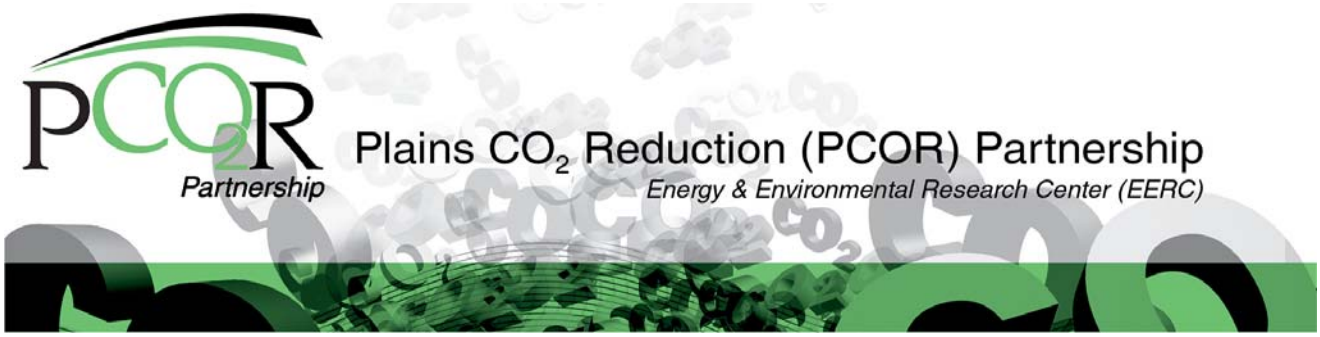

PLAINS CO_2 REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report
Task 13 – Deliverable D58/D59

(for the period October 1 – December 31, 2014)

Prepared for:

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EXECUTIVE SUMMARY

The Plains CO_2 Reduction (PCOR) Partnership is one of seven Regional Carbon Sequestration Partnerships (RCSPs) competitively awarded by the U.S. Department of Energy National Energy Technology Laboratory in 2003 as part of a national plan to mitigate greenhouse gas emissions. The PCOR Partnership is led by the Energy & Environmental Research Center at the University of North Dakota and continues to include stakeholders from the public and private sector in Phase III. The PCOR Partnership region includes all or part of nine U.S. states and four Canadian provinces.

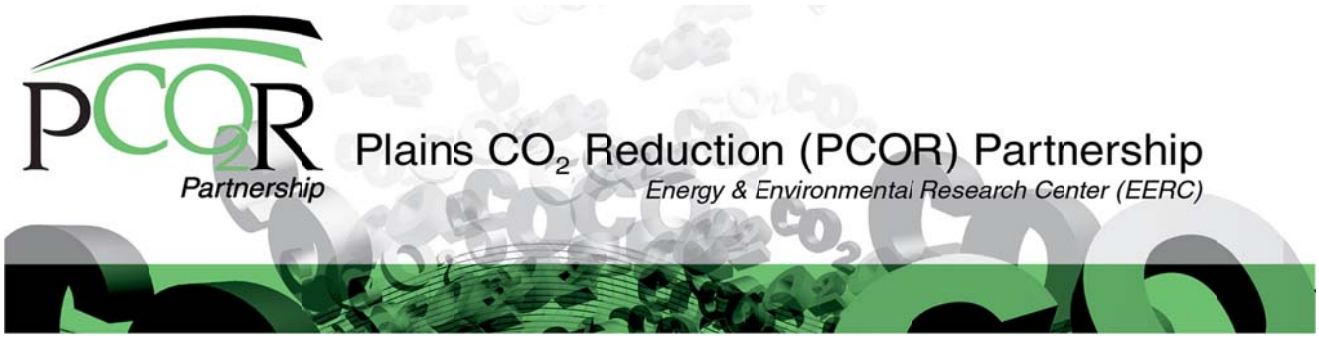
Phase III, the development phase, a 10-year effort (2007–2017), is an extension of the characterization (Phase I) and validation (Phase II) phases. The Phase III efforts of the PCOR Partnership include two large-volume demonstration tests—one in Canada and one in the United States—that focus on injecting carbon dioxide (CO_2) into deep geologic formations for CO_2 storage. Budget Period 4 (Years 3–8 of Phase III) began October 1, 2009.

This progress report presents an update of Phase III PCOR Partnership activities from July 1, 2014, through September 30, 2014.

Denbury Resources Inc. continued CO_2 injection at the Bell Creek oil field. PCOR Partnership monitoring, verification, and accounting activities continued this quarter, including a 3-D seismic survey (11.6 sq mi), a 3-D vertical seismic profile, and a four-well repeat-pulsed neutron logging campaign. In addition, the now quarterly soil gas- and water-monitoring event was completed in December 2014, collecting over 210 soil gas samples from field Phases 1 and 2.

The 12th International Conference on Greenhouse Gas Technologies (GHGT-12) was held October 5–9, 2014, in Austin, Texas. This conference series has established itself as the principal international conference on greenhouse gas mitigation technologies especially on carbon capture and storage. The PCOR Partnership presented ten of its accepted abstracts, comprising six oral presentations (two on behalf of RCSP working groups) and four poster presentations. In addition, the PCOR Partnership program manager chaired several sessions at the conference related to water use and geomechanics.

Ten tasks continued. In addition to the foregoing, regional characterization activities included preparation of a value-added comprehensive characterization report; outreach activities were planned for additional interviews in January 2015 for the 60-minute energy and coal documentary; and RCSP Water Working Group conference calls were held, and a new fact sheet entitled “Long-Term Protection of Freshwater Resources Following CO_2 Storage” was finalized.



PLAINS CO_2 REDUCTION PARTNERSHIP PHASE III
Quarterly Technical Progress Report
October 1 – December 31, 2014

INTRODUCTION

The Plains CO_2 Reduction (PCOR) Partnership is one of seven regional partnerships operating under the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) Regional Carbon Sequestration Partnership (RCSP) Program. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota (UND) in Grand Forks, North Dakota, and includes stakeholders from the public and private sectors. The membership, as of September 30, 2014, is listed in Table 1. The PCOR Partnership region includes all or part of nine states (Iowa, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, Wisconsin, and Wyoming) and four Canadian provinces (Alberta, British Columbia, Manitoba, and Saskatchewan).

The RCSP Program is part of NETL's Carbon Storage Program (Figure 1) and is a government–industry effort tasked with determining the most suitable technologies, regulations, and infrastructure needs for carbon capture and storage (CCS) on the North American continent.

The PCOR Partnership Program is being implemented in three phases:

- Phase I – Characterization Phase (2003–2005): characterized opportunities for carbon sequestration
- Phase II – Validation Phase (2005–2009): conducted small-scale field validation tests
- Phase III – Development Phase (2007–2017): involves large-volume carbon storage demonstration tests

Phase III is divided into three budget periods (BPs), running from October 1, 2007, to September 30, 2017:

- BP3: October 1, 2007 – September 30, 2009
- BP4: October 1, 2009 – September 30, 2015
- BP5: October 1, 2015 – September 30, 2017

BP1 and BP2 were effective in Phase II.

Table 1. PCOR Partnership Membership Phase III (October 1, 2007 – present, inclusive)

DOE NETL	Great River Energy	North Dakota Natural Resources Trust
UND EERC	Halliburton	North Dakota Petroleum Council
Abengoa Bioenergy New Technologies	Hess Corporation	North Dakota Pipeline Authority
Air Products and Chemicals, Inc.	Huntsman Corporation	Otter Tail Power Company
Alberta Department of Energy	Husky Energy Inc.	Outsource Petrophysics, Inc.
Alberta Department of Environment	Indian Land Tenure Foundation	Oxand Risk & Project Management Solutions
Alberta Innovates – Technology Futures	Interstate Oil and Gas Compact Commission	Peabody Energy
ALLETE	Iowa Department of Natural Resources	Petroleum Technology Research Centre
Ameren Corporation	Lignite Energy Council	Petroleum Technology Transfer Council
American Coalition for Clean Coal Electricity	Manitoba Geological Survey	Pinnacle, a Halliburton Service
American Lignite Energy	Marathon Oil Company	Prairie Public Broadcasting
Apache Canada Ltd.	MBI Energy Services	Pratt & Whitney Rocketdyne, Inc.
Aquistore	MEG Energy Corporation	Praxair, Inc.
Baker Hughes Incorporated	Melzer Consulting	Ramgen Power Systems, Inc.
Basin Electric Power Cooperative	Minnesota Power	RPS Energy Canada Ltd.
BillyJack Consulting Inc.	Minnkota Power Cooperative, Inc.	Saskatchewan Ministry of Industry and Resources
Biorecro AB	Missouri Department of Natural Resources	SaskPower
Blue Source, LLC	Missouri River Energy Services	Schlumberger
BNI Coal, Ltd.	Montana–Dakota Utilities Co.	Sejong University
British Columbia Ministry of Energy, Mines, and Petroleum Resources	Montana Department of Environmental Quality	Shell Canada Limited
British Columbia Oil and Gas Commission	National Commission on Energy Policy	Spectra Energy
C12 Energy, Inc.	Natural Resources Canada	Suncor Energy Inc.
Computer Modelling Group Ltd.	Nebraska Public Power District	TAQA North, Ltd.
Continental Resources, Inc.	North American Coal Corporation	TGS Geological Products and Services
Dakota Gasification Company	North Dakota Department of Commerce Division of Community Services	University of Alberta
Denbury Onshore LLC	North Dakota Department of Health	University of Regina
Eagle Operating, Inc.	North Dakota Geological Survey	WBI Energy, Inc.
Eastern Iowa Community College District	North Dakota Industrial Commission Department of Mineral Resources, Oil and Gas Division	Weatherford Advanced Geotechnology
Enbridge Inc.	North Dakota Industrial Commission Lignite Research, Development and Marketing Program	Western Governors' Association
Encore Acquisition Company	North Dakota Industrial Commission Oil and Gas Research Council	Westmoreland Coal Company
Energy Resources Conservation Board/ Alberta Geological Survey		Wisconsin Department of Agriculture, Trade and Consumer Protection
Environment Canada		Wyoming Office of State Lands and Investments
Excelsior Energy Inc.		Xcel Energy
Great Northern Project Development, LP		

The overall mission of the Phase III program is to 1) gather characterization data to verify the ability of the target formations to store carbon dioxide (CO_2), 2) facilitate the development of the infrastructure required to transport CO_2 from sources to the injection sites, 3) facilitate sensible development of the rapidly evolving North American regulatory and permitting framework, 4) develop opportunities for PCOR Partnership partners to capture and store CO_2, 5) facilitate establishment of a technical framework by which carbon credits can be monetized for CO_2 stored in geologic formations, 6) continue collaboration with other RCSPs, and 7) provide outreach and education for CO_2 capture and storage stakeholders and the general public.

In Phase III, the PCOR Partnership is building on the information generated in its characterization (Phase I) and validation (Phase II) phases. The PCOR Partnership plans to fully utilize the infrastructure of its region to maximize CO_2 injection volumes. A programmatic

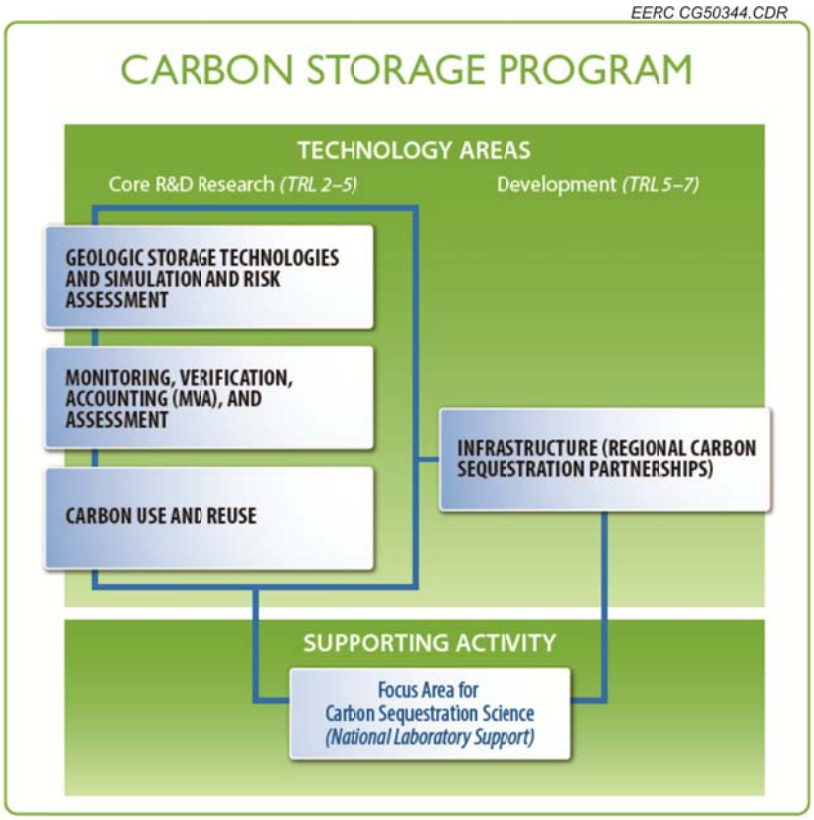


Figure 1. DOE Carbon Storage Program technology areas featuring regional partnerships (courtesy of Andrea Dunn, DOE NETL; "TRL" stands for technical readiness level).

development phase (Phase III) goal is implementation of large-scale field testing involving at least 1 million metric tons of CO_2 per project. Each of the RCSP large-volume injection tests is designed to demonstrate that the CO_2 storage sites have the potential to store regional CO_2 emissions safely, permanently, and economically for hundreds of years.

The PCOR Partnership is working with two large-scale demonstration sites. The sites are located 1) in the Denbury Resources Inc. (Denbury)-operated Bell Creek oil field in Powder River County in southeastern Montana and 2) near Spectra Energy Transmission's (Spectra's) Fort Nelson gas-processing facility, situated near Fort Nelson, British Columbia, Canada. In addition, the PCOR Partnership is collaborating with the Petroleum Technology Research Centre (PTRC) on site characterization, risk assessment, and monitoring, verification, and accounting (MVA) activities associated with the Aquistore Project near Estevan, Saskatchewan, Canada. The PCOR Partnership's work has concluded with Apache Canada Ltd. to further characterize the Zama Acid Gas Enhanced Oil Recovery (EOR), CO_2 Storage, and Monitoring Project in Alberta, Canada, as well as its work on a multiyear, binational characterization effort of the Basal Cambrian system (Figure 2).

Figure 2. Location of large-scale sites in PCOR Partnership Phase III.

