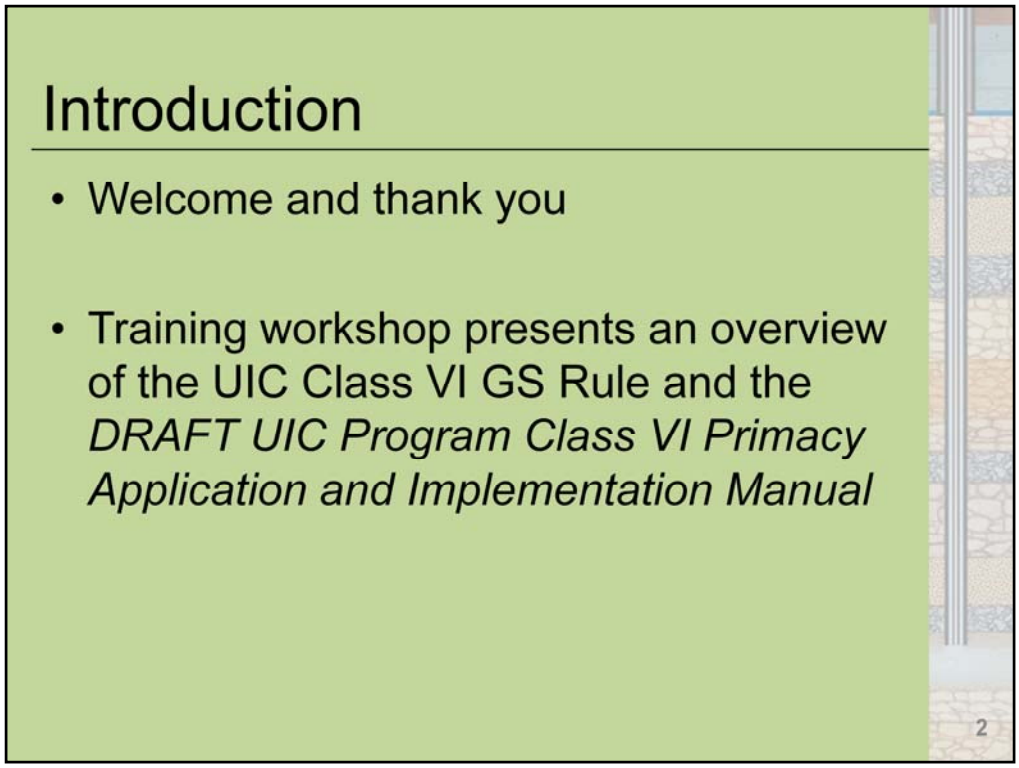
United States
Environmental Protection
Agency

