



Plains CO₂ Reduction (PCOR) Partnership
Energy & Environmental Research Center (EERC)

PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report Task 13 – Deliverable D58/D59

(for the period October 1 – December 31, 2015)

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PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III
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October 1 – December 31, 2015

EXECUTIVE SUMMARY

The Plains CO₂ Reduction (PCOR) Partnership is one of seven Regional Carbon Sequestration Partnerships (RCSPs) competitively awarded by the U.S. Department of Energy (DOE) 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 (CO₂) into deep geologic formations for CO₂ storage. The status of the PCOR Partnership Phase III CO₂ injection demonstration project located near Fort Nelson, British Columbia, Canada, has changed to a “suspended” status. Funding originally designated for Fort Nelson efforts has been used to support the PCOR Partnership participation in the Aquistore project. Budget Period (BP) 4 began October 1, 2009.

This progress report presents an update of Phase III PCOR Partnership activities from October 1, 2015, through December 31, 2015.

The 6-month extension to BP4 began October 1, 2015, and focused on extended and enhanced work, specifically in the Bell Creek activities. As of December 31, 2015, the most recent month of record, 2.807 million tonnes of total gas (composition of approximately 98% CO₂) has been purchased by Denbury Resources Inc. (Denbury) for injection into the Bell Creek Field since May 2013, equating to an estimated 2.753 million tonnes of CO₂ stored. The fall 2015 enhanced pulsed-neutron logging program was completed. In conjunction with Denbury’s Bell Creek operations/productions engineering team and Schlumberger operations and service quality teams, 17 of the 18 proposed wells were successfully logged.

Injection was restarted in November 2015 at the Aquistore site, and daily data downloads have resumed. PCOR Partnership modeling and simulation activities were performed in support of the Aquistore and Bell Creek projects, and laboratory efforts focused on the Williston Basin. One Bell Creek quarterly surface and near-surface sampling event was conducted.

Nine tasks continued. In addition to the foregoing, the Program Year 8 annual assessment report (October 1, 2014 – September 30, 2015) was completed; “Batch 1” of the updated pages for the PCOR Partnership public Web site, including a revised home page, went live December 1, 2015; one milestone for Bell Creek test site activities was completed; collaboration continued on DOE best practices manuals; and the PCOR Partnership participated in National Risk Assessment Partnership beta tool Webinars.



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INTRODUCTION

The Plains CO₂ 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 Partnerships (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 December 31, 2015, 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 – March 31, 2016
- BP5: April 1, 2016 – 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	Omaha Public Power District
Alberta Department of Energy	Husky Energy Inc.	Otter Tail Power Company
Alberta Department of Environment	Indian Land Tenure Foundation	Outsource Petrophysics, Inc.
Alberta Innovates – Technology Futures	Interstate Oil and Gas Compact Commission	Oxand Risk & Project Management Solutions
ALLETE	Iowa Department of Natural Resources	Peabody Energy
Ameren Corporation	Lignite Energy Council	Petroleum Technology Research Centre
American Coalition for Clean Coal Electricity	Manitoba Geological Survey	Petroleum Technology Transfer Council
American Lignite Energy	Marathon Oil Company	Pinnacle, a Halliburton Service
Apache Canada Ltd.	MBI Energy Services	Prairie Public Broadcasting
Aquistore	MEG Energy Corporation	Pratt & Whitney Rocketdyne, Inc.
Baker Hughes Incorporated	Melzer Consulting	Praxair, Inc.
Basin Electric Power Cooperative	Minnesota Power	Ramgen Power Systems, Inc.
BillyJack Consulting Inc.	Minnkota Power Cooperative, Inc.	RPS Energy Canada Ltd.
Biorecro AB	Missouri Department of Natural Resources	Saskatchewan Ministry of Industry and Resources
Blue Source, LLC	Missouri River Energy Services	SaskPower
BNI Coal, Ltd.	Montana–Dakota Utilities Co.	Schlumberger
British Columbia Ministry of Energy, Mines, and Petroleum Resources	Montana Department of Environmental Quality	Sejong University
British Columbia Oil and Gas Commission	National Commission on Energy Policy	Shell Canada Limited
C12 Energy, Inc.	Natural Resources Canada	Spectra Energy
The CETER Group, Ltd.	Nebraska Public Power District	Suncor Energy Inc.
Computer Modelling Group Ltd.	North American Coal Corporation	TAQA North, Ltd.
Continental Resources, Inc.	North Dakota Department of Commerce	TGS Geological Products and Services
Dakota Gasification Company	Division of Community Services	University of Alberta
Denbury Resources Inc.	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	Weatherford Advanced Geotechnology
Enbridge Inc.	Department of Mineral Resources, Oil and Gas Division	Western Governors' Association
Encore Acquisition Company	North Dakota Industrial Commission	Westmoreland Coal Company
Energy Resources Conservation Board/Alberta Geological Survey	Lignite Research, Development and Marketing Program	Wisconsin Department of Agriculture, Trade and Consumer Protection
Environment Canada	North Dakota Industrial Commission	Wyoming Office of State Lands and Investments
Excelsior Energy Inc.	Oil and Gas Research Council	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 (CO₂), 2) facilitate the development of the infrastructure required to transport CO₂ 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 CO₂, 5) facilitate the establishment of a technical framework by which carbon credits can be monetized for CO₂ stored in geologic formations, 6) continue collaboration with other RCSPs, and 7) provide outreach and education for CO₂ 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 CO₂ injection volumes. A programmatic

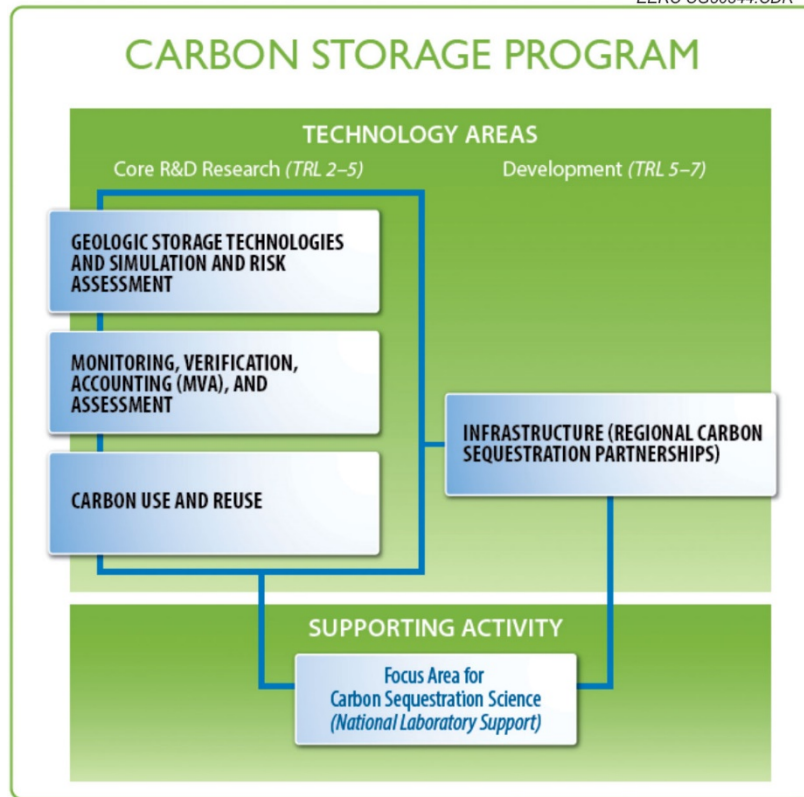


Figure 1. DOE Carbon Storage Program technology areas featuring regional partnerships (courtesy of Andrea Dunn, DOE NETL; “TRL” stands for technology readiness level).

development phase (Phase III) goal is implementation of large-scale field testing involving at least 1 million metric tons of CO₂ a project. Each of the RCSP large-volume injection tests is designed to demonstrate that the CO₂ storage sites have the potential to store regional CO₂ emissions safely, permanently, and economically for hundreds of years.

The PCOR Partnership is working with Denbury Resources Inc. (Denbury) in the Denbury-operated Bell Creek oil field in Powder River County in southeastern Montana. The PCOR Partnership has also conducted a feasibility study for 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 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), CO₂ 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 for the demonstration projects are as follows: 1) conduct a successful Bell Creek demonstration to verify that the region’s large number of oil fields have the potential to store significant quantities of CO₂ in a safe, economical, and environmentally responsible manner and 2) support Spectra’s feasibility study of a Fort Nelson demonstration to verify the economic feasibility of using the region’s carbonate saline formations for safe, long-term CO₂ 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) CO₂ Procurement (completed); 8) Transportation and Injection Operations (completed); 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, CO₂ 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 (completed)	Melanie D. Jensen
Task 9 – Operational Monitoring and Modeling	John A. Hamling and Lawrence J. Pekot
Task 10 – Site Closure	TBA*
Task 11 – Postinjection Monitoring and Modeling	TBA
Task 12 – Project Assessment	Loreal V. Heebink
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:

- Attended the Midwest RCSP Partners Meeting in Columbus, Ohio, October 20–22, 2015.
- Attended the Science & Engineering Research Committee held December 14, 2015, in Ottawa, Ontario, Canada.
- Continued efforts to update Deliverable (D)81, Regional Carbon Sequestration Atlas (update), due August 31, 2016, including organizing information/text for new pages to be added and reworking/writing pages for specific projects, including Bell Creek, basal Cambrian/Cambro-Ordovician, and Aquistore, and revisiting pages that need figures/statistics updated.
- Continued activities to update the content and function of the partners-only **Decision Support System (DSS)**, including the following:
 - Began integrating current CO₂ storage calculations into the PCOR Partnership GIS (geographic information system).
 - Provided internal SQL training to two researchers for use in accessing data for ArcGIS applications.
- Continued activities to update the content of the **PCOR Partnership general database**, including the following:

- Updated North Dakota and Montana Petra projects with the latest general well information from each state’s online resource as follows: added 385 new North Dakota wells and seven new Montana wells.
- Updated North Dakota production information.
- Updated North Dakota injection data.
- Updated South Dakota, Saskatchewan, British Columbia, and Manitoba projects.
- Continued work on Saskatchewan oilfield update for the DSS.
- Updated Montana producing formation data.
- Imported new LAS (log ASCII standard) well files for 2015 wells from the North Dakota Industrial Commission (NDIC) Web site into the North Dakota project.
- With regard to the **Aquistore** project static modeling and dynamic predictive simulations effort:
 - Held monthly internal Aquistore update meetings to discuss the progress of activities and abstract/presentation topics for upcoming conferences.
 - Prepared an abstract for the Greenhouse Gas Control Technologies (GHGT)-13 Conference to be held November 14–18, 2016. Submitted to PTRC and SaskPower for comment.
 - Continued investigating potential options (e.g., stimulation) to increase injectivity, including possible use of propellants for stimulation.
 - In November 2015, SaskPower received permission from regulatory authorities to temporarily raise the bottomhole injection pressure limit from 90% of estimated fracture pressure to 95% in an effort to improve well injectivity. This effort appears to have been successful as daily injection performance has improved.
 - Injection was restarted in November 2015. Daily data downloads have resumed.
 - With regard to **modeling and simulation** activities:
 - ◆ Updated Aquistore simulation with new daily injection data gathered since the restart of operations. The improved well injection performance has been challenging to match in the simulation. Additional analysis of the data is proceeding to help explain the relationship between injectivity, pressure, and temperature.
 - ◆ Acquired a depth-converted 3-D baseline seismic dataset for the Aquistore site, which will be used to adapt and update our existing Aquistore model.
 - ◆ Investigated history matching with an attempt to correct injection rate to account for temperature effect.
 - ◆ Continued work on comparing properties in the static model with the history-matched simulation model properties. The purpose is to compare the two models to ensure changes made to achieve a history match make sense with known geologic data.
 - ◆ Continued work on the draft simulation report.
- With regard to the **Williston Basin** CO₂ Storage Sink Relative Permeability laboratory characterization effort:
 - Obtained core from the Broom Creek Formation to add to the samples in the study.
 - Continued work on the report.
 - Worked on laboratory characterization efforts:
 - ◆ Continued thin-section petrographic analyses of all samples.
 - ◆ Completed x-ray fluorescence (XRF) analyses of the Broom Creek samples.