The PCOR Partnership's objectives are as follows: 1) investigate the efficacy of various MVA strategies as a means of developing a CO_2 storage project in conjunction with a commercial EOR operation in order to verify that the region's large number of oil fields have the potential to store significant quantities of CO_2 in a safe, economical, and environmentally responsible manner and 2) verify the economic feasibility of using the region's carbonate saline formations for safe, long-term CO_2 storage. During Phase III, the PCOR Partnership will continue to refine storage resource estimates and evaluate other factors relevant to regional storage goals.

The PCOR Partnership plans to achieve its Phase III mission through a series of 16 tasks: 1) Regional Characterization; 2) Public Outreach and Education; 3) Permitting and National Environmental Policy Act (NEPA) Compliance; 4) Site Characterization and Modeling; 5) Well Drilling and Completion (completed); 6) Infrastructure Development; 7) CO_2 Procurement (completed); 8) Transportation and Injection Operations; 9) Operational Monitoring and Modeling; 10) Site Closure; 11) Postinjection Monitoring and Modeling; 12) Project Assessment; 13) Project Management; 14) RCSP Water Working Group (WWG) Coordination; 15) Further Characterization of the Zama Acid Gas EOR, CO_2 Storage, and Monitoring Project (completed); and 16) Characterization of the Basal Cambrian System (completed). Table 2 lists the responsibility matrix for these 16 tasks.

It should be noted that Tasks 10 and 11 will not be initiated until BP5.

Table 2. Phase III Responsibility Matrix

Phase III Task Description	Task Leader
Task 1 – Regional Characterization	Wesley D. Peck
Task 2 – Public Outreach and Education	Daniel J. Daly
Task 3 – Permitting and NEPA Compliance	Charles D. Gorecki
Task 4 – Site Characterization and Modeling	James A. Sorensen
Task 5 – Well Drilling and Completion (completed)	John A. Hamling
Task 6 – Infrastructure Development	Melanie D. Jensen
Task 7 – CO_2 Procurement (completed)	John A. Harju
Task 8 – Transportation and Injection Operations	Melanie D. Jensen
Task 9 – Operational Monitoring and Modeling	Charles D. Gorecki
Task 10 – Site Closure	TBA*
Task 11 – Postinjection Monitoring and Modeling	TBA
Task 12 – Project Assessment	Katherine K. Anagnost
Task 13 – Project Management	Charles D. Gorecki
Task 14 – RCSP WWG Coordination	Ryan J. Klapperich
Task 15 – Further Characterization of the Zama Acid Gas EOR, CO_2 Storage, and Monitoring Project (completed)	Charles D. Gorecki
Task 16 – Characterization of the Basal Cambrian System (completed)	Wesley D. Peck

* To be announced.

PROGRESS OF WORK

Task 1 – Regional Characterization

Significant accomplishments for Task 1 for the reporting period included the following:

- With regard to the upcoming DOE NETL Atlas V:
  - On October 17, 2014, uploaded the Bell Creek project atlas pages for DOE NETL.
  - Corrected oilfield CO_2 storage values, and integrated them into the NATCARB (National Carbon Sequestration Database and Geographic Information System) database.
  - Received a draft of the PCOR Partnership section of the atlas for review, with comments due to DOE NETL by January 9, 2015.
- Continued activities to update the content and function of the partners-only **Decision Support System (DSS)**, including the following:
  - Continued working with EERC programming personnel to improve the online GIS (geographic information system) map.
  - Continued updates to the site, including the addition of a 2014 annual meeting landing page.
  - Updated North Dakota and Montana monthly oil production values.
  - Updated North Dakota and Montana Petra projects with the latest general well information from each state's online resource, as follows: added 191 new North Dakota wells and 17 new Montana wells.

  - On November 25, 2014, moved the new and enhanced search tool for the GIS application to "live" (www2.undeerc.org/website/PCORP/DSS/).
    - Implemented this advanced search tool to better serve client needs and improve the ability to search using different attributes, e.g., search by source type, source name, CO_2 source amounts, and also ability to exclude these same attributes. For example, in a search for "all ethanol plants," any sources with a CO_2 output of less than 25,000 tons can be excluded.
    - Also, added the option to export the remaining results. In addition, oilfield searches are now broken into "all oil fields" and "unitized oil fields," and the oil fields can be searched by their name.
    - Began preparation of a presentation on the DSS online mapping services to showcase the capabilities for viewing results in a comprehensive and interactive framework outside of a report.
- Attended the 12th International Conference on Greenhouse Gas Control Technologies (GHGT-12) held October 5–9, 2014, in Austin, Texas, and presented the following (the papers are available at www.sciencedirect.com; citations for the papers are listed in the Phase III Products section, under Conference Papers):
  - "Evaluation of Large-Scale Carbon Dioxide Storage Potential in the Basal Saline System in the Alberta and Williston Basins in North America" "Wellbore Evaluation of the Basal Cambrian System" "A Workflow to Determine CO_2 Storage in Deep Saline Formations" "Model Development of the Aquistore CO_2 Storage Project"
- Continued work on several additional **value-added reports**, including the following:
  - Reviewed and modified the draft regional characterization report summarizing past and present characterization efforts.
  - Continued work on the report summarizing methods of original oil in place and CO_2 storage calculations.
  - Continued efforts on the Cedar Creek Anticline (CCA) report:
    - Created production charts from data to populate the report.
    - Worked on incorporating CO_2 sources in proximity to the CCA and began making a map of the CCA area with pertinent information related to CO_2 EOR and CO_2 storage.
- With regard to the **Aquistore** Project static modeling and dynamic predictive simulations effort:
  - On October 2, 2014, held a WebEx meeting with PTRC and members of its Science & Engineering Research Committee (SERC) to discuss progress on the Aquistore project, including the three simulation cases requested by SERC during the last WebEx. As requested, provided SERC access to the models and simulation results.
  - Worked on running three additional simulation cases with hysteresis included.
  - Continued work on the new simulation scenarios to investigate when the pressure front reaches the monitoring well.
  - Continued working with PTRC on understanding the Computer Modelling Group simulation files provided.

- Worked on several corrections to the geologic modeling and simulation report for the Aquistore project (Deliverable [D] 93), which was submitted September 30, 2014.
- With regard to the **Aquistore** Project core work (12 samples), continued work on the value-added lab report.

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- Approval was granted by the DOE NETL project manager for an extension request to Subtask 1.4, Collaboration with PTRC's Aquistore Project, to September 30, 2015, along with the addition of a new deliverable due July 31, 2015.

Task 2 – Public Outreach and Education

Significant accomplishments for Task 2 for the reporting period included the following:

- During this reporting period, the PCOR Partnership outreach activities included ten oral presentations and five poster presentations. The following quantities of PCOR Partnership outreach materials were distributed:
  - PCOR Partnership documentary entitled "Nature in the Balance: CO_2 Sequestration" – 9
  - PCOR Partnership documentary entitled "Reducing Our Carbon Footprint: The Role of Carbon Markets" – 6
  - PCOR Partnership documentary entitled "Out of the Air – Into the Soil" – 5
  - PCOR Partnership documentary entitled "Managing Carbon Dioxide: The Geologic Solution" – 10
  - PCOR Partnership documentary entitled "Global Energy and Carbon: Tracking Our Footprint" – 6
  - PCOR Partnership video short entitled "Installing a Casing-Conveyed Permanent Downhole Monitoring System" – 2
  - "Plains CO_2 Reduction Partnership Atlas, 4th Edition" – 16
  - "Plains CO_2 Reduction Partnership Atlas, 4th Edition, Revised" – 41
- On October 5–9, 2014, attended the GHGT-12 Conference in Austin, Texas, where the RCSP Outreach Working Group (OWG) presentation "Digital Communications: Status and Potential Applications for CCUS [carbon capture, utilization, and storage] Public Outreach" was presented (paper available at www.sciencedirect.com; citation for the paper is listed in the Phase III Products section, by author, under Conference Papers).
- Continued efforts to expand the type and presentation of statistics for overall past outreach activities and for planning.
- Continued an in-house review of outreach products using a standard, industry-accepted framework.
- With regard to the **Aquistore Open House**, held December 11, 2014, at the Energy Training Institute in Estevan, Saskatchewan:
  - Upon request, provided information on a graphic dealing with types and relative positions of site-monitoring instruments.

  - Accepted an invitation to attend and participate.
  - Upon request, provided comments for materials for use at the open house, and agreed to provide two posters (the general outreach poster, D24, and the Aquistore Project poster, D95) for display at the open house.
  - Traveled to Estevan, Saskatchewan, to attend the open house (provided the posters, but fell ill and ultimately was unable to attend).
- Continued to revise three draft Phase II project fact sheets, including holding meetings with project personnel to discuss content, with a focus on the terrestrial and McGregor projects at this time.
- Continued activities associated with **education and teacher education** seminars, including the following:
  - Spoke with teachers in North Dakota and Minnesota who may be interested in participating in the classroom activities for the Carbon Challenge (related to the kickoff of the Boundary Dam CCS Project/2014 SaskPower CCS Symposium held September 30 – October 2, 2014).
  - On December 5, 2014, discussed ideas for classroom activities for a PCOR Partnership version of the Carbon Challenge (based on activities for the Carbon Challenge undertaken by groups in Regina, Saskatchewan, Canada; Scotland; Norway; Spain; and Australia; and recent discussions held with local teachers in the PCOR Partnership region).
- Participated in a number of **conference calls** this month, including the following:
  - On October 27, 2014, participated in the monthly RCSP OWG conference call; topics discussed included an upcoming community information session scheduled for early December in Regina, Saskatchewan.
  - On November 24, 2014, participated in the monthly OWG conference call; topics discussed included the 2015 call schedule and potential topics for future discussion.
  - Prepared for the monthly Aquistore outreach advisory panel conference call scheduled for November 24, 2014, but the call was canceled.
  - On December 18, 2014, participated in the monthly OWG conference call; topics discussed included the announcement of the best practices manual (BPM) updates and the assignment for the OWG as well as continued discussion of topics for future discussion.
- Continued efforts to update the **public Web site** (www.undeerc.org/pcor), including the following:
  - Continued ongoing identification and repair of broken links.
  - Added the permanent downhole monitoring (PDM) video short to the video clip library (under the "Oil Production" category, www.undeerc.org/pcor/Video-Clip-Library/Videos/Documentaries/PDM.aspx).
  - Added the updated Lignite Field Validation Test Site fact sheet (value-added) (www.undeerc.org/pcor/newsandpubs/pdf/FactSheet10B.pdf).
  - Added the November 2014 version of the NETL fact sheet "Plains CO_2 Reduction (PCOR) Partnership – Development-Phase Large-Scale Field Projects" to the public Web site (replacing the previous version, www.undeerc.org/pcor/NewsAndPubs/pdf/NT42592.pdf).

- Continued collaborative efforts with **Prairie Public Broadcasting (PPB)**, including the following:
  - Resumed work on Parts 3 and 4 of the four-part educational video series entitled "Meeting the Challenge," including updating the narration on November 21, 2014.
  - Completed a "teaser" video (approximately 1:25 minutes) for the Bell Creek documentary (D21, due April 2016) for viewing by Denbury personnel in Midland, Texas, during CO_2 Conference Week.
  - On November 21, 2014, met with PPB in Fargo, North Dakota to decide on reasonable actions for improved tracking of PCOR Partnership materials posted on PPB's YouTube channel, the North Dakota Studies education Web site, and the national PBS educator-focused Learning Media site.
  - Received summary tracking information (on a quarterly basis) for the period of January 1, 2011, to September 30, 2014, for the PCOR Partnership digital materials posted on PPB's YouTube channel.
  - Discussed with PPB personnel the potential for produced interviews from documentaries (PPB has an ongoing process of producing full interviews from their activities, including PCOR Partnership documentaries, for inclusion in a publicly available archive database) as value-added products for the PCOR Partnership.
  - With regard to D22, the energy from coal 60-minute documentary (due January 2016):
    - Finalized schedules and questions for several interviews scheduled for January 12 and 13, 2015, in Houston and Plano, Texas.
- During this reporting period, information regarding the **site visits** to the PCOR Partnership public Web site included the following:
  - There were 5510 visits to the public Web site (www.undeerc.org/pcor). Traffic increased 72% over last quarter (3196 visits). Over 20% of these visits were initiated from a mobile device or tablet.
  - There were 4680 unique visitors to the public Web site, representing a 70% increase from last quarter (2751 visitors). In particular, 83% of these visitors (4643 visitors) were new to the Web site (visitors whose visit was marked as a first-time visit in this quarter).
  - Of the 5510 visits, 45% of the Web traffic was domestic and 55% was international. Table 3 lists the top ten countries for visits to the PCOR Partnership Web site. These included the United States, India, United Kingdom, Canada, Australia, Germany, Philippines, Malaysia, Spain, and Pakistan. There was traffic from 124 countries overall (Figure 3).
  - There were 387 visits originating from within the PCOR Partnership region (Figure 4). Approximately 63% of the regional visits originated from the United States, and 37% came from Canada. Visits from within the PCOR Partnership region comprised 7% of the overall traffic to the public Web site (it should be noted that the totals are exaggerated to some degree because the visit location data were aggregated at the state and province levels, even though the PCOR Partnership region formally includes only portions of British Columbia, Montana, and Wyoming).

Table 3. Visit Activity from the Top Ten Countries and the PCOR Partnership Region

	Country	Visits*	PCOR Partnership State/Province	Visits*
1.	United States	2506		
			North Dakota	70
			Minnesota	47
			Wisconsin	47
			Missouri	23
			Iowa	18
			Montana	12
			Nebraska	12
			South Dakota	11
			Wyoming	5
2.	India	568		
3.	United Kingdom	473		
4.	Canada			
			Alberta	80
			Saskatchewan	42
			British Columbia	15
			Manitoba	5
5.	Australia	162		
6.	Germany	94		
7.	Philippines	93		
8.	Malaysia	88		
9.	Spain	82		
10.	Pakistan	55		
	Other 114 countries	1089		
	Total Visits	**5510**	**Total PCOR Partnership Visits**	**387**

*Arranged by the number of visits to the site.

- During this reporting period, a breakdown of how visitors came to the PCOR Partnership Web site, also referred to as **traffic sources** (Figure 5), is provided below:
  - Direct traffic consists of those visitors who bookmark or type in the URL (www.undeerc.org/pcor). It is likely that most of the direct traffic (14%) is from persons familiar with the PCOR Partnership.
  - Search traffic refers to the use of search engines and accounted for more than 82% of the traffic. Google Analytics provides the keywords visitors used. The top keywords used include "carbon sequestration," "what is CO_2?," and "CO_2 sequestration."
  - Referral site traffic (3%) corresponds to the traffic directed to the PCOR Partnership Web page from other sites via links. The top three referring Web sites were energy.gov, mybigcampus.com, and sequestration.mit.edu.