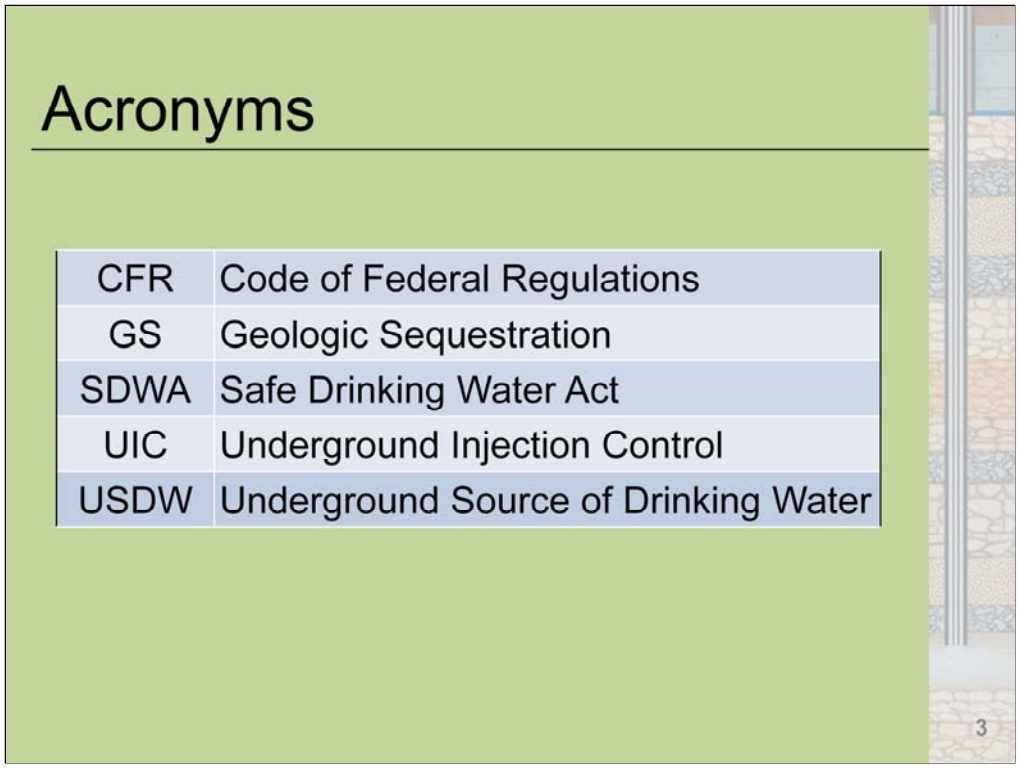
Welcome to the Underground Injection Control Geologic Sequestration training workshop for the new UIC GS (or Class VI) Rule, formally known as the *Federal Requirements Under the Underground Injection Control Program for Carbon Dioxide Geological Sequestration Wells.*



Good morning. I'm [insert workshop facilitator] of [affiliation] and I'd like to introduce [other staff on presentation team] and we'll be helping to facilitate the presentations today and tomorrow. I'd like to thank you all for taking the time to participate in this GS Rule training workshop.

The presentations you'll be hearing are based on the UIC Class VI GS Rule and on the material in the *Draft UIC Program Class VI Primacy Application and Implementation Manual.* Workshop participants should have all received copies of the Draft PAIM with the Director's Toolkit CD. In addition, the Draft PAIM is going out for public comment through EPA's Office of Ground Water and Drinking Water website and a final version will also be posted on the website.

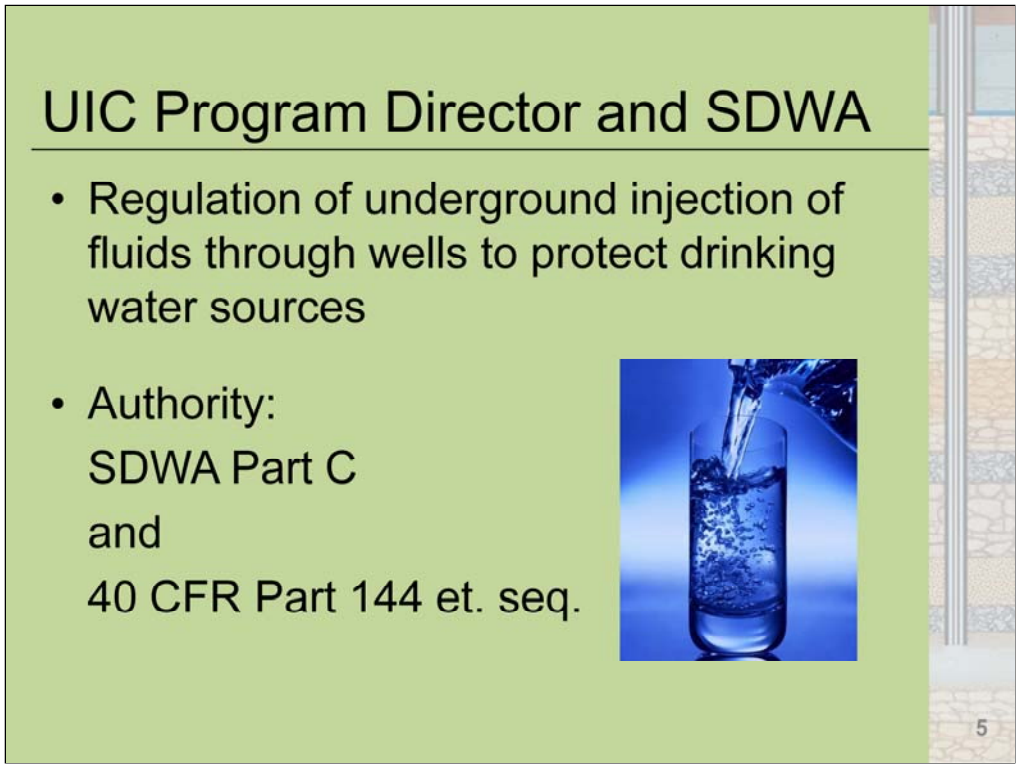
The presentations here serve as an overview of the UIC Class VI GS rule requirements and are intended to assist in the interpretation and understanding of the rule and of UIC Class VI Program primacy application requirements. More details on GS rule-related technical activities are also available in the companion technical guidances, some of which were previously posted to the website for public comment, and final versions will be there as well. Over time, EPA may provide a series of more detailed technical webcasts on topics such as geologic site characterization, AoR modeling, injection well construction, and testing and monitoring of a GS site.



