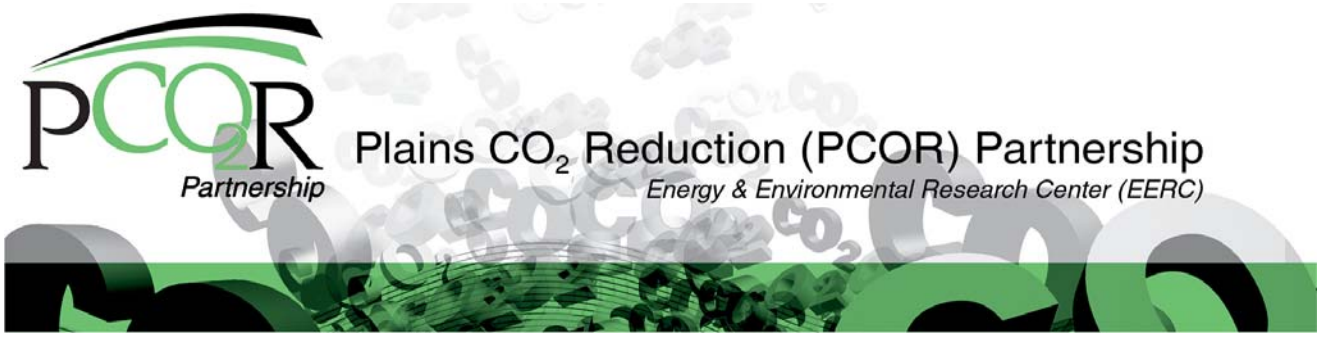

PLAINS CO_2 REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report
Task 13 – Deliverable D58/D59

(for the period July 1 – September 30, 2014)

Prepared for:

Federal Information Tracking System (FITS)
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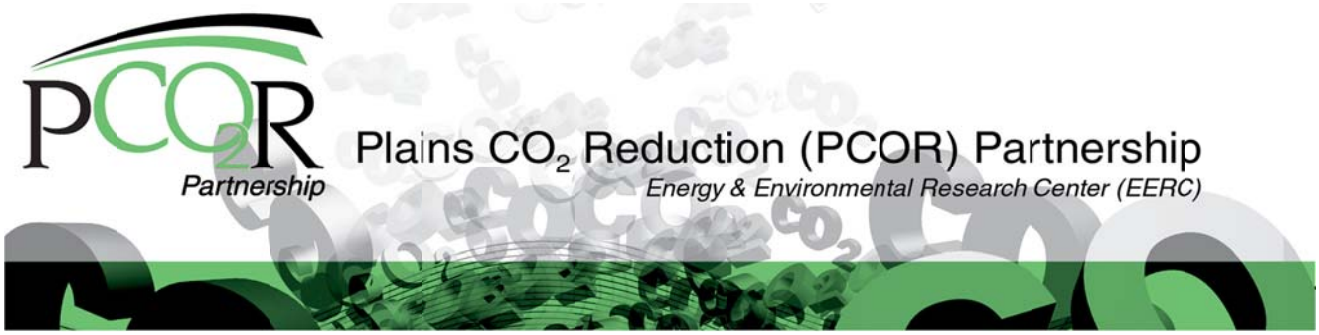
TABLE OF CONTENTS

Continued…

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES



PLAINS CO_2 REDUCTION PARTNERSHIP PHASE III
Quarterly Technical Progress Report
July 1 – September 30, 2014

EXECUTIVE SUMMARY

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

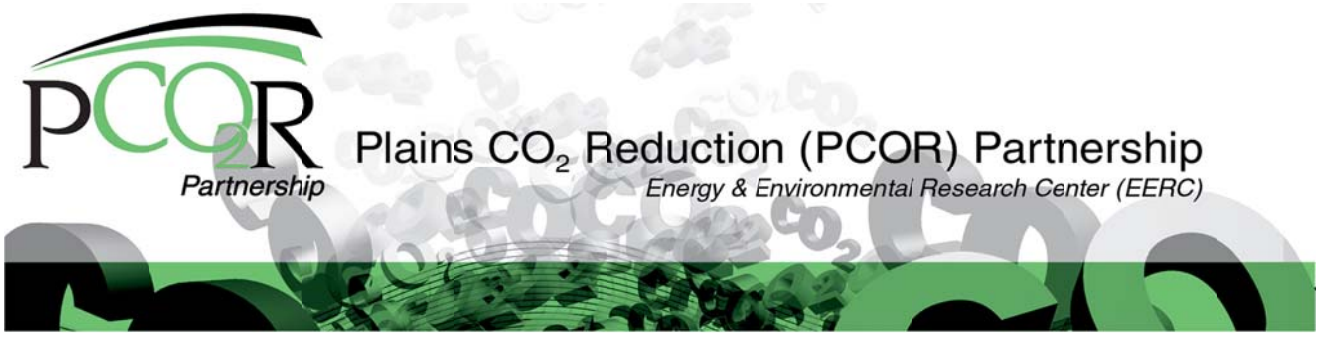
Phase III, the development phase, a 10-year effort (2007–2017), is an extension of the characterization (Phase I) and validation (Phase II) phases. The Phase III efforts of the PCOR Partnership include two large-volume demonstration tests—one in Canada and one in the United States—that focus on injecting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

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

Of significant importance, over 1 million metric tons of CO_2 has been injected at the Bell Creek test site! Denbury Resources Inc. (Denbury) has cumulatively injected (May 2013 – August 2014) over 1,247,000 metric tons of CO_2. Monitoring, verification, and accounting activities continued this quarter, including a monthly operational-phase sampling event in July/August and a full-field sampling event in September, as well as completion of 19 pulsed-neutron monitor logs within and surrounding the Phase 1 development area to monitor for vertical CO_2 migration in the near-wellbore environment and changes in water, oil, and gas saturations to evaluate conformance and storage efficiency.

The 2014 PCOR Partnership Annual Membership Meeting was held September 16 and 17, 2014, at the Embassy Suites in downtown Denver, Colorado. The meeting attracted 86 attendees representing 52 organizations from 14 states, the District of Columbia, and three Canadian provinces.

Additional activities included a 2-week filming trip with Prairie Public Broadcasting to Europe in September, the annual update to regional CO_2 sources and characterization of the Minnelusa Formation, the RCSP Water Working Group annual meeting, and DOE NETL approval of the Interstate Oil and Gas Compact Commission (IOGCC) Operational and Postoperational Liability Report, which will be posted on the IOGCC's Web site in the near future.



PLAINS CO_2 REDUCTION PARTNERSHIP PHASE III
Quarterly Technical Progress Report
July 1 – September 30, 2014

INTRODUCTION

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

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

The PCOR Partnership Program is being implemented in three phases:

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

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

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

BP1 and BP2 were effective in Phase II.

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

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

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

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

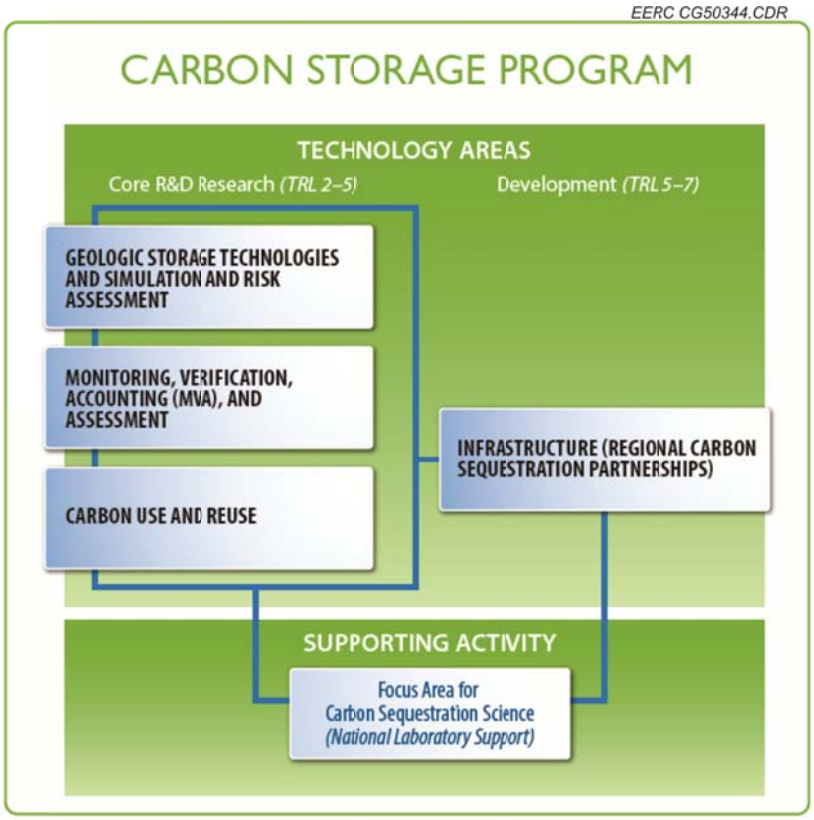


Figure 1. DOE Carbon Storage Program technology areas featuring regional partnerships (courtesy of Andrea Dunn, DOE NETL; "TRL" stands for technical readiness level).

