5)
- Pre-operational testing results
40 CFR 146.82(c)(4), (7), (8)
- Amendments to other project plans
40 CFR 146.82(c)(9)
- Any other information requested by the UIC Program Director
40 CFR 146.82(c)(10)
- Financial responsibility updates
40 CFR 146.85

146.87; before the pre-operation phase of the project, owners or operators will have only used this module to submit their proposed pre-operational testing program files.

While the GSDT modules used during the pre-operation phase can be populated and submitted in any order, the EPA recommends the following process. First, owners or operators should review the general project information sections of the Project Information Tracking module (including the project name, contact information, etc.) to confirm that the information is accurate and up to date. Second, owners or operators should populate and submit the modules used to provide detailed information (e.g., the Pre-Operational Testing module). Third, they should finish populating the 40 CFR 146.82(c) section of the Project Information Tracking module (by uploading the completed narrative template and filling out the checklist) and submit it. The EPA recommends that, throughout this process, owners or operators delete or replace any obsolete information/files in the GSDT modules to ensure that the GSDT contains the most up-to-date information for the project. Note that deleting a file does not alter or hinder the reporting and recordkeeping requirements described in Section 2.5. The GSDT maintains a full record of all previously submitted materials; if an owner or operator deletes/removes a file, this simply means that the file will not be included in an owner or operator's next submission.

Also, similar to the permit application review process, the permitting authority's evaluation of the pre-operation information will likely be an iterative one. Permitting authorities may need to ask clarifying questions, request additional information, or discuss the content of a submittal with owners or operators. As described in Section 2.4, the GSDT's Information Request module will facilitate written communication between owners or operators and permitting authorities during this process (and throughout the life of a Class VI project). In addition to the specific information listed at 40 CFR 146.82(c)(1)–(9), the UIC Program Director may request any additional information necessary to inform his or her decision to authorize injection [40 CFR 146.82(c)(10)]. The EPA recommends that owners or operators contact their permitting authority with any questions about additional required information or the evaluation process.

Depending on a project's permit conditions and the timeframe of the permitting authority's evaluation, an owner or operator may also need to begin certain periodic reporting activities, such as providing financial responsibility updates using the Financial Responsibility Demonstration module (see Section 4.6). The EPA recommends that owners or operators discuss the need for such submittals with their permitting authority.

4.1 Site Characterization

The Class VI Rule, at 40 CFR 146.82(c)(2), describes updates that must be made to the project's site characterization information during the pre-operation phase. To support the UIC Program Director's evaluation, the EPA anticipates that the owner or operator will update the site characterization information from the permit application based on the results of the pre-operational testing required at 40 CFR 146.87 (see Section 4.4). As with the original site characterization information, these updates serve to demonstrate that the project meets the minimum criteria for site suitability specified at 40 CFR 146.83. They inform the final AoR delineation, as well as updated plans for site operation, testing and monitoring, and other aspects of the project.

Site Characterization Submissions

Class VI Rule requirements:

- 40 CFR 146.82(c)(2), (3)
- 40 CFR 146.83

Relevant GS DT modules:

- Project Information Tracking module
- AoR and Corrective Action module

Reference documents:

- *UIC Program Class VI Well Site Characterization Guidance*

Electronic resources:

- 40 CFR 146.82(c) narrative template
- GS DT user guides

The data used to develop the site characterization updates will be generated during the logging and testing activities conducted pursuant to 40 CFR 146.87. Recommendations for gathering the data are provided in the *UIC Program Class VI Well Site Characterization Guidance*. In some cases, such as those in which additional relevant scientific publications or state well records become available during the pre-operation phase, the updates could also be supported by secondary data.

The site characterization updates can be incorporated into the 40 CFR 146.82(c) narrative, using the template available in the GS DT’s Project Information Tracking module. In this narrative, the EPA recommends that owners or operators integrate the formation testing results into the existing site

description, highlighting any changes in the understanding of the site since submittal of the permit application. Ideally, the updates will address any key uncertainties identified in the permit application and provide additional evidence to demonstrate that the site meets the suitability criteria at 40 CFR 146.83. The narrative should also include new or updated information on the compatibility of the carbon dioxide stream with the properties of the injection and confining zones, based on the results of formation testing at 40 CFR 146.87(c)-(d) [40 CFR 146.82(c)(3)], as well as any other relevant information that can support an evaluation of the site’s geology.

When complete, the compiled 40 CFR 146.82(c) narrative should be submitted using the Project Information Tracking module. As stated above, the EPA recommends that the 40 CFR 146.82(c) narrative be provided as a single PDF file, with supplemental materials provided separately using the module field designated for “any other information requested by the UIC Program Director.” These may include updated maps, figures, or other summary items providing a synthesis of the logging and testing results. While the site characterization component of the 146.82(c) narrative relies on the results of pre-operational testing, the actual logging and testing results (e.g., log analyst reports) should be submitted separately, using the Pre-Operational Testing module (see Section 4.4). The EPA recommends that owners or operators cross-reference their pre-operational testing submittals in the 40 CFR 146.82(c) narrative file.

In addition to submitting the 146.82(c) narrative with the Project Information Tracking module, owners or operators may also need to update certain site-related information in the AoR and Corrective Action module, as part of the AoR and corrective action submission (see Section 4.2).

As with the site characterization components of the permit application, the pre-operation phase site characterization information forms the foundation on which other UIC Program Director decisions are based, pursuant to 40 CFR 146.82(c). Therefore, the EPA recommends that owners or operators review the site characterization materials for consistency with related items, such as the final AoR delineation, the Testing and Monitoring Plan, and (if applicable) the alternative PISC timeframe demonstration. Owners or operators should contact their permitting authority if

questions arise about site-specific considerations or about the level of detail necessary to fulfill the Class VI Rule requirements.

4.2 AoR and Corrective Action

The Class VI Rule, at 40 CFR 146.82(c)(1), (6), and (9), requires updates to the AoR and corrective action materials submitted with the permit application, including the delineation of the final AoR (based on data obtained during logging and testing of the well and the formation), an update on the corrective action status of wells in the AoR, and an amended AoR and Corrective Action Plan that reflects the pre-operation phase activities. To support the permitting authority's evaluation, the EPA recommends that owners or operators submit the following, using the AoR and Corrective Action module:

- An amended AoR and Corrective Action Plan. This plan should present the final AoR delineation, describe how the delineation is supported by the newly collected data, and contain any necessary updates to the procedures for corrective action (including phased corrective action, if proposed) and AoR reevaluation.
- Updates to the detailed modeling data or any other information supporting the final AoR delineation.
- Documentation of any corrective action that has been completed.

Specific recommendations for submitting each of these items are provided in the subsections below. The content and format of the submissions will likely be similar to those provided as part of the permit application: detailed modeling information such as input and output data, narrative descriptions, tabular well data, etc. (see Section 3.1.2). Recommendations for preparing these materials are provided in the *UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance* and the *UIC Program Class VI Well Project Plan Development Guidance*.

The EPA recommends that owners or operators hold a discussion with their permitting authority prior to submitting any new modeling information, to address any questions related to data files/formats or the overall approach for submitting modeling data. Once these questions have been addressed, owners or operators should upload the amended AoR and Corrective Action Plan to the AoR and Corrective Action module and enter any updates to the detailed computational modeling/corrective action information. Following successful submission of information in this module, owners or operators can check the relevant boxes in the Project

AoR and Corrective Action Submissions

Class VI Rule requirements:

- 40 CFR 146.82(c)(1), (6), (9)
- 40 CFR 146.84

Relevant GSDT modules:

- Project Information Tracking module
- AoR and Corrective Action module

Reference documents:

- *UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- AoR and Corrective Action Plan template
- GSDT user guides

Information Tracking module to confirm that they have completed this component of pre-operation phase reporting.

AoR and Corrective Action Plan

To fulfill the requirements at 40 CFR 146.82(c)(1), (6), and (9), the EPA recommends that owners or operators review the material in the approved AoR and Corrective Action Plan (i.e., as it was incorporated into the Class VI permit) and amend it to:

- Reflect the final AoR and the procedures used to delineate it.
- Provide a status update on corrective action activities, including both completed and remaining (planned) activities, in light of the final AoR delineation.
- Include any necessary changes to the procedures for AoR reevaluation.

The AoR and Corrective Action Plan will serve as a benchmark for future activities. The requirement to maintain and implement the approved plan is directly enforceable, pursuant to 40 CFR 146.84(b). Accordingly, the plan submitted during the pre-operation phase should reflect the most up-to-date site characterization information and computational modeling procedures, to most efficiently support these future activities.

At this stage of a Class VI project, the AoR and Corrective Action module should contain the last version of the plan submitted before the Class VI permit was issued. The EPA recommends that owners or operators delete this file and replace it with the up-to-date file.⁶ As with the initial plan submittal, supplemental materials that are not part of the plan itself should be uploaded elsewhere in the module and not incorporated into the plan file. In addition to the examples of supplemental materials listed in Section 3.1.2, the EPA encourages owners or operators to submit an explanation of the changes that have been made to the plan, especially if substantial changes have been necessary.

In certain cases (e.g., for some well-characterized project sites with substantial existing data available in the pre-construction phase), only minimal updates to the computational model may be needed, and the final AoR delineation might be the same as the one included in the Class VI permit. If this is the case, the EPA recommends that owners or operators amend the AoR and Corrective Action Plan to include a technical description of how the newly obtained data support the final delineation.

Detailed Computational Modeling Data

The computational modeling data supporting the final AoR delineation should be submitted using the AoR and Corrective Action module, using the same procedures as the submittals made during the pre-construction phase (see Section 3.1.2). The EPA recommends that owners or operators review each component of the existing submission (as it appears in the module) and

⁶ If the permitting authority made any changes to the plan before incorporating it into the permit, the file in the reporting module may not be exactly the same as the approved plan. When revising the plan file, EPA recommends that owners or operators ensure that they are using the final, approved plan as a starting point.

edit or replace information as necessary. Regardless of the extent to which the AoR delineation may change, the EPA recommends that owners or operators ensure that all fields in the module reflect the most up-to-date information so that the permitting authority can confirm that the modeling effort appropriately incorporates the results of the pre-operation phase activities.

Documentation supporting the corrective action status update described above can also be submitted in the AoR and Corrective Action module. This documentation may include tables of well information and/or plugging reports from any wells that have received corrective action.

4.3 Injection Well Construction

To support the review of final construction procedures required by 40 CFR 146.82(c)(5), the EPA recommends that owners or operators submit final as-built drawings/schematics of the injection well and a description of any deviations from the construction procedures included in the Class VI permit. The *UIC Program Class VI Well Construction Guidance* contains information on designing and constructing an injection well that meets the Class VI Rule requirements, including considerations related to the pre-operation phase.

