CCS REGULATION

NEWSLETTER

Welcome to the CCS Regulation Newsletter. This is produced by the **MIT Carbon Capture and Sequestration Technologies Program**. It is a quarterly report designed to keep the reader up-to-date with the current regulatory news and issues surrounding Carbon Capture and Storage (CCS).
For more information about the program, please see http://sequestration.mit.edu

Are EPA's Class VI Well Regulations Workable?

At the recent 14th Carbon Sequestration Forum at MIT on April 24-25, 2013, there was a session entitled: Are EPA's Class VI Well Regulations Workable? Speaking were Bob Van Voorhees from the Carbon Sequestration Council and Philip Jagucki from Schlumberger Carbon Services. The following is a synopsis of the information contained in their presentations, as well as comments expressed by attendees during the discussion period.

Background

EPA's Class VI well regulation for CO_2 geological sequestration wells under the Underground Injection Control (UIC) program is the first new well class since the five initial well classes were implemented to protect the Underground Sources of Drinking Water (USDW). In 2005 the US EPA initiated the development of a new regulatory framework for geologic sequestration of CO_2.
In 2008 the Class VI regulations were proposed and in 2010 the rule was promulgated. Initially CCS R&D projects were expected to continue under Class V well permits. However, EPA is now asking for new geological sequestration projects to permit as Class VI wells.

Table of Contents

Featured Article
- Are EPA's Class VI Well Regulations Workable?.....page 1

Regular Features
- Federal CCS Regulation News .....page 4
- State CCS Regulation Updates.....page 7

News
- International Regulatory News.....page 5
- CCS Project News.....page 6
- Publications and Releases.....page 8

CCS Regulation Newsletter

To date there have been 4 projects which have applied for the UIC Class VI permit. These are FutureGen (4 wells), Tenaska's Taylorville project (2 wells), Illinois Basin Decatur project (1 Well), and the Archer Daniels Midland's Industrial Sources project (1 well). The first permit application was submitted 22 months ago and to date, no permit has yet been issued. Some of this long processing time has been attributed to it being the first application. Nonetheless, long processing times of Class VI well permits are a concern.

Complying with certain requirements of the permitting process may pose problems, including the 50 year timeframe of Post Injection Site Care (PISC), the requirement for robust geological modeling on sometimes limited data, and the requirement to demonstrate financial responsibility with annually updated cost estimates. On the positive side, regulators have designed the process to be flexible and there are aspects that have been left open in order to take into account the unique factors of each CO_2 injection project. How flexible EPA proves to be with regards to the permitting process, only time will tell.

Positive Factors

The UIC Class VI well rule is designed to be adaptable and it is therefore able to tailor its requirement based on specific site and different project factors. These include allowing the operators to make project specific decisions to casing, cementing, injection sites, formation sites and injection depth.

The Class VI regulation itself is also adaptable. There is a six-year review process for sections of the rule that allows the regulation to take into account and incorporate any learning and research that has occurred. While this is a stated intention of the rule, EPA is not bound to do so.

Pre-injection site characterization wells are allowed and encouraged. If there is no previous well that intersects the target reservoir, it is possible to use a staged process to allow the injection well or a planned observation well to serve as the site characterization well by first permitting it as a stratigraphic test well. This stage is an opportunity to gain knowledge of the chemical and physical characteristics of the injection and confining zones. It is also possible to use the Class VI permitting process to gain additional knowledge before final site delineation by using the opportunity for formation testing after construction of the permitted well and before initiating injection of the permitted CO_2 stream.

Negative Factors

The main negative issue with the Class VI well regulation is the length of the PISC. The default requirement of 50 years of PISC is seen as inappropriate, especially for short-term projects. There may be a potential for an unknown alternative PISC shorter than the 50-year default. Responding to initial concerns, EPA has clarified that this option is available throughout the project lifetime to promote a learning environment. Bob Van Voorhees emphasized the need to consider shorter time frames as the default time period for pilot and demonstration projects until there is more robust monitoring and operational data available.

EPA Class VI rule contains no provision for governmental assumption of post-injection or post-closure responsibility. Elsewhere in the world, countries deal differently with this issue. In Canada there are post-stewardship funds for post-injection monitoring. In Chevron's Gorgon project in Australia, Chevron assumes a 20-year post closure liability, before transferring it over to the Australian Government.