- ◆ Completed bulk volume determination of the initial sample set using a 3-D scanner.
- ◆ Continued porosity measurements of the initial sample set.
- ◆ Continued mercury injection capillary pressure (MICP) and x-ray diffraction (XRD) testing of the initial sample set.
- ◆ Continued MICP and XRD testing and 3-D bulk volume measurements of the Broom Creek samples.
- ◆ Continued to quality-check XRD data.
- ◆ Completed air permeability testing on initial sample set. Continued data reduction.
- ◆ Prepared brine solutions for relative permeability testing.
- ◆ Continued preparing the relative permeability system, including shakedown, brine recovery procedures, and troubleshooting and repairing a leak in the system.

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

- Although the Aquistore project had no problems or delays during the reporting period, simulation history matching has required considerable effort.
- Troubleshooting of the relative permeability system has delayed the relative permeability testing in the Williston Basin CO₂ Storage Sink Relative Permeability laboratory characterization effort.

Task 2 – Public Outreach and Education

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

- Hosted a Webinar on October 29, 2015, to discuss the D21 documentary “The Bell Creek Story” with Denbury Resources.
- Continued discussions with PTRC regarding collaboration on a paper and presentation at the GHGT-13 Conference to be held November 14–18, 2016. Provided comments and updated a draft of an abstract on outreach.
- Continued work on the draft Phase II project fact sheets. Addressed comments on the updated Phase II Northwest McGregor and Lignite fact sheets based on final internal EERC management review.
- Obtained the involvement of BillyJack Consulting, Inc., in development of the update of the Phase II Zama fact sheet in cooperation with internal EERC researchers.
- Obtained the involvement of The CETER Group (CETER) as a reviewer for the coal documentary (D22).
- Began working on a draft questionnaire for Bell Creek Field landowners with PCOR Partnership MVA personnel. The draft questionnaire deals with landowner perception of water quality-monitoring activities, water quality information reports, and the quality of their interaction with EERC personnel.
- During the quarter, the PCOR Partnership was represented by EERC personnel at eight conferences/meetings and one workshop/seminar. Specifically, the PCOR Partnership outreach activities included three oral presentations. The following quantities of PCOR Partnership outreach materials were distributed:

- PCOR Partnership documentary entitled “Reducing Our Carbon Footprint: The Role of Carbon Markets” – 2
- PCOR Partnership documentary entitled “Out of the Air – Into the Soil” – 1
- PCOR Partnership documentary entitled “Managing Carbon Dioxide: The Geologic Solution” – 1
- PCOR Partnership documentary entitled “Global Energy and Carbon: Tracking Our Footprint” – 1
- “Plains CO₂ Reduction Partnership Atlas, 4th Edition, Revised” – 1
- Participated in a number of **conference calls** this quarter, including the following:
 - No Aquistore Outreach and Advisory Working Group monthly conference calls were held this quarter.
 - With regard to the monthly RCSP Outreach Working Group (OWG) conference calls, the focus continued to be discussion of ongoing review and update of the RCSP outreach and education best practices manual (BPM) draft:
 - ◆ Participated in the OWG conference call held on October 17, 2015, to discuss BPM comments and plan next steps.
 - ◆ In lieu of participation in the OWG monthly call on November 19, 2015, sent written comments on the review and update of the DOE Outreach BPM and followed up with discussions with the OWG lead. The text was accepted by the OWG lead as a draft update for the Executive Summary and Section 1 of the manual. Review continued on the remainder of the draft Outreach BPM document.
 - ◆ Participated in the OWG monthly call on December 17, 2015, and continued review and revision on the DOE outreach BPM for the OWG. Exchanged e-mails with the OWG lead regarding the work.
- Continued efforts to update the **public Web site** (www.undeerc.org/pcor), including the following:
 - Submitted “Batch 1” of the planned upgrade of the PCOR Partnership public Web site content to Andrea Dunn for approval. Received approval November 20, 2015.
 - “Batch 1” of the updated (revised) pages for the PCOR Partnership public Web site, including a revised home page, went live December 1, 2015 (www.undeerc.org/PCOR/). The entire site has a new look, and the left navigation menu has been edited to make shorter categories. A new “Technical Publications” section was added to provide direct access to content for the technical audience (e.g., technical reports, PDM [permanent downhole monitoring] video). Web pages where specific changes were made include the following:
 - ◆ Home page – new look (Figure 3), direct links to more content, including a featured documentary
 - ◆ Meet the Team – updated personnel and job titles
 - ◆ Greenhouse Effect – updated text to simplify content
 - ◆ Land Resources – updated text to simplify content, larger map
 - ◆ Regulations and Permitting – updated map with interactivity, updated text to simplify content, added new printable state and provincial regulations document
 - ◆ CO₂ Sequestration Projects – new look, updated text, updated map



Figure 3. Screenshot of the new look of the PCOR Partnership Web site.

- ◆ Technical Publications – added new landing page for new section
- ◆ Outreach Posters – added new page
- ◆ Documentaries – added new look for existing content
- Continued limited content development for the “Batch 2” of the upgrade for the public PCOR Partnership Web site, with a focus on content for the technical poster and “Options to Reduce CO₂” pages to be added to the Web site. Met with EERC PCOR Partnership senior management to review the new technical poster page and began addressing their review comments.
- Continued activities to update the Quest Project page on the public Web site to reflect the fact that the project will begin injection.
- Released an e-mail blast announcing the addition of the Household Energy and Carbon Footprint Web pages (funded in part by the North Dakota Department of Commerce Office of Renewable Energy and Energy Efficiency) to the PCOR Partnership Web site on December 15, 2015 (www.undeerc.org/PCOR/household-energy/). The Web pages provide information to homeowners and interested parties regarding the types of energy that come to households and provide a choice among three online calculators to determine carbon footprint from household energy. The Web pages also contain information on actions individual homeowners can take to reduce their household carbon footprint and what society as a whole can do.
- Provided an interview for the EERC electronic newsletter concerning the addition of the North Dakota Department of Commerce Division of Community Services (DCS)-

- funded household energy and carbon footprint pages that are now available from the PCOR Partnership Web site.
- On December 17, 2015, attended a meeting with the Grand Forks, North Dakota, city government Green Committee to discuss the addition of the DCS-funded Household Energy and Carbon Footprint Web pages, ways they could help publicize the Web pages, and ways the Web pages could be used.
 - Replied to *Save on Energy* Web site regarding a link with the Kids Only page on the PCOR Partnership Web site.
 - Continued ongoing identification and repair of broken links.
 - Continued collaborative efforts with **Prairie Public Broadcasting (PPB)**, including the following:
 - Reviewed draft *Meeting the Challenge* education presentation video series (Parts 3 and 4) with PCOR Partnership managers.
 - Traveled to Fargo, North Dakota, for a meeting with PPB personnel; discussed BP4 extension and BP5 plans, schedules, and budget; and provided this information to EERC PCOR Partnership managers.
 - With regard to the Bell Creek 30-minute documentary (D21):
 - ◆ Prepared a draft presentation and interview questions to be used in discussions to finalize interviewees and interview schedules.
 - ◆ Reviewed and organized D21 B-roll.
 - With regard to D22, the Coal in the Modern Age 60-minute documentary:
 - ◆ Traveled to Beulah, North Dakota, for an interview video shoot at Dakota Gasification Company and the Freedom Mine for Documentary D22.
 - ◆ Continued work on the coal documentary (D22) transcripts.
 - ◆ Investigated the potential for site filming in China through the Global Carbon Capture and Storage Institute (GCCSI) but learned this was not an option.
 - ◆ Reviewed and organized window dubs of interviews and site films and the interview transcriptions.
 - ◆ Updated the preliminary storyline draft including use of interview quotes.
 - During this reporting period, information regarding the **site sessions/visits** to the PCOR Partnership public Web site included the following:
 - There were 8191 sessions/visits to the public Web site (www.undeerc.org/pcor). Traffic increased 44% from last quarter (5697 sessions/visits). The U.S. sessions/visits showed the largest increase at 22%; international sessions/visits dropped 15%; and the PCOR Partnership region sessions/visits (including portions of both United States and Canada) increased 79%.
 - There were 6966 unique visitors to the public Web site, representing a 41% increase from last quarter (4932 visitors). In particular, 84% of these visitors were new to the Web site (visitors whose visit was marked as a first-time visit in this quarter).
 - Of the 8191 sessions/visits, 49% of the Web traffic was domestic, and 51% was international. Table 3 lists the top ten countries for visits to the PCOR Partnership Web site: the United States, India, United Kingdom, Canada, Australia, Malaysia, Kenya, Pakistan, Netherlands, and Philippines. There was traffic from 136 countries overall (Figure 4).

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

	Country	Sessions/ Visits*	PCOR Partnership State/Province	Visits*
1	United States	3982		
			North Dakota	125
			Minnesota	90
			Wisconsin	76
			Iowa	53
			Missouri	41
			Montana	32
			Nebraska	29
			Wyoming	12
			South Dakota	11
2	India	916		
3	United Kingdom	512		
4	Canada	410		
			Alberta	79
			British Columbia	68
			Saskatchewan	28
			Manitoba	6
5	Australia	315		
6	Malaysia	154		
7	Kenya	124		
8	Pakistan	115		
9	Netherlands	90		
10	Philippines	87		
	Other 126 countries	1486		
Total Sessions/Visits		8191	Total PCOR Partnership Visits	650

*Arranged by the number of visits to the site.