EPA recommends that the final construction information be incorporated into the 40 CFR 146.82(c) narrative. This component of the narrative can also be used to provide information on the compatibility of the carbon dioxide stream with the materials used to construct the well [40

CFR 146.82(c)(3)]. As noted above, the EPA recommends that the 40 CFR 146.82(c) narrative be provided as a single PDF file. Supplemental materials that are not compatible with this format (such as high-resolution images) may be provided separately using the module field designated for “any other information requested by the UIC Program Director.” Regardless of whether as-built drawings and other images are incorporated into the narrative or provided separately, they should be legible, clear, and include all relevant legends, scales, labels, etc.

Injection Well Construction Submissions
<u>Class VI Rule requirements:</u>
• 40 CFR 146.82(c)(3), (5)
• 40 CFR 146.86
<u>Relevant GSDT modules:</u>
• Project Information Tracking module
<u>Reference documents:</u>
• <i>UIC Program Class VI Well Construction Guidance</i>
<u>Electronic resources:</u>
• 40 CFR 146.82(c) narrative template
• GSDT user guides

The EPA recommends that owners or operators hold a discussion with their permitting authority if the actual well construction procedures varied significantly from the approved procedures incorporated in the Class VI permit. (Ideally, owners or operators will notify the permitting authority as

soon as possible after identifying the need for such a change—e.g., if relevant information about subsurface formations arises during drilling—to ensure that the well, as built, meets the Class VI requirements.) The EPA also recommends that owners or operators and permitting authorities discuss the ramifications of any changes on other aspects of the project, including operations, well plugging, and associated financial responsibility costs.

4.4 Pre-Operational Testing

The Class VI Rule requires owners or operators to conduct certain activities to verify proper construction of the well and obtain data on the chemical and physical characteristics of the injection and confining zones [40 CFR 146.87]. These activities should be performed pursuant to the approved pre-operational testing program in the Class VI permit (see Section 3.1.5) and the results submitted during the pre-operation phase to inform the UIC Program Director's evaluation pursuant to 40 CFR 146.82(c)(4), (7), and (8).

Before conducting the logs and tests required by 40 CFR 146.87, owners or operators must notify their permitting authority and provide them with an opportunity to witness the logging and testing. An owner or operator must provide a testing schedule to the permitting authority at least 30 days before the first test takes place, and any changes to the schedule must be submitted at least 30 days before the next scheduled test [40 CFR 146.87(f)]. These notifications can be submitted using the Pre-Operational Testing module.

The EPA anticipates that the pre-operational testing results will include a combination of narrative information (including third-party materials, such as log analyst reports), graphs/figures, and tabular data. Log results may be submitted in Log ASCII Standard (LAS) format, if desired. Both the *UIC Program Class VI Well Site Characterization Guidance* and the *UIC Program Class VI Well Construction Guidance* provide recommendations for conducting the required logs and tests. In addition, the *UIC Program Class VI Well Testing and Monitoring Guidance* includes recommendations related to MITs.

The Pre-Operational Testing module was designed to facilitate submission of the logging and testing results. Unlike most other GSDT modules used during the pre-construction and pre-operation phases, owners or operators will not yet have used the applicable components of the Pre-Operational Testing module. Therefore, the EPA recommends that owners or operators contact their permitting authority before populating the module to discuss any questions about how to use the module or about the specific types of information to submit. Following successful submission of the module, owners or operators can check the corresponding box in the Project Information Tracking module to confirm that they have completed this component of pre-operation phase reporting.

During this phase of a Class VI project, the pre-operational testing results are likely to be the primary source of site-specific information informing the final AoR delineation, Testing and Monitoring Plan, and other project components. Therefore, the EPA recommends that interpretive materials submitted with the pre-operational testing results include a discussion of data limitations and remaining uncertainties at the site. The EPA also recommends that owners

Pre-Operational Testing Submissions

Class VI Rule requirements:

- 40 CFR 146.82(c)(4), (7), (8)
- 40 CFR 146.87

Relevant GSDT modules:

- Project Information Tracking module
- Pre-Operational Testing module

Reference documents:

- *UIC Program Class VI Well Site Characterization Guidance*
- *UIC Program Class VI Well Construction Guidance*
- *UIC Program Class VI Well Testing and Monitoring Guidance*

Electronic resources:

- GSDT user guides

or operators provide information to document compliance with quality assurance/quality control (QA/QC) procedures for the logs and tests, such as equipment calibration information and QA/QC sample data (e.g., blanks, duplicates, or matrix spikes used during laboratory analyses).

The Pre-Operational Testing module provides a great deal of flexibility to owners or operators, reflecting the flexibility of the associated Class VI Rule requirements. The EPA encourages owners or operators to contact their permitting authority to discuss the best approach for submitting a particular project's pre-operational testing results.

4.5 Other Project Plans

The Class VI Rule, at 40 CFR 146.82(c)(9), requires the UIC Program Director to consider any amendments to the proposed Testing and Monitoring Plan, Injection Well Plugging Plan, PISC and Site Closure Plan, and Emergency and Remedial Response Plan that are necessary to address new information collected during logging and testing of the well and the formation. (See Section 4.2 for a discussion of the AoR and Corrective Action Plan.) This requirement also includes consideration of any necessary updates to the alternative PISC timeframe demonstration, if one

has been proposed. The EPA expects that owners or operators will submit amended project plan files to support this evaluation.

Other Project Plan Submissions

Class VI Rule requirements:

- 40 CFR 146.82(c)(9)
- 40 CFR 146.90
- 40 CFR 146.92(b)
- 40 CFR 146.93(a), (c)
- 40 CFR 146.94(a)

Relevant GSDT modules:

- Project Information Tracking module
- Project Plan Submissions module
- Alternative PISC Timeframe Demonstration module

Reference documents:

- *UIC Program Class VI Well Project Plan Development Guidance*
- *UIC Program Class VI Well Testing and Monitoring Guidance*
- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*

Electronic resources:

- Project plan templates
- GSDT user guides

The EPA anticipates that the amended project plans will have a similar content and format as the original approved plans (e.g., PDF files developed using the templates provided in the Project Plan Submissions module). See the *UIC Program Class VI Well Project Plan Development Guidance* for more information on the project plans, and refer to the *UIC Program Class VI Well Testing and Monitoring Guidance* and the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance* for recommendations on the information to be included in these submittals.

At this stage of a Class VI project, the Project Plan Submissions module should contain the last versions of the project plans that were submitted before the Class VI permit was issued. The EPA recommends that owners or operators delete these files and replace them with the most up-to-date files.⁷ Supplemental materials that are not part of the plans can be uploaded in the designated fields in the Project Plan Submissions module. In addition to the examples of

⁷ If the permitting authority made any changes to the plan before incorporating it into the permit, the file in the Project Plan Submissions module may not be exactly the same as the approved plan. When updating the plan, EPA recommends that owners or operators ensure that they are using the final, approved plan as a starting point.

supplemental materials provided for the original proposed plans (see Sections 3.1.6, 3.1.7, 3.1.8 and 3.1.9), the EPA recommends that owners or operators consider submitting an explanation of the changes that have been made to each plan, particularly if substantial changes were necessary.

Any revisions to the alternative PISC timeframe demonstration materials can be made directly in the Alternative PISC Timeframe Demonstration module. The EPA recommends that owners or operators delete any obsolete information from that module and replace it with information that reflects the most up-to-date understanding of the site. Because this demonstration relies heavily on computational modeling results, owners or operators are encouraged to reference the detailed modeling submission as appropriate in their submission.

Following successful submission in the Project Plan Submissions module and (if applicable) the Alternative PISC Timeframe Demonstration module, owners or operators can check the relevant boxes in the Project Information Tracking module to confirm that they have completed the corresponding components of pre-operation phase reporting.

In certain cases, it may not be necessary to amend one or more of the project plans. For example, if sufficient project-specific data were available during the pre-construction phase and the AoR delineation has not changed substantially, the existing strategy outlined in the Emergency and Remedial Response Plan may still be appropriate. If owners or operators believe this may be the case for their project, the EPA recommends that they discuss this possibility with the permitting authority before making the relevant pre-operation phase submittals. In lieu of an amended plan, the UIC Program Director may request a technical justification of why no amendment is needed. This justification can be submitted using the supplemental materials field of the Project Plan Submissions module.

4.6 Financial Responsibility

If amendments to the AoR and Corrective Action Plan, Injection Well Plugging Plan, PISC and Site Closure Plan, or Emergency and Remedial Response Plan lead to increased costs for the covered activities, the owner or operator must update the cost estimate supporting the financial responsibility demonstration within 60 days [40 CFR 146.85(c)(3)]. Also, owners or operators must update their cost estimates annually [40 CFR 146.85(c)(2)]. Given the likelihood that one or more project plans will change and the time needed to construct the well and perform all required pre-operational testing, it is likely that an updated cost estimate will be needed during the pre-operation phase.

Updated cost estimates should be submitted using the Financial Responsibility Demonstration module, with the same procedures used to submit the initial cost estimate materials during the pre-construction phase (see Section 3.1.3). The EPA recommends that owners or operators delete any obsolete information

Financial Responsibility Submissions

Class VI Rule requirements:

- 40 CFR 146.85(c)(2), (4), and (e)
- 40 CFR 146.85(a)(5)(ii), (c)(4), and (d)(3)

Relevant GSDT modules:

- Project Information Tracking module
- Financial Responsibility Demonstration module

Reference documents:

- *UIC Program Class VI Financial Responsibility Guidance*

Electronic resources:

- GSDT user guides

from the module and replace it with an up-to-date version. If final copies of financial instruments were not provided during the pre-construction phase, they should be provided whenever they become available. See Section 3.1.3 for more information about submitting materials related to financial instruments. Once the updated financial responsibility information is submitted, the owner or operator can check the corresponding box in the Project Information Tracking module.

Owners or operators are encouraged to contact their permitting authority to discuss the need for (or the timing of) cost estimate updates or any other questions related to submitting financial responsibility information.

5 Injection Phase Reporting and Recordkeeping

During the injection phase, owners or operators must submit information at certain intervals as specified by the project's permit and the Class VI Rule. The goal of injection phase information collection and reporting is to demonstrate that the project is in compliance with the Class VI permit, to identify any endangerment of USDWs, and to generate a body of data to support project milestones (such as AoR reevaluations and the demonstration of non-endangerment made at the end of the project). Specifically, owners or operators must submit periodic reports of testing and monitoring results; notifications and results of well tests; and documentation related to AoR reevaluations, financial responsibility updates, and project plan amendments, as well as notifications and other information associated with emergency and remedial response activities or adverse financial conditions. Table 5-1 summarizes these requirements and the associated Class VI Rule citations, and further details are provided in the subsections below.

The Class VI Rule also specifies certain recordkeeping requirements for injection phase information. Pursuant to 40 CFR 146.91(f)(2), data on the nature and composition of injected fluids must be retained for 10 years after site closure, and the UIC Program Director may require the owner or operator to deliver these records to him or her at the end of this retention period. In addition, 40 CFR 146.91(f)(3) requires monitoring data collected pursuant to 40 CFR 146.90(b)-(i) to be retained for 10 years after it is collected, and 40 CFR 146.84(g) requires that modeling data and inputs used to support AoR reevaluations be retained for 10 years as well.