The rule requires robust geological knowledge for modeling the CO_2 behavior underground. Although fields without existing wells that penetrate the entire column require a stratigraphic test well, construction of a detailed geological model based on sparse data would create a scaling up problem. The nature of the UIC permit requires constant review and the geological

modeling is required to be updated after well construction and when injection and monitoring starts in order to take into account the data that is generated.

The Class VI regulation has eliminated the aquifer exemption option even when the USDW is very deep, unusable, or difficult to identify. In these cases EPA has stated that below 10,000 parts per million total dissolved solids is a USDW and cannot be used for CO_2 injection.

When applying for the Class VI UIC permit, the Area of Review (AOR) needs to be established. The AOR is defined by the greater of either the CO_2 boundary or the pressure front. The AOR is therefore very difficult to predict and delineate. Under initial EPA guidance, it would even have been possible to have an essentially infinite AOR. EPA is moving to clarify that the focus should be on pressure increases caused by injection rather than on inherent reservoir pressures. In order to address this issue, Tenaska designated a large and conservative AOR when they applied for the Class VI well permit for its Taylorville project. But not all companies will have the flexibility to designate such a large AOR.

The permit is for a single well. There are no area permits, even though it is likely that a commercial project will need more than one injection well. The permit also does not include monitoring wells and other infrastructure requirements.

There is a presumptive requirement for high annular pressure (fluid pressure between the casing and tubing) to maintain pressure so that it exceeds the operating injection pressure. This can lead to problems with the cement isolation capacity. It may also damage the casing, mechanical elements of the well, and the surrounding formations. EPA has provided a mechanism for making exceptions in those cases, but the injection of supercritical CO_2 streams seems likely to make this exception the most common approach.

At least every 5 years throughout the project lifetime, the owners or operators need to review and update the major plans for the project (area of review and corrective action plan, testing and monitoring plan, emergency and remedial response plan) and make any necessary adjustments in the demonstration of financial responsibility. These requirements are designed to ensure that operators have the resources to undertake storage activities and that the regulator would have the resources to close the site when needed and to avoid endangering a USDW. The Class VI rule places a continued financial responsibility on the operators until site closure is approved.

Summary

There are many uncertainties in the UIC permitting process. These come from the geology, the permitting process, long term planning, financing and monitoring. The Class VI permit is an interactive process with the plans designed to be updated throughout the project's lifetime. This provides flexibility to help manage some of the variation in site characteristics as well as regulatory uncertainty. However some factors, mainly the 50-year post injection site care, may prove to be a large barrier for many companies.

There may be the need for a multi-step experimental permitting period to smooth out some of these issues. Currently the use of CO_2 in pre-operational testing is awaiting EPA confirmation, but though this may remove uncertainties and unknowns about the Class VI well regulation, many still remain.

While there was agreement that the requirements of EPA Class VI well permits can be workable, there was concern about how flexible EPA would be during the permitting process. There are going to be challenges and it is critically important that the industry, the regulators, other stakeholders and knowledgeable experts in research and academia all work together to make permitting Class VI wells workable.

CCS Regulation Newsletter

Federal CCS Regulation News and Updates

February 4, 2013. Sen Lisa Murkowski (R-AK) released an energy policy blueprint which calls for federal energy programs to support CCUS and EOR. This proposal is to expand the DOE's coal R&D program beyond CCUS. Currently CCS and the associated programs compile two-thirds of the DOE Fossil Energy's budget and this energy proposal calls for wider support for clean energy research projects.
http://ghgnews.com/index.cfm/murkowski-energy-blueprint-calls-for-ccus-eor/

February 8, 2013. EPA has published a draft climate change adaption plan in the Federal Register. EPA said it will review its current programs and identify specific actions the agency can take to integrate climate adaptation into its operations.
http://ghgnews.com/index.cfm/epa-issues-draft-climate-change-adaptation-plan/

March 6, 2013. The House of Representatives has passed a stop-gap spending measure that would extend funding for government agencies through the end of the fiscal year at current levels.
http://ghgnews.com/index.cfm/wrap-up38/