- There were 650 sessions/visits originating from within the PCOR Partnership region (Figure 5). Approximately 72% of the regional visits originated from the United States, and 28% came from Canada. Visits from within the PCOR Partnership region comprised 8% 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).
- During this reporting period, a breakdown of how visitors came to the PCOR Partnership Web site, also referred to as **traffic sources** (Figure 6), was determined and is provided below:
 - Search traffic refers to the use of search engines such as Google, Bing, and Yahoo. Search traffic accounted for more than 85% of the overall traffic that came to the public

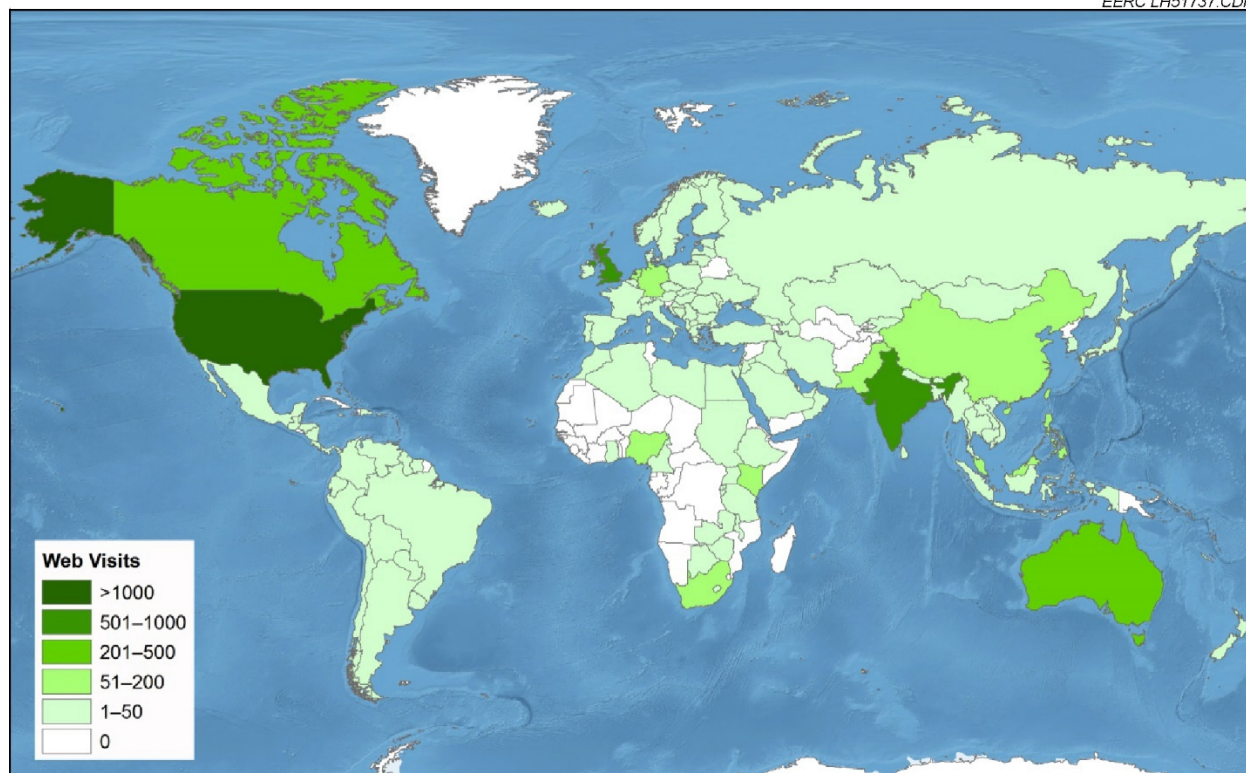


Figure 4. Map of PCOR Partnership Web site global traffic for this reporting period.

Web site. Google Analytics provides keywords that visitors used to find the public Web site. The top three search phrases were “carbon sequestration,” “what is CO₂,” and “CO₂ sequestration.”

- 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 (over 11%) is from persons familiar with the PCOR Partnership. Links provided as part of the promotional e-mail for the newly added Household Energy and Carbon Footprint Web pages resulted in 89 of the direct traffic visits.
- Referral site traffic (over 2%) 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, globalccsinstitute.com, and arthapedia.in.
- 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 sessions** to the PCOR Partnership public Web site included 11,485 page views (a 39% increase from last quarter); the top five pages viewed are listed in Table 4. These five pages comprise about 74% of total page views.

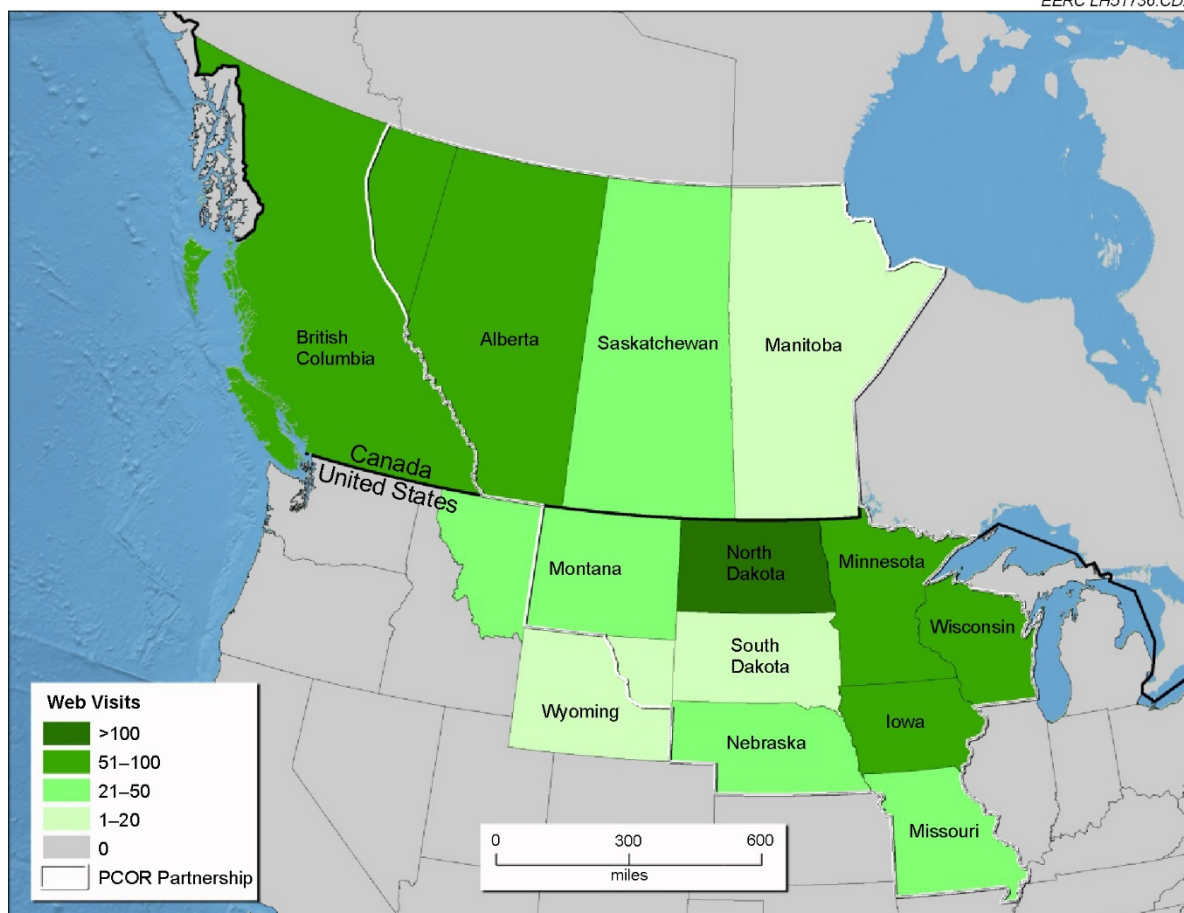


Figure 5. Map of PCOR Partnership Web site regional visits for this reporting period.

- 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 in Table 6. These videos can also be streamed on the PCOR Partnership public Web site.
- During this reporting period, the PCOR Partnership received **public television exposure** from documentaries broadcast in North Dakota, northwestern Minnesota, and Manitoba. A total of four broadcasts aired, with one broadcast of "Managing Carbon Dioxide: The Geologic Solution" and three broadcasts of "Global Energy and Carbon: Tracking Our Footprint."
- In addition to YouTube and the public Web site, PCOR Partnership documentaries and video clips are available on PBS Learning Media. This free, online media service was developed for PreK–12 educators to enhance learning through images, videos, etc., and provides teachers with the ability to create custom lesson plans based on this content. Table 7 lists the top ten video clips viewed during this quarter.

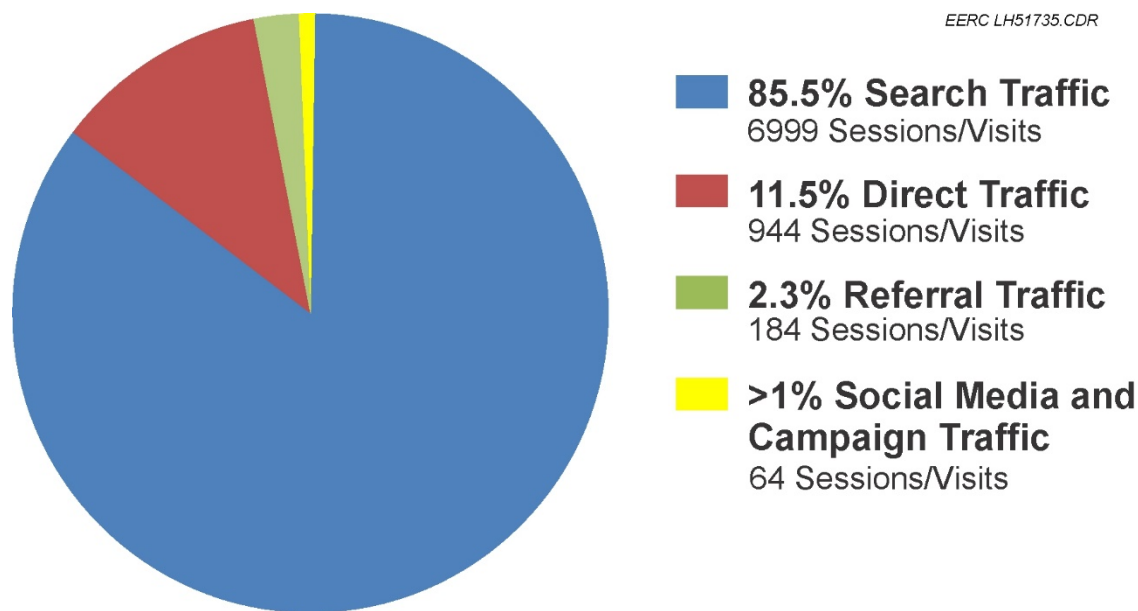


Figure 6. PCOR Partnership public Web site traffic sources for this reporting period.

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

Page Title	Page Views	% Page Views	Page
What Is CO ₂ Sequestration?	5664	49.3	www.undeerc.org/pcor/sequestration/whatissequestration.aspx
What Is CO ₂ ?	1752	15.3	www.undeerc.org/pcor/sequestration/whatisco2.aspx
Terrestrial Sinks	461	4.0	www.undeerc.org/pcor/region/terrestrial/default.aspx
CO ₂ Sequestration Projects	422	3.7	www.undeerc.org/pcor/co2sequestrationprojects/default.aspx
Home Page	314	2.7	www.undeerc.org/pcor/default.aspx

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

Video	Video Length	Views	Est. Minutes Watched	Avg. View Duration
Reducing Our Carbon Footprint Documentary	26:49	881	4209	4:46
Reforestation in Brazil	4:41	637	1307	2:03
The Phases of Oil Recovery – So Far	2:40	376	703	1:52
Household Energy Around the World	5:34	89	271	3:02
Family Transportation and Carbon Footprint	3:37	82	146	1:46

Table 6. PCOR Partnership Documentaries on PPB YouTube Channel Accessed

Video	Video Length	Views	Est. Minutes Watched	Avg. View Duration
Global Energy and Carbon: Tracking Our Footprint	32:36	2545	17,273	7:00
Managing Carbon Dioxide: The Geologic Solution	31:40	348	4201	12:00

Table 7. Top Ten EERC PCOR Partnership-Related Videos Viewed on PBS Learning Media

Video	Video Length	Views
Household Electricity and Carbon Footprint	4:22	51
No Till Farming and Carbon Storage	3:32	43
Human CO ₂ and Climate Change	2:02	31
Carbon-Based Fuels and Our Quality of Life	1:43	26
Energy, CO ₂ , and Our Carbon Footprint	1:11	25
Household Energy Around the World	5:34	20
Cutting Carbon: Society's Options	2:50	17
Sequestering Carbon in the Prairie	1:45	16
A Postindustrial Economy: Household Energy in the U.S.	4:11	15
Family Transportation and Carbon Footprint	3:17	15

- During this reporting period, there were three instances of **media content** published regarding the PCOR Partnership. These are listed in Table 8.

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

- The difficulty of obtaining filming connections in China may require changes in arrangements in order to obtain the type of film footage needed to fulfill the D22 documentary story concept.