Table 5-1. Summary of submittals to be made during the injection phase.

Reporting Requirement	Relevant GSDT Modules	Recommended Format	Timing and Frequency
Semi-annual reports of testing and monitoring results [40 CFR 146.91(a)]	Injection and Post-Injection Phase Reporting module	A single uploaded PDF containing the narrative component of each semi-annual report, with supporting data and other supplemental materials uploaded separately as necessary	Semi-annually, on the schedule set in the plan or permit
Notifications of well tests and stimulation activities [40 CFR 146.91(d)]	Injection and Post-Injection Phase Reporting module	An uploaded PDF letter	At least 30 days before the event
Results of MITs, workovers, and other tests of the injection well, if required by UIC Program Director [40 CFR 146.91(b)]	Injection and Post-Injection Phase Reporting module	An uploaded PDF, with supporting data and other supplemental materials uploaded separately as necessary	Within 30 days of the event With the next semi-annual report, for certain types of activities per 40 CFR 146.91(a)(7)

Reporting Requirement	Relevant GSDT Modules	Recommended Format	Timing and Frequency
Submissions associated with an AoR reevaluation, including AoR and Corrective Action Plan amendments, or justification that no amendment is needed [40 CFR 146.84(e)]	AoR and Corrective Action module	A combination of uploaded PDF files (including a single uploaded PDF containing the narrative component of the plan) and data files in other formats, as well as information entered directly into the module	According to the schedule (or triggering criteria) set in the permit or the approved AoR and Corrective Action Plan
Testing and Monitoring Plan amendments, or justification that no amendment is needed [40 CFR 146.90(j)]	Project Plan Submissions module	A single uploaded PDF, with supporting data and other supplemental materials uploaded separately as necessary	Within 1 year of an AoR reevaluation, following significant changes to the facility, or when required by the UIC Program Director (as specified in the permit or the approved Testing and Monitoring Plan)
Emergency and Remedial Response Plan amendments, or justification that no amendment is needed [40 CFR 146.94(d)]	Project Plan Submissions module	A single uploaded PDF, with supporting data and other supplemental materials uploaded separately as necessary	Within 1 year of an AoR reevaluation, following significant changes to the facility, or when required by the UIC Program Director (as specified in the permit or the approved Emergency and Remedial Response Plan)
Financial responsibility cost estimate updates [40 CFR 146.85(c)(2), (c)(4), and (e)]	Financial Responsibility Demonstration module	A combination of uploaded PDF files and information entered directly into the module	Annually, 60 days before instrument anniversary Within 60 days of project plan amendment or notification by UIC Program Director
Financial responsibility instrument updates [40 CFR 146.85(a)(5)(ii), (c)(4), and (d)(3)]	Financial Responsibility Demonstration module	A combination of uploaded PDF files and information entered directly into the module	Annually Within 60 days of cost estimate increase to greater than value of current instrument Within 60 days of notification of third-party adverse financial conditions

Reporting Requirement	Relevant GS DT Modules	Recommended Format	Timing and Frequency
Emergency notifications [40 CFR 146.88(f)(3), 146.91(c), 146.94(b)(3)]	Injection and Post-Injection Phase Reporting module	An uploaded PDF letter, with other supplemental materials uploaded separately as necessary	Within 24 hours Included in the semi-annual report, for certain types of events per 40 CFR 146.91(a)(3)-(4)
Follow-up submissions after an emergency shutdown or loss of mechanical integrity [40 CFR 146.88(f)(4)-(5), 146.94(c)]	Injection and Post-Injection Phase Reporting module	One or more uploaded file(s)	Before resuming injection or as required by the UIC Program Director
Notifications of adverse financial conditions [40 CFR 146.85(d)]	Financial Responsibility Demonstration module	An uploaded PDF letter (submission by certified mail also required)	Within 10 days of the start of bankruptcy proceedings

5.1 Semi-Annual Reports of Testing and Monitoring Results

The Class VI Rule, at 40 CFR 146.91(a), requires owners or operators to submit semi-annual reports of testing and monitoring results. These reports must contain the results of monitoring conducted pursuant to 40 CFR 146.90, as specified in the approved Testing and Monitoring Plan, as well as certain summary statistics of operational parameters and descriptions of permit exceedances and emergency shut-offs. Recommendations for submitting each of these components are provided in the subsections below.

Semi-Annual Report Requirements

- Changes to the characteristics of the carbon dioxide stream compared to the proposed operating data
40 CFR 146.91(a)(1)
- Operational monitoring results, including monthly and cumulative summary statistics
40 CFR 146.91(a)(2), (5)-(6)
- Description of permit exceedances or events that triggered shut-off devices
40 CFR 146.91(a)(3)-(4)
- Results of monitoring prescribed under 40 CFR 146.90, including corrosion monitoring, ground water monitoring, external MITs, pressure fall-off tests, plume and pressure front monitoring, surface air and/or soil gas monitoring (if required), and any other activities included in the approved Testing and Monitoring Plan
40 CFR 146.91(a)(7)

The Injection and Post-Injection Phase Monitoring module of the GS DT facilitates submission of the semi-annual reports and any supplemental information supporting those reports. The module provides a semi-annual report template that can be downloaded, populated, and uploaded back to the module. The EPA recommends that owners or operators use the template, which includes specific instructions and examples for each required component.

For ease of submission and to facilitate the permitting authority's evaluation, the EPA recommends that each semi-annual report be provided as a single PDF file. This file should include a summary of the activities conducted and

an interpretation (supported by graphics/charts) that synthesizes the results of these activities and their relevance to the permit conditions and Class VI Rule requirements. Supplemental materials or appendices that accompany the report but are not compatible with this format (such as tabular data, high-resolution images, and GIS files) may be provided separately in the designated module field.

Because injection phase testing and monitoring activities are conducted according to the project-specific Testing and Monitoring Plan, the specific content of the semi-annual report will vary among projects, and, potentially, among different reporting periods for a single project.

However, in general, EPA recommends that owners or operators submit the following types of information for each testing and monitoring activity, if applicable:

- The purpose, date, time, and location of sampling event, test, or survey.
- A list or brief description of methods used.
- Interpretation of results with respect to permit conditions/regulatory requirements and past results.
- Any identified data gaps.
- The QA/QC procedures employed.
- The names of any contractors or laboratories involved in sampling and analysis (and their certifications, if applicable).
- Any identified amendments to the Testing and Monitoring Plan that may be necessary to continue protection of USDWs.

Additional recommendations for reporting the results of specific types of monitoring are provided in the subsections below. Again, these general recommendations may not apply to all projects or to all components of an individual project's semi-annual report. The EPA recommends that owners or operators contact their permitting authority before submitting their first semi-annual report, to discuss any questions about how to submit particular types of information. Background information on conducting all required testing and monitoring for Class VI projects can be found in the *UIC Program Class VI Well Testing and Monitoring Guidance*.

5.1.1 Carbon Dioxide Stream Monitoring Results

The Class VI Rule, at 40 CFR 146.91(a)(1), requires the semi-annual report to include any changes to the physical, chemical, and other relevant characteristics of the carbon dioxide stream compared to the proposed operating data. Carbon dioxide stream monitoring is also a required component of the Testing and Monitoring Plan, pursuant to 40 CFR 146.90. As a result, the requirement at 40 CFR 146.91(a)(7) to include the results of 40 CFR 146.90 monitoring activities in the semi-annual report applies to this information. This means that the overall results of carbon dioxide stream monitoring must also be included in the semi-annual report, not just changes compared to what was proposed.

Changes in the carbon dioxide stream may lead to changes in the potential for interactions with the injection formation, subsurface fluids, and/or injection well construction materials. Additionally, monitoring the chemical and physical characteristics of the carbon dioxide stream may help distinguish the injectate from the native fluids in case of fluid migration out of the injection zone. An individual project's Class VI permit may also specify certain carbon dioxide stream characteristics (e.g., water content, concentrations of certain impurities) that must be maintained to remain in compliance with the permit.

Data on the carbon dioxide stream's characteristics will be generated during periodic injectate monitoring, which is required to be included in the Testing and Monitoring Plan by 40 CFR 146.90. The monitoring frequency, parameters, procedures, etc., will be specified in the approved plan. Owners or operators can consult Section 3.1 of the *UIC Program Class VI Well Testing and Monitoring Guidance* for further information on conducting carbon dioxide stream monitoring.

Carbon dioxide stream monitoring results can be incorporated into the semi-annual report template available in the GS DT. The EPA recommends that owners or operators include a list of chemicals analyzed (including carbon dioxide and any other constituents specified in the approved Testing and Monitoring Plan), a description of the sampling methodology, a tabulation of the analytical results, including results from any QA/QC samples, and a synthesis of the results interpreting any changes in the characteristics of the injected carbon dioxide stream. The EPA also recommends that owners or operators submit the results of previous analyses to facilitate evaluation of temporal trends. In general, owners or operators should provide any information necessary to demonstrate compliance with the Class VI permit and the approved Testing and Monitoring Plan, including the approved QASP.

When complete, the compiled semi-annual report file should be submitted using the Injection and Post-Injection Phase Reporting module. As stated above, the EPA recommends that the semi-annual report be provided as a single PDF file, with supplemental materials (e.g., copies of laboratory reports or tabular monitoring data) uploaded separately using the designated field in the module.

5.1.2 Operational Monitoring Results

The Class VI Rule requires that the following types of operational monitoring information be included in the semi-annual report:

- Monthly average, maximum, and minimum values for injection pressure, flow rate, and volume and annular pressure [40 CFR 146.91(a)(2)].

Carbon Dioxide Stream Submissions

Class VI Rule requirements:

- 40 CFR 146.90(a)
- 40 CFR 146.91(a)(1), (7)

Relevant GS DT modules:

- Injection and Post-Injection Phase Reporting module

Reference documents:

- *UIC Program Class VI Well Testing and Monitoring Guidance*

Electronic resources:

- Semi-annual report template
- GS DT user guides

- The monthly volume and/or mass of the carbon dioxide stream injected over the reporting period and the volume injected cumulatively over the life of the project [40 CFR 146.91(a)(5)].
- The monthly annulus fluid volume added [40 CFR 146.91(a)(6)].

Continuous monitoring of each of these parameters is a required component of the Testing and Monitoring Plan pursuant to 40 CFR 146.90(b), and 40 CFR 146.91(a)(7) requires that results of these activities are included in the semi-annual report. Operational monitoring results are used to demonstrate compliance with permit conditions and identify any deviations from permitted conditions that may result in USDW endangerment.

Operational Monitoring Submissions

Class VI Rule requirements:

- 40 CFR 146.90(b)
- 40 CFR 146.91(a)(2), (5)-(7)

Relevant GSDT modules:

- Injection and Post-Injection Phase Reporting module

Reference documents:

- *UIC Program Class VI Well Testing and Monitoring Guidance*

Electronic resources:

- Semi-annual report template
- GSDT user guides

Data to support this reporting requirement will be generated by continuous recording devices required by 40 CFR 146.88(e)(1) and 146.90(b), as specified in the approved Testing and Monitoring Plan. Sections 3.2 and 3.3 of the *UIC Program Class VI Well Testing and Monitoring Guidance* provide information on conducting continuous monitoring during injection.