Acronyms used in the Background portion of the training include:

CFR: Code of Federal Regulations
GS: Geologic Sequestration
SDWA: Safe Drinking Water Act
UIC: Underground Injection Control
USDW: Underground Source of Drinking Water

Background Information on the UIC Program



Underground injection wells (including those in state territorial waters) are regulated by EPA through a UIC Program Director. Part C of the Safe Drinking Water Act (SDWA, Section 1421 *et seq.*, 42 U.S.C. 300h *et seq.*). authorizes EPA to establish minimum requirements for UIC programs that regulate the subsurface injection of fluids onshore and offshore, under submerged lands within the territorial jurisdiction of the United States, in order to allow for effective drinking water source protection while regulating the underground injection of fluids.

Under this SDWA authority, the Agency has promulgated a series of UIC regulations. The UIC program itself can be administered by a State, Tribe, Territory, or by EPA. More discussion on administering the UIC program will follow in future presentations.

UIC Injection Well Classes

Class VI	Minimize environmental impacts from GS

Class I	Isolate hazardous, industrial, and municipal wastes through deep injection
Class II	Inject oil and gas production wastes
Class III	Minimize environmental impacts from solution mining
Class IV	Injection of hazardous and radioactive waste PROHIBITED except for authorized cleanup activities
Class V	Manage shallow injection of all other fluids