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

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

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

The PCOR Partnership's objectives are as follows: 1) conduct a successful field demonstration to verify that the region's large number of oil fields have the potential to store significant quantities of CO_2 in a safe, economical, and environmentally responsible manner and 2) verify the economic feasibility of using the region's carbonate saline formations for safe, long-term CO_2 storage. During Phase III, the PCOR Partnership will continue to refine storage resource estimates and evaluate other factors relevant to regional storage goals.

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

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

Table 2. Phase III Responsibility Matrix

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

* To be announced.

PROGRESS OF WORK

Task 1 – Regional Characterization

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

- Submitted the annual update to the review source attributes report (Deliverable [D]1) on September 30, 2014.
- Continued work on posters (Figures 3 and 4) and papers for the 12th International Conference on Greenhouse Gas Control Technologies (GHGT-12) to be held in October in Austin, Texas.
- Submitted "Improvements in the Application of CO_2 Storage Efficiency Values for Deep Saline Formations" (D7) on September 30, 2014.
- Continued work on the Bell Creek project atlas pages for inclusion in the upcoming DOE Atlas V (due October 17 to DOE).
- Attended the PCOR Partnership Annual Membership Meeting in Denver, Colorado, September 15–17, 2014.
- Continued activities to update the content and function of the partners-only **Decision Support System (DSS)**, including the following:
  - Updated the North Dakota and Montana Petra projects with current well information.

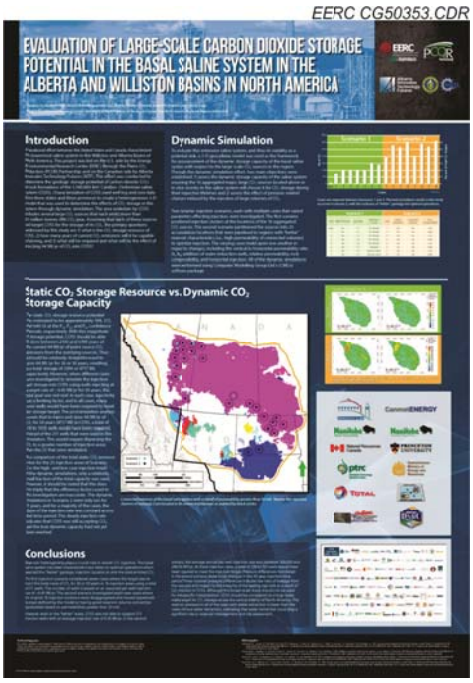


Figure 3. Poster describing the CO_2 storage potential in the basal saline system, to be presented at GHGT-12 in Austin, Texas.

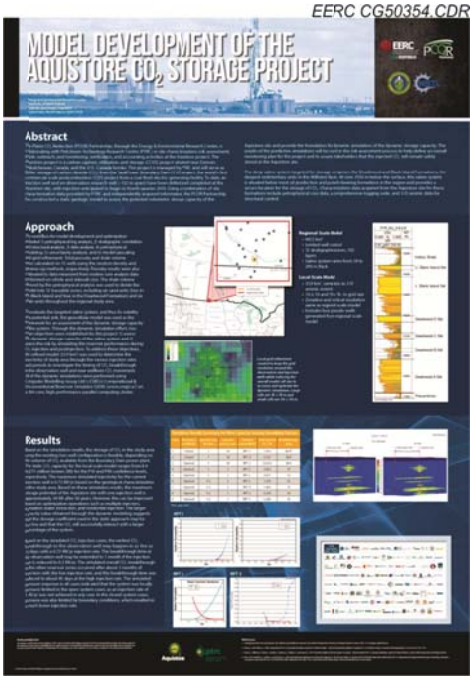


Figure 4. Poster describing the modeling efforts associated with the Aquistore Project, to be presented at GHGT-12 in Austin, Texas.

  - Met with programming staff and discussed the following: an upgrade to Flex 3.6, improvements to the interactive mapping feature, enhanced search capability, data exportation, and improved data response time.
  - Continued working with programming to improve the online geographic information system (GIS) map.
  - Continued to pursue updates to the partners-only Web site.
- Continued work on several additional **value-added reports**, including the following:
  - Continued work on a regional characterization report summarizing all past and present efforts.
  - Continued work on the report summarizing methods of original oil in place and CO_2 storage calculations.
  - Submitted a value-added report entitled "Broom Creek Formation Outline" on August 28, 2014.
  - Continued efforts on the Cedar Creek Anticline white paper.
- Hosted a meeting on September 15, 2014, in Denver, Colorado, with PTRC in conjunction with the PCOR Partnership Annual Membership Meeting.
- With regard to the **Aquistore** Project static modeling and dynamic predictive simulations effort:
  - Held an in-house meeting to review the Aquistore model on July 8, 2014.
  - Participated in a modeling seminar with PTRC on July 17, 2014, and discussed the modeling work conducted both by the EERC and Schlumberger Carbon Services (Schlumberger).
  - Continued work on the new simulation scenarios as requested by the PTRC SERC (science and engineering research committee).
    - Data were received from PTRC regarding the depths of perforations and monitoring sensors. This information will be used in the new simulations to help more accurately measure pressure changes at the monitoring sensors due to injection.
    - Continued work on the new simulation scenarios to investigate when the pressure front reaches the monitoring well. Began running simulation for D93, the geologic modeling and simulation report due September 30, 2014.
  - Completed an update of P_{10}, P_{50}, and P_{90} models for the uncertainty-modeling portion of the simulation study.
  - Continued work on facies model.
  - Continued running base-case simulations and preparing models for simulation.
  - Scheduled a WebEx with PTRC (including SERC) for October 2, 2014, to discuss next steps with regard to the Aquistore project.
  - Continued work on the new simulation scenarios to investigate when the pressure front reaches the monitoring well.
  - Submitted D93 (modeling and simulation update) on September 30, 2014.
- With regard to the **Aquistore** Project core work (12 samples):
  - Continued analysis of the thin sections.
  - Worked on clay and quantitative x-ray diffraction (XRD) analyses.
  - Continued relative permeability to CO_2 and brine analyses.
  - Scanning electron microscopy (SEM) results are pending.

- Relative permeability on the second sample has been restarted, with 100% brine run through the sample.
- Began preparation of the data sheets.

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

- A request to extend Subtask 1.4, collaboration with PTRC's Aquistore Project, to September 30, 2015, and add a new deliverable due July 31, 2015 has been made.