Continuous monitoring results can be incorporated into the semi-annual report template available in the GSDT. The EPA recommends that the monthly and cumulative data required by 40 CFR 146.91(a)(2), (5), and (6) be presented in one or more tables within the semi-annual report file. EPA also recommends that, to ensure compliance with 40 CFR 146.91(a)(7), owners or operators submit all available results for

these parameters; the EPA recommends a summary tabular and/or graphical format for these data (i.e., owners or operators should not only submit the monthly/cumulative values). The data can either be incorporated directly into the semi-annual report file or uploaded separately using the field for supplemental information.

5.1.3 Description of Exceedances or Shut-Offs

The semi-annual report must include a description of any event that exceeded or otherwise diverged from permitted levels for annulus pressure or injection pressure, pursuant to 40 CFR 146.91(a)(3). In addition, the semi-annual report must include a description of any event that triggered a shut-off device, as well as a description of the activities conducted in response to such an event. Importantly, permit exceedances and automatic shut-offs may also require 24-hour reporting pursuant to 40 CFR 146.91(c), as described in Section 5.4.1; this section only describes the requirements applicable to the semi-annual report. The purpose of including this information in the semi-annual report is to allow the permitting authority to evaluate it in the context of other monitoring results, with the ultimate goal of ensuring USDW protection.

The underlying data for this component of the semi-annual report will be generated during the continuous monitoring required by 40 CFR 146.90(b), with supplemental information potentially coming from the project's operational records (e.g., internal incident reports) or emergency reporting submissions (see Section 5.4.1). The continuous monitoring information in Sections 3.2 and 3.3 of the *UIC Program Class VI Well Testing and Monitoring Guidance* may be useful to owners or operators when preparing this component of their semi-annual report.

The EPA recommends that owners or operators incorporate these event descriptions directly into the semi-annual report file, using the template available in the GSDT. The EPA recommends that the descriptions consist of brief narrative explanations, supported by tables, charts, graphs, or images as appropriate. Appendices (e.g., a record of 24-hour emergency notifications), attachments, etc., can also be incorporated into the semi-annual report PDF or be uploaded separately in the designated GSDT module field.

In general, the EPA recommends that the event descriptions include a brief overview of what occurred, any identified causes, the duration of the exceedance, and a description of the owner or operator's response. If any emergency reporting was conducted pursuant to 40 CFR 146.91(c), owners or operators are encouraged to include cross-references to those previous submissions.

5.1.4 Other Testing and Monitoring Results

In addition to the specific components listed at 40 CFR 146.91(a)(1)-(6), the Class VI Rule requires that the semi-annual report include the results of monitoring prescribed under 40 CFR 146.90 [40 CFR 146.91(a)(7)]. This means that the semi-annual report must include the results of monitoring conducted to comply with the approved Testing and Monitoring Plan. Because testing and monitoring strategies (and, therefore, the associated results) will vary from project to project, the following recommendations may not apply to all projects in all situations. The EPA recommends that owners or operators consult with their permitting authorities to determine how best to present results from their individual projects, especially if a project's approved Testing and Monitoring Plan includes monitoring methods not specified under 40 CFR 146.90.

Corrosion Monitoring

The Class VI Rule, at 40 CFR 146.90(c), requires quarterly corrosion monitoring of well materials, by analyzing coupons of well material, routing the carbon dioxide stream through a loop of well material, or an alternate method approved by the UIC Program Director. Furthermore, the UIC Program Director may require casing inspection logs to be run [40 CFR 146.89(d)]. Section 3.4 of the *UIC Program Class VI Well Testing and Monitoring Guidance* provides information related to corrosion monitoring.

Exceedance and Shut-off Submissions

Class VI Rule requirements:

- 40 CFR 146.91(a)(3)-(4)

Relevant GSDT modules:

- Injection and Post-Injection Phase Reporting module

Reference documents:

- *UIC Program Class VI Well Testing and Monitoring Guidance*

Electronic resources:

- Semi-annual report template
- GSDT user guides

The EPA recommends that corrosion monitoring results be incorporated directly into the semi-annual report file, using the template provided in the GSDT. The EPA recommends that owners or operators provide a brief narrative describing the method of sampling/measurement (e.g., the method for retrieval of coupons, the material from which coupons or loops are made, etc.) and an interpretation of the measured or observed results. This should be accompanied by the actual measurements of mass and thickness loss in any corrosion coupons or loops used (e.g., in a

tabular or graphical format), presented in the context of all previous results. If casing inspection logs were run, the owner or operator may submit information about the measured casing inspection logs and comparison to previous logs; information about the thickness of the casing (referencing the original casing thickness); and the locations of any detected anomalies such as pits, scratches, and splits. Supplemental items such as photographs can be incorporated into the semi-annual report file or uploaded separately in the designated field.

Other Testing and Monitoring Submissions

Class VI Rule requirements:

- 40 CFR 146.90(c)-(i)
- 40 CFR 146.91(a)(7)

Relevant GSDT modules:

- Injection and Post-Injection Phase Reporting module

Reference documents:

- *UIC Program Class VI Well Testing and Monitoring Guidance*

Electronic resources:

- Semi-annual report template
- GSDT user guides

External MITs

The Class VI Rule, at 40 CFR 146.89(c) and 40 CFR 146.90(e), requires annual external MITs. This testing may take the form of a tracer survey (e.g., oxygen activation log), a temperature log, a noise log, or another test required or allowed by the UIC

Program Director, as specified in the approved Testing and Monitoring Plan. External MITs are described in Section 2.3 of the *UIC Program Class VI Well Testing and Monitoring Guidance*.

MITs are subject to special reporting requirements under 40 CFR 146.91(b) and (d), as described in Section 5.2. Because MIT results must be submitted within 30 days of the test, owners or operators may have already submitted these results by the time they prepare their semi-annual report in a given reporting period. To avoid duplicative reporting, the EPA recommends that owners or operators include a short statement in the semi-annual report indicating the date of the test, the outcome, and a cross-reference to the previous submission that includes the complete results.

Pressure Fall-Off Testing

Pressure fall-off testing is required by the Class VI Rule at least once every five years, unless more frequent testing is required by the UIC Program Director, pursuant to 40 CFR 146.90(f). The schedule for pressure fall-off testing and the associated reporting will be specified in a project's approved Testing and Monitoring Plan. Section 3.5 of the *UIC Program Class VI Well Testing and Monitoring Guidance* provides more detailed information about pressure fall-off testing.

Results of pressure fall-off testing must be reported within 30 days of the test, if required by the UIC Program Director [40 CFR 146.91(b)(3)] (see Section 5.2). If pressure fall-off test results

were submitted within the 6 months covered by the semi-annual report, the EPA recommends that owners or operators include a short statement in the semi-annual report indicating the date of the test, any notable results, and a cross-reference to a previous submission that includes the previous results. (If the UIC Program Director/the project's Testing and Monitoring Plan does not require 30-day reporting of pressure fall-off results, owners or operators should include the full set of results in their semi-annual report.)

Ground Water Quality Monitoring Above the Confining Zone

Periodic monitoring of ground water quality above the confining zone(s) is required by the Class VI Rule [40 CFR 146.90(d)]. Owners or operators of wells operating under injection depth waivers must also sample ground water below the lower confining zone [40 CFR 146.95(f)(3)(i)]. The parameters, methods, schedule, and other specifics of this monitoring activity will be established in the project's approved Testing and Monitoring Plan.

Recommendations for conducting ground water monitoring are covered in Section 4 of the *UIC Program Class VI Well Testing and Monitoring Guidance*.

Ground water monitoring results can be incorporated directly into the semi-annual report template available in the GSRT. The EPA recommends that owners or operators include a list of parameters analyzed (as specified in the approved Testing and Monitoring Plan), a description of the sampling locations and methodology, a tabulation of the analytical results (including results for any QA/QC samples), and a synthesis of the results in the context of permit/regulatory compliance (e.g., an interpretative narrative that discusses any changing trends, any evidence of fluid leakage/fluid migration above the confining zone, and any implications for project operations or USDW protection, supported by maps and graphs as appropriate). To facilitate identification and evaluation of temporal trends, the EPA recommends that owners or operators submit the results of previous analyses, including baseline data. Any supplemental materials that owners or operators wish to provide (e.g., copies of laboratory reports) can be provided separately using the designated field in the module.

Carbon Dioxide Plume and Pressure-Front Tracking

The Class VI Rule, at 40 CFR 146.90(g), requires the owner or operator to perform direct and indirect monitoring to track the carbon dioxide plume and pressure front. As described in Section 5 of the *UIC Program Class VI Well Testing and Monitoring Guidance*, owners or operators may incorporate a variety of methods/techniques into their Testing and Monitoring Plans to fulfill this requirement. Accordingly, the specific types of information submitted related to plume and pressure-front tracking will vary from project to project.

In general, the EPA recommends that owners or operators incorporate the following items into their semi-annual report files (as applicable):

- One or more maps showing the locations/spatial extents (including, if applicable, depths/elevations), dates, and types of monitoring activities.
- Time-series graphs/charts showing monitoring results over time (including the current reporting period, previous reporting periods, and baseline data). For example, pressure or

saturation profiles at a given location or profiles of carbon dioxide trapping indicators could be submitted in this manner.

- Snapshot figures showing distributions of parameters over a given spatial extent at a particular time, such as one or more images showing the interpreted location of the carbon dioxide plume and pressure front in cross-sectional and plan/map view.
- A description of data processing methods used for geophysical surveys, as well as the major assumptions employed when analyzing monitoring results.
- Instrument calibration data, method sensitivity information, QA sample results, or other information to demonstrate compliance with the approved QASP.

In addition to the actual monitoring results, the EPA recommends that owners or operators include an interpretative narrative that synthesizes the results from the various monitoring methods, compares the results to the predictions generated during AoR delineation modeling, identifies any anomalies, and discusses any implications for project operations or USDW protection. Owners or operators should keep in mind that plume and pressure-front monitoring results are a key component of AoR reevaluations (see Section 5.3.1), as well as the project's ultimate non-endangerment demonstration (see Section 6.2.3). Submitting clear, organized, relevant, and complete results in the semi-annual reports will support efficient evaluations of these other Class VI project components.

To supplement the information included in the semi-annual report file, owners or operators may submit contractor's reports, GIS files, well log results, or other types of information that would not be practical to incorporate directly into the report PDF. These supplemental materials can be uploaded separately in the designated field in the GSDT.

Surface Air and/or Soil Gas Monitoring

The Class VI Rule allows the UIC Program Director, at his or her discretion, to require surface air and/or soil gas monitoring [40 CFR 146.90(h)]. If such activities are determined to be necessary, they will be incorporated into the approved Testing and Monitoring Plan. See Section 6 of the *UIC Program Class VI Well Testing and Monitoring Guidance* for more information.