40 CFR 146.5

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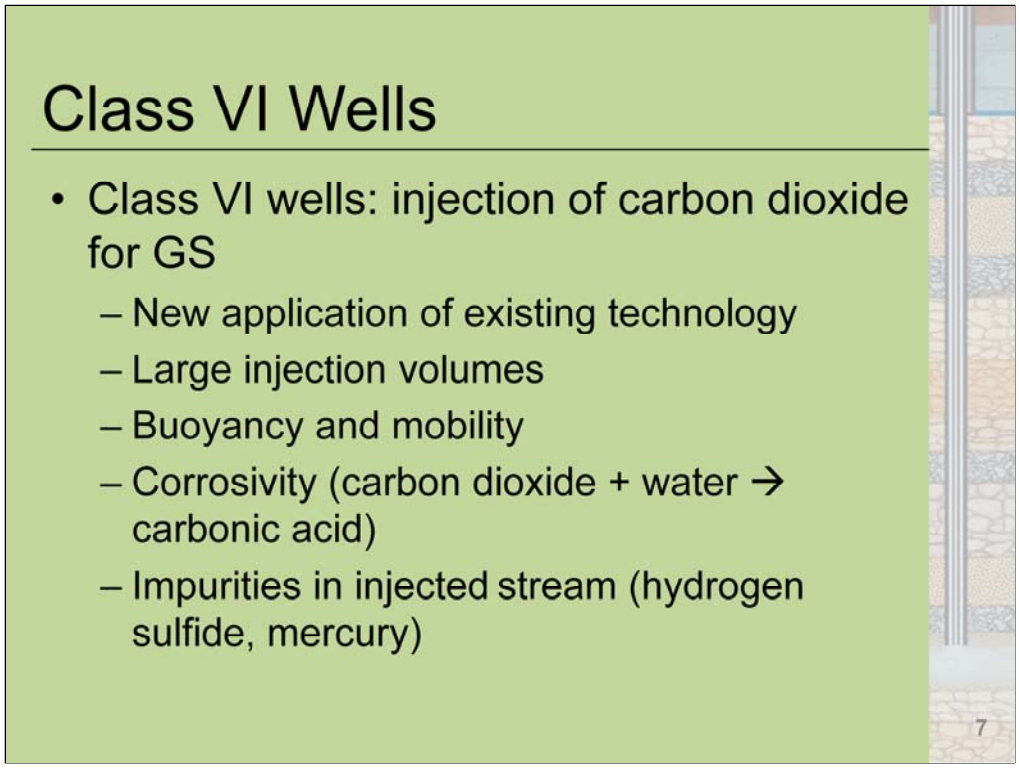
The purposes of existing UIC injection well classes 1 through 5 and the new well class 6 are listed here.

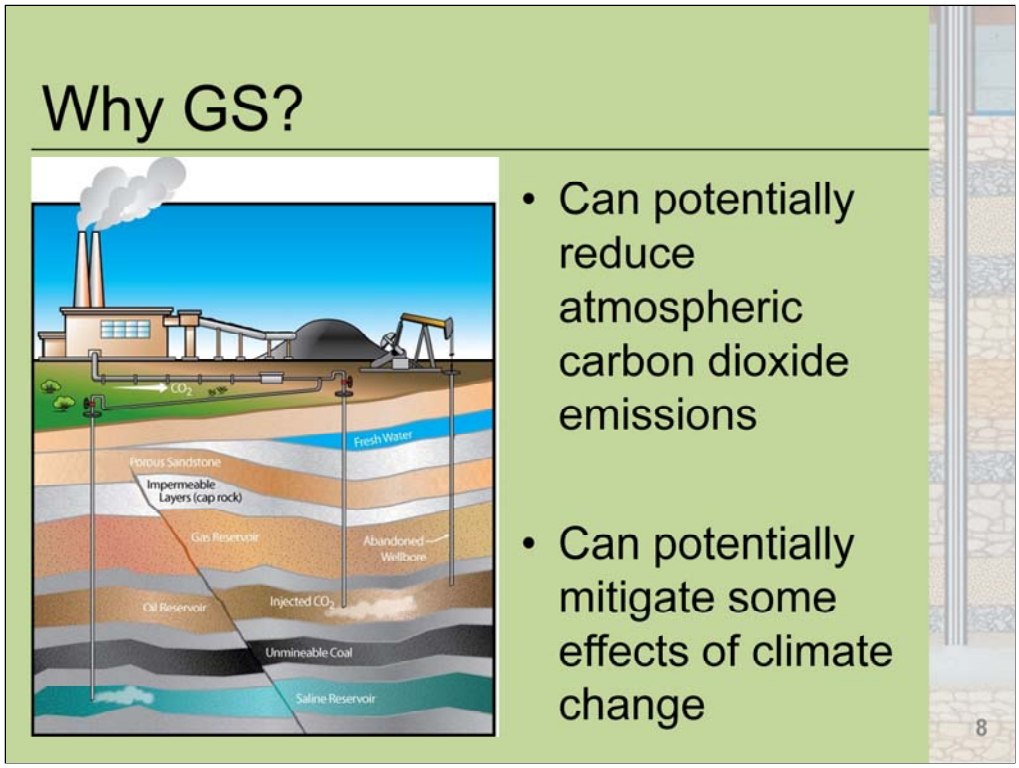
The GS Rule defines a new class, Class VI, to be used for the injection of carbon dioxide. The GS Rule sets forth the federal requirements for the permitting, siting, construction, operation, monitoring, and closure of Class VI injection wells, including those wells that need to be re-permitted as Class VI wells (those previously operating as a different class of well.)