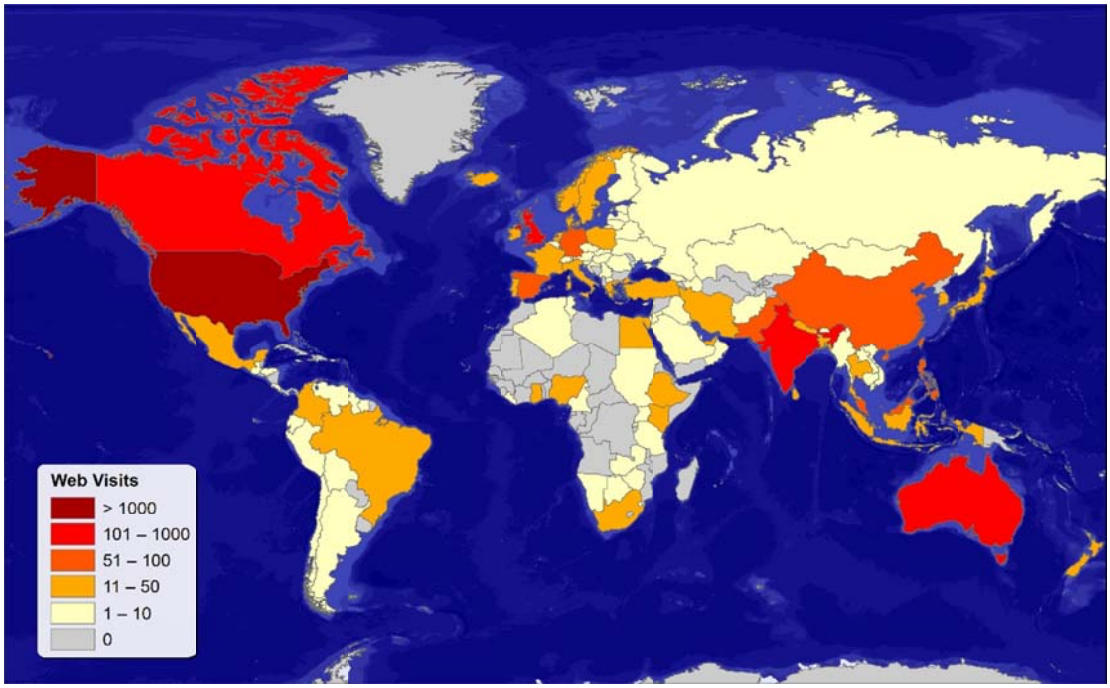


Figure 3. Map of PCOR Partnership Web site global traffic for this reporting period.

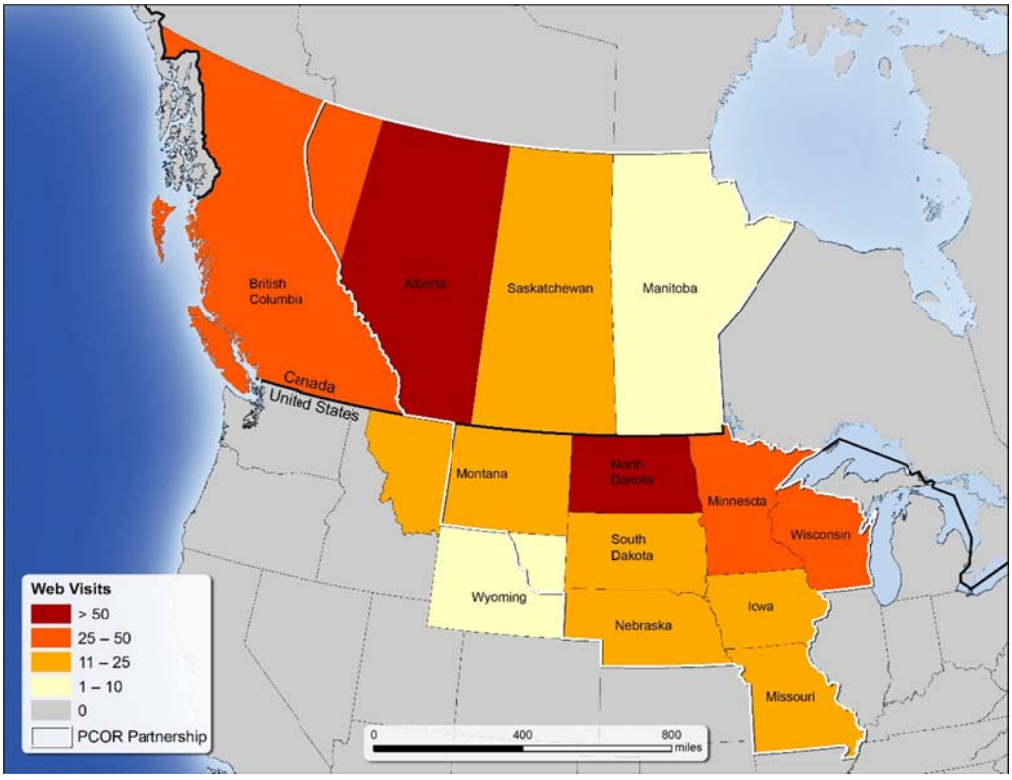


Figure 4. Map of PCOR Partnership Web site regional visits for this reporting period.

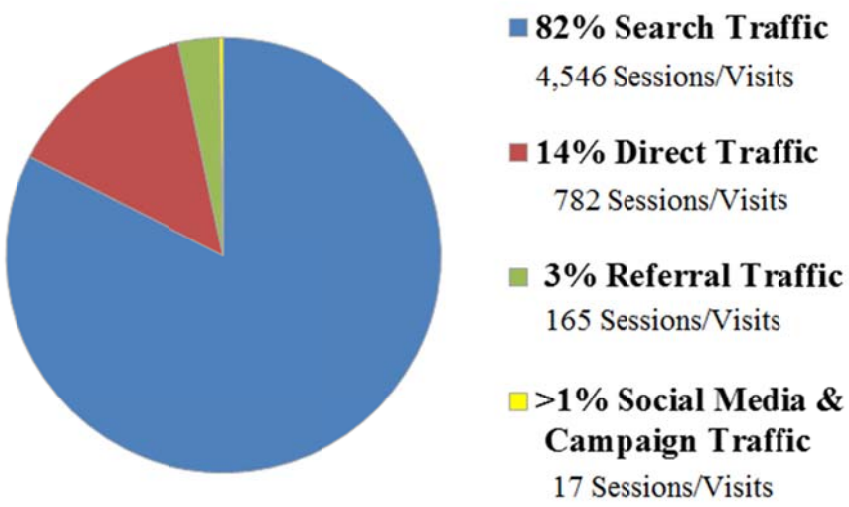


Figure 5. PCOR Partnership public Web site traffic sources for this reporting period.

  - Less than 1% of site traffic resulted from teacher campaigns and social interactions, such as e-mail or social media sources (e.g., Facebook and YouTube).
- During this reporting period, the **nature of the visits** to the PCOR Partnership public Web site included 8493 page views (a 54% increase from last quarter); the top five pages viewed are listed in Table 4. These five pages comprise 56% of total page views.
- During this reporting period, the PCOR Partnership received **public television exposure** from documentaries broadcast in North Dakota, northwestern Minnesota, and Manitoba. A total of 24 broadcasts aired. The number of telecasts by documentary are as follows: "Out of the Air Into the Soil: Land Practices That Reduce Atmospheric Carbon" (6), "Managing Carbon Dioxide: The Geologic Solution" (9), and "Global Energy and Carbon: Tracking our Footprint" (9).
- During this reporting period, there was no **media content** published regarding the PCOR Partnership.

Table 4. Top "Page Views" on the PCOR Partnership Public Web Site

Page Title	Page Views	% Page Views	Page
What Is CO_2 Sequestration	3862	45.5	www.undeerc.org/pcor/sequestration/whatissequestration.aspx
What Is CO_2	681	8.0	www.undeerc.org/pcor/sequestration/whatisco2.aspx
Home Page	396	4.7	www.undeerc.org/pcor/
Terrestrial Sinks	336	4.0	www.undeerc.org/pcor/region/terrestrial/default.aspx
CO_2 Sequestration Projects	300	3.2	www.undeerc.org/pcor/co2sequestrationprojects/default.aspx

- All five documentaries and 50 video clips taken from the documentaries have been uploaded to the EERC's YouTube channel. The top five accessed YouTube videos are listed in Table 5. Because of the volume of material, the videos were organized into seven playlists. Each video description includes one or more links to the PCOR Partnership public Web site. Two PCOR Partnership full-length documentaries are also on the PPB YouTube Channel. These are listed on Table 6.These videos can also be streamed on the PCOR Partnership public Web site.

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- All activities are on schedule, and there were no problems or delays during the reporting period.

Task 3 – Permitting and NEPA Compliance

Significant accomplishments for Task 3 for the reporting period included the following:

- Effective November 25, 2014, Charles Gorecki was named the new task leader.
- Continued review of the U.S. Environmental Protection Agency (EPA)-proposed rule for carbon emissions from existing stationary sources.
- Attended GHGT-12 in Austin, Texas, and the paper entitled "Guidance for States and Provinces on Operational and Postoperational Liability in the Regulation of Carbon Geologic Storage" was presented (paper available at www.sciencedirect.com; citation for the paper is listed in the Phase III Products section, by author, under Conference Papers).
- On October 19–21, 2014, attended the Interstate Oil and Gas Compact Commission (IOGCC) 2014 Annual Meeting in Columbus, Ohio.
- Began planning for D8, permitting review – update 2, due September 30, 2015.

Table 5. Top EERC PCOR Partnership-Related YouTube Channel Videos Accessed

Video	Views	Est. Minutes Watched	Avg. View Duration
Reducing Our Carbon Footprint Documentary	336	2620	7.47
The Phases of Oil Recovery – So Far	165	345	2.05
Reforestation in Brazil	158	353	2.13
Reservoir Geology 101: Fluid in the Rocks	91	111	1.12
Household Energy and Carbon	72	156	2.10
CO_2 EOR and Geologic CO_2 Sequestration	72	156	2.09

Table 6. PCOR Partnership Documentaries on PPB YouTube Channel Accessed

Video	Views	Est. Minutes Watched	Avg. View Duration
Global Energy and Carbon: Tracking Our Footprint	1186	10,007	8.44
Managing Carbon Dioxide: The Geologic Solution	75	439	5.85

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- All activities are on schedule, and there were no problems or delays during the reporting period.

Task 4 – Site Characterization and Modeling

Significant accomplishments for Task 4 for the reporting period included the following:

- On November 3–7, 2014, modeling staff attended a NExT (Network for Excellence in Training) Advanced Petroleum Geomechanics course in Houston, Texas (to investigate geomechanics beyond simple elastic, isotropic behavior).
- On December 10, 2014, presented on PCOR Partnership activities at an intro to GIS class at North Dakota State University in Fargo, North Dakota, on December 10, 2014.
- **Bell Creek** test site activities included the following:
  - With regard to **geomechanical** efforts, the following activities occurred:
    - Continued working on D32, geomechanical report update (due January 2015).
    - Continued updating the geomechanical model:
      - Performed literature review and data collection for data deeper than the Madison Formation for the development of the 3-D mechanical earth model (MEM); the data can include the outcrop data, Williston Basin logs, and surfaces derived from 3-D seismic data.
      - Continued working on creating synthetic logs for select wells for use in helping populate rock properties into the 3-D MEM.
    - Worked on interpretation of the baseline 3-D surface seismic survey, including incorporating the analysis into the geomechanical model and maps.
    - Continued working on the geomechanical modeling workflow, estimating stress and geomechanical properties using 3-D seismic data and preparing reservoir properties for upcoming geomechanical simulations.
  - Continued work on Bell Creek **characterization**, including the following:
    - Compared the pulsed-neutron logging (PNL) crossplots using baseline processed data to total porosity with the Version 2 geologic model porosity for each well with PNL data.
    - Updated the geologic reference model with core data, and recalculated petrophysical logs and surfaces.
    - Discussed and selected final test parameters for 05-06 OW SCAL (special core analysis) work with Denbury and Core Labs.
    - Continued working on Version 3 of the geologic model:
      - Created multiple cross sections throughout the field, correlating seismic amplitude with depositional facies; began creating facies logs; and worked with the EERC's Applied Geology Laboratory personnel to interpret data.
      - Used AVO (amplitude-versus-offset) analysis to analyze 3-D seismic data in new ways and evaluate seismic amplitude data and their relation to log character and core.

    - Reviewed core analysis data and created cross sections through 190 wells with core analysis.
    - Continued building the updated facies model (part of Version 3 geologic model).
    - Incorporated new data, including seismic, to create a more accurate model of the field for better prediction of CO_2 movement.
    - Worked on incorporating lab-generated data into Techlog to supplement data currently in the 3-D model.
    - Worked on interpretation of the baseline 3-D surface seismic survey, including incorporating the analysis into the geomechanical model and maps. Maps were created for the 11.5-square-mile monitor 3-D seismic survey.
    - Investigated methods to improve porosity distribution in geologic models.
    - Compared the PNL total crossplot porosity computed form baseline logs to the Version 2 geologic model porosity for each well with PNL data.
    - Compared effective porosity values from synthetic logs and PNL residual saturation tool calculations.
    - Created training images for the Version 3 facies model, and used multiple-point statistics to geostatistically populate the models in order to increase the accuracy and obtain better predictive results.
- **Applied Geology Laboratory** activities included the following:
  - Worked on developing core photo logs to help determine core depth shifts, particularly for older core, in the geologic reference model.
  - With regard to the 60 feet of full-diameter 33-14R core (collected April 2013):
    - Continued fine-tuning the thin-section descriptions and x-ray diffraction data.
    - Finalized permeability-to-air measurements, and began preparing the report.
  - With regard to the 56-14R full-core plugs (collected March 2013):
    - Finished the permeability-to-air measurements that were started October 10, 2014.
    - Permeability-to-water measurements are on hold awaiting equipment availability.

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- All activities are on schedule, and there were no problems or delays during the reporting period.

Task 5 – Well Drilling and Completion

This task ended in Quarter 3 – BP4, Year 7 (June 2014).