Similar to the other types of testing and monitoring results, the EPA recommends that surface air and/or soil gas monitoring results be incorporated directly into the semi-annual report template. The EPA recommends that owners or operators include a list of parameters analyzed (as specified in the approved Testing and Monitoring Plan), a description of the sampling locations and methodology, and a tabulation of the analytical results, including results from any QA/QC samples. To facilitate identification and evaluation of temporal trends, the EPA recommends that owners or operators submit the results of previous analyses, including baseline data. In addition to the analytical testing results, the EPA recommends that owners or operators include an interpretative narrative that discusses any changing trends, any evidence of carbon dioxide reaching the surface, and any implications for project operations or USDW protection. This narrative may be supported by maps and graphs, as appropriate. In general, owners or operators should provide any information necessary to demonstrate compliance with the Class VI permit and the approved Testing and Monitoring Plan, including the approved QASP. Any supplemental

materials that owners or operators wish to provide (e.g., copies of laboratory reports, GIS files) can be provided separately using the designated field in the module. If any emergency reporting was conducted pursuant to 40 CFR 146.91(c)(5), as described in Section 5.4, the EPA recommends that owners or operators include a cross-reference to the associated submittals.

5.2 Well Testing Notifications and Results

The Class VI Rule contains special reporting requirements for well tests and related activities, including MITs, stimulation activities, and workovers. First, owners or operators must notify the UIC Program Director in writing 30 days before any planned workovers, stimulation activities (other than those conducted for formation testing under 40 CFR 146.82), and other planned tests of the injection well [40 CFR 146.91(d)]. Second, owners or operators must submit the results of MITs, workovers, and other tests of the injection well (if required by the UIC Program Director) within 30 days of the activity [40 CFR 146.91(b)]. The EPA expects that any project-specific requirements, such as which well tests require 30-day reporting under 40 CFR 146.91(b)(3), will be incorporated into the project's permit conditions and/or the approved Testing and Monitoring Plan.

Both types of submissions described above can be made using the GS DT's Injection and Post-Injection Phase Reporting module. Background information on well testing and the associated Class VI Rule requirements can be found in the *UIC Program Class VI Well Testing and Monitoring Guidance*.

For notifications made pursuant to 40 CFR 146.91(d), the EPA recommends that owners or operators upload a PDF letter stating the date/time/location of the planned activity and providing

a brief description of what will be done. Owners or operators may also want to state the purpose of the activity or the applicable permit condition/Class VI Rule requirement that it will fulfill. The EPA does not anticipate that owners or operators will need to submit any supplemental materials to accompany this notification letter, but the Injection and Post-Injection Phase Reporting module does provide the option to do so.

When submitting the results of well tests and other activities pursuant to 40 CFR 146.91(b), the EPA recommends that owners or operators upload a brief narrative report (in PDF) summarizing the procedures used and any key interpretations/outcomes. Owners or operators may use the field for supplemental materials to upload items such as log

Well Testing Notifications and Results Requirements

- Notifications of planned workovers, stimulations, and well tests
40 CFR 146.91(d)
- Results of MITs, workovers, and other well tests (if required by the UIC Program Director)
40 CFR 146.91(b)

Well Testing Notifications and Results Submissions

Class VI Rule requirements:

- 40 CFR 146.91(d)
- 40 CFR 146.91(b)

Relevant GS DT modules:

- Injection and Post-Injection Phase Reporting module

Reference documents:

- *UIC Program Class VI Well Testing and Monitoring Guidance*

Electronic resources:

- GS DT user guides

files or log analyst reports; alternatively, these items may be incorporated directly into the owner or operator's narrative file.

While the specific information to be submitted will vary depending on the type and purpose of the test or other activity, owners or operators are encouraged to submit details such as the following (as applicable):

- Operating conditions during testing, including injection rate, pressure, and temperature, or the conditions and timing associated with shutting-in the well.
- The numbers and locations of measurement stations (e.g., for oxygen activation logs).
- The name of the logging company and log analyst(s) responsible for preparing or interpreting the results.
- Plots of results (e.g., for pressure fall-off tests, a plot of change in pressure as a function of time) and information on any data processing methods used.
- Details on instrumentation, including relevant information related to calibration or QA/QC.
- A description of any anomalous results, including records of any corrective action or other activities undertaken in response to the test results.
- A comparison of the current results to previous results and any implications for project plans, predictions, or operations.

The EPA encourages owners or operators to contact their permitting authority to discuss any questions related to submitting well test results. Note that any failure to maintain mechanical integrity must be reported within 24 hours, pursuant to 40 CFR 146.91(c); see Section 5.4.1 for more information on the associated submissions.

5.3 Project Plan Amendments and Other Periodic Reporting

In addition to the specific reporting requirements at 40 CFR 146.91, owners or operators must also submit information related to AoR reevaluations, project plan amendments, and financial responsibility during the injection phase. Like other planned reporting during the injection phase, the purpose of these submissions is to demonstrate compliance with permit and Class VI Rule requirements and to demonstrate that the project is operating in a way that is protective of USDWs.

While the Class VI Rule includes minimum timing requirements for these periodic reporting activities, the actual reporting schedule for an individual project (including criteria that would trigger

Project Plan Amendments and Other Periodic Reporting Requirements

- AoR reevaluations, including an amended AoR and Corrective Action Plan or a demonstration that no amendment is needed
40 CFR 146.84(e)(4)
- Other amended project plans, or (if applicable) justifications that no amendments are needed
40 CFR 146.90(j), 146.93(a)(4), 146.94(d)
- Financial responsibility cost estimate and instrument updates
40 CFR 146.85(a)(5)(ii), (c)(2), (c)(4), (d)(3), (e)

unscheduled AoR reevaluations or plan reviews) will be specified in that project's permit and approved project plans. Depending on the item to be submitted, owners or operators will use the AoR and Corrective Action module, the Project Plan Submissions module, and/or the Financial Responsibility Demonstration module to make these submissions. The subsections below provide recommendations for each action.

5.3.1 AoR Reevaluations and Corrective Action

Owners or operators of Class VI injection wells are required to reevaluate the AoR delineation at a fixed frequency not to exceed five years, as specified in the AoR and Corrective Action Plan, or when warranted by monitoring and operational conditions [40 CFR 146.84(e)]. The purpose of the reevaluation is to ensure that the AoR delineation continues to represent the area where USDWs may be endangered by the injection activities, as required by 40 CFR 146.84(a).

Procedures and processes associated with AoR reevaluations are described in Section 4 of the *UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance*. In general, the EPA anticipates that owners or operators will compare testing and monitoring results and other newly acquired project data to the modeled predictions generated during AoR delineation. Depending on the project and the approach that the owner or operator chooses to take, this may or may not involve additional computational modeling. Regardless of the approach used, the owner or operator will ultimately need to submit one of two items:

1. A technical demonstration, supported by project data, that the existing AoR delineation (and the AoR and Corrective Action Plan) remains appropriate; or
2. An amended AoR and Corrective Action Plan with a modified AoR delineation based on computational modeling (and, potentially, an updated corrective action strategy).

AoR Reevaluation and Corrective Action Submissions

Class VI Rule requirements:

- 40 CFR 146.84(e)

Relevant GSDT modules:

- AoR and Corrective Action module

Reference documents:

- *UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- AoR and Corrective Action Plan template
- GSDT user guides

Owners or operators can submit all reevaluation information using the AoR and Corrective Action module of the GSDT. For a demonstration that the existing AoR remains appropriate, the EPA recommends that owners or operators submit a narrative PDF document that compares all available, relevant project data (e.g., from site characterization, operations, and testing and monitoring) to the computational predictions and/or the inputs that supported the existing AoR delineation. The EPA recommends that data presentation formats such as maps, diagrams, and charts/graphs be incorporated into the narrative; the actual data supporting this synthesis can be submitted separately as a supplement to the narrative PDF. Owners or operators are also encouraged to cross-reference semi-annual reports or other testing and monitoring submissions. If any computational modeling was conducted to support the demonstration, the owner or

operator may also need to update some of the other tabs in the module to reflect the changes to the associated parameters, results, etc. When considered together, this submission will serve as the demonstration that no plan amendment is needed, pursuant to 40 CFR 146.84(e)(4).

If the owner or operator is submitting an amended AoR and Corrective Action Plan as a result of the reevaluation, the EPA expects that an analysis of the reevaluation and its outcome (similar to that described above) will also be submitted. The owner or operator should use the AoR and Corrective Action module to submit a description of inconsistencies found during the reevaluation and all necessary changes to the modeling data (e.g., associated with the calibration of the model) used for the delineation of the new AoR. The amended AoR and Corrective Action Plan should benchmark any changes to the AoR delineation process and provide an updated corrective action strategy (or a demonstration that one is not needed). Note that, if the permitting authority made any changes to the submitted plan before incorporating it into the permit, the existing file in the module may not be exactly the same as the approved plan. When amending the plan, the EPA recommends that owners or operators ensure that they are using the current, approved plan as a starting point.

Because of the flexibility that the Class VI Rule allows for AoR reevaluations and associated reporting, the EPA encourages owners or operators to contact their permitting authority prior to submitting their first AoR reevaluation documentation to discuss any questions related to the reevaluation approach or what information should be submitted.

If a revised AoR has been delineated, owners or operators must also identify all wells in the reevaluated AoR that require corrective action [40 CFR 146.84(e)(2)]. For any newly identified wells (i.e., wells that were not within the previously delineated AoR), the owner or operator must submit a description of each well's type, construction, date drilled, location, depth, and record of plugging and/or completion, as well as any additional information required by the UIC Program Director [40 CFR 146.84(c)(2)] and, if necessary, perform corrective action on these wells [40 CFR 146.84(e)(3)]. The EPA recommends that owners or operators communicate with their permitting authorities before conducting corrective action on wells that were not previously identified in the AoR and Corrective Action Plan. As described above, the AoR and Corrective Action module is designed to facilitate submission of all corrective action materials, including any documentation of corrective action that has been performed, such as plugging reports, records of any remedial cementing, etc.

The AoR and Corrective Action module can also be used to submit documentation of corrective action conducted on a phased schedule during the injection phase (i.e., pre-scheduled corrective action that is not associated with an AoR reevaluation), if such activities are included in the approved AoR and Corrective Action Plan. For these phased corrective action submissions, owners or operators may update just the corrective action section of the reporting module; no modeling or project plan submissions are necessary.

5.3.2 Other Project Plan Amendments

Owners or operators must periodically review their Testing and Monitoring Plan and Emergency and Remedial Response Plan, and either make amendments or demonstrate that no amendments are needed [40 CFR 146.90(j) and 146. 94(d)]. These reviews will occur after AoR reevaluations

and/or significant changes to the facility; like AoR reevaluations, the actual reporting schedule for an individual project (including criteria that would trigger unscheduled plan reviews) will be specified in that project's permit and approved project plans. The Class VI Rule does not require formal periodic reviews and amendments of the Injection Well Plugging Plan or the PISC and Site Closure Plan during the injection phase; however, 40 CFR 146.93(a)(4) states that owners or operators may submit a modified PISC and Site Closure Plan at any time during the life of the project.