Task 3 – Permitting and NEPA Compliance

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

- Attended the IOGCC (Interstate Oil and Gas Compact Commission) Annual Meeting in Oklahoma City, Oklahoma, September 26 – October 1, 2015.
- Attended the final North Dakota Department of Health public meeting on the Clean Power Plan on November 18, 2015, in Fargo, North Dakota.
- Attended a Webinar entitled “EPA’s Proposed New Emission Rules and Impact on Oil & Gas Industry” presented December 8, 2015, by Jack Luellen, a partner with Fox Rothschild LLP, and hosted by the Association of Desk and Derrick Clubs (ADDC).

Table 8. PCOR Partnership Media Coverage

Date	Headline	Media Organization/ Publication	City	Journalist, Author, or Source	Type
10/21/2015	2015 Pioneer Award winners announced	World Cement	NA	Joseph Green	Online
10/23/2015	EERC announces 2015 Plains CO ₂ Reduction Partnership Pioneer Award winners	Sustainable Manufacturer Network	NA	Staff reporter	Online
11/5/2015	Hoeven pushes for national lab, university partnerships for clean energy	Prairie Business Magazine	NA	Staff reporter	Online

- Attended a Global CCS Institute Webinar entitled “Lessons Learned on CO₂ Storage from the Midwest Regional Carbon Sequestration Partnership Program,” hosted by Battelle on December 8, 2015.
- Attended CO₂ Conference Week held December 8–11, 2015, in Midland, Texas, which included a field trip to the Seminole San Andres Unit (SSAU) project.
- Attended a presentation entitled “Smart Waterflood in Carbonates: A Promising IOR Method?,” presented December 10, 2015, in Grand Forks, North Dakota, by Professor Hemanta Sarma, Oil and Gas Engineering, Department of Chemical & Petroleum Engineering, University of Calgary, Alberta, Canada.
- Participated in Shell Canada Webinar entitled “Building Social License and a Regulatory Framework: The Quest CCS Project” on October 20, 2015.
- With regard to the U.S. Environmental Protection Agency (EPA) UIC (underground injection control) Class II Transition to Class VI:
 - Witnessed the passing of a resolution presented by North Dakota regulators asking EPA to clarify the rules of Class VI wells at the IOGCC Annual Meeting in Oklahoma City, Oklahoma, September 26 – October 1, 2015.
- Continued gathering information for D76 (once considered a value-added report) on the rules, regulations, and statutes crosswalk and flowchart for various scenarios of CCS geologic storage and for CO₂ EOR for each of the PCOR Partnership states and provinces. Continued searching PCOR Partnership states and provinces for contact information for oil and natural gas and carbon capture, use, and storage regulators.
 - Continued work on preparing descriptor language and flowcharts of North Dakota injection well permitting requirements.
 - E-mailed all PCOR Partnership region regulatory contacts requesting assistance and received various e-mail responses. Spoke with a few contacts.
 - Contacted Iowa and U.S. EPA Region 7 contacts.
 - Continued review of Alberta’s permitting process.
 - Began review of Missouri Oil and Gas regulations.
 - Prepared the Wyoming injection well and UIC permitting rules/regulations/statutes flowchart and drilling regulatory crosswalk. Continued refinement and consolidation.

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:

- Developed sidebars for DOE’s site characterization BPM. Submitted five 1-page sidebars highlighting case studies from the PCOR Partnership’s experience to the DOE BPM lead for consideration of inclusion in the BPM:
 - Considerations for Proper Estimation of CO₂ Storage Resource in Deep Saline Formations
 - Using Outcrop Data to Provide Insight into Subsurface Regional Structure, Facies, and Heterogeneities – An Example from the Bell Creek Oil Field
 - The Importance of Drilling a new Exploratory Well to Better Understand the Subsurface – An Example from the Fort Nelson Project
 - The Components of Constructing a Geocellular Model for Determining CO₂ Storage Resource – An Example from the Aquistore Project
 - The Significance of Dynamic Modeling for Refining Storage Capacity, Assessing Risk, and Addressing Permit Requirements – An Example from the Aquistore Project
- Reviewed a draft chapter entitled “Detailed Characterization” that will be included in the updated DOE site characterization BPM. Comments will be provided to the group lead.
- Continued work on developing the outline and format of the PCOR Partnership site characterization BPM (D35).
- **Bell Creek** test site activities included the following:
 - With regard to **geomechanical** efforts, the following activities occurred:
 - ◆ Continued investigating the potential application of FLAC3D and COMSOL software to the geomechanical simulations.
 - ◆ Continued examining the functionality of Computer Modelling Group’s (CMG’s) GEM software to determine if the simulation process can be improved.
 - ◆ Continued updating the rock mechanical properties of the 3-D MEM, including the Young’s Modulus, Poisson’s Ratio, unconfined compressive strength, and in situ stresses, using log data (e.g., pulsed-neutron logs [PNL], gamma ray [GR], density [RHOB], distributed transaction coordinator [DTC], and distributed temperature system [DTS]) and Petrel software.
 - ◆ Began studying the 3-D seismic AVO (amplitude variation with offset) inversion process for understanding stress regimes using the Hampson–Russell seismic processing software package.

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:

- Attended the American Institute of Chemical Engineers (AIChE) 2015 Annual Meeting held November 9–13, 2015, in Salt Lake City, Utah. Presented a talk entitled “The Effects of Variation in CO₂ Stream Composition and Flow Rate on Enhanced Oil Recovery and Geologic Storage” based on work that was originally performed under an International Energy Agency Greenhouse Gas R&D Programme (IEAGHG) contract with DOE cofunding, but the topic is also applicable to PCOR Partnership D45 (Bell Creek Test Site – Infrastructure Development Report), which is due March 31, 2016. The information presented in Salt Lake City will continue to be updated for inclusion in D45. The DOE project manager for the IEAGHG–DOE project approved the presentation. At the conference, sessions on CO₂ capture and geologic storage were attended.
- Prepared and submitted a value-added report entitled “Assessing Temporary Storage Options to Manage Variable-Rate CO₂ Emissions for Use During Enhanced Oil Recovery” on October 8, 2015. The report and manuscript were approved by PCOR Partnership Program Manager Andrea Dunn on October 30, 2015. The authors plan to submit the manuscript for possible publication in *Energy & Environmental Science* and have been determining appropriate reviewer names to submit with the manuscript.
- Continued work on an updated version of the CO₂ capture technologies value-added report. Added summaries for several technologies that were not included in the first version of the capture technology overview. Information for the technologies was found in the presentations from the 2014 and 2015 DOE NETL capture technology meetings as well as literature searches.
- Provided information about injection site infrastructure to another PCOR Partnership researcher.
- Researched the CCS CO₂ tax credit for a partner who inquired.
- Met with an EERC researcher to discuss oilfield surface facilities that are used during CO₂ recycling.

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 – CO₂ Procurement

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

Task 8 – Transportation and Injection Operations

This task ended Quarter 4, BP4, Year 8 (September 2015).

Task 9 – Operational Monitoring and Modeling

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

- Participated in the Research Partnership to Secure Energy for America (RPSEA) Interactive Workshop Focusing on Induced Seismicity held November 3–5, 2015, in Houston, Texas.
- Attended and presented at the AIChE 2015 Annual Meeting held November 9–13, 2015, in Salt Lake City, Utah.
- Attended the Carbon Management Technology Conference held November 17–19, 2015, in Sugar Land, Texas.
- Attended the 2015 IEAGHG R&D Carbon Capture and Storage Summer School held December 6–12, 2015, in Perth, Australia.
- Attended the Global CCS Institute Webinar “Lessons Learned on CO₂ Storage from the Midwest Regional Carbon Sequestration Partnership Program,” hosted by Battelle on December 8, 2015.
- Attended CO₂ Conference Week held December 8–11, 2015, in Midland, Texas, where we presented “Laboratory Studies of MMP (minimum miscibility pressure) and Hydrocarbon Mobilization in Conventional and Bakken Plays using CO₂, Methane, and Ethane” during Theme Session 3: “CO₂ Flooding Case Histories.”
- Prepared and submitted an abstract entitled “How Green Is My Oil? A Detailed Look at Carbon Accounting for CO₂ Enhanced Oil Recovery Sites (CO₂ EOR)” for the Carbon Capture, Utilization, and Storage (CCUS) Conference to be held June 14–15, 2016.
- Began preparing abstracts for GHGT-13 regarding PCOR Partnership activities to be sent to Denbury for comment. Denbury personnel will be coauthors on each of these abstracts (tentatively titled):
 - “Monitoring 2.5 million tonnes of CO₂ at the Bell Creek Oil Field”
 - “Impact of CO₂ Impurity on MMP and Oil Recovery Performance of Bell Creek Oil Field”
 - “4-D Seismic Monitoring Enhances Geological Interpretation, Reservoir Simulation, and Production Operations”
- Submitted Milestone (M) 53 Entitled “Bell Creek Test Site – Expanded Baseline and Time-Lapse 3-D Surface Seismic Survey Completed” on December 17, 2015. Received DOE approval on December 18, 2015.
- Began work on M54 entitled “Initial Processing and Analysis of Historic InSAR Data Completed.”
- Held Linux training led by Guru Labs at the EERC November 2–6, 2015. The purpose of this training was to better understand the Linux operating system that is installed on the

geophysics processing workstation, improving efficiency when using the workstation. Several staff members working on the Bell Creek project attended.

- Attended the CMG Webinar “The Role of Coupled Geomechanical Modelling in Reservoir Simulation” on Wednesday, November 18, 2015.
- With regard to DOE BPMs:
 - DOE BPM for MVA:
 - ◆ Reviewed and provided comments on draft Chapters 1 and 3.
 - ◆ Developed and submitted five PCOR Partnership call-out boxes to the RCSP group for consideration of inclusion in the BPM:
 - Pulsed-Neutron Log Use Within a Monitoring, Verification, and Accounting (MVA) Program
 - Using Near-Real-Time History Matching to Guide MVA Deployment
 - Designing an MVA Program to Reduce Risk and Meet Regulatory Requirements
 - PNL and Seismic Monitoring Integration for Risk Reduction
 - Periodic Surface 3-D Seismic Surveys
 - DOE Carbon Storage and Well Management Systems BPM:
 - ◆ Reviewed and submitted comments for the Introduction chapter to the BPM working group.
 - ◆ The PCOR Partnership revised and submitted Chapter 5 – Injection Operations on December 31, 2015. Included were three PCOR Partnership-related call-out boxes entitled:
 - Formation Pressure Testing for Reservoir Analysis
 - Landowner Relations
 - Consideration of Wildlife During CCS Project Planning
 - ◆ Participated in the DOE Carbon Storage Systems and Well Management BPM conference call. Received writing assignments and a time line for draft completion of the document by February 29, 2016.
- Continued work on developing the outline and format/structure of the PCOR Partnership MVA BPM.
- Initiated detailed planning and scope of work for Bell Creek life cycle assessment. The EERC will lead this effort with support from a consultant at CETER.
- Continued **Bell Creek** site activities, including the following:
 - Began preparation for meetings with Denbury in Plano, Texas, scheduled for January 6, 2016. Agenda items include Bell Creek D21 documentary planning and scheduling of interviews, Bell Creek life cycle assessment, PNL (pulsed-neutron logging) planning, seismic processing and interpretation update (Denbury and EERC presentations) and planning a path forward, update on initial InSAR processing, and revised time line and path forward for outstanding PCOR Partnership products under Denbury review.
 - Used the most recent publicly available data to determine that cumulative total CO₂ gas injection is 3,848,446 metric tons through October 31, 2015. This value represents the total gas volume injected, which includes purchase and recycle streams and is NOT corrected for a gas composition of approximately 98% CO₂ (Table 9). It should be noted that there were two injection wells that had cumulative data added to the

Table 9. Bell Creek CO₂ Gas Injection Totals for October 2015 (cumulative totals May 2013 to October 2015)*

	October 2015 Injection
Total, Mscf	3,720,906
Total, U.S. tons [†]	121,830
Total, metric tons [†]	193,264
Cumulative Total, Mscf [‡]	74,094,137
Cumulative Total, U.S. tons ^{†‡}	4,238,068
Cumulative Total, metric tons ^{†‡}	3,848,446

Source: MBOG database.