Task 6 – Infrastructure Development

Significant accomplishments for Task 6 for the reporting period included the following:

- Continued work on a journal article about the attenuation of variable CO_2 sources for use in EOR for submission to the journal entitled *Energy & Environmental Science* (www.rsc.org/publishing/journals/ee/about.asp), as follows:
  - Finalized the text and figures for the manuscript.
  - Prepared an overview value-added report explaining the genesis of the research and the manuscript. The manuscript will be appended to the value-added report.
  - Submitted the value-added report and manuscript for internal PCOR Partnership management review.
- Continued to update technologies for the CO_2 capture technologies update overview.
- Attended the GHGT-12 Conference in Austin, Texas.
- Continued preparation of the update to the "Opportunities and Challenges Associated with CO_2 Compression and Transport During CCS Activities" report (D85, due March 2015).

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- All activities are on schedule, and there were no problems or delays during the reporting period.

Task 7 – CO_2 Procurement

This task ended Quarter 4, BP4, Year 6 (September 2013).

Task 8 – Transportation and Injection Operations

Significant accomplishments for Task 8 for the reporting period included the following:

- Continued researching the effects of different impurities in CO_2 from anthropogenic sources on pipeline operation during start-up and shutdown and at transient conditions.
  - Reviewed the effects of impurities on operability of injection site infrastructure.
  - Also studied the effects of CO_2 stream variability on pipeline and injection field infrastructure.

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- All activities are on schedule, and there were no problems or delays during the reporting period.

Task 9 – Operational Monitoring and Modeling

Significant accomplishments for Task 9 for the reporting period included the following:

- On October 23–24, 2014, attended the CCUS Workshop in Midland, Texas.

- Continued **Bell Creek** site activities, including the following:
  - Based on the most recent publicly available data, cumulative CO_2 injection is 1,361,551 metric tons through September 30, 2014 (Table 7).
- Attended and presented "Characterization and Time-Lapse Monitoring Utilizing Pulsed-Neutron Well Logging: Associated CO_2 Storage at a Commercial CO_2 EOR Demonstration" (Figure 6) and "A Rapid Method for Determining CO_2–Oil MMP and Visual Observations of CO_2–Oil Interactions at Reservoir Conditions" at GHGT-12 in Austin, Texas (paper available at www.sciencedirect.com; citation for the paper is listed in the Phase III Products section, by author, under Conference Papers).
  - Performed a 6-month critical review and update to data management standard operating procedures.
  - With regard to **modeling and simulation** activities:
    - Continued literature review for CO_2 EOR simulation strategies.
    - Worked on Phase 2 simulation file organization in an effort to prepare for Phase 2 simulations.
    - Worked on simulation computer cluster support.
  - With regard to **injection-phase seismic** efforts:
    - Coordination, planning, and mobilization of a repeat 3-D vertical seismic profile (VSP) and repeat 3-D seismic acquisition.
    - On October 19 – November 11, 2014, traveled to the Bell Creek oil field to oversee fieldwork and collect data, including a repeat 3-D seismic survey (11.6 square miles), a repeat 3-D VSP (at the 04-03 OW completed on October 30, 2014, Figure 7), and four PNLs completed November 9, 2014. Acquired quotes, assessing vendor capabilities for 4-D VSP and microseismic processing. Selected Paulsson Geophysical for 4-D VSP processing and initiated data extraction and pre-processing.
    - Worked with the in-house geophysicists on the 3-D seismic data, specifically on fracture identification.

Table 7. Bell Creek CO_2 Injection Totals for September 2014 (cumulative totals May 2013 to September 2014)

	September 2014 Injection
Total, Mscf	2,202,088
Total, U.S. tons*	125,956
Total, metric tons*	114,376
Cumulative Total, Mscf [+]	26,213,934
Cumulative Total, U.S. tons*[+]	1,499,396
Cumulative Total, metric tons*[+]	1,361,551

Source: Montana Board of Oil and Gas [MBOG] database.

* There is an approximately 2–3-month lag in posting of injection/production volumes to the MBOG database. This was calculated utilizing a conversion of 17.483 Mscf/U.S. ton and 19.253 Mscf/metric ton.

[+] Cumulative totals are for the period from May 2013 to the month listed.

Figure 6. PCOR Partnership poster entitled “Characterization and Time-Lapse Monitoring Utilizing Pulsed-Neutron Well Logging: Associated CO_2 Storage at a Commercial CO_2 EOR Demonstration” displayed (second row, from right) at GHGT-12 in Austin, Texas.

Figure 7. Vibroseis trucks are used to conduct 3-D VSP surveys in the Bell Creek Field.

- Continued analysis of **pressure gauge response** from the 05-06 OW well, including the following:
  - ♦ Continued reservoir surveillance and analysis of continuous PDM data in the 05-06 OW well.
  - ♦ Downloaded PDM data and cleared memory from 05-06 OW data system on October 24, 2014.
- With regard to **injection-phase PNL** activities:
  - ♦ Mobilized Schlumberger Carbon Services (Schlumberger) on November 5, 2014 to imitate a four-well repeat-PNL campaign to provide a tie between wellbore and seismic gas saturations and to evaluate PNL sensitivity to short-term gas saturation changes.
  - ♦ Held a prejob operations and safety meeting on November 5, and logging was performed on four wells November 6–9, 2014, completing one well/day (04-04 P, 04-03 I, 05-01 I, and 33-13 I).
  - ♦ On November 5–11, 2014, traveled to the Bell Creek oil field to provide well site management for operational monitoring PNL acquisition.
  - ♦ On November 14, 2014, attended meetings at Denbury headquarters in Plano, Texas, to conduct an operational review of PNL operations and log interpretation review meeting focused on the 19-well repeat-PNL campaign conducted in August 2014.
  - ♦ Finished PNL quality assurance/quality control (QA/QC) of the processed logs from the 19 wells (collected August 2014), and compiled field data for the 05-06 OW and 04-04 wells.
  - ♦ Compared effective porosity values from synthetic logs and PNL residual saturation tool calculations.
- With regard to **injection-phase sampling** activities:
  - ♦ On September 25, 2014 (last reporting quarter), completed the September 2014 surface and near-surface MVA annual full-field repeat sampling event as follows:
    - o Water samples collected:
      - ▪ Stock well samples: six project samples plus one duplicate sample.
      - ▪ Surface water samples: eight project samples.
      - ▪ Fox Hills Formation groundwater-monitoring wells: two project samples.
    - o Soil gas samples collected (includes individual well pads, interspaced, soil gas profile station, plugged and abandoned, and 04-03 grid):
      - ▪ Project samples: 339
      - ▪ Duplicate samples: 36
      - ▪ Field blanks: 24
    - o September 2014 data sets and archival status:
      - ▪ Completed the final Analytical Research Laboratory, Energy Labs, and Isotech water data analysis.
      - ▪ Completed analysis of final Isotech soil gas data.
      - ▪ Completed analysis of CO_2 purchase and recycle Isotech and ARL data.
    - o Landowner packages:
      - ▪ All analytical tables were checked for QA/QC, and landowner packages were compiled.

        - Delivered landowner packages to landowners in December.
    - On December 1–3, 2014, completed the December 2014 quarterly soil gas- and water-monitoring event, as follows:
        - Collected over 210 soil gas samples from Phases 1 and 2.
        - Collected water parameters from a select group of nine wells in and around the injection area (a sample was not collected from 05-04 because the ground was frozen).
        - Initiated analysis activities.
    - Updated the near-surface monitoring project database and interactive map product with data from the September sampling event, and implemented minor programming improvements to improve usability. This database provides enhanced data access for efficient interpretation by the project team.
- With regard to the **Fort Nelson** project:
- Presented "Application of Canadian Standards Association Guidelines for Geologic Storage of CO_2 Toward the Development of a Monitoring, Verification, and Accounting Plan for a Potential CCS Project at Fort Nelson, British Columbia, Canada" at GHGT-12 in Austin, Texas (paper available at www.sciencedirect.com; citation for the paper is listed in the Phase III Products section, by author, under Conference Papers).
    - Received an invitation from CSIRO (Commonwealth Scientific and Industrial Research Organization) to be a reviewer of the efforts to develop ISO (International Organization for Standardization) standards for geologic storage of CO_2.

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- All activities are on schedule, and there were no problems or delays during the reporting period.

Task 10 – Site Closure

This task is anticipated to be initiated in Quarter 1, BP5, Year 9 (October 2015).

Task 11 – Postinjection Monitoring and Modeling

This task is anticipated to be initiated in Quarter 1, BP5, Year 9 (October 2015).

Task 12 – Project Assessment

Significant accomplishments for Task 13 for the reporting period included the following:

- The annual assessment report for Program Year (PY) 7 (October 1, 2013, to September 30, 2014), was submitted on December 30, 2014.

Task 13 – Project Management

Significant accomplishments for Task 13 for the reporting period included the following:

- On October 3, 2014, in response to a request from DOE, provided progress information to the Carbon Sequestration Leadership Forum Secretariat.
- In response to a request from DOE, provided slide and video clip information to a NETL program manager.
- On November 5 and 6, 2014, project personnel attended the 2014 Midwest Carbon Sequestration Science Conference in Champaign, Illinois.
- On November 18, 2014, project personnel attended the 2014 Midwest Regional Carbon Sequestration Partnership Annual Partners Meeting in Columbus, Ohio.
- On November 21, 2014, project personnel attended the DOE Subsurface Technology Engineering Challenges and R&D Opportunities: Wellbore Integrity Briefing at the U.S. Energy Association in Washington, D.C.
- Sent an e-mail blast to the partners regarding the 2014 annual meeting presentations, agenda, posters, and information (located on partners-only Web site).
- Finalized the September 2014 Technical Advisory Board (TAB) meeting minutes.
- Continued planning for the winter TAB meeting to be held March 3 and 4, 2015, in Phoenix, Arizona.
- On October 14–15, 2014, attended the Executive Roundtable "Commercial and Financial Structuring of Commercial-Scale Projects with Carbon Capture and Sequestration" in Washington, D.C.
- Attended the GHGT-12 Conference in Austin, Texas (Figure 8).
- On November 21, 2014, participated in a meeting with C12 Energy to discuss risk assessment activities in Denver, Colorado.
- On November 10–11, 2014, project personnel presented at the Asia–Pacific Economic Cooperation (APEC) Expert Workshops on CCUS in Beijing, China.
- On December 8–12, 2014, project personnel attended CO_2 Conference in Midland, Texas (www.co2conference.net/).
- On December 12, 2014, submitted an abstract to the CO_2Quest International Forum on Recent Developments of CCS Implementation (www.co2quest.eu/ccsforum15.htm).
- Conducted task leader meetings on October 17, November 20, and December 19, 2014. Topics included a discussion on upcoming BPMs, a recap of GHGT-12, updates on Bell Creek and Aquistore, work on Year 8 budgets, upcoming deliverables/milestones and travel, as well as updates from task leaders present.
- Deliverables and milestones completed in October:
  - September monthly update
  - Task 1: D58/D59 – Quarterly Progress Report
  - Task 14: D99 – Water/CCS Nexus-Related Fact Sheet
  - Task 14: M23 – Monthly WWG Conference Call Held
  - Task 9: M48 – Bell Creek Test Site – 1 Million Metric Tons of CO_2 Injected

Figure 8. Charles Gorecki (third from left) participating in a regional partnerships panel discussion at GHGT-12 in Austin, Texas.

- Deliverables and milestones completed in November:
  - October monthly update
  - Task 14: M23 – Monthly WWG Conference Call Held
- Deliverables and milestones completed in December:
  - November monthly update
  - Task 12: D57 – Annual Assessment Report

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- All activities are on schedule, and there were no problems or delays during the reporting period.

Task 14 – RCSP WWG Coordination

Significant accomplishments for Task 14 for the reporting period included the following:

- Attended and presented "The Nexus of Water and CCS: An RCSP Perspective" at GHGT-12 in Austin, Texas (paper available at www.sciencedirect.com; citation for the paper is listed in the Phase III Products section, by author, under Conference Papers).
- With regard to monthly conference calls (M23):

  - On October 28, 2014, monthly conference call topics focused on events at GHGT-12, progress of the DOE Web site and fact sheet, and future products and collaborations for the WWG.
  - On November 25, 2014, monthly conference call topics included partnership updates, the revised CCS and water nexus figure, and the draft outline to the WWG BPM deliverable. Began working with a consultant to develop an outline for the BPM (D80, due November 2016).
  - No monthly conference call is required in December.
- On October 31, 2014, submitted the latest fact sheet (D99) entitled "Long-Term Protection of Freshwater Resources Following CO_2 Storage."
- Received revisions from DOE NETL, and subsequently finalized the WWG fact sheet.
- Continued the redesign of the water–CCS nexus graphic for both the WWG Web site and future fact sheet revisions.
- In response to a request from DOE, provided updated WWG graphic for the Crosscutting Program to use in a water-related document.
- Completed review of a journal article submitted to the *International Journal of Greenhouse Gas Control*.
- Discussed the possibility of someone from DOE's Crosscutting Program related to water to participate in the January WWG conference call.
- On December 15–18, 2014, attended the American Geophysical Union (AGU) Fall Conference on behalf of the WWG in San Francisco, California.

Actual or anticipated problems, delays, or changes during the reporting period included the following:

- The Water–Energy Workshop hosted by Lawrence Livermore National Laboratory has been postponed until February 2015 (from December 15, 2014).

Task 15 – Further Characterization of the Zama Acid Gas EOR, CO_2 Storage, and Monitoring Project

This task ended Quarter 2, BP4, Year 7 (February 2014).

Task 16 – Characterization of the Basal Cambrian System

This task ended Quarter 2, BP4, Year 7 (March 2014).

PHASE III COST STATUS

The approved BP4 (Modification No. 31) budget along with actual costs incurred and in-kind cost share reported are shown in Table 8. A spending plan for BP4 and actual incurred cost by quarter of cash funds for BP4 are provided in Figure 9 and Table 9.

Table 8. Phase III Budget – BP4

Organization	Approved Budget*, $	Actual Costs Incurred, $
DOE Share – Cash	60,623,437	49,740,833
Nonfederal Share – Cash	2,411,971	2,871,414
Nonfederal Share – In-Kind	33,783,776	33,409,458
Total	96,819,184	86,021,705

*As of Modification No. 31.