Depending on the results of the most recent AoR reevaluation (see Section 5.3.1), the extent of any recent changes to the project, and other factors, owners or operators may submit either an amended project plan or a demonstration that no amendment is needed. More information on completing and documenting project plan amendments can be found in the *UIC Program Class VI Well Testing and Monitoring Guidance*, the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*, and the *UIC Program Class VI Well Project Plan Development Guidance*.

Both the amended project plans and the justifications that no plan amendments are needed can be submitted using the Project Plan Submissions module. If owners or operators determine that no plan amendment is necessary, the EPA recommends that, to meet the requirements for this demonstration, owners or operators submit a narrative document describing the approach used to evaluate the plan (which should be consistent with the approach outlined in the existing approved plan) and the outcome of this evaluation. Owners or operators should support this discussion with project data presented in the form of maps, graphs/charts, tables, diagrams, or other formats as appropriate. The EPA recommends that the demonstration document be provided as a single PDF; supplemental items that are not compatible with this format, like GIS files, can be uploaded separately in the field designated for appendices and supporting materials.

The EPA expects that amended project plans will have a similar content and format as the original approved plans: PDF files developed using the templates provided in the Project Plan Submissions module, with any materials that cannot or are not intended to be incorporated into the plan uploaded separately. Owners or operators can use the same procedures to submit amended plans as in previous project phases (see Section 4.5). Note that, if the permitting authority made any changes to a plan before incorporating it into the permit, the existing file in the Project Plan Submissions module may not be exactly the same as the approved plan. When amending a project plan, the EPA recommends that owners or operators ensure that they are using the current, approved plan as a starting point.

Other Project Plan Submissions

Class VI Rule requirements:

- 40 CFR 146.90(j)
- 40 CFR 146.93(a)(4)
- 40 CFR 146.94(d)

Relevant GSDT modules:

- Project Plan Submissions module

Reference documents:

- *UIC Program Class VI Well Testing and Monitoring Guidance*
- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- Project plan templates
- GSDT user guides

5.3.3 Financial Responsibility Updates

The Class VI Rule requires that owners or operators update their financial responsibility cost estimates on an annual basis to adjust for inflation [40 CFR 146.85(c)(2)]. The cost estimate must also be updated if the AoR and Corrective Action Plan, the Injection Well Plugging Plan,

the PISC and Site Closure Plan, or the Emergency and Remedial Response Plan are amended [40 CFR 146.85(c)(2)], or if the UIC Program Director determines during the annual adjustment that the estimate is no longer adequate [40 CFR 146.85(e)]. In addition, the Class VI Rule requires that the financial responsibility instruments be updated (or additional instruments secured) if the cost estimate increases to an amount greater than the face amount of the financial instrument(s) currently in use [40 CFR 146.85(c)(4)].

Financial Responsibility Submissions

Class VI Rule requirements:

- 40 CFR 146.85(a)(5)(ii), (c)(2) and (4), and (e)

Relevant GS DT modules:

- Financial Responsibility Demonstration module

Reference documents:

- *UIC Program Class VI Financial Responsibility Guidance*

Electronic resources:

- Online materials at <http://www.epa.gov/uic/financial-responsibilities-underground-injection-well-owners-or-operators>
- GS DT user guides

Recommendations for generating these materials (including developing cost estimates) is provided in the *UIC Program Class VI Financial Responsibility Guidance*. The EPA anticipates that the content and format of the updated documentation will be similar to that of the items submitted during the permit application process or the previous financial responsibility update (see Sections 3.1.3 and 4.6).

Both cost estimate and financial instrument updates can be submitted using the GS DT's Financial Responsibility Demonstration module, using the tabs associated with the applicable activity or instrument. When preparing these submissions, the EPA recommends that owners or operators delete any obsolete information from the module (including both directly entered data and uploaded files) and replace it with an up-to-date version. The EPA encourages owners or operators to contact their permitting authority to discuss the timing of cost estimate or financial instrument updates or any other questions related to submitting financial responsibility information.

5.4 Emergency and Remedial Response and Other Occasional Reporting

In certain situations, owners or operators must submit notifications and other documentation associated with unexpected events. The Class VI Rule includes specific requirements for reporting associated with emergency and remedial response, as well as for adverse financial conditions (such as bankruptcy) experienced by either the owner or operator or a third-party provider of a financial responsibility instrument. While the EPA

Emergency and Remedial Response and Other Occasional Reporting Requirements

- Emergency notifications and follow-up submissions
40 CFR 146.88(f)(3)-(5), 146.91(c) and (e), 146.94(b)-(c)
- Notifications of adverse financial conditions
40 CFR 146.85(d)

anticipates that emergency situations will likely require direct (non-GSDT) communication between the owner or operator and the permitting authority, all notifications, reports, and other required submissions must still be submitted electronically in compliance with 40 CFR 146.91(e).

The GSDT's Injection and Post-Injection Phase Reporting module and Financial Responsibility Demonstration modules facilitate the submission of emergency and remedial response materials and notifications of adverse financial conditions, respectively. The subsections below provide recommendations specific to both of these types of submissions. The Injection and Post-Injection Phase Reporting module can also be used to submit other types of materials that may be required by a Class VI permit and are not otherwise accommodated by the GSDT. Owners or operators can use the Other Submissions tab of the module for this purpose and enter a brief description of the item they are submitting in the designated text-entry field.

5.4.1 Emergency and Remedial Response

The Class VI Rule lists several situations or events that require owners or operators to submit emergency notifications. Specifically, the owner or operator must report any of the following within 24 hours:

- Any evidence that the injected carbon dioxide stream or associated pressure front may cause endangerment of a USDW [40 CFR 146.91(c)(1), 146.94(b)(3)].
- Any noncompliance with permit conditions or equipment malfunctions that may cause fluid movement into a USDW [40 CFR 146.91(c)(2)].
- Any triggering of the automatic shut-off system [40 CFR 146.88(f)(3), 146.91(c)(3)].
- Any failure to maintain mechanical integrity [40 CFR 146.91(c)(4)].
- Any release of carbon dioxide to the atmosphere or biosphere, for projects with surface air and/or soil gas monitoring [40 CFR 146.91(c)(5)].

Emergency and Remedial Response Submissions

Class VI Rule requirements:

- 40 CFR 146.88(f)(3)-(5), 146.91(c) and (e), 146.94(b)-(c)

Relevant GSDT modules:

- Injection and Post-Injection Phase Reporting module

Reference documents:

- *UIC Program Class VI Project Plan Development Guidance*

Electronic resources:

- GSDT user guides

The EPA anticipates that the initial emergency notification will likely take the form of a phone call or other immediate mode outlined in the Emergency and Remedial Response Plan. However, the formal notification must still be submitted electronically in compliance with 40 CFR 146.91(e). In addition, after an emergency event has occurred, an owner or operator may need to submit follow-up information, such as a demonstration that USDWs will not be endangered by resuming injection [40 CFR 146.94(c)], a demonstration that mechanical integrity has been restored [40 CFR 146.88(f)(4)], or documentation that remedial actions or other procedures have been carried out according to the Emergency and Remedial Response Plan or as requested by the UIC Program Director. Any project-

specific requirements associated with these notifications and follow-up submissions will be established in the project's approved Emergency and Remedial Response Plan. See the *UIC Program Class VI Well Project Plan Development Guidance* for further information.

Both notifications and follow-up submissions can be submitted using the Emergency and Remedial Response tab of the Injection and Post-Injection Phase Reporting module. The EPA recommends that notifications consist of a PDF letter containing the date/time/location of the event and a brief description of what occurred. Follow-up documentation may take various formats, such as narrative descriptions of remedial activities, results of MITs, monitoring data, or additional notifications (e.g., notifications that injection will resume, per 40 CFR 146.88(f)(5)). Because of the wide variety of potential follow-up submissions, the EPA recommends that owners or operators review their Emergency and Remedial Response Plan and consult with their permitting authority to determine the appropriate materials to submit.

5.4.2 Notifications of Adverse Financial Conditions

The Class VI Rule requires owners or operators to notify their UIC Program Director of any adverse financial conditions that may affect their ability to cover the costs of any of the required activities guaranteed by the financial responsibility instruments [40 CFR 146.85(d)]. These events could include bankruptcy or other adverse financial conditions experienced by the owner or operator, a third-party provider of a financial instrument, or a corporate guarantor.

The EPA anticipates that specific conditions associated with these notifications will be stated in the financial instruments themselves. The *UIC Program Class VI Financial Responsibility Guidance* provides further information on this. Unless otherwise specified in the permit or financial instruments, the EPA recommends that the notification consist of a PDF letter describing the situation and the owner or operator's plans to establish other means of financial assurance.

Note that, in the case of bankruptcy proceedings, the Class VI Rule requires that a notification be sent by certified mail within 10 days of commencement of the proceedings [40 CFR 146.85(d)(1)]. The EPA recommends that owners or operators submit the notification first using the GSDT and follow it with the certified mail letter. Submitting the notification via the GSDT allows owners or operators to rapidly alert their permitting authority, as well as to comply with the Class VI Rule's electronic reporting requirement under 40 CFR 146.91(e).

Adverse Financial Conditions Submissions

Class VI Rule requirements:

- 40 CFR 146.85(d) and 146.91(e)

Relevant GSDT modules:

- Financial Responsibility Demonstration module

Reference documents:

- *UIC Program Class VI Financial Responsibility Guidance*

Electronic resources:

- GSDT user guides

6 Post-Injection Phase Reporting and Recordkeeping

Following cessation of injection, a Class VI project enters the post-injection phase. During this phase, owners or operators will plug the injection well, perform PISC testing and monitoring, demonstrate that the site no longer poses an endangerment to USDWs, and close the site, pursuant to 40 CFR 146.92 and 146.93. These activities (and their associated reporting requirements) are intended to demonstrate that the site is managed and monitored properly following the cessation of injection, to maintain protection of USDWs through the end of the project's lifespan. Because injection wells may be converted to monitoring wells after injection has ceased, injection well plugging is not required to take place at the beginning of the post-injection phase. However, pursuant to 40 CFR 146.93(f)(1), the site closure report must include documentation of appropriate injection well and monitoring well plugging as specified in 40 CFR 146.92 and 146.93(e), regardless of when the injection well plugging took place.

Information that owners or operators will submit during this phase of a Class VI project is summarized below in Table 6-1. The Class VI Rule, at 40 CFR 146.91(f)(4), states that well plugging reports, PISC data (including information used to develop the alternative PISC timeframe), and site closure reports must be retained for 10 years following site closure. Pursuant to 40 CFR 146.93(h), the owner or operator must deliver the records to the UIC Program Director at the conclusion of this retention period. Owners or operators should discuss plans for this transfer with their permitting authority. Note that the Class VI Rule, at 40 CFR 146.91(f)(5), also grants the UIC Program Director the authority to require owners or operators to retain records from any project phase for more than 10 years after site closure.