* There has been a lag in posting of injection/production volumes to the MBOG database. Total gas injection volumes are **NOT CORRECTED** for gas composition and include the combined purchased and recycled gas streams.

[†] 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.

- Montana Board of Oil and Gas (MBOG) database during the October 2015 injection updates for this monthly reporting period; these cumulative totals consequently updated previous months' (March 2014 until current) totals.
- As of December 31, 2015, the most recent month of record, 2.807 million tonnes of total gas (composition of approximately 98% CO₂) has been purchased for injection into the Bell Creek Field, equating to an estimated 2.753 million tonnes of CO₂ stored (Table 10), with the difference comprising other trace gases in the purchase gas stream. A separate methodology from that used to calculate total gas injected was used to calculate a cumulative associated CO₂ storage volume estimate by correcting the gas purchase volume (approximately 98% CO₂) obtained from Denbury's custody transfer meter with gas compositional data.
- Continued mixing methane–CO₂ ratios to fill in the gaps in the related MMP laboratory experiments.
- Continued repeat analyses of miscible-phase sampling of mobilized hydrocarbons using methane, CO₂, and ethane at Bell Creek reservoir conditions.
- Integrated the methane and CO₂ MMP measurements to the simulation. Different percentages of methane in CO₂ were simulated to compare oil recovery efficiency in Bell Creek Phases 1 and 2.
- Discussed internally options for publication of our MMP method and results in a journal article.
- Oil samples were authorized by Denbury to be shipped from Houston to the EERC for use in a hysteresis study to be performed on core plugs from wells 33-14, 56-14, and/or 05-06 OW (observation well).
- With regard to **modeling** and dynamic reservoir pressure and multiphase fluid flow **simulation** efforts:
 - ◆ Consistent progress since April 2011.
 - ◆ Worked on simulation cases in the updated Phases 1 and 2 combined model update.
 - ◆ Simulated and compared ten cases for recycled gas flooding in Phase 1 and 2 areas.

Table 10. Cumulative Total Gas Purchased and Estimated Associated CO₂ Storage Volumes for the Bell Creek Field¹

	December 2015 Gas Volume
Monthly Total Gas Purchased, MMscf ²	1717
Monthly Total Gas Purchased, million tons ²	0.098
Monthly Total Gas Purchased, million tonnes ²	0.089
Cumulative Total Gas Purchased, MMscf ^{2,3}	54,034
Cumulative Total Gas Purchased, million tons ^{2,3}	3.091
Cumulative Total Gas Purchased, million tonnes ^{2,3}	2.807
Cumulative Total CO ₂ Stored, MMscf ^{3,4}	53,003
Cumulative Total CO ₂ Stored, million tons ^{3,4}	3.032
Cumulative Total CO ₂ Stored, million tonnes ^{3,4}	2.753

¹ Conversion factors of 17.483 Mscf/ton and 19.253 Mscf/tonne were used to calculate volumes.

² Total gas purchased volumes are **NOT CORRECTED** for gas composition.

³ Cumulative totals are for the period from May 2013 to the month listed.

⁴ Total gas CO₂ stored volumes are **CORRECTED** for gas composition.

- ◆ Constructed a Phase 3–7 dynamic model (from Version [V] 2 full-field model) for predictive simulations.
- ◆ Processed well perforation data and production history data for Phases 3–6.
- ◆ Continued matching production history in the Phase 3 area for the primary depletion stage. Separated the Phase 3 simulation model area with the 100-ft × 100-ft grid. Model executes more quickly than the Phases 3–6 model, but gas production is not matched. Divided the large-scale field model into five regional-phase-scale models.
- ◆ Worked on the new Bell Creek simulation model for development Phases 3–6, including upscaling the static model from 100-ft × 100-ft cells to 300 ft × 300-ft cells to allow faster simulation time. The model is able to run; however, simulations are slow. Numerical tuning will be performed to help the simulations run more efficiently. The model will be history-matched and used for predictive simulations as well as consistency comparisons with the finer grid model.
- ◆ Worked on analyzing 3-D seismic data, including creating difference maps and preparing for joint 4-D inversion using the baseline and monitoring datasets.
- ◆ Continued 4-D seismic analysis on the October 2014 monitor survey, including technical parameterization of fluid substitution modeling, seismic properties estimation, and crossplotting. Prepared a presentation for Denbury meetings in Plano, Texas, in January 2016.
- ◆ Continued horizon interpretation and quality control for 4-D analysis.
- ◆ Modified the reservoir properties in Phases 1 and 2 areas of the V3 geologic model update.
- ◆ Renewed a software license for COMSOL Multiphysics and Subsurface Flow module. This simulation software has multiple applications, one of which is simulation of fluid flow in the subsurface.
- With regard to **injection-phase seismic** efforts:
 - ◆ Continued passive seismic monitoring of 04-03 OW using the borehole seismic array:

- o Continuous operation since May 22, 2013.
 - o Remotely restarted the passive seismic monitoring system after a crash. The system is currently up and running.
- With regard to **injection-phase PNL** activities:
 - ◆ Completed the fall 2015 enhanced PNL program. Successfully completed logging 17 of the 18 proposed wells. 34-09 was planned but not logged because of an unknown restriction in the wellbore that was encountered, which prevented logging the zone of interest.
 - o Held multiple conference calls with the Denbury Operations Team and Schlumberger Logging Team to discuss and plan field operations for this upcoming campaign with a focus on service quality and efficiency.
 - o Hosted a strategic operations planning meeting and WebEx in conjunction with Denbury's Bell Creek operations/productions engineering team, Schlumberger operations and service quality teams, and EERC oilfield and operations management teams to develop and modify a standard operating procedure (SOP) for the fall 2015 enhanced PNL campaign. This SOP was developed to ensure service quality and mitigate the tighter clearance in some of the wells that will be logged by following ALARA (as low as reasonably achievable) principles regarding operational risk.
 - o Wellsite management from Denbury, Schlumberger, and the EERC were active for this campaign to better ensure quality of service with SOP compliance.
- With regard to **injection-phase sampling** activities:
 - ◆ Travel for Bell Creek activities:
 - o Traveled to Gillette, Wyoming, for near-surface sampling at the Bell Creek site, October 25 – November 1, 2015.
 - o Traveled to Gillette, Wyoming, for site work at the Bell Creek oil fields, October 26 – November 5, 2015.
 - o Traveled to Gillette, Wyoming, for site work at the Bell Creek oil fields, November 1–13, 2015.
 - o Traveled to Gillette, Wyoming, for site work at the Bell Creek oil fields, November 16–19, 2015.
 - o Traveled to Gillette, Wyoming, for site work at the Bell Creek oil fields, December 7–11, 2015.
 - ◆ Continued reservoir pressure and distributed temperature monitoring of the 05-06 OW from the permanent downhole monitoring (PDM) system using the casing–conveyed pressure–temperature gauges (PTGs) and fiber optic DTS:
 - o Continuous operation since April 2012.
 - o Successfully installed replacement PROMORE 05-06 OW PTG interrogator (part of the PDM system), which was necessary because of persistent communication issues while downloading data. Sent the original interrogator that was replaced back to PROMORE as an exchange, and PROMORE will download and send the data from the replaced unit.
 - o Reviewed and processed PDM data.
 - ◆ Activities completed from the annual full-field Bell Creek MVA sampling event (August 24–28, 2015):

- o Completed the soil gas data compilation and quality assurance/quality control (QA/QC).
- o Completed, reviewed, and printed/bound the landowner groundwater results packages for the August 2015 sample event and provided to Denbury for review.
- ◆ With regard to the November 2015 Bell Creek Field groundwater and soil gas sample event (October 26 – November 2) (NOTE: this is currently the last planned full-field near-surface operational monitoring event):
 - o Collected over 180 gas samples, completed field parameter measurements for 12 shallow groundwater and two Fox Hills Formation groundwater locations, and sampled one shallow groundwater sample for laboratory analyses.
 - o Completed soil gas sample analyses on gas bag samples.
 - Continued QA/QC on gas bag analyses.
 - Processing is under way.
 - o Continued water sample analyses.
 - o Completed laboratory analyses on one shallow groundwater sample.
 - Processing is under way.
 - o Received confirmation of landowners' desire to continue the sampling events.
- ◆ With regard to the Bell Creek site visit November 16–20, 2015:
 - o Distributed landowner results packages.
 - o Met with Denbury personnel regarding future sample strategies.
 - o Collected oil samples from two Phase 1 wells.
 - Submitted oil samples from 05-06 and 56-14 wells for analyses.
 - o Collected field parameter measurements as well as sampled the two Fox Hills Formation groundwater locations for laboratory analyses.
 - Analyses are complete.
 - Processing is under way.
- ◆ With regard to the Bell Creek site visit December 7–11, 2015:
 - o Borehole array computers were powered down, removed, dismantled, and cleaned, and a hardware issue was fixed. Computers were reinstalled and brought back online. New satellite provider equipment was installed and remote access tested.
- ◆ Developed a list of interview questions to discuss with landowners regarding the level of engagement pertaining to PCOR Partnership field activities and to solicit input on how engagement could be improved for future activities or at future CCUS sites. It is expected that these results will be used to improve future outreach and be incorporated into outreach best practices, where applicable.
- ◆ Completed analysis of the purchase and recycle gas stream samples collected on September 16–17, 2015 (Table 11). Four samples from the purchase gas stream and four samples from the recycle gas stream were collected to investigate short-term variability in the injected gas composition in order to provide improved gas composition estimates for calculating CO₂ storage volumes and to improve predictive reservoir simulations.
- ◆ Continued working with Denbury personnel on oil and gas samples from three wells in Phase 1 and purchase/recycle gas sampling (timing/frequency).

Table 11. Oil and CO₂ Gas Stream Sampling and Analyses

Stream(s)	Dates Sampled
Production: Oil and CO ₂ Gas ¹	Sept 2014, ² Nov/Dec 2014, Jan 2014, ³ March 2015, July 2015
Purchase/Recycle: CO ₂ Gas ⁴	May 2014, ⁵ June 2014, July 2014, Sept 2014, Oct 2014, April 2015, July 2015, Sept 2015

¹ Wells 56-14R, 32-02, and 05-06 unless otherwise noted; ² Wells 56-14R and 32-02 only; ³ Well 05-06 only;

⁴ Both purchase and recycle streams unless otherwise noted; ⁵ Purchase stream only.

- With regard to the **Fort Nelson** project:
 - The Fort Nelson demonstration site work under Task 9 was discontinued in October 2015.