March 12, 2013. Senators Henry Waxman (D-CA), Earl Blumenauer (D-OR) and Brian Schatz (D-HI) have released a draft carbon-pricing legislation and solicited comments on it from stakeholders and the public. The main topic in this discussion is putting a price on carbon. The legislation establishes that the emitter would pay a fee for each ton of CO_2 emitted. The draft contains alternative prices of $15, $25 and $35 per ton for discussion purposes. The revenue generated would be directed to benefit tax payers in a number of different proposals, including reducing the Federal deficit.
http://democrats.energycommerce.house.gov/index.php?q=news/waxman-whitehouse-blumenauer-and-schatz-release-carbon-price-discussion-draft

April 11, 2013. Rep. Nick Rahall (D-WV) has introduced H.R. 1486: No Carbon Tax Act of 2013 Bill. This Bill is to prohibit the Secretary of the Treasury and the Administrator of EPA from devising or implementing a carbon tax.
http://www.govtrack.us/congress/bills/113/hr1486/text

April 18, 2013. The DOE has released its Fiscal Year 2014 Congressional Budget Request. There has been a $25 million budget cut, and the details indicate that the Department's focus is moving away from Carbon Capture for the upcoming year.
http://ghgnews.com/index.cfm/doe-fy-2014-budget-request-e28098shortchanginge28099-ccs-observer-says/

April 18, 2013. The American Petroleum Institute and the National Association of Manufacturers have petitioned the Supreme Court to review and overturn a federal appeals court decision that upheld EPA's blueprint for regulating GHG emissions from stationary sources. The groups said that GHG emissions cannot be regulated under the Clean Air Act's Prevention of Significant Deterioration program. This petition states that as CO_2 is not listed as a criteria pollutant under the Clean Air Act's National Ambient Air Quality Standards, it should not be held to the same regulatory standards as other pollutants.
http://ghgnews.com/index.cfm/industry-groups-ask-supreme-court-to-overrule-ghg-determination/

April 24, 2013. A bipartisan group of legislators reintroduced the Master Limited Partnerships (MLP) Parity Act in the House and Senate. The current MLP provides tax advantages to energy project developers limited to oil, natural gas, coal extraction and pipeline projects. Senators Coon (D-DE) and Murkowski (R-AK), two of the Act's sponsors, have noted that this Bill would allow other energy projects to have access to these tax advantages and "level the playing field" for clean energy technologies. CCS and coal gasification projects would be eligible for the tax structure.
http://ghgnews.com/index.cfm/new-bill-would-expand-tax-benefits-to-ccs-clean-energy-projects/

CCS Regulation Newsletter

International Regulatory News

EU

January 15, 2013. The EU has released draft laws for emissions performance standards or mandatory CCS certificates. If approved, it would require the EU Commission to prepare impact assessment and legislative proposals in 2014 for CCS to be deployed after 2020.
http://www.euractiv.com/climate-environment/brussels-steers-resolute-new-ccs-news-517045

UK

February 11, 2013. Conservative MP Tim Yeo has tabled an amendment which would have forced electricity companies to remove any coal or gas fired power plants by 2030 unless they are fitted with CO_2 capture equipment.
http://www.bellona.org/articles/articles_2013/1360599478.53

South Africa

March 1, 2013. A carbon tax around $13 per ton of CO_2 is to be introduced in South Africa around 2015.

http://www.rtcc.org/south-africa-gives-new-carbon-tax-a-cautious-welcome/

GCCSI

March 4, 2013. The GCCSI has opened an office in Beijing.
http://bellona.org/ccs/ccs-news-events/news/article/global-ccs-institute-establishes-office-in-beijing.html

China

March 6, 2013. China has announced that there is no official schedule for the countries carbon tax. The tax was intended to apply to carbon emissions from fossil fuels and it was supposed to start in 2012. The national emissions trading scheme is easier to implement than a carbon tax and the Chinese Government is focusing on a cap and trade system in the years to come.
http://ghgnews.com/index.cfm/gove28099t-official-no-e28098official-schedulee28099-for-carbon-tax-in-china/

http://www.bloomberg.com/news/2013-03-06/china-backing-away-from-carbon-tax-start-in-2013-official-says.html