Table 6-1. Summary of submittals to be made during the post-injection phase.

Reporting Requirement	Relevant GSDT Modules	Recommended Format	Timing and Frequency
Injection Well Plugging Plan amendments, if necessary [40 CFR 146.92(c)]	Project Plan Submissions module	A single uploaded PDF, with supporting data and other supplemental materials uploaded separately as necessary	Upon cessation of injection
Notice of intent to plug the injection well [40 CFR 145.92(c)]	Injection and Post-Injection Phase Reporting module	Uploaded PDF letter	At least 60 days before scheduled well plugging
Well plugging report [40 CFR 146.92(d)]	Injection and Post-Injection Phase Reporting module	A single uploaded PDF, with supporting data and other supplemental materials uploaded separately as necessary	Within 60 days of well plugging
PISC and Site Closure Plan Amendments or justification that no amendment is needed [40 CFR 146.93(a)(3)]	Project Plan Submissions module	A single uploaded PDF, with supporting data and other supplemental materials uploaded separately as necessary	Upon cessation of injection

Reporting Requirement	Relevant GSDT Modules	Recommended Format	Timing and Frequency
PISC monitoring results [40 CFR 146.93(b)]	Injection and Post-Injection Phase Reporting module	A single uploaded PDF containing the narrative component of each report, with supporting data and other supplemental materials uploaded separately as necessary	As specified in the approved PISC and Site Closure Plan
Non-endangerment demonstration [40 CFR 146.93(b)(3)]	Non-Endangerment Demonstration module	Uploaded files in PDF and other formats and references to previously submitted materials	At end of 50 years or the approved alternative PISC timeframe, or based on site-specific data
Notice of intent for site closure [40 CFR 146.93(d)]	Injection and Post-Injection Phase Reporting module	Uploaded PDF letter	At least 120 days before site closure
Notice of intent to plug monitoring wells [N/A*]	Injection and Post-Injection Phase Reporting module	Uploaded PDF letter	N/A
Site closure report [40 CFR 146.93(f)]	Injection and Post-Injection Phase Reporting module	A single uploaded PDF, with supporting data and other supplemental materials uploaded separately as necessary	Within 90 days of site closure

*This item is not specifically required by the Class VI Rule; however, the EPA recommends that owners or operators provide notification before plugging monitoring wells. The requirement to plug monitoring wells appears in the Class VI Rule at 40 CFR 146.93(e).

In addition to the reporting requirements that are specific to the post-injection phase, some injection phase reporting requirements continue to apply after injection has ceased. (Other injection phase reporting requirements, such as those associated with operational monitoring, do not.) To avoid redundancy, the injection phase reporting activities that continue through the post-injection phase activities are not discussed in the subsections below; refer to Section 5 for recommendations on submitting the associated materials. Injection phase reporting requirements that continue to apply through the post-injection phase are as follows:

- AoR reevaluations and corrective action updates, including amendments to the AoR and Corrective Action Plan, if necessary (see Section 5.3.1).
- Other project plan reviews and amendments (see Section 5.3.2). While the Testing and Monitoring Plan will no longer be in effect after the cessation of injection, the Emergency and Remedial Response Plan may need to be amended following AoR reevaluations or other project-specific criteria. Note that there are also post-injection phase requirements related to the Injection Well Plugging Plan and the PISC and Site Closure Plan, which are discussed in Sections 6.1.1, 6.2.1, and 6.3.1 below.

- Financial responsibility cost estimate and financial instrument updates (see Section 5.3.3). Note that, pursuant to 40 CFR 146.85(b)(2), an owner or operator may be released from a financial instrument by the UIC Program Director if the associated project phase has been completed and the owner or operator has fulfilled all necessary financial obligations.
- Emergency and remedial response reporting, if necessary (see Section 5.4.1).
- Notifications of adverse financial conditions, if necessary (see Section 5.4.2).

The post-injection phase reporting schedule for each of these items will likely vary among projects and will be specified in each project's permit conditions and/or the applicable approved project plans. The EPA encourages owners or operators to contact their permitting authorities to discuss any questions or concerns related to post-injection phase reporting of these activities.

6.1 Injection Well Plugging

Requirements for injection well plugging are provided in the Class VI Rule at 40 CFR 146.92. Before plugging the injection well, owners or operators must notify the UIC Program Director and (if necessary) submit an amended Injection Well Plugging Plan [40 CFR 146.92(c)]. After

the plugging activities are complete, the owner or operator must submit an injection well plugging report [40 CFR 146.92(d)]. The Injection and Post Injection Phase Reporting module and the Project Plan Submissions module of the GSRT were designed to facilitate submission of these items.

As noted above, injection wells may be converted to monitoring wells after injection has ceased, so injection well plugging is not required to take place at the beginning of the post-injection phase. The only timing requirement specified in the Class VI

Rule is that plugging take place before site closure, so that the necessary plugging records can be incorporated into the site closure report per 40 CFR 146.93(f)(1). The EPA recommends that owners or operators notify their permitting authorities before and after converting the injection well to a monitoring well, including a general description of what activities (e.g., removal of well equipment) will take place/have taken place.

6.1.1 Pre-Plugging Submissions

The owner or operator must notify the UIC Program Director at least 60 days before plugging the injection well (though a shorter notice period may be allowed by the Director), pursuant to 40 CFR 146.92(c). As noted above, the Class VI Rule allows injection well plugging to occur at any time during the post-injection phase. However, if injection well plugging does take place at the beginning of the post-injection phase, it may be necessary to submit the notice of intent to plug *before* injection ends, in order to meet the 60-day requirement. In addition, if any changes have been made to the original, approved Injection Well Plugging Plan, the owner or operator must also provide the amended plan at this time. More details about the injection well plugging

requirements can be found in the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*, and recommendations related to the Injection Well Plugging Plan are provided in the *UIC Program Class VI Well Project Plan Development Guidance*.

The notice of intent to plug can be submitted using the Injection and Post-Injection Phase module of the GS DT, on the Other Submissions tab. The EPA recommends that owners or operators upload a PDF letter stating the time and date of the planned activity and providing a brief description of what will be done. A template to guide the development of this letter is available for download from the GS DT. The EPA does not anticipate that owners or operators will need to submit any supplemental materials to accompany this notification letter, but the Injection and Post-Injection Phase Reporting module provides the option to do so.

Owners or operators can use the Project Plan Submissions module to submit the amended Injection Well Plugging Plan, if necessary. The EPA expects that the plan will have a similar content and format as the original approved plan: a PDF file developed using the template provided in the Project Plan Submissions module, with any materials that cannot or are not intended to be incorporated into the plan itself uploaded separately. Owners or operators can use the same procedures to submit amended plans as in previous project phases (see Section 4.5). Note that, if the permitting authority made any changes to the plan before incorporating it into the permit, the existing file in the Project Plan Submissions module may not be exactly the same as the approved plan. When revising the plan file, the EPA recommends that owners or operators ensure that they are using the current, approved plan as a starting point.

The Class VI Rule does not require that owners or operators submit a justification that no amendment to the Injection Well Plugging Plan is needed. However, the EPA recommends that owners or operators submit a statement to this effect in the Project Plan Submissions module (e.g., in the form of a brief letter in PDF), so that the GS DT contains a full record of documentation for the project. The EPA recommends that owners or operators contact their permitting authority if there is uncertainty about whether an amended plan is needed.

In addition to the notice of intent to plug and the amended Injection Well Plugging Plan, owners or operators may also need to conduct reporting related to the preparatory activities specified at 40 CFR 146.92(a). For example, the external MIT required before plugging the injection well is subject to the notification and reporting requirements under 40 CFR 146.91(b) and (d). See Section 5.2 for more information on these reporting requirements.

Pre-Plugging Submissions

Class VI Rule requirements:

- 40 CFR 146.92(c)

Relevant GS DT modules:

- Injection and Post-Injection Reporting Phase module
- Project Plan Submissions module

Reference documents:

- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- Injection Well Plugging Plan template
- Notice of intent to plug template
- GS DT user guides

6.1.2 Well Plugging Report

Following plugging of the injection well, owners or operators must submit a report detailing how the well was plugged, pursuant to 40 CFR 146.92(d). The Class VI Rule specifies that this report must be certified as accurate by the owner or operator and by the person who performed the

plugging operation (if other than the owner or operator). The plugging report serves to demonstrate that plugging was carried out in compliance with the Class VI Rule and the approved Injection Well Plugging Plan, so that the well does not pose an endangerment to USDWs.

Well Plugging Report Submissions

Class VI Rule requirements:

- 40 CFR 146.92(d)

Relevant GS DT modules:

- Injection and Post-Injection Reporting Phase module

Reference documents:

- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*

Electronic resources:

- Well plugging report template
- GS DT user guides

schematic/drawings). The EPA recommends that the well plugging report be compiled into a single PDF and uploaded to the Other Submissions tab of the Injection and Post-Injection Phase Reporting module. Supplemental materials not compatible with this format can be uploaded separately in the designated field.

The Class VI Rule does not specify the contents of the plugging report, but recommendations are provided in the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*, and a template is available for download from the GS DT. In general, the EPA recommends that the well plugging report include a description of both the pre-plugging activities conducted pursuant to 40 CFR 146.92(a), including the results of the final external MIT, and the procedures/outcomes of the actual plugging operation (including any

6.2 PISC Reporting

The Class VI Rule, at 40 CFR 146.93(a)-(b), provides a set of requirements for PISC activities. Upon cessation of injection, the owner or operator must submit an amended PISC and Site Closure Plan or a demonstration that no amendment is needed [40 CFR 146.93(a)(3)]. During the post-injection phase, owners or operators must conduct monitoring and submit the results as specified in the approved PISC and Site Closure Plan, until they can demonstrate that no additional monitoring is needed to ensure that the project does not pose an endangerment to USDWs [40 CFR 146.93(b)]. In the GS DT, owners or operators can use designated sections of the Project Plan Submissions module, the Injection and Post-Injection Phase Reporting module, and the Non-Endangerment Demonstration module to submit the required materials.

PISC Reporting Requirements

- Amended PISC and Site Closure Plan, if necessary
40 CFR 146.93(a)(3)
- PISC testing and monitoring results
40 CFR 146.93(a)(2)(iv), (b)
- Non-endangerment demonstration
40 CFR 146.93(b)(3)

6.2.1 PISC and Site Closure Plan

Upon cessation of injection, the Class VI Rule requires that owners or operators either submit an amended PISC and Site Closure Plan or demonstrate to the UIC Program Director through monitoring data and modeling results that no amendment to the plan is needed [40 CFR 146.93(a)(3)]. More information on completing and documenting this plan amendment can be found in the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance* and the *UIC Program Class VI Well Project Plan Development Guidance*.