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

- Submitted notification on October 7, 2015, that the co-task leaders for Task 9 are John Hamling and Larry Pekot.
- The Fort Nelson test site Subtask 9.2.2 – Implementation of Monitoring Plan was eliminated, effective October 2015, since the demonstration was suspended. D53 “Fort Nelson Test Site – Best Practices Manual – Monitoring for CO₂ Storage in a Brine Formation” and D70 “Fort Nelson Test Site – Best Practices Manual – Simulation” were also eliminated from the scope of work.
- During maintenance of the Qorex system, a fault was identified in the interrogator system that appears to have been caused by an electrical short resulting in the system becoming nonoperational. Contacted Qorex and determined the system is out of warranty. Qorex advised on how to disconnect from the fiber-optic line. Returned the faulty 05-06 OW Qorex interrogator to the EERC for troubleshooting. Dismantled the panel housing and identified the shorted component that led to extensive damage to one of the main circuit boards. Investigating options to repair/replace the circuit board pending cost estimates.
- With regard to the fall 2015 enhanced PNL program, we were unable to log 34-09 because of fill in the bottom of the well preventing the logging of the reservoir, thus limiting the usefulness of logging this well. The overall knowledge gained and benefit of the logging campaign to PCOR Partnership activities in the Bell Creek Field is not expected to be significantly impacted.
- With respect to the purchase stream CO₂ composition, this value has now been corrected to 98% CO₂, which in previous monthly and quarterly reports was reported as being 96% CO₂. The issue was due, in part, to the presence of air contamination in the sampled gas bags from May–October 2014. The air contamination was present because of the configuration of the gas bag collection process where air in the fittings and tubing was allowed to enter the sample. To correct for this, the sample analyses were then normalized to remove the air contamination, yielding the higher CO₂ concentration. Subsequent sampling has been performed using Summa canisters, which allows for collection of the gas without allowing air contamination. The current analysis of samples utilizing this new

collection methodology has found the CO₂ concentration to be approximately 98%, adding credence to the previous normalized CO₂ values.

- A software bug associated with the 4-D seismic analysis was reported to Hampson–Russell. An upgrade to latest beta version was performed to address the bug. Hampson–Russell is reissuing our software license to accommodate an upgrade to its latest software version.
- Unsuccessfully attempted to remotely fix the auto updater for accessing the status of the borehole array computer. This will be fixed during the next field trip currently scheduled for January 2016.

Task 10 – Site Closure

This task is anticipated to be initiated in Quarter 3, BP5, Year 9 (April 2016).

Task 11 – Postinjection Monitoring and Modeling

This task is anticipated to be initiated in Quarter 3, BP5, Year 9 (April 2016).

Task 12 – Project Assessment

Significant accomplishments for Task 12 for the reporting period included the following:

- Submitted D57 entitled “Annual Assessment Report” on December 31, 2015.

Task 13 – Project Management

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

- A letter was sent on October 26, 2015, to notify DOE that the status of the PCOR Partnership Phase III CO₂ injection demonstration project located near Fort Nelson, British Columbia, Canada, has changed to a “suspended” status. The PCOR Partnership suggested DOE remove the Phase III Demonstration Site designation from the Fort Nelson CCS project.
- Submitted notification that the co-task leaders for Task 9 are John Hamling and Larry Pekot.
- Attended the Carbon Capture Sequestration and the Carbon Capture Utilization Working Group meeting held December 2–3, 2015, in Austin, Texas (Figure 7). The meeting was part of the North American Energy Ministers’ Working Group on Climate Change and Energy created in 2014 by Mexican Secretary of Energy Pedro Joaquin Coldwell, U.S. Secretary of Energy Ernest J. Moniz, and then Canadian Minister of Natural Resources Greg Rickford (since replaced by James Carr).



Figure 7. Attendees at the Carbon Capture Sequestration and the Carbon Capture Utilization Working Group meeting held December 2–3, 2015, in Austin, Texas.

- Attended the Intelligent Monitoring Systems Project Kickoff Meeting and provided an update on the PCOR Partnership Program on December 2–3, 2015, in Pittsburgh, Pennsylvania.
- Attended the PCOR Partnership continuation application meeting held December 4, 2015, in Morgantown, West Virginia.
- Attended CO₂ Conference Week held December 8–11, 2015, in Midland, Texas.
- Prepared and submitted an abstract entitled “The Plains CO₂ Reduction Partnership: Guiding CCS Deployment in Central North America” for the CCUS Conference, to be held June 14–16, 2016.
- Continued revising the project management plan accordingly for the BP4 extension.
- Continued working on the PCOR Partnership BP5 continuation application. Worked on reviewing/revising the Gantt chart, current deliverables and milestones, statement of project objectives (SOPO), task budgets, and an overview presentation of BP5 activities for discussion.
- Met with consultants from CETER to discuss their involvement in several PCOR Partnership tasks and get updates on the progress of several ongoing efforts.
- Participated in DOE’s BPMs’ synergistic Webinar in October 2015 with BPM leads from DOE and other partnerships. Participated in the DOE BPM Synergy Webinar on December 10, 2015.
- Participated in the RCSP “Designing, Drilling, and Operating CCS Wells” BPM conference call.
- Reviewed the DOE risk analysis BPM draft. Comments were provided to the BPM working group leads.
- Participated in National Risk Assessment Partnership (NRAP) beta tool Webinars (IAM-CS model, NSealR, REV tool, Design for Risk Evaluation and Monitoring, Wellbore Leakage Analysis Tool, Aquifer Impact Model, Short-Term Seismic Forecasting Tool,

and RROM-Gen tools). We are testing several of the beta tools and are attending the corresponding Webinars.

- Held a task leader meeting October 9, 2015. Topics discussed included a recap of the PCOR Partnership Annual Meeting, the BP4 extension, the Shell Quest project, the PCOR Partnership BPMs, upcoming NRAP Webinars, Bell Creek and Aquistore project updates, upcoming meetings/conferences, and task leader updates.
- Held a task leader meeting November 20, 2015. Topics discussed included the BP5 continuation application, attendance at North Dakota public input meetings regarding EPA's Clean Power Plan, attendance at recent conferences and meetings, participation in NRAP Webinars, Bell Creek and Aquistore project updates, upcoming meetings/conferences, and task leader updates.
- Held a task leader meeting December 15, 2015. Topics discussed included the BP5 continuation application, abstracts for the upcoming CCUS and GHGT-13 conferences, Bell Creek and Aquistore project updates, upcoming meetings/conferences, and task leader updates.
- Held the second BPM writing workshop on November 10, 2015. Several EERC staff who will be working on the PCOR Partnership BPMs attended.
- Began planning the 2016 PCOR Partnership Annual Membership Meeting, including choosing a location (Grand Forks, North Dakota) and prospective dates.
- Continued planning for the spring 2016 Technical Advisory Board (TAB) meeting to be held in New Orleans, Louisiana, on April 4–6. Contacted TAB members with hotel block information.
- Distributed a summary of the September 2015 PCOR Partnership TAB meeting held in Chicago, Illinois (in conjunction with the PCOR Partnership Annual Membership Meeting) to the members.
- Sent out the press release regarding PCOR Partnership 2015 Pioneer Award winners.
- Upon request, supplied information regarding the PCOR Partnership Phase II Lignite Field Validation Test to Samuel Tam of DOE Headquarters.
- Received renewed licenses for several Schlumberger software packages.
- Deliverables and milestones completed in October:
 - September monthly update
 - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
 - Task 14: M23 – Monthly WWG Conference Call Held
- Deliverables and milestones completed in November:
 - October monthly update
- Deliverables and milestones completed in December:
 - November monthly update
 - Task 9: M53 – Bell Creek Test Site – Expanded Baseline and Time-Lapse 3-D Surface Seismic Survey Completed
 - Task 12: D57 – Annual Assessment Report

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

- A letter was sent on October 26, 2015, to notify DOE that the status of the PCOR Partnership Phase III CO₂ injection demonstration project located near Fort Nelson,

British Columbia, Canada, has changed to a “suspended” status. The PCOR Partnership suggested DOE remove the Phase III Demonstration Site designation from the Fort Nelson CCS project. Despite the change in status, significant accomplishments have come from DOE’s participation in the Fort Nelson CCS project. Funding originally designated for Fort Nelson efforts has been used to support PCOR Partnership participation in the Aquistore project. With DOE’s acceptance of the status change, the SOPO and project management plan are undergoing modifications.

Task 14 – RCSP WWG Coordination

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

- Submitted November 20, 2015, and received approval November 23, 2015, on a request to change the scope of work from working on a BPM (D80) to create and edit a special issue of *International Journal of Greenhouse Gas Control* (IJGGC) (D106) under a new subtask.
- With regard to the Special Issue of the IJGGC on the “Nexus of Water and Carbon Capture and Storage:”
 - Most of the articles have been submitted. A couple of authors have requested a brief extension; the EERC is working with Elsevier to accommodate that.
 - Reviewed submissions and assigned editors.
 - Continued development of a draft paper for the special journal issue of IJGGC on behalf of the WWG.
 - Continued review of the articles. Sent comments to authors.
- With regard to monthly conference calls (M23):
 - Held the monthly conference call on October 29, 2015. Discussed the list of topics/ideas for the DOE BPM additions, the plan and time line for developing the additions, and the status of submissions for the special journal of IJGCC on the Nexus of Water and CCS and the plan for the review process.
 - The November 2015 monthly conference call was rescheduled to December 2015 because of unavailability of participants.
 - Held the November/December WWG monthly conference call on December 8, 2015, to discuss progress of the special journal of IJGCC and DOE BPM sidebars related to WWG.
- Distributed notes from the October and December conference calls.
- With regard to WWG topics for DOE BPMs:
 - Continued review of DOE BPMs for inclusion of water-focused material. Prepared one-page draft/example document for the site characterization BPM. Continued work on water-focused sidebars.
 - Began drafting sidebars for the DOE BPMs and sent draft ideas to DOE.
 - Revised the list of potential WWG topics for DOE BPMs and reached out to the representatives for the BPMs.
- Continued collaborative efforts with CETER, including the following:
 - Discussed the special issue of IJGGC, including the peer review process, preliminary editor assignments, and a list of potential reviewers.

- Discussed potential ideas for DOE BPM sidebars and worked on an example of a call-out box addition to the DOE BPMs.

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

- Submitted November 20, 2015, and received approval November 23, 2015, on a request to change the scope of work from working on a BPM (D80) to create and edit a special issue of IJGGC (D106) under a new subtask.
- The November 2015 monthly conference call was rescheduled to December 2015 because of unavailability of participants.

Task 15 – Further Characterization of the Zama Acid Gas EOR, CO₂ 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. 33) budget along with actual costs incurred and in-kind cost share reported is shown in Table 12. A spending plan for BP4 and actual incurred cost by quarter of cash funds for BP4 are provided in Figure 8 and Table 13.

Table 12. Phase III Budget – BP4

Organization	Approved Budget,* \$	Actual Costs Incurred, \$
DOE Share – Cash	65,123,437	57,914,668
Nonfederal Share – Cash	2,411,971	2,991,641
Nonfederal Share – In-Kind	35,766,276	34,228,295
Total	103,301,684	95,134,604

*As of Modification No. 33.

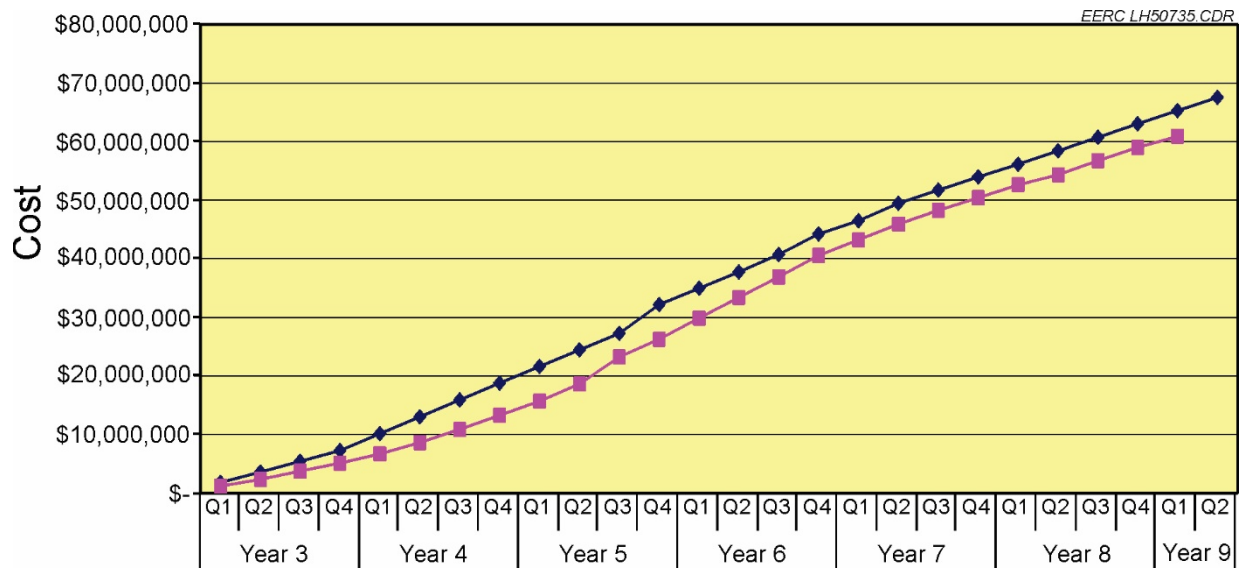


Figure 8. PCOR Partnership Phase III, BP4, Years 3–9 funding (cash only).