Australia- China

March 10, 2013. The Australian-Chinese Co-ordination Group on Clean Coal Technology has agreed to allocate up to $12 million in funding to undertake a feasibility study to focus on an industrial scale post combustion capture project with CCS in China.
http://www.globalccsinstitute.com/institute/news/australia-china-post-combustion-capture-pcc-feasibility-study-project

South Korea and Scotland

March 18, 2013. The Scottish Carbon Capture and Storage (SCCS) has signed an MoU agreement with South Korea's leading CCS research institute to develop technologies for reducing CO_2 emissions from power generation and industry.
http://www.energydigital.com/green_technology/scottish-and-south-korean-researchers-collaborate-on-ccs

Germany

April 2, 2013. The EU energy chief has advised Germany to keep fracking options open or it could risk loosing its competitive edge in energy generation.
http://www.reuters.com/article/2013/04/02/germany-shale-oettinger-idUSL5N0CP0BL20130402?type=companyNews&feedType=RSS&feedName=companyNews

EU

April 4, 2013. The European Commission has announced the second round of NER 300 funding. The deadline for submission is July 3, 2013. Officials however have declined to say when the sale of 100 million carbon permits meant to finance the schemes would start.
http://bellona.org/ccs/ccs-news-events/news/article/european-commission-launches-second-call-for-ccs-projects-proposals.html

Alberta, Canada

April 15, 2013. Alberta's Premier Alison Redford is considering increasing the price of carbon in Alberta by imposing a limit on tar-sands emissions and a $40/ton tax on productions above that limit.
http://www.theglobeandmail.com/commentary/albertas-carbon-tax-is-a-bold-move-sadly-its-not-enough/article10798463/?cmpid=rss1

EU

April 16, 2013. The European Parliament has voted to block plans to "backload" 900 million carbon allowances forcing the proposed reforms back to the committee stage. The proposal was aiming to temporarily remove 900 million carbon credits from the European Trading System (ETS) over the next three years and reinsert them back into the market in 2019 and 2020.
http://www.businessgreen.com/bg/analysis/2261753/eu-ets-carbon-backloading-vote-the-reaction

CCS Regulation Newsletter

CCS Project News

Aberthaw, UK

January 17, 2013. RWE and Shell have captured the first ton of CO_2 at the joint SO_2 /CO_2 demonstration plant on a 5 MW slipstream at the Aberthaw Power Station, UK.http://www.hydrocarbonprocessing.com/Article/3143116/RWE-Shell-launch-integrated-sulfur-carbon-capture-plant-at-UK-power-station.html

Port Arthur, TX, USA

January 28, 2013. Air Products announced the launch of Phase 1 of its 2 stage CCS project in Port Arthur, Texas. The project reached full capacity of 1Mt/yr of CO_2 capture in April 2013. www.airproducts.com/company/news-center/2013/01/0128-air-products-phase-one-carbon-capture-project-onstream-in-texas.aspx

Mongstad, Norway

January 31, 2013. The CO_2 Technology Centre Mongstad has announced the formation of an international test center network for carbon test facilities around the world. The goal is to share knowledge to accelerate the commercialization of CCS worldwide. http://www.globalccsinstitute.com/institute/news/tcm-launches-ccs-test-centre-network

FutureGen, IL, USA

February 7, 2013. The DOE has announced a new co-operative agreement with the FutureGen Alliance to develop phase II. This enables partners Babcock & Wilcox and Air Liquide to start power plant design and cost-estimate work. http://fossilfuel.energy-business-review.com/news/ccs-project-in-us-moves-forward-into-second-phase-development-060213

New Gas Plant with CCS, USA

February 12, 2013. Summit and Linde have started collaborating to develop a commercial scale gas-fired power plant that will capture up to 90% of CO_2 emissions http://www.summitpower.com/story/summit-power-and-linde-to-develop-natural-gas-power-plants-with-carbon-capture/

HECA, CA, USA

February 22, 2013. SCS Energy hopes to make a financial investment decision on HECA by the end of 2013. If approved, the $3.9 billion polygen project will begin construction in 2014. http://ghgnews.com/index.cfm/scs-energy-hopes-to-declare-financial-close-on-heca-by-yeare28099s-end/