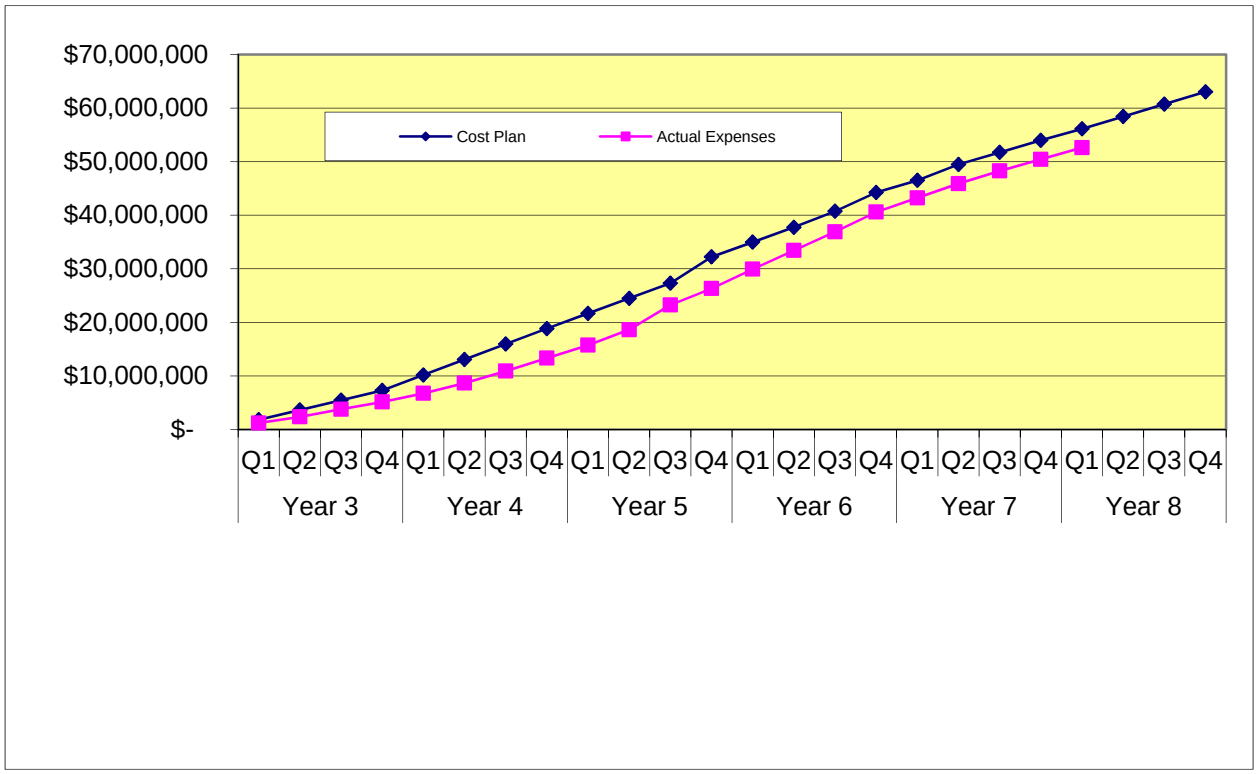


Figure 9. PCOR Partnership Phase III, BP4, Years 3–8 funding (cash only).

PHASE III SCHEDULE STATUS

Table 10 lists all deliverables and milestones by quarter, with completion dates, through the end of the reporting period (see Table 11 for the Gantt chart for BP4, Years 7 and 8).

Table 9. Phase III, BP4, Years 3–8 Spending Plan

Baseline Reporting Quarter	Year 3								Year 4							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
Baseline Cost Plan																
Federal Share	$1,692,969	$ 1,692,969	$ 1,692,969	$ 3,385,938	$ 1,692,969	$ 5,078,906	$1,692,969	$ 6,771,875	$2,707,624	$ 9,479,499	$2,707,624	$12,187,123	$2,707,624	$14,894,747	$2,707,624	$17,602,371
Nonfederal Share	$ 127,735	$ 127,735	$ 127,735	$ 255,470	$ 127,735	$ 383,204	$ 127,735	$ 510,939	$ 177,644	$ 688,583	$ 177,644	$ 866,227	$ 177,644	$ 1,043,871	$ 177,644	$ 1,221,515
Total Planned	$1,820,704	$ 1,820,704	$ 1,820,704	$ 3,641,407	$ 1,820,704	$ 5,462,111	$1,820,704	$ 7,282,814	$2,885,268	$10,168,082	$2,885,268	$13,053,350	$2,885,268	$15,938,618	$2,885,268	$18,823,886
Actual Incurred Cost																
Federal Share	$1,025,953	$ 1,025,953	$ 983,104	$ 2,009,057	$ 1,352,281	$ 3,361,338	$1,347,660	$ 4,708,998	$1,531,401	$ 6,240,399	$1,864,304	$ 8,104,703	$1,982,465	$10,087,168	$2,163,678	$12,250,846
Nonfederal Share	$ 171,873	$ 171,873	$ 164,935	$ 336,808	$ 74,929	$ 411,737	$ 4,563	$ 416,300	$ 80,246	$ 496,546	$ 56,614	$ 553,160	$ 257,142	$ 810,302	$ 251,531	$ 1,061,833
Total Incurred Cost	$1,197,826	$ 1,197,826	$ 1,148,039	$ 2,345,865	$ 1,427,210	$ 3,773,075	$1,352,223	$ 5,125,298	$1,611,647	$ 6,736,945	$1,920,918	$ 8,657,863	$2,239,607	$10,897,470	$2,415,209	$13,312,679
Variance																
Federal Share	$ 667,016	$ 667,016	$ 709,865	$ 1,376,881	$ 340,688	$ 1,717,568	$ 345,309	$ 2,062,877	$1,176,223	$ 3,239,100	$ 843,320	$ 4,082,420	$ 725,159	$ 4,807,579	$ 543,946	$ 5,351,525
Nonfederal Share	$ (44,138)	$ (44,138)	$ (37,200)	$ (81,339)	$ 52,806	$ (28,533)	$ 123,172	$ 94,639	$ 97,398	$ 192,037	$ 121,030	$ 313,067	$ (79,498)	$ 233,569	$ (73,887)	$ 159,682
Total Variance	$ 622,878	$ 622,878	$ 672,665	$ 1,295,542	$ 393,494	$ 1,689,036	$ 468,481	$ 2,157,516	$1,273,621	$ 3,431,137	$ 964,350	$ 4,395,487	$ 645,661	$ 5,041,148	$ 470,059	$ 5,511,207

Baseline Reporting Quarter	Year 5								Year 6							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
Baseline Cost Plan																
Federal Share	$2,671,493	$20,273,864	$ 2,671,493	$22,945,356	$ 2,671,493	$25,616,849	$4,771,676	$30,388,524	$2,612,701	$33,001,225	$2,612,701	$35,613,925	$2,862,592	$38,476,517	$3,362,375	$41,838,891
Nonfederal Share	$ 152,429	$ 1,373,944	$ 152,429	$ 1,526,373	$ 152,429	$ 1,678,802	$ 152,429	$ 1,831,231	$ 145,185	$ 1,976,416	$ 145,185	$ 2,121,601	$ 145,185	$ 2,266,786	$ 145,185	$ 2,411,971
Total Planned	$2,823,922	$21,647,808	$ 2,823,922	$24,471,729	$ 2,823,922	$27,295,651	$4,924,105	$32,219,755	$2,757,886	$34,977,641	$2,757,886	$37,735,526	$3,007,777	$40,743,303	$3,507,560	$44,250,862
Actual Incurred Cost																
Federal Share	$2,255,269	$14,506,115	$ 2,762,335	$17,268,450	$ 4,349,081	$21,617,531	$2,768,852	$24,386,383	$3,463,510	$27,849,893	$3,244,138	$31,094,031	$3,271,990	$34,366,021	$3,542,974	$37,908,995
Nonfederal Share	$ 160,751	$ 1,222,584	$ 134,138	$ 1,356,722	$ 264,409	$ 1,621,131	$ 296,942	$ 1,918,073	$ 156,655	$ 2,074,728	$ 244,345	$ 2,319,073	$ 209,528	$ 2,528,601	$ 156,775	$ 2,685,376
Total Incurred Cost	$2,416,020	$15,728,699	$ 2,896,473	$18,625,172	$ 4,613,490	$23,238,662	$3,065,794	$26,304,456	$3,620,165	$29,924,621	$3,488,483	$33,413,104	$3,481,518	$36,894,622	$3,699,749	$40,594,371
Variance																
Federal Share	$ 416,224	$ 5,767,749	$ (90,843)	$ 5,676,906	$(1,677,589)	$ 3,999,318	$2,002,824	$ 6,002,141	$ (850,810)	$ 5,151,332	$ (631,438)	$ 4,519,894	$ (409,399)	$ 4,110,496	$ (180,600)	$ 3,929,896
Nonfederal Share	$ (8,322)	$ 151,360	$ 18,291	$ 169,651	$ (111,980)	$ 57,671	$ (144,513)	$ (86,842)	$ (11,470)	$ (98,312)	$ (99,160)	$ (197,472)	$ (64,343)	$ (261,815)	$ (11,590)	$ (273,405)
Total Variance	$ 407,902	$ 5,919,109	$ (72,552)	$ 5,846,557	$(1,789,569)	$ 4,056,989	$1,858,311	$ 5,915,299	$ (862,280)	$ 5,053,020	$ (730,598)	$ 4,322,422	$ (473,742)	$ 3,848,681	$ (192,190)	$ 3,656,491

Baseline Reporting Quarter	Year 7								Year 8							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
Baseline Cost Plan																
Federal Share	$2,253,496	$44,092,387	$ 2,977,355	$47,069,742	$ 2,253,496	$49,323,237	$2,253,496	$51,576,733	$2,136,847	$53,713,580	$2,303,285	$56,016,865	$2,303,286	$58,320,151	$2,303,286	$60,623,437
NonFederal Share	$ -	$ 2,411,971	$ -	$ 2,411,971	$ -	$ 2,411,971	$ -	$ 2,411,971	$ -	$ 2,411,971	$ -	$ 2,411,971	$ -	$ 2,411,971	$ -	$ 2,411,971
Total Planned	$2,253,496	$46,504,358	$ 2,977,355	$49,481,713	$ 2,253,496	$51,735,208	$2,253,496	$53,988,704	$2,136,847	$56,125,551	$2,303,285	$58,428,836	$2,303,286	$60,732,122	$2,303,286	$63,035,408
Actual Incurred Cost																
Federal Share	$2,579,307	$40,488,302	$ 2,644,052	$43,132,354	$ 2,349,302	$45,481,656	$2,087,549	$47,569,205	$2,171,628	$49,740,833						
NonFederal Share	$ 62,881	$ 2,748,257	$ 14,980	$ 2,763,237	$ 15,096	$ 2,778,333	$ 90,494	$ 2,868,827	$ 2,587	$ 2,871,414						
Total Incurred Cost	$2,642,188	$43,236,559	$ 2,659,032	$45,895,591	$ 2,364,398	$48,259,989	$2,178,043	$50,438,032	$2,174,215	$52,612,247						
Variance																
Federal Share	$ (325,811)	$ 3,604,085	$ 333,303	$ 3,937,388	$ (95,806)	$ 3,841,581	$ 165,947	$ 4,007,528	$ (34,781)	$ 3,972,747						
NonFederal Share	$ (62,881)	$ (336,286)	$ (14,980)	$ (351,266)	$ (15,096)	$ (366,362)	$ (90,494)	$ (456,856)	$ (2,587)	$ (459,443)						
Total Variance	$ (388,692)	$ 3,267,799	$ 318,323	$ 3,586,122	$ (110,902)	$ 3,475,219	$ 75,453	$ 3,550,672	$ (37,368)	$ 3,513,304						

Table 10. Phase III Milestones and Deliverables

Title/Description	Due Date	Actual Completion Date
Year 1 – Quarter 1 (October–December 2007)		
D37: Task 4 – Fort Nelson Test Site – Geological Characterization Experimental Design Package	12/31/07	12/28/07
D63: Task 13 – Project Management Plan	12/31/07	12/28/07
M17: Task 4 – Fort Nelson Test Site Selected	12/31/07	12/28/07
Year 1 – Quarter 2 (January–March 2008)		
D38: Task 4 – Fort Nelson Test Site – Geomechanical Experimental Design Package	1/31/08	1/31/08
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/08	1/31/08
D11: Task 2 – Outreach Plan	3/31/08	3/31/08
D27: Task 3 – Environmental Questionnaire – Fort Nelson Test Site	3/31/08	4/02/08
D30: Task 4 – Williston Basin Test Site – Geomechanical Experimental Design Package	3/31/08	3/31/08
M1: Task 1 – Three Target Areas Selected for Detailed Characterization	3/31/08	3/20/08
M18: Task 4 – Fort Nelson Test Site Geochemical Work Initiated	3/31/08	3/19/08
Year 1 – Quarter 3 (April–June 2008)		
D14: Task 2 – General Phase III Fact Sheet	4/30/08	4/30/08
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/08	4/30/08
D17: Task 2 – General Phase III Information PowerPoint Presentation	5/30/08	5/30/08
M3: Task 3 – Start Environmental Questionnaire for Williston Basin Test Site	6/30/08	6/27/08
M6: Task 4 – Williston Basin Test Site Geochemical Work Initiated	6/30/08	6/30/08
M7: Task 4 – Williston Basin Test Site Geological Characterization Data Collection Initiated	6/30/08	6/30/08
Year 1 – Quarter 4 (July–September 2008)		
D12: Task 2 – Demonstration Web Pages on the Public Site	7/31/08	7/31/08
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/08	7/31/08
D1: Task 1 – Review of Source Attributes	9/30/08	9/26/08
M2: Task 1 – Demonstration Project Reporting System (DPRS) Prototype Completed	9/30/08	9/26/08
Year 2 – Quarter 1 (October–December 2008)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/08	10/31/08
D20: Task 2 – Documentary Support to PowerPoint and Web Site	12/31/08	12/31/08
D57: Task 12 – Project Assessment Annual Report	12/31/08	12/31/08