You may be familiar with the other UIC classes of injection wells, but briefly: Class I is for deep injection (hazardous or non hazardous). Class II is for injection related to oil and gas production. Class III is related to solution mining. Class IV had to do with hazardous and radioactive waste injection (now prohibited) and Class V wells are related to the shallow injection of all other fluids not included in Classes I, II, III, and VI.



Class VI wells are used to inject carbon dioxide for the purpose of GS. Some, but not all, unique aspects of Class VI wells are that:

1. GS is a new application of an existing technology (underground injection).
2. GS projects will likely have large injection volumes.
3. Carbon dioxide is both buoyant and mobile in the subsurface.
4. In the presence of water, carbon dioxide creates carbonic acid which can be corrosive to well materials. The chemistry of the carbon dioxide may also contribute to the mobilization of metals or other constituents that are naturally occurring in the subsurface.
5. Depending on the carbon dioxide source and capture technology, the injected stream may include impurities such as hydrogen sulfide. Hydrogen sulfide can increase the corrosivity of the injected carbon dioxide stream potentially impacting well materials, and the possible presence of impurities in the carbon dioxide stream may be a concern to be addressed by State UIC Program Directors as well as injection well owners and operators.



GS can be a beneficial technology that can potentially reduce carbon dioxide emissions to the atmosphere and potentially mitigate the effects of climate change.

Image: Los Alamos National Laboratory. Article by Anthony Mancino.
http://www.lanl.gov/news/index.php/fuseaction/1663.article/d/20081/id/12335