Both the amended project plan and the justification that no plan amendment is needed (whichever is appropriate for the individual project) can be submitted using the Project Plan Submissions module. If owners or operators determine that no plan amendment is necessary, the EPA recommends that they submit a narrative document describing the approach used to evaluate the plan and the outcome of this evaluation. The EPA recommends that the narrative address all of the elements in the approved plan and be based on both monitoring data related to ground water quality and plume and pressure front tracking collected during injection and recent revisions of the site computational model, to ensure compliance with 40 CFR 146.93(a)(3). Owners or operators should support this discussion with project data presented in the form of maps, graphs/charts, tables, diagrams, or other formats as appropriate. If an owner or operator proposes an alternative PISC timeframe as part of the Post-Injection Site Care Plan amendment, the EPA recommends that they thoroughly justify the alternative timeframe using the criteria at 40 CFR 146.93(c). The EPA recommends that the demonstration document be provided as a single PDF; supplemental items that are not compatible with this format, like GIS files, can be uploaded separately in the field designated for appendices and supporting materials.

The EPA anticipates that the amended PISC and Site Closure Plan, if one is needed, will have a similar content and format as the existing approved plan (e.g., a PDF file developed using the template provided in the Project Plan Submissions module, with any supplemental materials uploaded separately in the designated field). The EPA recommends that owners or operators discuss the need for plan amendments with their permitting authority, keeping in mind the need to collect a sufficient amount of data to inform the non-endangerment demonstration and the UIC Program Director's assessment that site closure is appropriate (see Sections 6.2.3 and 6.3).

6.2.2 PISC Monitoring Results

During the post-injection period, the owner or operator must implement the approved PISC and Site Closure Plan and report the results of PISC monitoring as specified in the plan. Post-injection monitoring must be performed for the duration of the PISC timeframe (either the default 50-year period or an approved alternative timeframe) or until the owner or operator can demonstrate non-endangerment to USDWs [40 CFR 146.93(b)(1)].

Similar to monitoring results submitted during the injection phase, post-injection monitoring submissions serve to demonstrate that the project is in compliance with the Class VI permit, to identify any endangerment of USDWs, and to generate data to support AoR reevaluations and the demonstration of non-endangerment.

The Class VI Rule does not specify the content, format, or timing of PISC monitoring submissions; the EPA expects that these will be determined on a project-specific basis in each project's PISC and Site Closure Plan. However, in general, the EPA anticipates that these submissions will have a similar format to the semi-annual reports of testing and monitoring results submitted during the injection phase: a PDF document containing a compilation of monitoring results (e.g., of MITs, ground water analysis, and plume and pressure front tracking) and associated interpretation, accompanied by attachments or other supplemental materials as necessary. The GS DT provides a template that owners or operators can download and use to guide the development of this document.

PISC Monitoring Results Submissions

Class VI Rule requirements:

- 40 CFR 146.93(a)(2)(iv), (b)

Relevant GS DT modules:

- Injection and Post-Injection Phase Reporting module

Reference documents:

- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*
- *UIC Program Class VI Well Testing and Monitoring Guidance*

Electronic resources:

- PISC monitoring report template
- GS DT user guides

Monitoring Guidance provide recommendations for conducting PISC monitoring activities and submitting the results.

6.2.3 Non-Endangerment Demonstration

Prior to receiving authorization for site closure, the owner or operator must submit a demonstration, based on monitoring results and other site-specific information, that no additional monitoring is needed to ensure that the Class VI project does not pose an endangerment to USDWs [40 CFR 146.93(b)(3)]. Pursuant to 40 CFR 146.93(b)(2), owners or operators may submit this non-endangerment demonstration at any time during the post-injection phase, even before the end of the designated PISC timeframe. This means that, if non-endangerment is demonstrated to the satisfaction of the UIC Program Director, an owner or operator could potentially receive authorization for site closure before the end of the PISC timeframe.

The data supporting the non-endangerment demonstration will be generated throughout the life of the Class VI project, during injection- and post-injection-phase monitoring and modeling. While the content of the demonstration will necessarily be site specific, the EPA recommends that it address ground water monitoring data, information on the

Non-Endangerment Demonstration Submissions

Class VI Rule requirements:

- 40 CFR 146.93(b)(3)

Relevant GS DT modules:

- Non-Endangerment Demonstration module

Reference documents:

- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*

Electronic resources:

- Non-endangerment demonstration template
- GS DT user guides

behavior of the carbon dioxide plume and pressure front, and the monitoring results' agreement with any AoR modeling predictions that are being used to support the demonstration, as well as an evaluation of potential conduits for fluid movement. The *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance* provides some additional recommendations for making the non-endangerment demonstration.

The GSDT includes a specific reporting module for non-endangerment demonstrations. The Non-Endangerment Demonstration module provides substantial flexibility to owners or operators, while helping ensure that all the necessary information is submitted. The EPA anticipates that the non-endangerment demonstration will be composed of one or more uploaded files, supplemented by references to previously submitted information (e.g., modeling results submitted using the AoR and Corrective Action module following the last AoR reevaluation). The module provides a template that owners or operators can download and use to guide the development of their submission.

The EPA recommends that owners or operators contact their permitting authorities to discuss any questions related to the non-endangerment demonstration submission, especially if the content of the demonstration is not specified in the approved PISC and Site Closure Plan.

6.3 Site Closure Reporting

Site closure is the final stage of a Class VI project, during which owners or operators submit a notice of intent to close the site, plug all monitoring wells, submit a site closure report, and record a notation on the deed to the facility property or other documents that the land has been

used to sequester carbon dioxide [40 CFR 146.93(d)-(g)]. The purpose of site closure reporting is to demonstrate compliance with the Class VI Rule and the permit, to demonstrate that monitoring wells are plugged appropriately in a way that is protective of USDWs, and to ensure that future land owners are made aware of the injection history of the site.

The Injection and Post-Injection Phase Reporting module of the GSDT is designed to facilitate the submission of site closure-related materials.

6.3.1 Pre-Site Closure Submissions

Owners or operators must notify the UIC Program Director of their intent to close a Class VI project site at least 120 days in advance of the intended site closure date, or on a schedule with a shorter notice period if allowed by the Director [40 CFR 146.93(d)]. At this time, if any changes have been made to the original PISC and Site Closure Plan, the owner or operator must also provide the amended plan. More details about the site closure process and templates for the submittals can be found in the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*, and recommendations related to the PISC and Site Closure Plan are provided in the *UIC Program Class VI Well Project Plan Development Guidance*.

The notice of intent for site closure can be submitted using the Injection and Post-Injection Phase module of the GSDT, on the Other Submissions tab. The EPA recommends that owners or operators upload a PDF letter stating the date/time/location of the planned activities (e.g., monitoring well plugging, site restoration tasks) and providing a brief description of what will be done. The GSDT provides a template that owners or operators can download and use to guide the development of this letter. The EPA does not anticipate that owners or operators will need to submit any supplemental materials to accompany this notification letter, but the Injection and Post-Injection Phase Reporting module does provide the option to do so.

Owners or operators can use the Project Plan Submissions module to submit the amended PISC and Site Closure Plan, if one is needed. The EPA expects that the plan will have a similar content and format as the existing, approved plan: a PDF file developed using the template provided in the Project Plan Submissions module, with any materials that cannot or are not intended to be incorporated into the plan itself uploaded separately. Owners or operators can use the same procedures to submit amended plans as in previous project phases (see Section 4.5). Note that, if the permitting authority made any changes to the plan before incorporating it into the permit, the existing file in the Project Plan Submissions module may not be exactly the same as the approved plan. When revising the plan file, the EPA recommends that owners or operators ensure that they are using the current, approved plan as a starting point.

The Class VI Rule does not require that owners or operators submit a justification that no plan amendment is needed prior to site closure. However, the EPA recommends that owners or operators submit a statement to this effect in the Project Plan Submissions module (e.g., in the form of a brief letter in PDF), so that the GSDT contains a full record of documentation for the project. The EPA recommends that owners or operators contact their permitting authority if there is uncertainty regarding whether an amended plan is needed.

The Class VI Rule, at 40 CFR 146.93(e) requires owners or operators to plug all monitoring wells after the UIC Program Director has authorized site closure. (If the injection well was repurposed for use as a monitoring well, it must be plugged in accordance with the Injection Well Plugging Plan, per 40 CFR 146.92(b); see Section 6.1.) While the Class VI Rule does not specifically require advance notification of monitoring well plugging, the EPA recommends that owners or operators notify the UIC Program Director before carrying out these activities (if the specifics are not included in the initial notification of intent for site closure). The EPA recommends that owners or operators use a letter similar to the one submitted in advance of

Pre-Site Closure Submissions

Class VI Rule requirements:

- 40 CFR 146.93(d)

Relevant GSDT modules:

- Injection and Post-Injection Reporting Phase module
- Project Plan Submissions module

Reference documents:

- *UIC Program Guidance on Class VI Well Plugging, Post-Injection Site Care, and Site Closure*
- *UIC Program Class VI Well Project Plan Development Guidance*

Electronic resources:

- PISC and Site Closure Plan template
- Notice of intent for site closure template
- GSDT user guides

injection well plugging and upload it to the Other Submissions tab of the Injection and Post-Injection Phase Reporting module.

6.3.2 Site Closure Report

The Class VI Rule requires owners or operators to submit a report within 90 days of site closure [40 CFR 146.93(f)]. The Class VI Rule, at 40 CFR 146.93(f)(1)-(3) specifies that the site closure report must include documentation of appropriate injection and monitoring well plugging; a copy of a survey plat that has been submitted to the local zoning authority, showing the location of the injection well; documentation of appropriate notification to applicable state, local, and tribal entities; and records reflecting the nature, composition, and volume of the carbon dioxide stream. Recommendations for notifying the relevant authorities and preparing the site closure report are provided in the *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*.

Site Closure Report Submissions

Class VI Rule requirements:

- 40 CFR 146.93(f)

Relevant GSDT modules:

- Injection and Post-Injection Reporting Phase module

Reference documents:

- *UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance*

Electronic resources:

- Site closure report template
- GSDT user guides

The EPA recommends that the site closure report be submitted as a single PDF file. The GSDT provides a template that owners or operators can download and use to guide the development of this document. Supplemental materials that are not compatible with this format (e.g., GIS files) can be uploaded separately in the designated field in the reporting module.

The owner or operator must also record a notation on the deed to the facility property or any other document that is normally examined during a title search [40 CFR 146.93(g)]. Pursuant to 40 CFR 146.93(g)(1)-(3), the notation must state that the land has been used for GS; the name of the government agency with which the survey plat was filed and the address of the EPA regional office to which it was submitted; and the volume of carbon dioxide injected, the injection zone(s), and the period over which the injection occurred. While the Class VI Rule does not require any formal submissions associated with the deed notation, the EPA recommends that the owner or operator provide evidence of this notation to the EPA, for example by attaching copies of it to the site closure report or uploading the documents separately within the Injection and Post-Injection Reporting module.