Task 2 – Public Outreach and Education

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

- During this reporting period, the PCOR Partnership outreach activities included 17 oral presentations, 23 poster presentations, and six exhibit booths. The following quantities of PCOR Partnership outreach materials were distributed:
  - PCOR Partnership documentary entitled "Nature in the Balance: CO_2 Sequestration" – 28
  - PCOR Partnership documentary entitled "Reducing Our Carbon Footprint: The Role of Carbon Markets" – 27
  - PCOR Partnership documentary entitled "Out of the Air – Into the Soil" – 98
  - PCOR Partnership documentary entitled "Managing Carbon Dioxide: The Geologic Solution" – 108
  - PCOR Partnership documentary entitled "Global Energy and Carbon: Tracking Our Footprint" – 111
  - PCOR Partnership video short entitled "Installing a Casing-Conveyed Permanent Downhole Monitoring System" – 4
  - "Plains CO_2 Reduction Partnership Atlas, 4th Edition, Revised" – 128
- Continued efforts to expand the type and presentation of statistics for overall past outreach activities and for planning.
- Continued to revise three draft Phase II project fact sheets including meetings with project personnel to discuss content.
- Continued an in-house review of outreach products using a standard, industry-accepted framework.
- Presented to the Lion's Club on August 20, 2014, in Grand Forks, North Dakota.
- Attended the PCOR Partnership Annual Membership Meeting in Denver, Colorado, September 15–17, 2014.
- Continued activities associated with education and teacher education seminars, including the following:
  - Presented at the International Workshop on Public Education, Training, and Community Outreach for Carbon Capture, Utilization, and Storage July 30–31 in Decatur, Illinois, and distributed PCOR Partnership information (atlas, documentaries, fact sheets, presentation).

  - Attended the North Dakota Library Association (NDLA) 2014 Annual Conference in Bismarck, North Dakota, and distributed the new public outreach poster and other materials.
  - Corresponded by e-mail with teachers in the region regarding potential participation in the Carbon Challenge coordinated by SaskPower as part of activities related to the Boundary Dam carbon capture facility commissioning.
- Participated in a number of conference calls this month, including the following:
  - On July 9, 2014, participated in a conference call with the SaskPower Boundary Dam Science Day and Carbon Challenge Group.
  - On August 21, 2014, participated in the monthly Outreach Working Group (OWG) conference call and provided feedback on the initial draft of the paper prepared for presentation at GHGT-12.
  - On September 18, 2014, participated in the monthly OWG conference call, and discussed the paper and slide presentation for GHGT-12.
- Continued efforts to update the **public Web site** (www.undeerc.org/pcor), including the following:
  - Submitted D13 – Public Site Update, including the Web tracking standard operating procedure.
  - Upgraded from Google Analytics (GA) Standard Web tracking to GA Universal.
  - Performed a Web site check to ensure tracking of all PCOR Partnership Web items (Web pages, PDFs, and videos) was not affected by the upgrade.
  - Continued ongoing identification and repair of broken links.
  - Worked on addition of new and updated fact sheets to the public Web site.
- Continued collaborative efforts with **Prairie Public Broadcasting (PPB)**, including the following:
  - Discussed next steps on D21, the Bell Creek Test Site 30-minute documentary (due April 2016).
  - With regard to D22, Energy from Coal 60-minute documentary (due January 2016):
    - Prepared draft letters to potential interviewees and locations in Europe.
    - Met with representatives of the Lignite Energy Council (LEC) to discuss additional contacts and site visits while in Europe.
    - Corresponded with potential interviewees and site locations for the European trip.
    - Finalized agreements with interviewees.
    - Traveled to France, Germany, the Netherlands, Denmark, and Sweden for the European filming trip September 19–30, 2014, and captured approximately 18 hours of film including the following:
      - Interviewed Juho Lipponen, head of the CCS Unit at the International Energy Agency in Paris, France (Figure 5).
      - Interviewed Christoph Oboton at the Zollverein Coal Mining Museum in Essen, Germany.
      - Interviewed Astrid Kandor, economist and lead author of "Power to the People," at the University of Lund, Sweden (Figure 6).

Figure 5. Juho Lipponen, International Energy Agency, during a filmed interview for the energy from coal documentary in Paris, France (photo courtesy of PPB).

Figure 6. Surface coal mining filmed near Koln, Germany (photo courtesy of PPB).

    - Captured footage of Rhine River traffic in Baden-Baden, Germany; general scenery; historic, working windmills in Schiedam and Kinderdjik (near Rotterdam), the Netherlands; a CO_2 geyser in Wallenborn, Germany; natural CO_2 springs at the Laakersee in Germany; equipment and restored facilities at the Zollverein Coal Mining Museum in Essen, Germany; open-pit coal mines (Figure 7) and coal-fired power plants, Koln, Germany; and solar and wind turbine sites.
    - Held a call with personnel from the World Resources Institute to discuss locations and interviews for the upcoming China trip (estimated for spring 2015).
- During this reporting period, information regarding the **site visits** to the PCOR Partnership public Web site included the following:
  - There were 3196 visits to the public Web site (www.undeerc.org/pcor). Traffic increased slightly over last quarter (3169 visits). 20% of these visits were initiated from a mobile device or tablet.
  - There were 2751 unique visitors to the public Web site, representing a 2% decrease from last quarter (2805 visitors). In particular, 85% of these visitors (2715 visitors) were new to the Web site (visitors whose visit was marked as a first-time visit in this quarter).

Figure 7. Economist and lead author of "Power to the People," Dr. Astrid Kander, during her interview with PPB at the University of Lund, Lund, Sweden (photo courtesy of PPB).

- Of the 3196 visits, 36% of the Web traffic was domestic and 64% was international. Table 3 lists the top ten countries for visits to the PCOR Partnership Web site. These included the United States, India, Australia, United Kingdom, Canada, Philippines, New Zealand, South Africa, Germany, and Nigeria. There was traffic from 101 countries overall (Figure 8).
- There were 264 visits originating from within the PCOR Partnership region (Figure 9). Approximately 71% of the regional visits originated from the United States, and 29% 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 skewed to some degree because the visit location data were aggregated at the state and province levels, even though the PCOR Partnership region formally includes only portions of British Columbia, Montana, and Wyoming).

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

	Country	Visits*	PCOR Partnership State/Province	Visits*
1.	United States	1163		
			North Dakota	83
			Minnesota	41
			Missouri	16
			Montana	16
			Wisconsin	12
			Iowa	7
			Nebraska	6
			South Dakota	4
			Wyoming	2
2.	India	642		
3.	Australia	220		
			Alberta	33
			Saskatchewan	28
			British Columbia	15
			Manitoba	1
4.	United Kingdom	152		
5.	Canada	128		
6.	Philippines	118		
7.	New Zealand	52		
8.	South Africa	51		
9.	Germany	48		
10.	Nigeria	34		
	Other 91 countries	588		
	Total Visits	**3196**	**Total PCOR Partnership Visits**	**264**

*Arranged by the number of visits to the site.

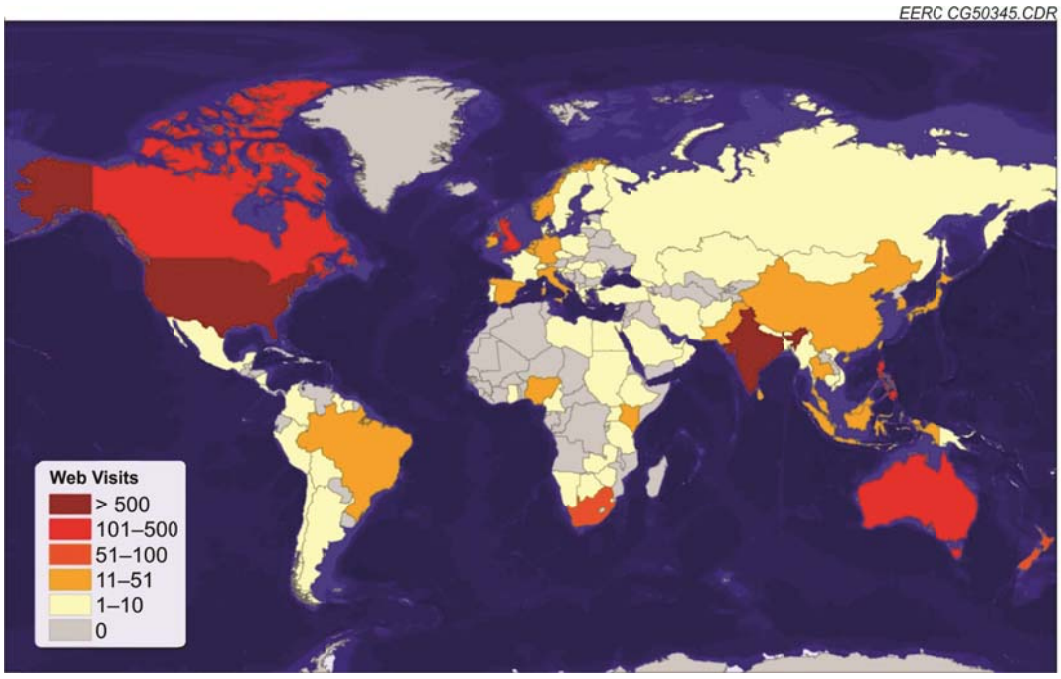


Figure 8. Map of PCOR Partnership Web site global traffic.