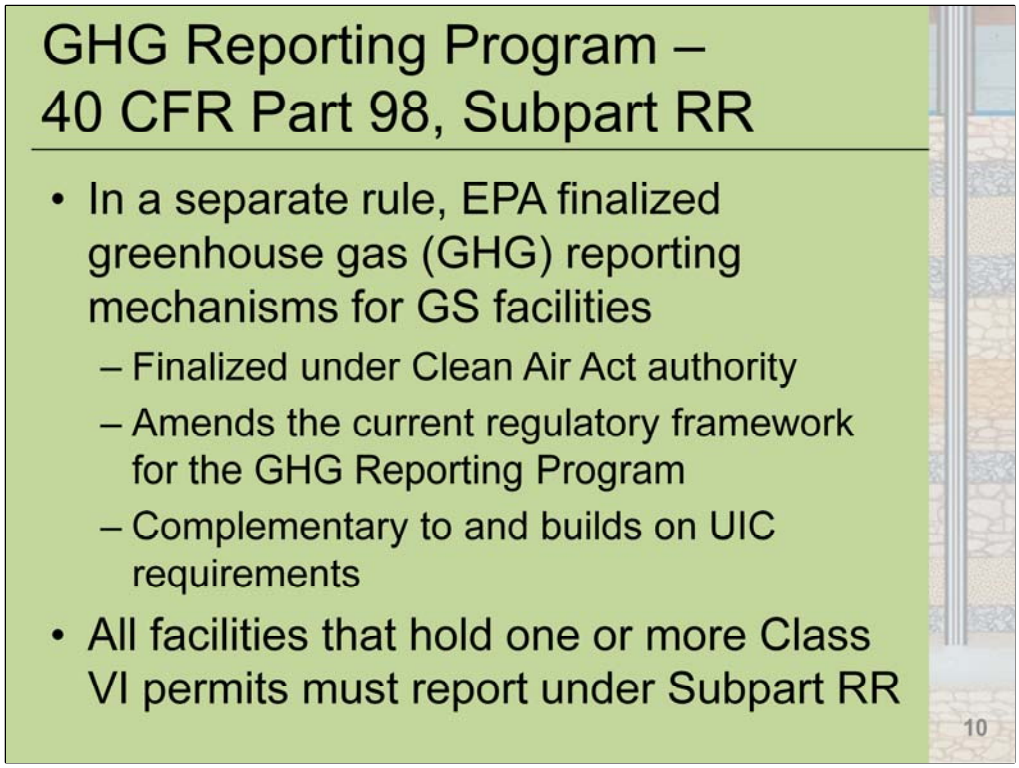
GS Rule Elements: Overview

40 CFR Part 146 Subpart H	
Permit Information	Testing and Monitoring
Site Characterization	Financial Responsibility
Area of Review and Corrective Action	Reporting and Recordkeeping
Injection Well Construction	Injection Well Plugging
Pre-Injection Activities	Post-Injection Site Care & Site Closure
Injection Well Operation	Emergency and Remedial Response
Mechanical Integrity	Injection Depth Waivers

The primary GS Rule elements for Class VI wells will be codified in 40 CFR 146 Subpart H (a brand new subpart in the CFR). These include: permitting, site characterization, area of review (AoR) and corrective action, injection well construction, pre-injection activities (such as logging and sampling), injection well operation, mechanical integrity, testing and monitoring, financial responsibility, reporting and recordkeeping, injection well plugging, post-injection site care (PISC) and site closure, emergency and remedial response, and injection depth waivers.

As some of these rule elements can be complex, even for those states with existing UIC programs, EPA recommends coordinating with other officials in the state in developing and implementing a Class VI program. For example, coordination with state financial experts to assess financial responsibility requirements will be beneficial.

Additionally, there are other new regulations promulgated under the Clean Air Act (CAA) for Greenhouse Gas Reporting 40 CFR Part 98 – Subpart RR that have to do with reporting to EPA on sequestered carbon dioxide. EPA will mention a little bit about the GHG Reporting Rule here, but there is a website included on slide 13 that can provide more information.



On November 22, 2010, EPA Administrator Lisa Jackson signed a final rule under the authority of the Clean Air Act (CAA) that requires facilities that inject carbon dioxide underground for geologic sequestration to annually report greenhouse gas (GHG) data to EPA. This rule was published in the Federal Register on December 1, 2010. The GHG reporting rule amends the regulatory framework for the Greenhouse Gas Reporting Program (also referred to as 40 CFR part 98, Subpart RR). The Greenhouse Gas Reporting Program requires reporting of greenhouse gases and other relevant information from certain source categories in the United States.

This GHG reporting rule is complementary to and builds on the UIC Class VI requirements – EPA's intention was to minimize duplicative efforts from reporters. All facilities with permitted Class VI injection wells are required to report to EPA under Subpart RR.

GHG Reporting Program – 40 CFR Part 98, Subpart RR (cont'd.)

- Facilities that inject carbon dioxide for enhanced oil recovery (EOR) and do not hold a UIC Class VI permit are not required to report under Subpart RR, but may choose to opt-in to these requirements
- GS research and development projects will be granted an exemption from the reporting requirements of Subpart RR

Facilities that conduct enhanced oil and gas recovery are not required to report under subpart RR unless the owner or operator chooses to opt-in to subpart RR, or the facility holds a UIC Class VI permit for carbon dioxide injection.

In addition, geologic sequestration research and development projects will be granted an exemption from the reporting requirements of Subpart RR.

GHG Reporting Program – 40 CFR Part 98, Subpart RR (cont'd.)