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 2 – Quarter 2 (January–March 2009)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/09	1/30/09
M21: Task 14 – Outline of White Paper on Nexus of CO_2 CCS and Water, Part Subtask 14.2 – White Paper on Nexus of CCS and Water	2/28/09	2/27/09
D24: Task 2 – PCOR Partnership Region Sequestration General Poster	3/31/09	3/31/09
Year 2 – Quarter 3 (April–June 2009)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/09	4/30/09
M23: Task 14 – Monthly WWG Conference Call Held	4/30/09	4/15/09
D2: Task 1 – First Target Area Completed	5/29/09	5/29/09
M23: Task 14 – Monthly WWG Conference Call Held	5/29/09	5/29/09
D16: Task 2 – Fort Nelson Test Site Fact Sheet	5/29/09	5/29/09
M24: Task 14 – WWG Annual Meeting Held	5/31/09	5/07/09
M23: Task 14 – Monthly WWG Conference Call Held	6/30/09	6/25/09
Year 2 – Quarter 4 (July–September 2009)		
M23: Task 14 – Monthly WWG Conference Call Held	Not applicable	Not required
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	7/31/09	7/31/09
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/09	7/31/09
M22: Task 14 – Draft White Paper – Nexus of CCS and Water Available for Comments	8/17/09	8/18/09 (DOE) 8/21/09 (WWG)
M23: Task 14 – Monthly WWG Conference Call Held	8/31/09	8/25/09
D1: Task 1 – Review of Source Attributes	9/30/09	9/25/09
D3: Task 1 – Permitting Review – One State and One Province	9/30/09	9/30/09
D9: Task 1 – Updated DSS	9/30/09	9/29/09
D47: Task 6 – Report on the Preliminary Design of Advanced Compression Technology	9/30/09	9/30/09
D77: Task 13 – Risk Management Plan Outline	9/30/09	9/18/09
M4: Task 4 – Bell Creek Test Site Selected	9/30/09	9/30/09
M5: Task 4 – Bell Creek Test Site – Data Collection Initiated	9/30/09	9/30/09
M23: Task 14 – Monthly WWG Conference Call Held	9/30/09	9/22/09

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 3 – Quarter 1 (October–December 2009)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/30/09	11/02/09
D78: Task 14 – Final White Paper on the Nexus of CCS and Water	10/30/09	10/28/09
M23: Task 14 – Monthly WWG Conference Call Held	10/31/09	10/26/09
M23: Task 14 – Monthly WWG Conference Call Held	11/30/09	11/16/09
D57: Task 12 – Project Assessment Annual Report	12/31/09	12/31/09
M23: Task 14 – Monthly WWG Conference Call Held	12/31/09	Waived by DOE
Year 3 – Quarter 2 (January–March 2010)		
D13: Task 2 – Public Site Updates	1/15/10	1/15/10
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/10	1/29/10
M23: Task 14 – Monthly WWG Conference Call Held	1/31/10	1/6/10
D79: Task 14 – Water Resource Estimation Methodology Document	2/28/10	Waived by DOE
M23: Task 14 – Monthly WWG Conference Call Held	2/28/10	2/25/10
D11: Task 2 – Outreach Plan	3/31/10	3/31/10
M23: Task 14 – Monthly WWG Conference Call Held	3/31/10	3/23/10
Year 3 – Quarter 3 (April–June 2010)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/10	4/30/10
M23: Task 14 – Monthly WWG Conference Call Held	4/30/10	4/28/10
M23: Task 14 – Monthly WWG Conference Call Held	5/31/10	5/13/10
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	6/30/10	6/30/10
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation (update)	6/30/10	6/29/10
M23: Task 14 – Monthly WWG Conference Call Held	6/30/10	6/23/10
M24: Task 14 – WWG Annual Meeting Held	6/30/10	5/13/10
Year 3 – Quarter 4 (July–September 2010)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/10	7/29/10
M23: Task 14 – Monthly WWG Conference Call Held	7/31/10	7/28/10
M23: Task 14 – Monthly WWG Conference Call Held	8/31/10	8/31/10
D1: Task 1 – Review of Source Attributes	9/30/10	9/20/10
D52: Task 9 – Fort Nelson Test Site – Site Characterization, Modeling, and Monitoring Plan	9/30/10	9/30/10
M9: Task 4 – Bell Creek Test Site Geological Model Development Initiated	9/30/10	9/30/10
M23: Task 14 – Monthly WWG Conference Call Held	9/30/10	Waived by DOE

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 4 – Quarter 1 (October–December 2010)		
D87: Task 4 – Bell Creek Test Site – Geomechanical Experimental Design Package	10/30/10	10/29/10
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/10	10/29/10
M23: Task 14 – Monthly WWG Conference Call Held	10/31/10	10/26/10
M23: Task 14 – Monthly WWG Conference Call Held	11/30/10	Waived by DOE
D57: Task 12 – Project Assessment Annual Report	12/31/10	12/23/10
M23: Task 14 – Monthly WWG Conference Call Held	12/31/10	12/13/10
Year 4 – Quarter 2 (January–March 2011)		
M8: Task 4 – Bell Creek Test Site Wellbore Leakage Data Collection Initiated	1/15/11	1/14/11
D31: Task 4 – Bell Creek Test Site – Geological Characterization Experimental Design Package	1/31/11	1/27/11
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/11	1/31/11
M23: Task 14 – Monthly WWG Conference Call Held	1/31/11	1/19/11
M28: Task 4 – Bell Creek Geological Experimental Design Package Completed	1/31/11	1/27/11
D15: Task 2 – Bell Creek Test Site Fact Sheet	2/28/11	2/28/11
M23: Task 14 – Monthly WWG Conference Call Held	2/28/11	Waived by DOE
D10: Task 1 – Demonstration Project Reporting System Update	3/31/11	3/25/11
D18: Task 2 – Bell Creek Test Site PowerPoint Presentation (update)	3/31/11	3/31/11
D26: Task 2 – Fort Nelson Test Site Poster	3/31/11	3/31/11
D28: Task 3 – Environmental Questionnaire – Bell Creek Test Site	3/31/11	3/30/11
D85: Task 6 – Report – Opportunities and Challenges Associated with CO_2 Compression and Transportation During CCS Activities	3/31/11	3/31/11
M23: Task 14 – Monthly WWG Conference Call Held	3/31/11	3/22/11
Year 4 – Quarter 3 (April–June 2011)		
M30: Task 5 – Bell Creek Test Site Baseline MVA Initiated	4/01/11	3/24/11
M23: Task 14 – Monthly WWG Conference Call Held	4/30/11	4/21/11
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/11	4/29/11
D88: Task 13 – Programmatic Risk Management Plan	4/30/11	4/29/11
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/11	5/31/11
D34: Task 4 – Bell Creek Test Site – Baseline Hydrogeological Final Report	5/31/11	5/31/11

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 4 – Quarter 3 (April–June 2011) (continued)		
M23: Task 14 – Monthly WWG Conference Call Held	5/31/11	5/5/11
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation (update)	6/30/11	6/30/11
M23: Task 14 – Monthly WWG Conference Call Held	6/30/11	6/23/11
M24: Task 14 – WWG Annual Meeting Held	6/30/11	5/5/11
Year 4 – Quarter 4 (July–September 2011)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/11	7/28/11
M23: Task 14 – Monthly WWG Conference Call Held	7/31/11	7/26/11
D29: Task 3 – Permitting Action Plan	8/31/11	8/31/11
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/11	8/31/11
D67: Task 9 – Fort Nelson Test Site – Simulation Report	7/31/11	8/31/11
M23: Task 14 – Monthly WWG Conference Call Held	8/31/11	8/24/11
D1: Task 1 – Review of Source Attributes	9/30/11	9/21/11
D4: Task 1 – Permitting Review – Basic EPA Requirements[+]	9/30/11	9/30/11
D9: Task 1 – Updated DSS	9/30/11	9/23/11
D25: Task 2 – Bell Creek Test Site Poster	9/30/11	9/30/11
D50: Task 9 – Bell Creek Test Site – Site Characterization, Modeling, and Monitoring Plan	9/30/11	9/30/11
M23: Task 14 – Monthly WWG Conference Call Held	9/30/11	Waived by DOE
M31: Task 9 – Bell Creek Test Site – Site Characterization, Modeling, and Monitoring Plan Completed	9/30/11	9/30/11
M33: Task 16 – Basal Cambrian Baseline Geological Characterization Completed	9/30/11	9/29/11
Year 5 – Quarter 1 (October–December 2011)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/11	10/31/11
M23: Task 14 – Monthly WWG Conference Call Held	10/31/11	10/26/11
M23: Task 14 – Monthly WWG Conference Call Held	11/30/11	11/30/11
D57: Task 12 – Project Assessment Annual Report	12/31/11	12/30/11
M23: Task 14 – Monthly WWG Conference Call Held	12/31/11	Waived by DOE
M34: Task 16 – Basal Cambrian Static Geological Model Completed	12/31/11	12/21/11

[+] Name change requested September 28, 2011, and approved October 3, 2011.

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 5 – Quarter 2 (January–March 2012)		
M16: Task 4 – Bell Creek Test Site – Initiation of Production and Injection Simulation	1/13/12	12/29/11
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/12	1/31/12
D65: Task 4 – Fort Nelson Test Site – Site Characterization Report	1/31/12	1/31/12
D81: Task 1 – Regional Carbon Sequestration Atlas (update)	1/31/12	1/31/12
M23: Task 14 – Monthly WWG Conference Call Held	1/31/12	1/19/12
M29: Task 4 – Fort Nelson Site Characterization Report Completed	1/31/12	1/31/12
D91: Task 16 – Report – Geological Characterization of the Basal Cambrian System in the Williston Basin	2/29/12	2/29/12
M23: Task 14 – Monthly WWG Conference Call Held	2/29/12	2/28/12
D5: Task 1 – Second Target Area Completed	3/31/12	3/30/12
D18: Task 2 – Bell Creek Test Site PowerPoint Presentation (update)	3/31/12	3/30/12
M10: Task 4 – Bell Creek Test Site Wellbore Leakage Data Collection Completed	3/31/12	3/12/12
M36: Task 13 – Annual Advisory Board Scheduled	3/31/12	3/28/12
M23: Task 14 – Monthly WWG Conference Call Held	3/31/12	3/27/12
Year 5 – Quarter 3 (April–June 2012)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/12	4/30/12
M23: Task 14 – Monthly WWG Conference Call Held	4/30/12	Waived by DOE
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/12	5/31/12
M23: Task 14 – Monthly WWG Conference Call Held	5/31/12	5/31/12
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation (update)	6/30/12	6/29/12
D41: Task 4 – Fort Nelson Test Site – Geochemical Report	6/30/12	6/29/12
D84: Task 6 – Report – A Phased Approach to Building Pipeline Network for CO_2 Transportation During CCS	6/30/12	6/29/12
M23: Task 14 – Monthly WWG Conference Call Held	6/30/12	6/28/12
M24: Task 14 – WWG Annual Meeting Held	6/30/12	5/3/12
M32: Task 4 – Fort Nelson Geochemical Report Completed	6/30/12	6/29/12

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 5 – Quarter 4 (July–September 2012)		
D13: Task 2 – Public Site Updates	7/31/12	7/31/12
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/12	7/31/12
D67: Task 9 – Fort Nelson Test Site – Simulation Report	7/31/12	7/31/12
M23: Task 14 – Monthly WWG Conference Call Held	7/31/12	7/24/12
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/12	8/31/12
M23: Task 14 – Monthly WWG Conference Call Held	8/31/12	8/30/12
D1: Task 1 – Review of Source Attributes	9/30/12	9/28/12
D10: Task 1 – DPRS Update	9/30/12	9/28/12
M23: Task 14 – Monthly WWG Conference Call Held	9/30/12	9/27/12
Year 6 – Quarter 1 (October–December 2012)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/12	10/31/12
M23: Task 14 – Monthly WWG Conference Call Held	10/31/12	10/25/12
M23: Task 14 – Monthly WWG Conference Call Held	11/30/12	11/28/12
D57: Task 12 – Project Assessment Annual Report	12/31/12	12/28/12
M23: Task 14 – Monthly WWG Conference Call Held	12/31/12	Waived by DOE
M37: Task 3 – IOGCC Task Force Subgroup Meeting 1 Held	12/31/12	12/21/12
Year 6 – Quarter 2 (January–March 2013)		
D32: Task 4 – Bell Creek Test Site – Geomechanical Final Report	1/31/13	1/31/13
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/13	1/31/13
M23: Task 14 – Monthly WWG Conference Call Held	1/31/13	1/16/13
D14: Task 2 – General Phase III Fact Sheet (update)	2/28/13	2/28/13
M23: Task 14 – Monthly WWG Conference Call Held	2/28/13	2/28/13
D85: Task 6 – Report – Opportunities and Challenges Associated with CO_2 Compression and Transportation During CCS Activities	3/31/13	Waived by DOE (journal article)
D89: Task 16 – Report – Geochemical Evaluation of the Basal Cambrian System	3/31/13	3/28/13
D99: Task 14 – Water/CCS Nexus-Related Fact Sheet	3/31/13	3/22/13
M23: Task 14 – Monthly WWG Conference Call Held	3/31/13	3/28/13
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/13	3/27/13

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 6 – Quarter 3 (April–June 2013)		
D15: Task 2 – Bell Creek Test Site Fact Sheet (update)	4/15/13	3/25/13
D16: Task 2 – Fort Nelson Test Site Fact Sheet (update)	4/30/13	Waived by DOE
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/13	4/30/13
M14: Task 4 – Bell Creek Test Site Geological Characterization Data Collection Completed	4/30/13	4/30/13
M23: Task 14 – Monthly WWG Conference Call Held	4/30/13	4/25/13
M35: Task 16 – Basal Cambrian Dynamic Capacity Estimation Completed	4/30/13	4/30/13
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/13	5/31/13
D43: Task 5 – Bell Creek Test Site – Monitoring Experimental Design Package	5/31/13	5/31/13
M23: Task 14 – Monthly WWG Conference Call Held	5/31/13	5/30/13
M27: Task 5 – Bell Creek Test Site – MVA Equipment Installation and Baseline MVA Activities Completed	5/31/13	5/31/13
M23: Task 14 – Monthly WWG Conference Call Held	6/30/13	6/27/13
M26: Task 8 – Bell Creek Test Site – CO_2 Injection Initiated	6/30/13	May 2013 – sent 6/25/13
M37: Task 3 – IOGCC Task Force Subgroup Meeting 2 Held	5/9/13	5/29/13
M42: Task 3 –Findings and Recommendations of the Operational and Postoperational Subgroups Presented to the Carbon Geologic Storage (CGS) Task Force	6/30/13	6/20/13 – sent 6/28/13
Year 6 – Quarter 4 (July–September 2013)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/13	7/31/13
D33: Task 4 – Bell Creek Test Site – Geochemical Final Report	7/31/13	7/31/13
M12: Task 4 – Bell Creek Test Site Geochemical Work Completed	7/31/13	7/31/13
M23: Task 14 – Monthly WWG Conference Call Held	7/31/13	7/25/13
D64: Task 4 – Bell Creek Test Site – Site Characterization Report	8/31/13	8/29/13
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/13	8/30/13
D81: Task 1 – Regional Carbon Sequestration Atlas (update)	8/31/13	5/1/13
M23: Task 14 – Monthly WWG Conference Call Held	8/31/13	Waived by DOE