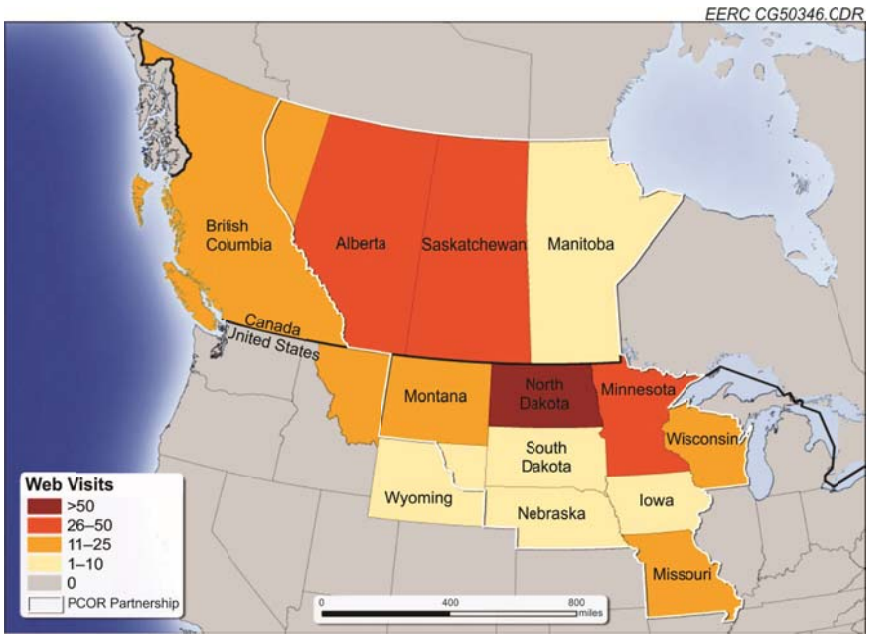


Figure 9. Map of PCOR Partnership Web site regional visits.

- During this reporting period, a breakdown of how visitors came to the PCOR Partnership Web site, also referred to as **traffic sources** (Figure 10), is provided below:
  - Direct traffic consists of those visitors who bookmark or type in the URL (www.undeerc.org/pcor). It is likely that most of the direct traffic (10%) is from persons familiar with the PCOR Partnership.
  - Search traffic refers to the use of search engines and accounted for more than 84% of the traffic. GA provides the keywords visitors used. The top keywords used include "carbon sequestration," "what is CO_2?" and "CO_2 sequestration?"
  - Referral site traffic (5%) 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, solarthermalmagazine.org, and sequestration.mit.edu.
  - Less than 1% of site traffic resulted from teacher campaigns and social interactions, such as e-mail or social media sources (e.g., Facebook and YouTube).
- During this reporting period, the **nature of the visits** to the PCOR Partnership public Web site included 5513 page views; the top five pages viewed are listed in Table 4. These five pages comprise 61% of total page views.
- During this reporting period, the PCOR Partnership received public television exposure from documentaries broadcast in North Dakota, northwestern Minnesota, and Manitoba. A total of 16 broadcasts aired. The number of telecasts by documentary are as follows: "Managing Carbon Dioxide: The Geologic Solution" (6), and "Global Energy and Carbon: Tracking Our Footprint" (10).

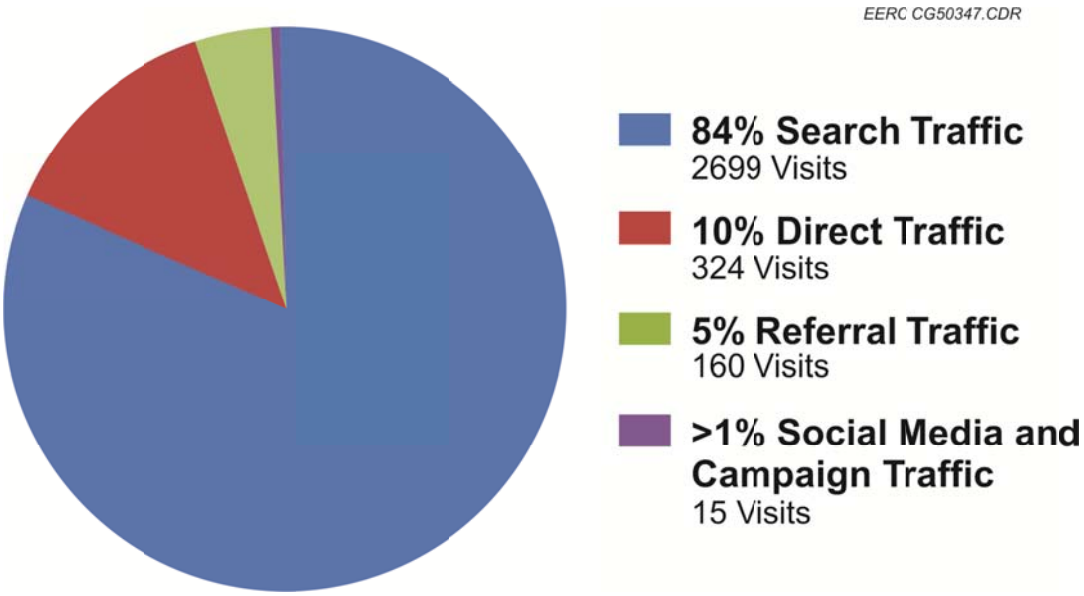


Figure 10. PCOR Partnership public Web site traffic sources.

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

Page Title	Page Views	% Page Views	Page
What Is CO_2 Sequestration	2187	40	www.undeerc.org/pcor/sequestration/whatissequestration.aspx
Home Page	490	8.8	www.undeerc.org/pcor/
CO_2 Sequestration Projects	263	4.8	www.undeerc.org/pcor/co2sequestrationprojects/default.aspx
What Is CO_2	240	4.4	www.undeerc.org/pcor/sequestration/whatisco2.aspx
Video Clip Library	183	3.3	www.undeerc.org/pcor/video-clip-library/default.aspx

- During this reporting period, the PCOR Partnership participated in the NDLA Conference in Bismarck, North Dakota, and disseminated outreach materials to 35 North Dakota public schools, universities, government employees, and public libraries.
- All five documentaries and 50 video clips taken from the documentaries were 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, as indicated in Table 6. Each video description includes one or more links to the PCOR Partnership public Web site. These videos can also be streamed on the PCOR Partnership public Web site.

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

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

Task 3 – Permitting and NEPA Compliance

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

- Attended a Webinar entitled "Innovation and Effective Stakeholder Engagement on Water and Energy Issues" sponsored by the Center for Climate and Energy Solutions (C2ES).

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

Video	Views	Est. Minutes Watched	Avg. View Duration
The Phases of Oil Recovery – So Far	123	946	2:20
Reforestation in Brazil	120	279	2:19
Reservoir Geology 101: Fluid in the Rocks	120	140	1:10
An Emerging Economy: Household Energy in India	114	304	2:40
Household Energy and Carbon	74	152	2:03

Table 6. PCOR Partnership-Related YouTube Channel Videos Arranged by Playlist

Playlist	Playlist Starts	Views	Est. Minutes Watched	Avg. Time in Playlist
CO_2, Energy, and Climate Change	3	14	8	2:36
Carbon Footprint	2	10	3	1:30
Terrestrial CO_2 Sequestration	1	10	3	2:43
Carbon Markets	1	8	4	3:31
Geologic CO_2 Sequestration	3	5	0	0:02
PCOR Partnership Documentaries	3	4	1	0:28
Oil Production	1	1	1	0:37
TOTALS	14	52		–

* Because some videos occur in more than one playlist, the total number of videos is less than the sum of the playlists.