Boundary Dam, Canada

February 25, 2013. SaskPower took Unit 3 offline to retrofit the power generating unit for its 110 MW CCS project. The construction on the 2.5 mile CO_2 pipeline will begin soon. http://ghgnews.com/index.cfm/saskpower-takes-boundary-dam-unit-offline-for-retrofit-work/

Swan Hills, Canada

February 25, 2013. The Alberta Government has cancelled a $285 million agreement for the funding of the CCS power plant. Low gas prices have made this project unfeasible and it has been placed on hold until gas prices increase. http://www.ogj.com/articles/2013/02/alberta--swan-hills-synfuels-end-ccs-pact.html

FutureGen, IL, USA

February 28, 2013. Illinois electricity suppliers are challenging the state's approval to charge customers on all electricity usage in order to cover FutureGen's costs. http://www.chicagobusiness.com/article/20130228/NEWS11/130229763/comed-power-suppliers-vying-to-halt-futuregen-financing-plan

W.A. Parish, TX, USA

March 15, 2013. The DOE has issued the project's final EIS (Environmental Impact Statement). The report finds that the project would have "negligible to minor" adverse impacts on the surrounding area.http://ghgnews.com/index.cfm/doe-issues-final-eis-for-wa-parish/?mobileFormat=true

Peterhead and White Rose Project, UK

March 20, 2013. Peterhead and the White Rose project have been announced as the two preferred bidders in the UK's £1 billion CCS Commercialization Program Competition.The projects have 18 months to submit FEED studies before the UK Government makes a final investment decision in 2015. The other 2 finalists,Captain Clean Energy and Teesside Low Carbon, have been placed as reserve projects. https://www.gov.uk/government/news/preferred-bidders-announced-in-uk-s-1bn-ccs-competition

IPAC-CO_2, Canada

March 31, 2013. The IPAC-CO_2, a CCS focused nonprofit basin in Saskatchewan, has closed after major sponsors did not renew their contracts. http://ghgnews.com/index.cfm/saskatchewane28099s-premier-says-ipac-co2e28099s-job-e28098is-donee28099/

Continued on page 7

CCS REGULATION NEWSLETTER

State CCS Regulation News and Updates

Texas

February 13, 2013. Texas legislators are pushing the US Congress to pass a tax amendment that would benefit Summit Power's TCEP project in Odessa, Texas. Currently CCS projects may loose one third of their grant money due to current tax codes which treat the federal grant as income.
https://www.argusmedia.com/News/Article?id=834671

Mississippi

February 22, 2013. The Mississippi Senate has approved two bills HB 894 and HB 1134, which will help Mississippi Power recover costs from its coal gasification power project Kemper County.
HB 894 provides the state's Public Service Commission with the ability to implement a rate recovery plan for the company and HB 1134 allows it to sell up to $1 billion in bonds to pay for any financing and construction costs over $2.4 billion.
http://gastopowerjournal.com/technologyainnovation/item/1455-new-mississippi-coal-gasification-plant-to-utilise-trig-technology#ixzz2Q1EGGGWe

Mississippi

March 8, 2013. The Mississippi Public Service Commission approved a rate increase of 12-13% for Mississippi Power Company's customers to help pay for the construction of Kemper Power station. Mississippi Power was asking for a 21% increase. The project is currently 75% complete and it is planned to begin operation in 2014.
http://mpbonline.org/News/article/997psc_approves_rate_increase_for_kemper_coal_plant

California

April 23, 2013. S.B. 34 advanced in the California Senate when it was passed 8-0 by the Natural Resources and Water Committee. The Bill now faces approval by the Senate Appropriations Committee. If approved it will then move to the upper house and then the whole Senate.
S.B. 34 aims to clarify subsurface pore space ownership and patch regulatory gaps for permitting of CCS and EOR projects in California.
http://ghgnews.com/index.cfm/ccs-legislation-advances-in-calif-senate/

CCS Project News (*continued from page 6)*

Belchatow, Poland

April 12, 2013. PGE has cancelled the Polish CCS project over inadequate government funding. http://ghgnews.com/index.cfm/pge-ends-polish-ccs-project-e28098green-hydrogene28099-also-appears-done/

Skyonic, TX, USA

April 5, 2013. Skyonic Corp. announced that it will break ground on its $125 million retrofit of a Capitol Aggregates cement plant near San Antonio, TX. It expects to start capture of 75 kt/yr of CO_2 in late 2014. http://ghgnews.com/index.cfm/texas-capture-retrofit-to-break-ground-this-month/ *Continued on page7*