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 6 – Quarter 4 (July–September 2013) (continued)		
D1: Task 1 – Review of Source Attributes	9/30/13	9/5/13
D6: Task 3 – Permitting Review – Update 1	9/30/13	9/24/13
D48: Task 7 – Bell Creek Test Site – Procurement Plan and Agreement Report	9/30/13	9/24/13
D90: Task 16 – Report – Wellbore Evaluation of the Basal Cambrian System	9/30/13	9/5/13
D94:Task 2 – Aquistore Project Fact Sheet	9/30/13	9/30/13
D95: Task 2 – Aquistore Project Poster	9/30/13	9/30/13
D98: Task 3 – Report – Findings, Recommendations, and Guidance of CGS Task Force	9/30/13	8/30/13
M23: Task 14 – Monthly WWG Conference Call Held	9/30/13	9/30/13
M38: Task 3 – IOGCC Task Force Wrap-Up Meeting Held	9/30/13	8/16/13 – sent 9/5/13
M39: Task 3 – IOGCC Task Force Editing Subgroup Meeting Held	9/30/13	6/3/13 – sent 9/5/13
M40: Task 15 – Further Characterization of the Zama Acid Gas EOR, CO_2 Storage, and Monitoring Project Completed	9/30/13	9/24/13
Year 7 – Quarter 1 (October–December 2013)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/13	10/31/13
D42: Task 5 – Bell Creek Test Site – Injection Experimental Design Package	10/31/13	10/30/13
D99: Task 14 – Water/CCS Nexus-Related Fact Sheet	10/31/13	10/31/13
M23: Task 14 – Monthly WWG Conference Call Held	10/31/13	10/31/13
M23: Task 14 – Monthly WWG Conference Call Held	11/30/13	11/21/13
M23: Task 14 – Monthly WWG Conference Call Held	12/31/13	Waived by DOE
M24: Task 14 – WWG Annual Meeting Held	12/31/13	8/19/13
M43: Task 9 – Bell Creek Test Site – First Full-Repeat Sampling of the Groundwater- Soil Gas-Monitoring Program Completed	12/31/13	11/15/13 – sent 12/13/13
Year 7 – Quarter 2 (January–March 2014)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/14	1/31/14
D57: Task 12 – Project Assessment Annual Report	1/31/14	1/31/14
M23: Task 14 – Monthly WWG Conference Call Held	1/31/14	1/28/14
M41: Task 6 – Decision to Incorporate Ramgen Compression Technology into Bell Creek Project	1/31/14	1/29/14

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 7 – Quarter 2 (January–March 2014) (continued)		
D86: Task 15 – Updated Regional Implementation Plan for Zama	2/28/14	2/28/14
M23: Task 14 – Monthly WWG Conference Call Held	2/28/14	2/27/14
D24: Task 2 – PCOR Partnership Region Sequestration General Poster (update)	3/31/14	3/27/14
D36: Task 4 – Bell Creek Test Site – Wellbore Leakage Final Report	3/31/14	3/19/14
D92: Task 16 – Report – Storage Capacity and Regional Implications for Large-Scale Storage in the Basal Cambrian System	3/31/14	3/27/14
D93: Task 1 – Geological Modeling and Simulation Report for the Aquistore Project	3/31/14	3/25/14
D96: Task 4 – Bell Creek Test Site – 3-D Seismic and Characterization Report	3/31/14	3/27/14
M23: Task 14 – Monthly WWG Conference Call Held	3/31/14	3/25/14
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/14	3/4/14 – sent 3/25/14
M44: Task 9 – Bell Creek Test Site – First 3-D VSP Repeat Surveys Completed	3/31/14	3/1/14 – sent 3/25/14
Year 7 – Quarter 3 (April–June 2014)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/14	4/30/14
M23: Task 14 – Monthly WWG Conference Call Held	4/30/14	4/24/14
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/14	5/30/14
D101: Task14 – WWG Web Site Content Update	5/31/14	5/30/14
M23: Task 14 – Monthly WWG Conference Call Held	5/31/14	5/21/14
D44: Task 5 – Bell Creek Test Site – Drilling and Completion Activities Report	6/30/14	5/30/14
M23: Task 14 – Monthly WWG Conference Call Held	6/30/14	6/26/14
M45: Task 9 – Bell Creek Test Site – First Full-Repeat of Pulsed Neutron Logging Campaign Completed	6/30/14	6/9/14
M46: Task 9 – Bell Creek Test Site – 1 Year of Injection Completed	6/30/14	6/26/14

Continued…

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 7 – Quarter 4 (July–September 2014)		
D13: Task 2 – Public Site Updates	7/31/14	7/29/14
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/14	7/31/14
M23: Task 14 – Monthly WWG Conference Call Held	7/31/14	7/17/14 WebEx
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/14	8/27/14 Exec. Sum.
M23: Task 14 – Monthly WWG Conference Call Held	8/31/14	Waived by DOE
D1: Task 1 – Review of Source Attributes	9/30/14	9/24/14
D7: Task 1 – Third Target Area Completed	9/30/14	9/26/14
D93: Task 1 – Geological Modeling and Simulation Report for the Aquistore Project	9/30/14	9/30/14
D100: Task 9 – Fort Nelson Test Site – Best Practices Manual – Feasibility Study	9/30/14	9/30/14
M23: Task 14 – Monthly WWG Conference Call Held	9/30/14	9/30/14
Year 8 – Quarter 1 (October–December 2014)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/14	10/31/14
D99: Task 14 – Water/CCS Nexus-Related Fact Sheet	10/31/14	10/31/14
M23: Task 14 – Monthly WWG Conference Call Held	10/31/14	10/28/14
M48: Task 9 – Bell Creek Test Site – 1 Million Metric Tons of CO_2 Injected	10/31/14	10/29/14
M23: Task 14 – Monthly WWG Conference Call Held	11/30/14	11/25/14
D57: Task 12 – Project Assessment Annual Report	12/31/14	12/30/14
M24: Task 14 – WWG Annual Meeting Held	12/31/14	8/11/14
Year 8 – Quarter 2 (January–March 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/15	
D32: Task 4 – Bell Creek Test Site – Geomechanical Report (Update 1)	1/31/15	
M23: Task 14 – Monthly WWG Conference Call Held	1/31/15	
M23: Task 14 – Monthly WWG Conference Call Held	2/28/15	
D25: Task 2 – Bell Creek Test Site Poster (update)	3/31/15	
D85: Task 6 – Report – Opportunities and Challenges Associated with CO_2 Compression and Transportation During CCUS Activities (update)	3/31/15	
M23: Task 14 – Monthly WWG Conference Call Held	3/31/15	
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/15	

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 8 – Quarter 3 (April–June 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/15	
M23: Task 14 – Monthly WWG Conference Call Held	4/30/15	
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/15	
M23: Task 14 – Monthly WWG Conference Call Held	5/30/15	
D102: Task 13 – Best Practices Manual – Adaptive Management Approach	6/30/15	
M23: Task 14 – Monthly WWG Conference Call Held	6/30/15	
M49: Task 9 – Bell Creek Test Site – 1.5 Million Metric Tons of CO_2 Injected	6/30/15	
Year 8 – Quarter 4 (July–September 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/15	
D49: Task 8 – Bell Creek Test Site – Transportation and Injection Operations Report	7/31/15	
M23: Task 14 – Monthly WWG Conference Call Held	7/31/15	
M50: Task 9 – Bell Creek Test Site – 2 Years of Near-Surface Assurance Monitoring Completed	7/31/15	
D35: Task 4 – Bell Creek Test Site – Best Practices Manual – Site Characterization	8/31/15	
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/15	
D81: Task 1 – Regional Carbon Sequestration Atlas (update)	8/31/15	
M23: Task 14 – Monthly WWG Conference Call Held	8/31/15	
M51: Task 9 – Bell Creek Test Site – Initial Analysis for First Large-Scale Repeat Pulsed-Neutron Logging Campaign Post-Significant CO_2 Injection Completed	8/31/15	
D1: Task 1 – Review of Source Attributes (update)	9/30/15	
D8: Task 3 – Permitting Review – Update 2	9/30/15	
D45: Task 6 – Bell Creek Test Site – Infrastructure Development Report	9/30/15	
M23: Task 14 – Monthly WWG Conference Call Held	9/30/15	

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 9 – Quarter 2 (January–March 2016)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/16	
D22: Task 2 – Energy from Coal 60-minute Documentary	1/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	1/31/16	
D14: Task 2 – General Phase III Fact Sheet (Update)	2/29/16	
M23: Task 14 – Monthly WWG Conference Call Held	2/29/16	
D11: Task 2 – Outreach Plan (Update)	3/31/16	
D53: Task 9 – Fort Nelson Test Site – Monitoring for CO_2 Storage in a Brine Formation Best Practices Manual	3/31/16	
D55: Task 11 – Bell Creek Test Site – Cost-Effective Long-Term Monitoring Strategies Report	3/31/16	
D69: Task 9 – Bell Creek Test Site – Best Practices Manual – Simulation Report	3/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	3/31/16	
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/16	

Table 11. Phase III, BP4, Years 7–8 Gantt Chart

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Table 11. Phase III, BP4, Years 7–8 Gantt Chart (continued)

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Table 11. Phase III, BP4, Years 7–8 Gantt Chart (continued)

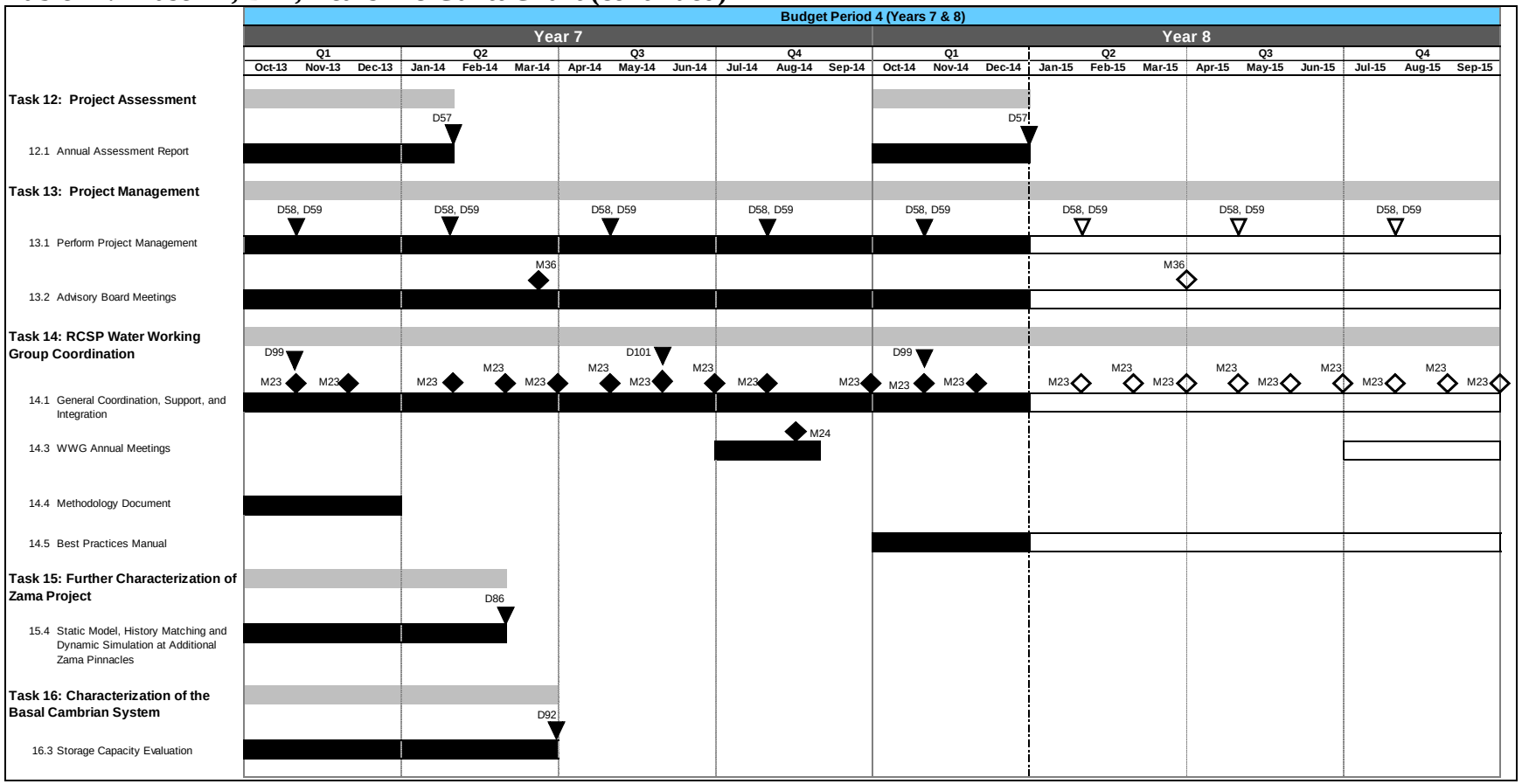

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Table 11. Phase III BP4, Years 7–8 Gantt Chart (continued)

Key for Deliverables ▼				Key for Milestones ◆	
D1	Review of Source Attributes	D58	Quarterly Progress Report	M23	Monthly WWG Conference Call Held
D7	Third Target Area Completed	D57	Project Assessment Annual Report	M24	WWG Annual Meeting Held
D8	Permitting Review – Update 2	D59	Milestone Quarterly Report	M36	Annual Advisory Board Meeting Scheduled
D13	Public Site Updates	D66	BC Test Site – Simulation Report	M41	Decision to Incorporate Ramgen Compression Technology into BC Project
D17	General Phase III Information PowerPoint Presentation	D81	Regional Carbon Sequestration Atlas	M43	BC Test Site – First Full-Repeat Sampling of the Groundwater- and Soil Gas- Monitoring Program Completed
D22	Energy from Coal 60-Minute Documentary	D85	Report – Opportunities and Challenges Associated with CO_2 Compression and Transportation During CCUS Activities	M44	BC Test Site – First 3-D VSP Repeat Surveys Completed
D24	PCOR Partnership Region CO_2 Storage General Poster	D86	Updated Regional Technology Implementation Plan for Zama	M45	BC Test Site – First Full-Repeat of Pulsed-Neutron Logging Campaign Completed
D25	BC Test Site Poster (Update)	D92	Report – Storage Capacity and Regional Implications for Large-Scale Storage in the Basal Cambrian System	M46	BC Test Site – 1 Year of Injection Completed
D32	BC Test Site – Geomechanical Report	D93	Report – Geological Modeling and Simulation for the Aquistore Project	M48	BC Test Site – 1 Million Metric Tons of CO_2 Injected
D35	BC Test Site – Best Practices Manual – Site Characterization	D96	BC Test Site – 3-D Seismic Acquisition and Characterization Report	M49	BC Test Site – 1.5 Million Metric Tons of CO_2 Injected
D36	BC Test Site – Wellbore Leakage Final Report	D99	Nexus of Water and CCS Fact Sheet	M50	BC Test Site – 2 Years of Near-Surface Assurance Monitoring Completed
D42	BC Test Site – Injection Experimental Design Package	D100	FN Test Site – Best Practices Manual– Feasibility Study	M51	Initial Analysis for First Large-Scale Repeat Pulsed-Neutron Logging Campaign Post-Significant CO_2 Injection Completed
D44	BC Test Site – Drilling and Completion Activities Report	D101	WWG Web Site Content Update		
D45	Report – Infrastructure Development				
D49	BC Test Site – Transportation and Injection Operations Report				

PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, three abstracts were submitted, four abstracts were accepted for poster presentation, and 15 presentations (ten oral and five poster) were given at 17 different meetings/conferences/workshops. In addition, a quarterly progress report and seven deliverables (three draft and four approved) were completed. In addition to the products cited below, staff also attended seven project management site trips. For more detail see the Meetings/Travel section.