- Reviewed compressed air storage regulations in an effort to compare and contrast them with CO_2 storage regulations.
- Continued review of the U.S. Environmental Protection Agency-proposed rule for carbon emissions from existing stationary sources.
- Provided a review of CCS injection regulations and greenhouse gas reporting requirements to internal staff for use in various white papers and reports.
- Finalized the Interstate Oil and Gas Compact Commission (IOGCC) Operational and Postoperational Liability Report with DOE NETL, and forwarded the final document to IOGCC for publication.
- Attended the PCOR Partnership Annual Membership Meeting in Denver, Colorado, September 15–17, 2014.
- With regard to the **Lignite Field Validation Test** site (Phase II):
  - Continued efforts to monitor the site during its reclamation phase, including a site visit on July 16, 2014.
  - In collaboration with Task 2, finalized an updated fact sheet with information and results from the validation test (Figure 11).

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.

Figure 11. Updated fact sheet, including results, for the Lignite Field Validation Test. This fact sheet is available for download from the PCOR Partnership Program public Web site at www.undeerc.org/pcor/NewsAndPubs/pdf/FactSheet10B.pdf (accessed October 2014).

Task 4 – Site Characterization and Modeling

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

- Attended the PCOR Partnership Annual Membership Meeting in Denver, Colorado, September 15–17, 2014.
- **Bell Creek** test site activities included the following:
  - With regard to **geomechanical** efforts, the following activities occurred:
    - Conducted literature review on the process of constructing a 3-D geomechanical model using a 1-D mechanical earth model (MEM) and 3-D seismic AVO (amplitude variations with offset) inversion. Also investigated the process of estimating stress and geomechanical properties using 3-D seismic data.
    - Continued working on the construction of the 1-D and 3-D MEMs. Upscaled well logs and 3-D seismic inversion were used to generate geomechanical properties. These properties were updated in both the 1-D and 3-D models using

Schlumberger's Techlog software. The zones, layering, and gridding of the 3-D MEM were optimized to improve the accuracy of the property populated.

- ♦ Worked on creating synthetic logs for select wells to incorporate into the 3-D MEM. Explored the possibility of including PNL (pulsed-neutron logging) data in the 3-D MEM.
- ♦ Continued preparing for the geomechanical simulations.

– Continued work on Bell Creek **characterization**, including the following:

- ♦ Created an updated facies model for the fieldwide geologic model.
- ♦ Entered core data into the Petra project – a total of 138 wells are now in the project, with core data from Exxon, Colorado School of Mines, and the U.S. Geological Survey (USGS) (Denver).
- ♦ Threshold entry pressure work by Core Labs is ongoing.

– Developed a poster on PNL work at Bell Creek for the GHGT-12 conference (Figure 12).

– Performed saturation modeling using the baseline PNLs for MVA and to help update the geologic model and simulations.

– Held three half-day in-house training sessions for Techlog software (used for petrophysical analyses).

– **Applied Geology Laboratory** activities included the following:

- ♦ With regard to the 60 feet of full-diameter 33-14R core (collected April 2013):
  - o Continued work on the thin-section descriptions and XRD data.

Figure 12. Poster on PNL work at the Bell Creek test site, to be presented at GHGT-12 in Austin, Texas.

    - Fine-tuned the thin-section descriptions and XRD data.
    - Worked on SEM analysis.
    - Performed permeability-to-air testing.
- With regard to the 56-14R full-core plugs (collected March 2013):
    - Continued work on the 56-14R full-core plugs.
    - Porosity measurements were completed, and perm-to-air measurements were begun.

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

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

Task 5 – Well Drilling and Completion

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

Task 6 – Infrastructure Development

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

- Continued work on a journal article about the attenuation of variable CO_2 sources for use in EOR. The journal selected is *Energy & Environmental Science* (www.rsc.org/publishing/journals/ee/about.asp).
- Attended the DOE CO_2 Capture Technologies Conference July 29 – August 1, 2014, in Pittsburgh, Pennsylvania.
- Continued to update technologies for the CO_2 capture technologies update overview.
- Spoke with a Dresser-Rand representative regarding the list of possible sites for a field demonstration of the SuperCompressor.
- Attended the PCOR Partnership Annual Membership Meeting in Denver, Colorado, September 15–17, 2014.

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

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

Task 7 – CO_2 Procurement

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

Task 8 – Transportation and Injection Operations

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

- Discussed approaches for a report about the surface facilities at Bell Creek.
- Continued to review literature associated with starting up and shutting down CO_2 pipelines as well as how variability in the CO_2 stream may affect pipeline and injection field infrastructure.
- Researched the effects of different impurities in CO_2 from anthropogenic sources on pipeline operation during start-up, shutdown, and at transient conditions. The effects of impurities on operability of injection site infrastructure were reviewed. The effects of CO_2 stream variability on pipeline and injection field infrastructure were also studied.

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

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

Task 9 – Operational Monitoring and Modeling

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

- Staff attended a 2-day training workshop (September 22–23, 2014) at the EERC held by Outsource Petrophysics, covering the basics of petrophysical analysis (used in both modeling and laboratory activities).
- Attended the PCOR Partnership Annual Membership Meeting in Denver, Colorado, September 15–17, 2014.
- Attended the North Dakota Petroleum Council (NDPC) Annual Meeting held in Dickinson, North Dakota.
- Attended a 2-day COMSOL training session. This software is advanced physics simulation software that has diverse applications. It is being investigated for its applicability to the Bell Creek project for potential modeling of the near-surface environment.
- Participated in the National Ground Water Association Webinar Environmental Isotopes in Groundwater Studies: Groundwater, Environmental Isotopes, and Salinity.
- Continued **Bell Creek** site activities, including the following:
  - Cumulative CO_2 injection is 1,247,174 metric tons through August 31, 2014 (Figure 13, Table 7).
  - Traveled to Plano, Texas, to meet with Denbury personnel at their headquarters; topics discussed included seismic work (vertical seismic profiles, surface seismic, and passive seismic monitoring), AZMI (above-zone monitoring interval) pressure gauge response, near-surface monitoring program, and modeling and simulation activities.

Figure 13. Booth backdrop showcasing the milestone achievement of 1 million tons of CO_2 injected at the Bell Creek test site, presented at the 2014 PCOR Partnership Annual Membership Meeting in Denver, Colorado.

Table 7. Bell Creek CO_2 Injection Totals May 2013 – August 2014

	July 2014 Injection, Mcf	August 2014 Injection, Mcf
Total, Mscf	2,424,888	2,384,170
Total, U.S. tons*	138,700	136,371
Total, metric tons*	125,949	123,834
Cumulative Total, Mscf[+]	21,627,676	24,011,846
Cumulative Total, U.S. tons*[+]	1,237,069	1,373,440
Cumulative Total, metric tons*[+]	1,123,341	1,247,174

Source: Montana Board of Oil & Gas [MBOG] Database.

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

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

- Held an operations review meeting with Schlumberger in Denver to discuss ways to improve operational excellence during well log acquisition.
- Denbury personnel presented an update on Denbury operations and also a Bell Creek Field update (Figure 14) at the PCOR Partnership Annual Membership Meeting on September 17, 2014.
- Continued the literature review for CO_2 EOR strategies.
- With regard to **modeling and simulation** activities:
  - Worked on the history match of CO_2 injection in the Phase 1 area.
  - Worked on the additional simulation cases requested by Denbury.
  - Worked on D66, 2014 Simulation Update, and provided it to Denbury for review and comment.
  - Submitted the executive summary for D66, Simulation Update, on August 27, 2014.
  - Worked on preparing data for the Phase 2 simulations, including cutting the geomodel.
  - Worked on the Phase 2 Bell Creek simulation, including two simulation scenarios testing different bottomhole injection pressures.
  - Continued tuning the Phase 2 history match model.
- With regard to **injection-phase seismic** efforts:
  - Worked on reviewing and testing RadExPro seismic software.
  - Worked on reviewing the microseismic interpretation method and software.