PHASE III SCHEDULE STATUS

Table 14 lists all deliverables and milestones by quarter, with completion dates, through the end of the reporting period (see Table 15 for the Gantt chart for BP4, Years 7–9).

Table 13. Phase III, BP4, Years 3–10 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	\$ 1,707,622	\$51,448,455	\$2,350,008	\$53,798,463	\$2,206,301	\$56,004,764
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	\$ 44,275	\$ 2,915,689	\$ 16,621	\$ 2,932,310	\$ 63,441	\$ 2,995,751
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	\$ 1,751,897	\$54,364,144	\$2,366,629	\$56,730,773	\$2,269,742	\$59,000,515
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	\$ 595,663	\$ 4,568,410	\$ (46,722)	\$ 4,521,688	\$ 96,985	\$ 4,618,673
NonFederal Share	\$ (62,881)	\$ (336,286)	\$ (14,980)	\$ (351,266)	\$ (15,096)	\$ (366,362)	\$ (90,494)	\$ (456,856)	\$ (2,587)	\$ (459,443)	\$ (44,275)	\$ (503,718)	\$ (16,621)	\$ (520,339)	\$ (63,441)	\$ (583,780)
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	\$ 551,388	\$ 4,064,692	\$ (63,343)	\$ 4,001,349	\$ 33,544	\$ 4,034,893

Continued . . .

Table 13. Phase III, BP4, Years 3–10 Spending Plan (continued)

Baseline Reporting Quarter	Year 9								Year 10							
	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	\$2,250,000	\$62,873,437	\$ 2,250,000	\$65,123,437	\$ 1,611,384	\$66,734,821	\$1,611,384	\$68,346,205	\$1,611,384	\$69,957,589	\$ 1,611,385	\$71,568,974	\$1,611,385	\$73,180,359	\$1,611,385	\$74,791,744
Non-Federal 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	\$2,250,000	\$65,285,408	\$ 2,250,000	\$67,535,408	\$ 1,611,384	\$69,146,792	\$1,611,384	\$70,758,176	\$1,611,384	\$72,369,560	\$ 1,611,385	\$73,980,945	\$1,611,385	\$75,592,330	\$1,611,385	\$77,203,715
Actual Incurred Cost																
Federal Share	\$1,909,898	\$57,914,662														
Non-Federal Share	\$ (4,110)	\$ 2,991,641														
Total Incurred Cost	\$1,905,788	\$60,906,303														
Variance																
Federal Share	\$ 340,102	\$ 4,958,775														
Non-Federal Share	\$ 4,110	\$ (579,670)														
Total Variance	\$ 344,212	\$ 4,379,105														

Table 14. 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 14. 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 14. 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 14. 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 14. 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 14. 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 14. 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
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 14. 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 14. 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 14. 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: Task 14 – 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

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Table 14. 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	1/30/15
D32: Task 4 – Bell Creek Test Site – Geomechanical Report (Update 1)	1/31/15	1/28/15
M23: Task 14 – Monthly WWG Conference Call Held	1/31/15	1/27/15
M23: Task 14 – Monthly WWG Conference Call Held	2/28/15	2/26/15
D25: Task 2 – Bell Creek Test Site Poster (update)	3/31/15	2/5/15
M23: Task 14 – Monthly WWG Conference Call Held	3/31/15	3/25/15
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/15	3/31/15

Continued . . .

Table 14. 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	4/29/15
M23: Task 14 – Monthly WWG Conference Call Held	4/30/15	4/28/15
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/15	6/1/15
M23: Task 14 – Monthly WWG Conference Call Held	5/30/15	5/28/15
D85: Task 6 – Report – Opportunities and Challenges Associated with CO ₂ Compression and Transportation During CCUS (carbon capture, utilization, and storage) Activities (update)	5/31/15	5/29/15
M23: Task 14 – Monthly WWG Conference Call Held	6/30/15	6/23/15
M49: Task 9 – Bell Creek Test Site – 1.5 Million Metric Tons of CO ₂ Injected	6/30/15	6/30/15
Year 8 – Quarter 4 (July–September 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/15	7/31/15
M23: Task 14 – Monthly WWG Conference Call Held	7/31/15	Waived by DOE
M50: Task 9 – Bell Creek Test Site – 2 Years of Near-Surface Assurance Monitoring Completed	7/31/15	7/21/15
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/15	8/27/15 Exec. Sum.
M23: Task 14 – Monthly WWG Conference Call Held	8/31/15	Waived by DOE
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	8/31/15
D1: Task 1 – Review of Source Attributes (update)	9/30/15	9/23/15
D8: Task 3 – Permitting Review – Update 2	9/30/15	9/30/15
D49: Task 8 – Bell Creek Test Site – Transportation and Injection Operations Report	7/31/15	9/29/15
M23: Task 14 – Monthly WWG Conference Call Held	9/30/15	9/30/15
Year 9 – Quarter 1 (October–March 2015)		
D59/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/15	10/31/15
M23: Task 14 – Monthly WWG Conference Call Held	10/31/15	10/29/15
M23: Task 14 – Monthly WWG Conference Call Held	11/30/15	Waived by DOE
D57: Task 12 – Project Annual Assessment Report	12/31/15	12/31/15
M24: Task 14 – WWG Annual Meeting Held	12/31/15	8/20/15
M53: Task 9 – Expanded Baseline and Time-Lapse 3-D Surface Seismic Survey Completed	12/31/15	12/17/15

Continued . . .

Table 14. 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	
M23: Task 14 – Monthly WWG Conference Call Held	1/31/16	
M54: Task 9 – Initial Processing and Analysis of Historic InSAR Data Completed	1/31/16	
D14: Task 2 – General Phase III Fact Sheet (update)	2/29/16	
D93: Task 1 – Geological Modeling and Simulation Report for the Aquistore Project (Update 2)	2/29/16	
M23: Task 14 – Monthly WWG Conference Call Held	2/29/16	
D11: Task 2 – Outreach Plan (update)	3/31/16	
D45: Task 6 – Bell Creek Test Site – Infrastructure Development 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	
M56: Task 9 – Life Cycle Analysis for Primary and Secondary Recovery Oil Completed	3/31/16	
M58: Task 9 – Bell Creek Test Site – Completion of 2.75 Million Metric Tons of CO ₂ Stored	3/31/16	
Year 9 – Quarter 3 (April–June 2016)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/16	
D15: Task 2 – Bell Creek Test Site Fact Sheet (update)	4/16/16	
D16: Task 2 – Fort Nelson Test Site Fact Sheet (update)	4/30/16	
D21: Task 2 – Bell Creek Test Site 30-minute Documentary	4/30/16	
D56: Task 11 – Report – Cost-Effective Long-Term Monitoring Strategies for the Fort Nelson Test Site	4/30/16	
M23: Task 14 – Monthly WWG Conference Call Held	4/30/16	
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/16	
D101: Task 14 – WWG Web Site Content Update 1	5/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	5/31/16	
M57: Task 9 – Life Cycle Analysis for EOR (enhanced oil recovery) at the Bell Creek Field Completed	5/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	6/30/16	

Continued . . .

Table 14. Phase III Milestones and Deliverables (continued)

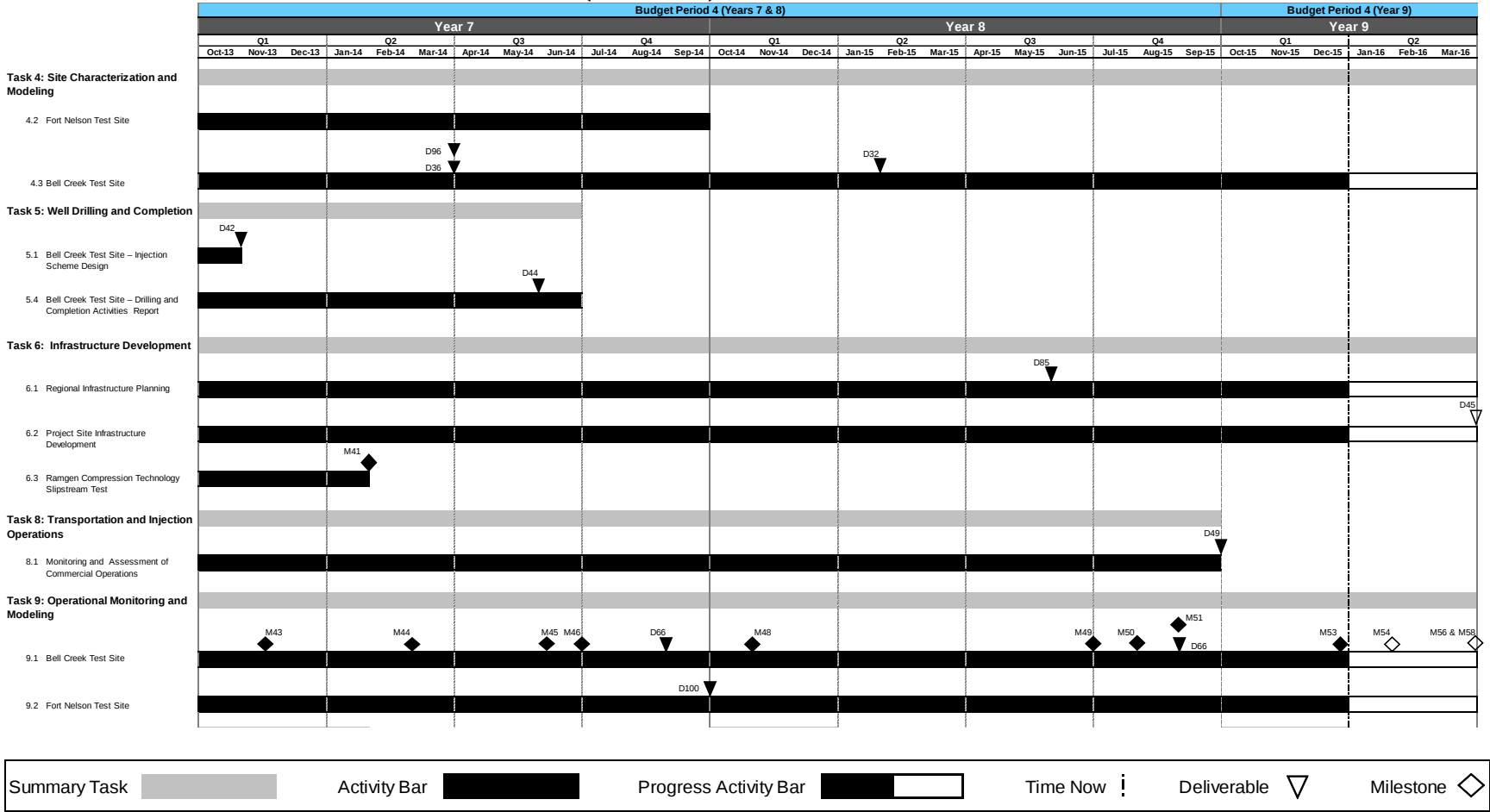
Title/Description	Due Date	Actual Completion Date
Year 9 – Quarter 4 (July–September 2016)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/16	
D13: Task 2 – Public Site Updates	7/31/16	
D22: Task 2 – Energy from Coal 60-minute Documentary	7/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	7/31/16	
D66: Task 9 – Bell Creek Test Site – Simulation Report (update)	8/31/16	
D81: Task 1 – Regional Carbon Sequestration Atlas (update)	8/31/16	
D102: Task 13 – Best Practices Manual – Adaptive Management Approach	8/31/16	
D103: Task 13 – Best Practices Manual – Programmatic Risk Management	8/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	8/31/16	
M59: Task 9 – Completed the PCOR Partnership Adaptive Management Approach Best Practices Manual	8/31/16	
D1: Task 1 – Review of Source Attributes (update)	9/30/16	
D55: Task 11 – Bell Creek Test Site – Cost-Effective Long-Term Monitoring Strategies Report	9/30/16	
D73: Task 11 – Bell Creek Test Site –Monitoring and Modeling Fate of CO ₂ Progress Report	9/30/16	
M23: Task 14 – Monthly WWG Conference Call Held	9/30/16	

Table 15. Phase III, BP4, Years 7–9 Gantt Chart



Continued . . .