Abstracts

Submitted

Gorecki, C.D., Steadman, E.N., Harju, J.A., Hamling, J.A, Sorensen, J.A., Peck, W.D., Daly, D.J., Jensen, M.D., Klapperich, R.J., Ayash, S.C., and Anagnost, K.K., 2014, The Plains CO_2 Reduction Partnership—demonstrating carbon dioxide storage in the United States and Canada [abs.]: International Forum on Recent Developments of CCS Implementation, Athens, Greece, March 26–27, 2015.

Presentations

Dotzenrod, N.W., 2014, An overview of the Plains CO_2 Reduction (PCOR) Partnership and its project geospatial tools: Lecture for Introduction to GIS presented at North Dakota State University, Fargo, North Dakota, December 10, 2014.

Gorecki, C.D., Hamling, J.A., Braunberger, J.R., Klapperich, R.J., and Ayash, S.C., 2014, Bell Creek activities update: Presented to U.S. Department of Energy National Energy Technology Laboratory personnel, Morgantown, West Virginia, December 3, 2014.

Harju, J.A., 2014, Lessons from integrated carbon capture, utilization, and storage: Presented at the Asia-Pacific Economic Cooperation (APEC) Expert Workshops on Carbon Capture Utilization and Storage–Enhanced Oil Recovery (CCUS–EOR), Beijing, China, November 10–11, 2014.

Harju, J.A., 2014, Overview of carbon dioxide enhanced oil recovery (EOR): Presented at the Asia-Pacific Economic Cooperation (APEC) Expert Workshops on Carbon Capture Utilization and Storage–Enhanced Oil Recovery (CCUS–EOR), Beijing, China, November 10–11, 2014.

Hawthorne, S.B., Miller, D.J., Gorecki, C.D., Sorensen, J.A., Hamling, J.A., Roen, T.D., Steadman, E.N, Harju, J.A., and Melzer, L.S., 2014, A rapid method for determining CO_2–oil MMP and visual observations of CO_2–oil interactions at reservoir conditions: Presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Klapperich, R.J., Stepan, D.J., Jensen, M.D., Gorecki, C.D., Steadman, E.N., Harju, J.A., Nakles, D.V., and McNemar, A.T., 2014, The nexus of water and CCS—a regional carbon sequestration partnership perspective: Presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Peck, W.D., 2014, Update on EERC Aquistore efforts: Presented via WebEx/conference call with Science and Engineering Research Council (SERC) personnel for the Aquistore modeling update, Grand Forks, North Dakota, October 2, 2014.

Peck, W.D., 2014, A workflow to determine CO_2 storage potential in deep saline formations: Presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Sorensen, J.A., Botnen, L.S., Smith, S.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Application of Canadian Standards Association guidelines for geologic storage of CO_2 toward the development of a monitoring, verification, and accounting plan for a potential CCS project at Fort Nelson, British Columbia, Canada: Presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Steadman, E.N., 2014, EERC Oil and Gas Group—current projects and paths forward: Presented to Steffes Corporation personnel, Grand Forks, North Dakota, October 15, 2014.

Poster Presentations

Braunberger, J.R., Hamling, J.A., Gorecki, C.D., Miller, H., Rawson, J., Walsh, F., Pasternack, E., Rowe, W., Butsch, R., Steadman, E.N., and Harju, J.A., 2014, Characterization and time-lapse monitoring utilizing pulsed-neutron well logging—associated CO_2 storage at a commercial CO_2 EOR project: Poster presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Glazewski, K.A., Hamling, J.A., Peck, W.D., Doll, T.E., Laumb, J.D., Gorecki, C.D., Azzolina, N.A., Nakles, D.V., Steadman, E.N., and Harju, J.A., 2014, A regional wellbore evaluation of the basal Cambrian system: Poster presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, TX, Oct 5–9, 2014.

Jensen, M.D., Schlasner, S.M., Sorensen, J.A., and Hamling, J.A., 2014, Operational flexibility of CO2 transport and storage: Poster presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Liu, G., Peck, W.D., Braunberger, J.R., Klenner, R.C.L., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Evaluation of large-scale carbon dioxide storage potential in the basal saline system in the Alberta and Williston Basins in North America: Poster presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Peck, W.D., Klenner, R.C.L., Liu, G., Gorecki, C.D., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Model development of the Aquistore CO_2 storage project: Poster presented at the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

Deliverables/Milestones

Draft

Gorecki, C.D., Harju, J.A., Steadman, E.N., Romuld, L., Hamling, J.A., Sorensen, J.A., Botnen, L.S., Daly, D.J., Jensen, M.D., Peck, W.D., Smith, S.A., Klapperich, R.J., Anagnost, K.K., and Votava, T.J., 2014, Annual assessment report: Plains CO_2 Reduction (PCOR) Partnership Phase III draft Task 12 Deliverable D57 (October 1, 2013 – September 30, 2014) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, December 2014.

Approved

Liu, G., Gorecki, C.D., Bailey, T.P., Peck, W.D., and Steadman, E.N., 2014, Geologic modeling and simulation report for the Aquistore project: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 1 Deliverable D93 (update 1) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2014-EERC-11-03, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Sorensen, J.A., Botnen, L.S., Smith, S.A., Liu, G., Bailey, T.P., Gorecki, C.D., Steadman, E.N., Harju, J.A., Nakles, D.V., and Azzolina, N.A., 2014, Fort Nelson carbon capture and storage feasibility study – a best practices manual for storage in a deep carbonate saline formation: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 9 Deliverable D100 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication No. 2014-EERC-11-08, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Draft Submitted and Approved

Kalenze, N.S., Hamling, J.A., Ayash, S.C., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Bell Creek test site – 1 million metric tons injected: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 9 Milestone M48 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2014-EERC-11-01, Grand Forks, North Dakota, Energy & Environmental Research Center, October.

Klapperich, R.J., Gorecki, C.D., Steadman, E.N., Harju, J.A., and McNemar, A.T., 2014, Long-term protection of freshwater resources following CO_2 storage: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 14 Deliverable D99 for U.S. Department of Energy National

Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, November.

Progress Reports

Monthlies

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Botnen, L.S., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Harju, J.A., Anagnost, K.K., and Klapperich, R.J., 2014, Plains CO_2 Reduction (PCOR) Partnership: Phase III monthly report (September 1–30, 2014) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, October.

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Botnen, L.S., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Harju, J.A., Anagnost, K.K., and Klapperich, R.J., 2014, Plains CO_2 Reduction (PCOR) Partnership: Phase III monthly report (October 1–31, 2014) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, November.

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Harju, J.A., Anagnost, K.K., and Klapperich, R.J., 2014, Plains CO_2 Reduction (PCOR) Partnership: Phase III monthly report (November 1–30, 2014) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, December.

Quarterlies

Gorecki, C.D., Harju, J.A., Steadman, E.N., Romuld, L., Sorensen, J.A., Botnen, L.S., Daly, D.J., Hamling, J.A., Jensen, M.D., Peck, W.D., Klapperich, R.J., Anagnost, K.K., and Votava, T.J., 2014, Plains CO_2 Reduction Partnership Phase III Task 13 Deliverable D58/59 quarterly technical progress report (July 1 – September 30, 2014) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592 and North Dakota Industrial Commission Contract Nos. FY08-LX111-162 and G-015-030, Grand Forks, North Dakota, Energy & Environmental Research Center, October.

Conference Papers

Botnen, L.S., Connors, K.C., Bliss, K.J., Bengal, L.E., and Harju, J.A., 2014, Guidance for states and provinces on operational and postoperational liability in the regulation of carbon geologic storage: Energy Procedia, v. 63, p. 6688–6693.

Braunberger, J.R., Hamling, J.A., Gorecki, C.D., Miller, H., Rawson, J., Walsh, F., Pasternack, E., Rowe, W., Butsch, R., Steadman, E.N., and Harju, J.A., 2014, Characterization and time-lapse monitoring utilizing pulsed-neutron well logging—associated CO_2 storage at a commercial CO_2 EOR project: Energy Procedia, v. 63, p. 3935–3944.

Glazewski, K.A., Hamling, J.A., Peck, W.D., Doll, T.E., Laumb, J.D., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, A regional wellbore evaluation of the basal Cambrian system: Energy Procedia, v. 63, p. 5715–5723.

Hawthorne, S.B., Miller, D.J., Gorecki, C.D., Sorensen, J.A., Hamling, J.A., Roen, T.D., Harju, J.A., and Melzer, L.S., 2014, A rapid method for determining CO_2/oil MMP and visual observations of CO_2/oil interactions at reservoir conditions: Energy Procedia, v. 63, p. 7724–7731.

Klapperich, R.J., Stepan, D.J., Jensen, M.D., Gorecki, C.D., Steadman, E.N., Harju, J.A., Nakles, D.V., and McNemar, A.T., 2014, The nexus of water and CCS—a regional carbon sequestration partnership perspective: Energy Procedia, v. 63, p. 7162–7172.

Liu, G., Peck, W.D., Braunberger, J.R., Klenner, R.C.L., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Evaluation of large-scale carbon dioxide storage potential in the basal saline system in the Alberta and Williston Basins in North America: Energy Procedia, v. 63, p. 2911–2920.

Peck, W.D., Bailey, T.P., Liu, G., Klenner, R.C.L., Gorecki, C.D., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Model development of the Aquistore CO_2 storage project: Energy Procedia, v. 63, p. 3723–3734.

Peck, W.A., Glazewski, K.A., Klenner, R.C.L., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, A workflow to determine CO_2 storage potential in deep saline formations: Energy Procedia, v. 63, p. 5231–5238.

Sorensen, J.A., Botnen, L.S., Smith, S.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Application of Canadian Standards Association guidelines for geologic storage of CO_2 toward the development of a monitoring, verification, and accounting plan for a potential CCS project at Fort Nelson, British Columbia, Canada: Energy Procedia, v. 63, p. 5959–5970.

Wade, S., Cather, M., Cumming, L., Daly, D.J., Garrett, G., Greenberg, S., Myhre, R., Stone, M., and Tollefson, L., 2014, Digital communications—status and potential applications for CCUS public outreach: Energy Procedia, v. 63, p. 7070–7086.

Meeting Minutes

Klapperich, R.J., 2014, Minutes—Regional Carbon Sequestration Partnership Water Working Group monthly conference call: September 30, 2014.

Klapperich, R.J., 2014, Minutes—Regional Carbon Sequestration Partnership Water Working Group conference call: October 28, 2014.

Klapperich, R.J., 2014, Minutes—Regional Carbon Sequestration Partnership Water Working Group conference call: November 25, 2014.

MEETINGS/TRAVEL

Representatives from the PCOR Partnership incurred travel costs for their participation in the following 16 meetings/conferences, one workshop, and seven project management site trips in this reporting period:

- October 5–9, 2014: traveled to Austin, Texas, to present at the GHGT-12 Conference.
- October 14–15, 2014: traveled to Washington, D.C., to attend the Executive Roundtable "Commercial & Financial Structuring of Commercial-Scale Projects with Carbon Capture and Sequestration."
- October 18–22, 2014: traveled to Columbus, Ohio, for the IOGCC annual meeting.
- October 19–27, 2014: traveled to Gillette, Wyoming, for site work at the Bell Creek Field.
- October 23–24, 2014: traveled to Midland, Texas, to present at the CCUS Workshop.
- October 23–27, 2014: traveled to Gillette, Wyoming, for site work at the Bell Creek Field.
- October 27–31, 2014: traveled to Gillette, Wyoming, for site work at the Bell Creek Field.
- October 30 – November 4, 2014: traveled to Gillette, Wyoming, for site work at the Bell Creek Field.
- November 4–7, 2014: traveled to Champaign, Illinois, to attend the 2014 Midwest Carbon Sequestration Science Conference.
- November 5–11, 2014: traveled to Gillette, Wyoming, for site work at the Bell Creek Field.
- November 7–13, 2014: traveled to Beijing, China, to present at the APEC Expert Workshops on CCUS and for academic exchange discussion.
- November 13–14, 2014: traveled to Plano, Texas, to attend meetings with Denbury.
- November 17–19, 2014: traveled to Columbus, Ohio, to attend the Midwest Regional Carbon Sequestration Partnership Annual Partners Meeting.
- November 20–21, 2014: traveled to Washington, D.C., to attend the Subsurface Technology Engineering Challenges Briefing.
- November 20–24, 2014: traveled to Denver, Colorado, for meetings with C12 Energy.
- November 21, 2014: traveled to Fargo, North Dakota, to meet with the PPB Educational Department.
- November 30 – December 7, 2014: traveled to Gillette, Wyoming, for sampling at the Bell Creek Field.
- December 3–4, 2014: traveled to Morgantown, West Virginia, to visit DOE.
- December 7–12, 2014: traveled to Midland, Texas, to attend and present at CO_2 Conference Week.
- December 10, 2014: traveled to Fargo, North Dakota, to present at a GIS class at North Dakota State University.
- December 10–12, 2014: traveled to Estevan, Saskatchewan, Canada, for a community open house for the Aquistore Project.
- December 12–18, 2014: traveled to San Francisco, California, to attend the American Geophysical Union Fall Conference.

- December 14–20, 2014: traveled to Gillette, Wyoming, for sampling at the Bell Creek Field.
- December 15–16, 2014: traveled to Bismarck, North Dakota, to attend the Williston Basin Society of Petroleum Engineers (SPE) Meeting and SPE Board Meeting.

Materials presented at these meetings are available to partners on the PCOR Partnership DSS Web site (www2.undeerc.org/website/pcorp/).