Figure 14. Jim Rawson, Denbury, presenting a Bell Creek Field update at the 2014 PCOR Partnership Annual Membership Meeting in Denver, Colorado.

- Worked on passive microseismic monitoring, including the borehole array and recording system provided by SIGMA^3—daily operational checks are now performed by the EERC—and found/tested a utility application to view SEG-D field records (SegDSee) that will allow a verification check of data records after loading to the server.
- Used predictive simulation results to create a cross section for Denbury to help personnel select shot points for repeat 2-D seismic lines. Also selected shot points around the 04-03 OW monitoring well that have a high probability of detecting CO_2.
- Worked with the in-house geophysicists on the 3-D seismic data, specifically on fracture identification.
- Worked on picking horizons for the underburden formations of the reservoir using seismic data.
- Picked horizons for the Version 3 geologic model from the 3-D seismic.
- Spoke with Denbury regarding the recently collected 2-D seismic line; they are seeing good results with the data. Also discussed planning for a potential repeat 3-D surface seismic survey.
- Created a series of Bell Creek seismic (planned and completed) outline maps for in-house use.
- Continued the literature review on the process of building a seismic-driven 3-D geomechanical model using the 1-D MEM and 3-D seismic AVO inversion and estimating stress and geomechanical properties using 3-D seismic data.
- Worked on incorporating lab-generated data into Techlog to supplement data currently in the 3-D model.
- Worked on the 3-D surface seismic baseline survey, including the geomechanical model, maps (including creating maps of the 11.5-square-mile monitor survey), and interpretations.

– Continued analysis of **pressure gauge response** from the 05-06 OW well, including the following:
  - Traveled to Bell Creek to download permanent downhole monitoring (PDM) data (through July 21, 2014) and replace the data acquisition unit at the 05-06 OW well.
  - Continued reservoir surveillance and pressure/temperature analysis of continuous PDM data in the 05-06 OW well. Traveled to Bell Creek (September 21–25, 2014) to download data from the MOREVision and Qorex units.
– With regard to **injection-phase PNL** activities:
  - For the summer 2014 repeat PNL campaign, finalized evaluation and selection of wells for repeat PNLs, and initiated logging acquisition July 21, 2014.
  - Completed 19 PNL monitor logs within and surrounding the Phase 1 development area to monitor for vertical CO_2 migration in the near-wellbore environment and changes in water, oil, and gas saturations to evaluate conformance and storage efficiency.
  - Completed initial quality control (QC) and quick analysis of sigma logs in the 19 wells; detailed analysis and processing are in progress.
– With regard to **injection-phase sampling** activities:

- ♦ Traveled to the Bell Creek site **July 29 – August 1** for the July Bell Creek sampling event and completed the following:
  - o Collected CO_2 purchase and recycle samples.
  - o Collected Phase 1 oil samples.
  - o Collected limited groundwater parameter samples.
  - o Met with landowners.
  - o Performed maintenance on EERC sites (field office, monitoring well, soil gas profile station locations)
- ♦ Archived, compiled, and performed quality assurance and QC on the handheld meter and field (Micro Quad) gas chromotography results (over 210 total soil gas samples were collected).
- ♦ Continued planning of construction of an SQL database and interactive map product to house and improve access in interpretation of near-surface monitoring data for project team members and stakeholders.
- ♦ Completed the near-surface MVA annual full-field repeat sampling event on **September 25, 2014**, including the following:
  - o Approximately 400 total soil gas bag samples.
  - o 27 total water samples.
  - o Analysis is under way.

– With regard to the **Fort Nelson** test site activities, submitted the draft Best Practices Manual – Fort Nelson Feasibility Study (D100) on September 30, 2014.

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

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

Task 10 – Site Closure

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

Task 11 – Postinjection Monitoring and Modeling

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

Task 12 – Project Assessment

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

- The annual assessment report for Program Year (PY) 7 (October 1, 2013, to September 30, 2014), is due on December 31, 2014.

Task 13 – Project Management

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

- Welcomed new partner MBI Energy Services (Belfield, North Dakota) on August 18, 2014.
- Attended and presented at the IEA Greenhouse Gas R&D Programme (IEAGHG) Combined Monitoring and Modelling Network Meeting on August 4–7, 2014, in Morgantown, West Virginia. Presentations included the following:
  - An oral presentation entitled "Modeling and Monitoring Associated with CO_2 Storage at the Bell Creek Field."
  - Three posters: Zama, basal Cambrian, and Aquistore.
- Attended and presented at the DOE Carbon Storage R&D Project Review Meeting held August 12–14, 2014, in Pittsburgh, Pennsylvania. Presentations included the following:
  - An oral presentation entitled "Bell Creek Field Project" in the plenary session.
  - Four posters: basal Cambrian, Zama, Fort Nelson, and Aquistore.
- Attended the National Risk Assessment Partnership (NRAP) Stakeholders Meeting on August 14–15, 2014, in Pittsburgh, Pennsylvania.
  - Presented in an impromptu panel session discussing the MVA activities that are under way at Bell Creek.
- Attended and presented at the Advanced Workshop for CO_2 Storage in Mexico City, Mexico, on August 26–27, 2014.
- Attended and presented at the University of South Carolina Energy Leadership Institute's "Cradle to Grave: CO_2 Opportunities and Challenges" on September 11, 2014, in Columbia, South Carolina.
- Staff traveled to Casper, Wyoming, to attend the 2014 Wyoming CO_2 Conference held July 9–10, 2014.
- In conjunction with the UND College of Engineering and Mines, the EERC participated in Energy Research Day on September 4, 2014, and displayed a PCOR Partnership booth, posters, fact sheets, atlases, and documentary DVDs.
- Responded to a request from DOE (received on September 2, 2014) to provide updated information tracking progress in the development of technologies that will assist in CCS development for the Carbon Sequestration Leadership Forum (CSLF) Technology Roadmap.
- Staff participated in an in-house Well-Drilling 101 training course on July 31, 2014.
- Presented an update on the PCOR Partnership activities to new partner Sejong University during a visit to the EERC on July 3, 2014.
- Reviewed draft minutes from the Technical Advisory Board (TAB) WebEx held June 27, 2014.
- Continued planning for the 2014 PCOR Partnership **Annual Membership Meeting** scheduled for September 16 and 17, 2014, at the Embassy Suites in downtown Denver, Colorado, including:
  - On July 7, mailed the "member appreciation" postcard to all partners.
  - Continued planning for the TAB side meeting.
  - Continued planning for the PTRC Aquistore meeting.

  - On August 5, sent an e-mail blast regarding the availability of the preliminary agenda.
  - On August 19, sent an e-mail blast regarding the hotel room block cutoff date.
  - Continued preparation of presentations, posters, booth backdrops, and associated events.
  - Prepared the meeting agenda.
- Hosted the 2014 PCOR Partnership Annual Membership Meeting September 16 and 17, 2014, at the Embassy Suites in downtown Denver, Colorado. The meeting attracted 86 attendees representing 52 organizations from 14 states, the District of Columbia, and three Canadian provinces (Figure 15).
- Held the following side meetings in conjunction with the PCOR Partnership Annual Membership Meeting:
  - TAB meeting
  - PTRC Aquistore meeting
- Submitted a value-added programmatic risk management plan update (including an updated Bell Creek risk assessment) on August 29, 2014.
- Uploaded GHGT-12 papers with the following titles:
  - Evaluation of Large-Scale Carbon Dioxide Storage Potential in the Basal Saline System in the Alberta and Williston Basins in North America
  - Characterization and Time-Lapse Monitoring Utilizing Pulsed-Neutron Well Logging at an Incidental CO_2 Storage Demonstration
  - Application of Canadian Standards Association Guidelines for Geologic Storage of CO_2 Toward the Development of a Monitoring, Verification, and Accounting Plan for a Potential CCS Project at Fort Nelson, British Columbia, Canada
  - A Regional Wellbore Evaluation of the Basal Cambrian System
  - Guidance for States and Provinces on Operational and Postoperational Liability in the Regulation of Carbon Geologic Storage

Figure 15. Group photo at the 2014 PCOR Partnership Annual Membership Meeting in Denver, Colorado.