Table 15. Phase III, BP4, Years 7–9 Gantt Chart (continued)



Continued . . .

Table 15. Phase III BP4, Years 7–9 Gantt Chart (continued)

Key for Deliverables ▼				Key for Milestones ◆	
D1	Review of Source Attributes	D57	Project Assessment Annual Report	M23	Monthly WWG Conference Call Held
D7	Third Target Area Completed	D58	Quarterly Progress Report	M24	WWG Annual Meeting Held
D8	Permitting Review – Update 2	D59	Milestone Quarterly Report	M36	Annual Advisory Board Meeting Scheduled
D11	Outreach Plan	D66	BC Test Site – Simulation Report	M41	Decision to Incorporate Ramgen Compression Technology into BC Project
D13	Public Site Updates	D85	Report – Opportunities and Challenges Associated with CO ₂ Compression and Transportation During CCUS Activities	M43	BC Test Site – First Full-Repeat Sampling of the Groundwater- and Soil Gas- Monitoring Program Completed
D14	General Phase III Fact Sheet	D86	Updated Regional Technology Implementation Plan for Zama	M44	BC Test Site – First 3-D VSP Repeat Surveys Completed
D17	General Phase III Information PowerPoint Presentation	D92	Report – Storage Capacity and Regional Implications for Large-Scale Storage in the Basal Cambrian System	M45	BC Test Site – First Full-Repeat of Pulsed-Neutron Logging Campaign Completed
D24	PCOR Partnership Region CO ₂ Storage General Poster	D93	Report – Geological Modeling and Simulation for the Aquistore Project	M46	BC Test Site – 1 Year of Injection Completed
D25	BC Test Site Poster (Update)	D96	BC Test Site – 3-D Seismic Acquisition and Characterization Report	M48	BC Test Site – 1 Million Metric Tons of CO ₂ Injected
D32	BC Test Site – Geomechanical Report	D99	Nexus of Water and CCS Fact Sheet	M49	BC Test Site – 1.5 Million Metric Tons of CO ₂ Injected
D36	BC Test Site – Wellbore Leakage Final Report	D100	FN Test Site – Best Practices Manual– Feasibility Study	M50	BC Test Site – 2 Years of Near-Surface Assurance Monitoring Completed
D42	BC Test Site – Injection Experimental Design Package	D101	WWG Web Site Content Update	M51	BC Test Site – Initial Analysis for First Large-Scale Repeat Pulsed-Neutron Logging Campaign Post-Significant CO ₂ Injection
D44	BC Test Site – Drilling and Completion Activities Report			M53	BC Test Site – Expanded Baseline and Time-Lapse 3-D Surface Seismic Survey Completed
D45	Report – Infrastructure Development			M54	BC Test Site – Initial Processing and Analysis of Historic InSAR Data Completed
D49	BC Test Site – Transportation and Injection Operations Report			M56	BC Test Site – Life Cycle Analysis for Primary and Secondary Recovery Oil Completed
				M58	BC Test Site – njection of 2.75 Million Metric Tons of CO ₂ Completed

January 2016

PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, two abstracts were submitted for presentation, and two oral presentations were given at nine different meetings/conferences/workshops. In addition, a quarterly progress report and two deliverables/milestones (one draft, one approved) were completed. In addition to the products cited below, staff also undertook six project management site trips. For more detail, see the Meetings/Travel section.

Abstracts

Submitted

Azzolina, N.A., Peck, W.D., Hamling, J.A., Gorecki, C.D., Melzer, L.S., and Nakles, D.V., 2015, How green is my oil? A detailed look at carbon accounting for CO₂ enhanced oil recovery sites (CO₂ EOR) [abs.]: Carbon Capture, Utilization & Storage Conference, Tyson, Virginia, June 14–16, 2015.

Gorecki, C.D., Ayash, S.C., Peck, W.D., Hamling, J.A., Sorensen, J.A., Daly, D.J., Jensen, M.D., Klapperich, R.J., Heebink, L.V., Pekot, L.J., Steadman, E.N., and Harju, J.A., 2015, The Plains CO₂ Reduction Partnership—guiding CCS deployment in central North America [abs.]: Carbon Capture, Utilization & Storage Conference, Tyson, Virginia, June 14–16, 2015.

Presentations

Gorecki, C.D., 2015, Plains CO₂ Reduction (PCOR) Partnership budget period 5 discussion: Presented at the Plains CO₂ Reduction (PCOR) Partnership budget period 5 discussion, Morgantown, West Virginia, December 4, 2015.

Peck, W.D., 2015, Plains CO₂ Reduction (PCOR) Partnership perspective: Presented at North American Energy Ministers Climate Change and Energy Collaboration—Advancing the Deployment of CCUS, Austin, Texas, December 1–3, 2015.

Deliverables/Milestones

Draft Submitted

Gorecki, C.D., Harju, J.A., Steadman, E.N., Heebink, L.V., Romuld, L., Hamling, J.A., Sorensen, J.A., Daly, D.J., Jensen, M.D., Peck, W.D., Klapperich, R.J., Votava, T.F., Pekot, L.J., Ayash, S.C., and Ensrud, J.R., 2015, Annual assessment report: Plains CO₂ Reduction (PCOR) Partnership Phase III Draft Task 12 Deliverable D57 (October 1, 2014 – September 30, 2015) 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.

Draft Submitted and Approved

Burnison, S.A., Hamling, J.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2015, Bell Creek test site—expanded baseline and time-lapse 3-D surface seismic survey completed: Plains CO₂

Reduction (PCOR) Partnership Phase III Task 9 Milestone 53 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2015-EERC-12-19; Grand Forks, North Dakota, Energy & Environmental Research Center, December.

Approved

Dotzenrod, N.W., Hamling, J.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2015, Bell Creek test site—initial analysis for first large-scale repeat pulsed-neutron logging campaign post-significant CO₂ injection completed: Plains CO₂ Reduction Partnership Phase III Task 9 Milestone M51 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2015-EERC-10-06, Grand Forks, North Dakota, Energy & Environmental Research Center, August.

Wilson IV, W.I., Doll, T.E., and Gorecki, C.D., 2015, Permitting review—Update 2: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 3 Deliverable D8 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2015-EERC-10-09, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Progress Reports

Monthlies

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Harju, J.A., Heebink, L.V., and Klapperich, R.J., 2015, Plains CO₂ Reduction (PCOR) Partnership: Phase III Monthly Report (September 1–30, 2015) 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., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Pekot, L.J., Harju, J.A., Heebink, L.V., and Klapperich, R.J., 2015, Plains CO₂ Reduction (PCOR) Partnership: Phase III monthly report (October 1–31, 2015) 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., Pekot, L.J., Harju, J.A., Heebink, L.V., and Klapperich, R.J., 2015, Plains CO₂ Reduction (PCOR) Partnership: Phase III monthly report (November 1–30, 2015) 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 2015.

Quarterlies

Gorecki, C.D., Harju, J.A., Steadman, E.N., Romuld, L., Sorensen, J.A., Daly, D.J., Hamling, J.A., Jensen, M.D., Peck, W.D., Klapperich, R.J., Heebink, L.V., Votava, T.J., and Pekot, L.J., 2015,

Plains CO₂ Reduction Partnership Phase III Task 13 Deliverable D58/59 Quarterly Technical Progress Report (July 1 – September 30, 2015) 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.

Meeting Minutes

Ayash, S.C., and Nakles, D., 2015, Minutes—summary of Plains CO₂ Reduction (PCOR) Partnership technical advisory board meeting: Chicago, Illinois, September 15, 2015.

Klapperich, R.J., 2015, Minutes—Regional Carbon Sequestration Partnerships Water Working Group conference call: September 30, 2015.

Klapperich, R.J., 2015, Minutes—Regional Carbon Sequestration Partnerships Water Working Group conference call: October 29, 2015.

Klapperich, R.J., 2015, Minutes—Regional Carbon Sequestration Partnerships Water Working Group conference call: December 8, 2015.

MEETINGS/TRAVEL

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

- September 26 – October 1, 2015: traveled to Oklahoma City, Oklahoma, to attend the IOGCC Annual Meeting.
- September 27 – October 1, 2015: traveled to Southampton, United Kingdom, to present at the IEAGHG Risk Management & Environmental Research Combined Network Meetings.
- October 20–22, 2015: Traveled to Columbus, Ohio, to attend the Midwest Regional Carbon Sequestration Partnership Partners Meeting.
- October 21–22, 2015: Traveled to Beulah, North Dakota, for an interview and filming at the Dakota Gasification Company and the Freedom Mine.
- October 25 – November 1, 2015: Traveled to Gillette, Wyoming, for site work at the Bell Creek oil fields.
- October 26 – November 5, 2015: Traveled to Gillette, Wyoming, for SASSA project work at the Bell Creek site.
- November 1–3, 2015: Traveled to Gillette, Wyoming, for site work at the Bell Creek oil fields.
- November 3–5, 2015: Traveled to Houston, Texas, for the Interactive Workshop Focusing on Induced Seismicity.
- November 8–13, 2015: Traveled to Salt Lake City, Utah, to attend the AIChE Annual Meeting.
- November 16–19, 2015: Traveled to Gillette, Wyoming, for site work at Bell Creek.

- November 17, 2015: Traveled to Fargo, North Dakota, to meet with PPB production staff to work on budgets, planning, and schedules for the upcoming documentaries.
- December 1–3, 2015: traveled to Austin, Texas, to attend the Carbon Capture Sequestration and the Carbon Capture Utilization Working Group meeting.
- December 1–4, 2015: traveled to Morgantown, West Virginia, to attend the PCOR Partnership continuation application meeting.
- December 6–12, 2015: traveled to Perth, Australia, to attend the 2015 IEAGHG R&D Carbon Capture and Storage Summer School.
- December 7–11, 2015: traveled to Gillette, Wyoming, to conduct maintenance on geophysics systems at the Bell Creek site.
- December 8–11, 2015: traveled to Midland, Texas, to attend CO₂ Conference Week.
- December 13–15, 2015: traveled to Ottawa, Ontario, Canada, to attend the Science & Engineering Research Committee meetings.

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