Kemper County, MS, USA

April 5, 2013. Southern Company has withdrawn its request for a $1.5 billion federal loan guarantee for its Kemper County gasification project under construction saying that it can borrow the money elsewhere at a lower rate. Mississippi Power announced that it will cover more than $500 million of cost increases from the project.
http://ghgnews.com/index.cfm/southern-withdraws-15b-loan-guarantee-request-for-kemper-plant/
http://ghgnews.com/index.cfm/miss-power-to-absorb-540m-in-cost-increases-from-kemper-plant/

Rockport, IN USA.

May 3, 2013. Leucadia has suspended most work at its $2.8 billion gasification facility after the state called for a new round of regulatory review.
http://ghgnews.com/index.cfm/developer-suspends-most-work-on-indiana-gasification-project/

FutureGen, IL, USA

May 3, 2013. The DOE has released the Environmental Impact Statement (EIS) for FutureGen. The CCS project was found to have minor adverse impacts and would likely have a beneficial impact on the surrounding climate and GHG emissions.
http://ghgnews.com/index.cfm/draft-eis-anticipates-no-major-enviro-impacts-from-futuregen/

CCS REGULATION NEWSLETTER

Publications and Releases

DNV: CCS Risk Management Guidance

January 31, 2013. DNV KEMA has launched new risk management guidance for the CCS industry. The guidance has been developed over 15 months with support from 16 industry and regulator organizations. It provides a comprehensive reference source for CCS projects and operations worldwide.
http://www.dnv.com/press_area/press_releases/2013/dnv_kema_launches_new_guidance_covering_co2_safety_for_the_ccs_industry.asp

China: National Development and Reform Commission

February 6, 2013. According to China Securities Journal, the National Development and Reform Commission (NDRC) has released a notice to local governments and related associations of four industries, namely coal mining, power generation, building construction, and construction materials, in a bid to report their low-carbon technological innovative projects and industrialization demonstration projects in the mentioned four industries.
http://www.captureready.com/EN/Channels/News/showDetail.asp?objID=3069&isNew=

EPA: Draft Climate Change Adaption Plan

February 8, 2013. EPA has released its Draft Climate Change Adaption Plan for public comment. In the 55 page document EPA said that it will review its current programs and their vulnerability to climate change and identify specific actions the agency can take to integrate climate adaptation into its operations. This comes in response to the 2009 government wide directive from the Council on Environmental Quality which requires agencies to plan for future climate change.

The report does not propose specific rules but instead sets a framework to support and prioritize future actions. The report states that by 2015 EPA will have integrated "climate change science trend and scenario information" into its rule-making processes.
http://www.epa.gov/climatechange/impacts-adaptation/fed-programs.html

EU: CCS Policy Options

April 3, 2013. The European Commission (EC) has published a CCS Policy Options document. In this report the EC said that the main reason CCS technology has not progressed is because of the low CO_2 prices. The major options the paper suggests are mandatory emissions performance standards for power plants,tradable CCS certificates and national strategies.
http://www.globalccsinstitute.com/institute/news/european-commission-publishes-ccs-policy-options

IEA: Tracking Clean Energy Progress Report

April 19, 2013. The IEA has released its annual Tracking Clean Energy Progress Report in which it says that CCS development is not on track to meet the 2020 goals. The 13 large scale demonstration projects currently in operation or under construction only constitute a quarter of the capacity that must come online by the end of the decade in order to meet the goal of only 2 degrees Celsius by the end of the century. The report states that "w*hile the significant growth in cumulative spending that has occurred over the past five years is a positive sign, the current amount is far below the estimated $100 billion required to deliver CCS levels envisaged in the [2 degree Celsius goal]*".
http://ghgnews.com/index.cfm/iea-ccs-development-e28098not-on-tracke28099-to-meet-2020-goals/

Image: *Page 1:http://www.markdroberts.com/images/Capitol-dogwoods-5.jpg*

This newsletter was constructed using information from internet searches. The websites used have been cited.

Holly Javedan compiled this report. For more information, questions and comments please email javedan@mit.edu. Thank you.