  - The Nexus of Water and CCS: An RCSP (Regional Carbon Sequestration Partnership) Perspective
  - A Workflow to Determine CO_2 Storage in Deep Saline Formations
  - A Rapid Method for Determining CO_2–Oil MMP (minimum miscibility pressure) and Visual Observations of CO_2–Oil Interactions at Reservoir Conditions
  - Model Development of the Aquistore CO_2 Storage Project
- Conducted task leader meetings on July 1 and September 3, 2014. Topics discussed included recaps of the regulatory meeting and TAB WebEx, a Bell Creek and Aquistore update, proposed best practice manuals (BPMs), the annual meeting, GHGT-12 papers, as well as upcoming deliverables and conferences and updates from each task leader present.
- Deliverables and milestones completed in July:
  - Task 2: D13 – Public Site Updates
  - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
  - Task 14: Milestone (M) 23 – Monthly WWG Conference Call Held
- Deliverables and milestones completed in August:
  - July monthly update
  - Task 9: D66 – Bell Creek Test Site – Simulation Report, Update 3 (Executive Summary)
  - Task 14: M23 – Monthly WWG Conference Call Held
- Deliverables and milestones completed in September:
  - August monthly update
  - Task 1: D1 – Review of Source Attributes (Update)
  - Task 1: D7 – Third Target Area Completed
  - Task 1: D93 – Geological Modeling and Simulation Report for the Aquistore Project (Update)
  - Task 9: D100 – Fort Nelson Test Site – Best Practices Manual – Feasibility Study
  - Task 14: M23 – Monthly WWG Conference Call Held

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

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

Task 14 – RCSP WWG Coordination

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

- Discussed the latest fact sheet (D99, due October 31, 2014) focused on future protection of water resources with consultant.
- On July 16, 2014, participated in a National Groundwater Association Webinar entitled “Environmental Isotopes in Groundwater Studies: Groundwater, Environmental Isotopes, and Salinity.”

- Scheduled and held a WebEx in lieu of the July conference call milestone (M23) on July 17, 2014. Agenda items included a presentation about the WECSsim model (given by WWG member Peter Kobos of Sandia National Laboratory).
- Hosted the WWG Annual Meeting on August 11, 2014, in conjuction with the 2014 DOE Carbon Storage R&D Project Review Meeting in Pittsburgh, Pennsylvania. The RCSP OWG was invited to attend. Topics discussed included future activities for WWG and opportunities to partner with OWG.
- Reviewed the WWG Annual Meeting notes with the consultant to formulate next steps.
- Accepted an invitation to present the WWG poster as an oral presentation during the Water and CCS session at GHGT-12.
- Brainstormed about ideas for future work with WWG members.
- Held the monthly WWG conference call on September 30, 2014. Topics discussed focused on future products and collaborations for WWG, as well as progress on the development of the fact sheet on future protection of water resources (D99, due October 31, 2014) and the WWG Web site (which will be hosted on NETL's Web site).

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

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

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

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

Task 16 – Characterization of the Basal Cambrian System

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

PHASE III COST STATUS

The approved BP4 (Modification No. 30) budget along with actual costs incurred and in-kind cost share reported are shown in Table 8. A spending plan for BP4 and actual incurred cost by quarter of cash funds for BP4 are provided in Figure 16 and Table 9.

PHASE III SCHEDULE STATUS

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

Table 8. Phase III Budget – BP4

Organization	Approved Budget*, $	Actual Costs Incurred, $
DOE Share – Cash	60,124,121	47,569,205
Nonfederal Share – Cash	2,411,971	2,868,827
Nonfederal Share – In-Kind	33,483,776	33,339,053
Total	96,019,868	83,777,085

*As of Modification 30.

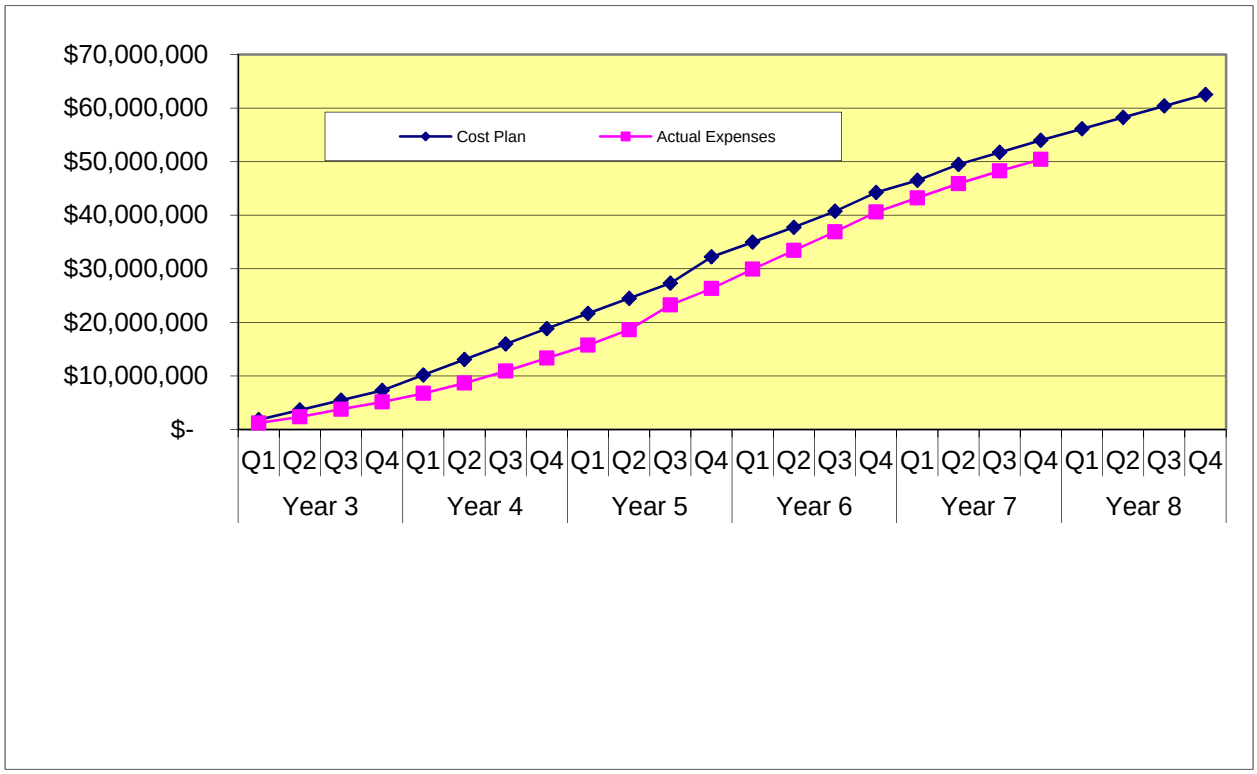


Figure 16. PCOR Partnership Phase III, BP4, Years 3–8 funding (cash only).