- Under Subpart RR, GS facilities must:
  - Report basic information on carbon dioxide received
  - Develop and implement an EPA-approved monitoring, reporting, and verification (MRV) plan
  - Report the amount of carbon dioxide sequestered using mass balance approach and annual monitoring activities
- www.epa.gov/climatechange/emissions/subpart/rr.html

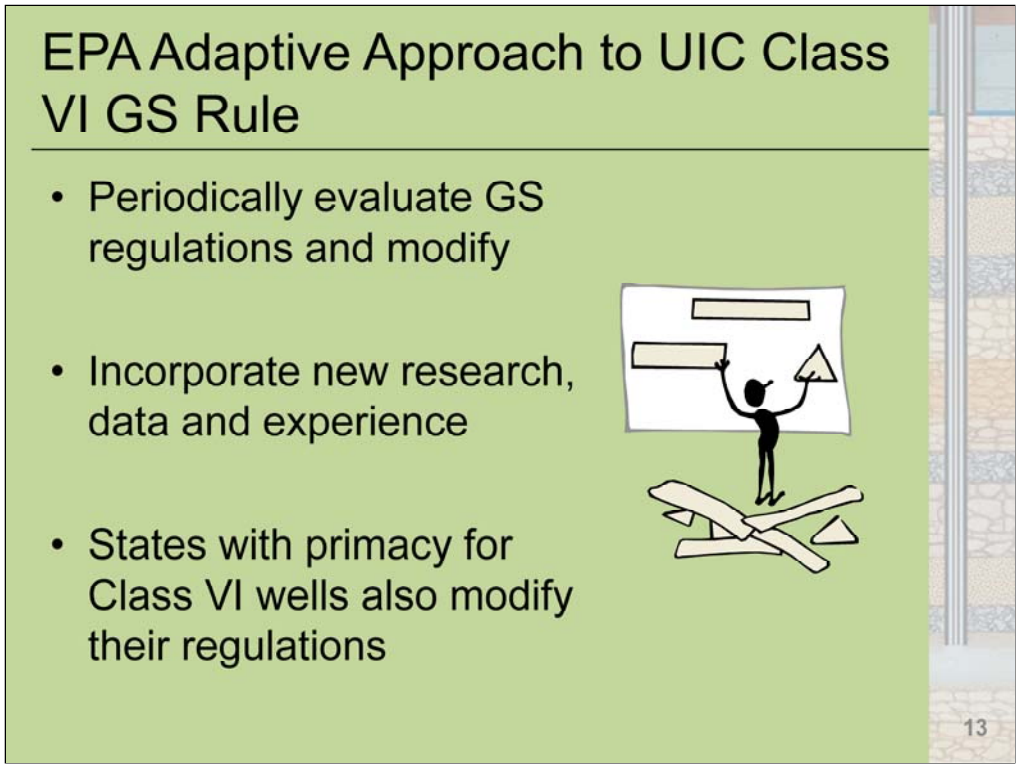
Under Subpart RR, facilities that conduct geologic sequestration, including UIC Class VI wells, are required to:

• Report basic information on carbon dioxide received for injection.

• Develop and implement an EPA-approved, site-specific monitoring, reporting and verification (MRV) plan.

• Report the amount of carbon dioxide geologically sequestered using a mass balance approach and annual monitoring activities.

For more information about Subpart RR, visit EPA's web site at the link shown here.



Due to the potentially fast pace of GS deployment, EPA has adopted an adaptive approach to rulemaking with the UIC Class VI regulations in order to ensure the protection of underground sources of drinking water (USDWs). EPA plans, every 6 years, to review the rule and data on UIC Class VI GS projects to determine whether the appropriate amount and types of information and appropriate documentation are being collected, and to determine if modifications to the UIC Class VI requirements are appropriate or necessary. This includes review of information from State programs that have allowed for the option of injection depth waiver applications or expansions to the areal extent of existing aquifer exemptions for Class II wells transitioning over to Class VI.

This adaptive approach provides regulatory certainty to Class VI injection well owners and operators, promotes consistent permitting approaches, and ensures that permitting agencies are able to meet current and future demands for Class VI permits. As such, early Class VI wells can be permitted in a manner that ensures USDW protection during the early phases of GS deployment, while EPA is able to adjust the regulations if necessary as new information and data are submitted. If EPA modifies any regulatory requirement through the adaptive approach, a state with primacy for the Class VI Program may need to modify their state regulations to ensure that they are still at least as stringent as the federal requirements. States are not required to change their regulations until after EPA has promulgated any revisions to the UIC Class VI GS Rule through a regulatory process. For more information on the adaptive approach to rulemaking, refer to the GS Rule Preamble.

UIC Program Director Resources on Class VI Implementation

- GS Rule Federal Register citation:

75 FR 77230 (Friday December 10, 2010)

- Draft UIC Program Class VI Primacy Application and Implementation Manual
- Draft UIC Program Class VI Project Plan Development Guidance
- Draft UIC Program Class VI Technical Guidance Documents

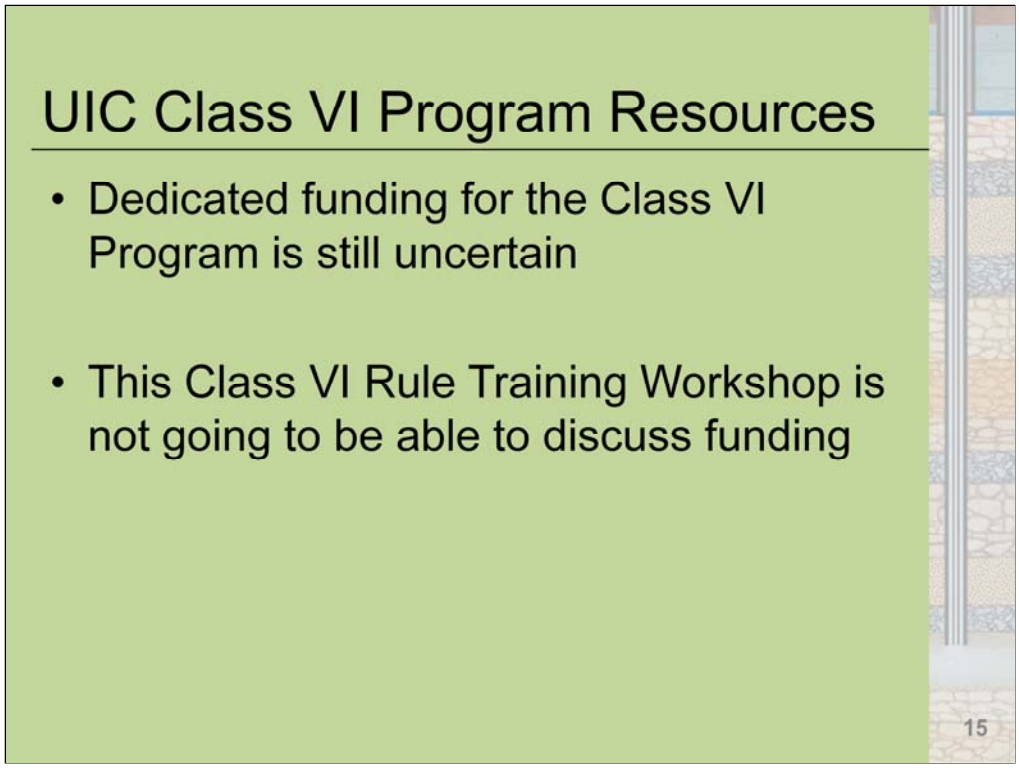
Numerous tools and resources are available to UIC Program Directors implementing the GS Rule. These include:

•The Draft UIC Program Class VI Primacy Application and Implementation Manual.

•Draft UIC Program Class VI Project Plan Development Guidance.

•Various other draft technical guidance documents in the process of being finalized.

•There may also be potential future technical webcasts available from EPA that focus on the details of specific GS rule elements.



We have heard from many Regions and States and we certainly know that funding and resources are very important issues when developing/approving state program applications (throughout the primacy process) and implementing a new program.

During this implementation workshop, however, the presentations and discussions will focus on the technical GS rule elements and on primacy acquisition.

We are not in a position right now to discuss UIC funding, we must all wait to see what future EPA budgets will look like.