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

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

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

Baseline Reporting Quarter	Year 7								Year 8							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
Baseline Cost Plan																
Federal Share	$2,253,496	$44,092,387	$ 2,977,355	$47,069,742	$ 2,253,496	$49,323,237	$2,253,496	$51,576,733	$2,136,847	$53,713,580	$2,136,847	$55,850,427	$2,136,847	$57,987,274	$2,136,847	$60,124,121
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	$2,136,847	$58,262,398	$2,136,847	$60,399,245	$2,136,847	$62,536,092
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								
NonFederal Share	$ 62,881	$ 2,748,257	$ 14,980	$ 2,763,237	$ 15,096	$ 2,778,333	$ 90,494	$ 2,868,827								
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								
Variance																
Federal Share	$ (325,811)	$ 3,604,085	$ 333,303	$ 3,937,388	$ (95,806)	$ 3,841,581	$ 165,947	$ 4,007,528								
NonFederal Share	$ (62,881)	$ (336,286)	$ (14,980)	$ (351,266)	$ (15,096)	$ (366,362)	$ (90,494)	$ (456,856)								
Total Variance	$ (388,692)	$ 3,267,799	$ 318,323	$ 3,586,122	$ (110,902)	$ 3,475,219	$ 75,453	$ 3,550,672								

Table 10. Phase III Milestones and Deliverables

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued…

Table 10. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 10. Phase III Milestones and Deliverables (continued)

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

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

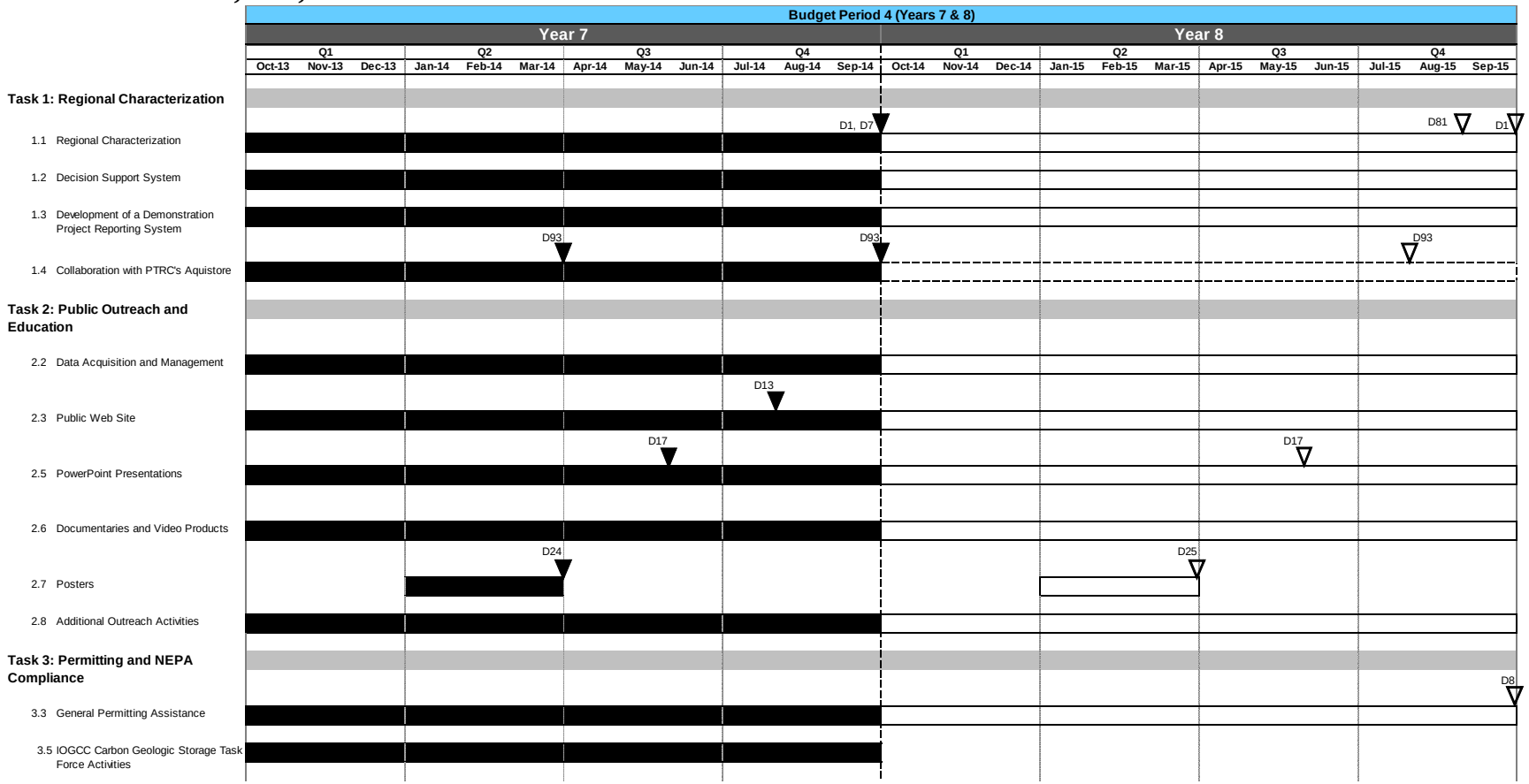


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Table 11. Phase III, BP4, Years 7–8 Gantt Chart (continued)

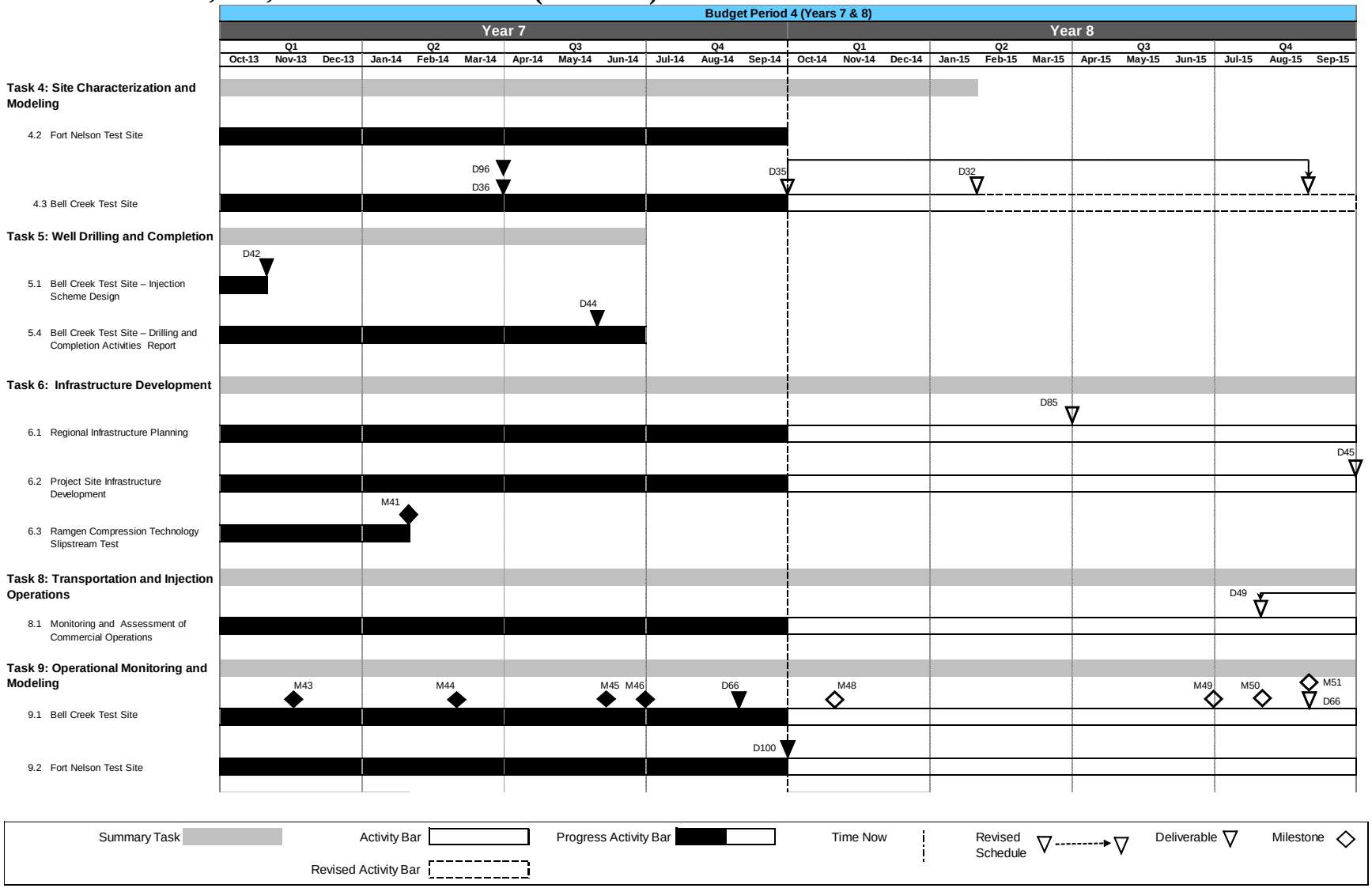

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Table 11. Phase III, BP4, Years 7–8 Gantt Chart (continued)

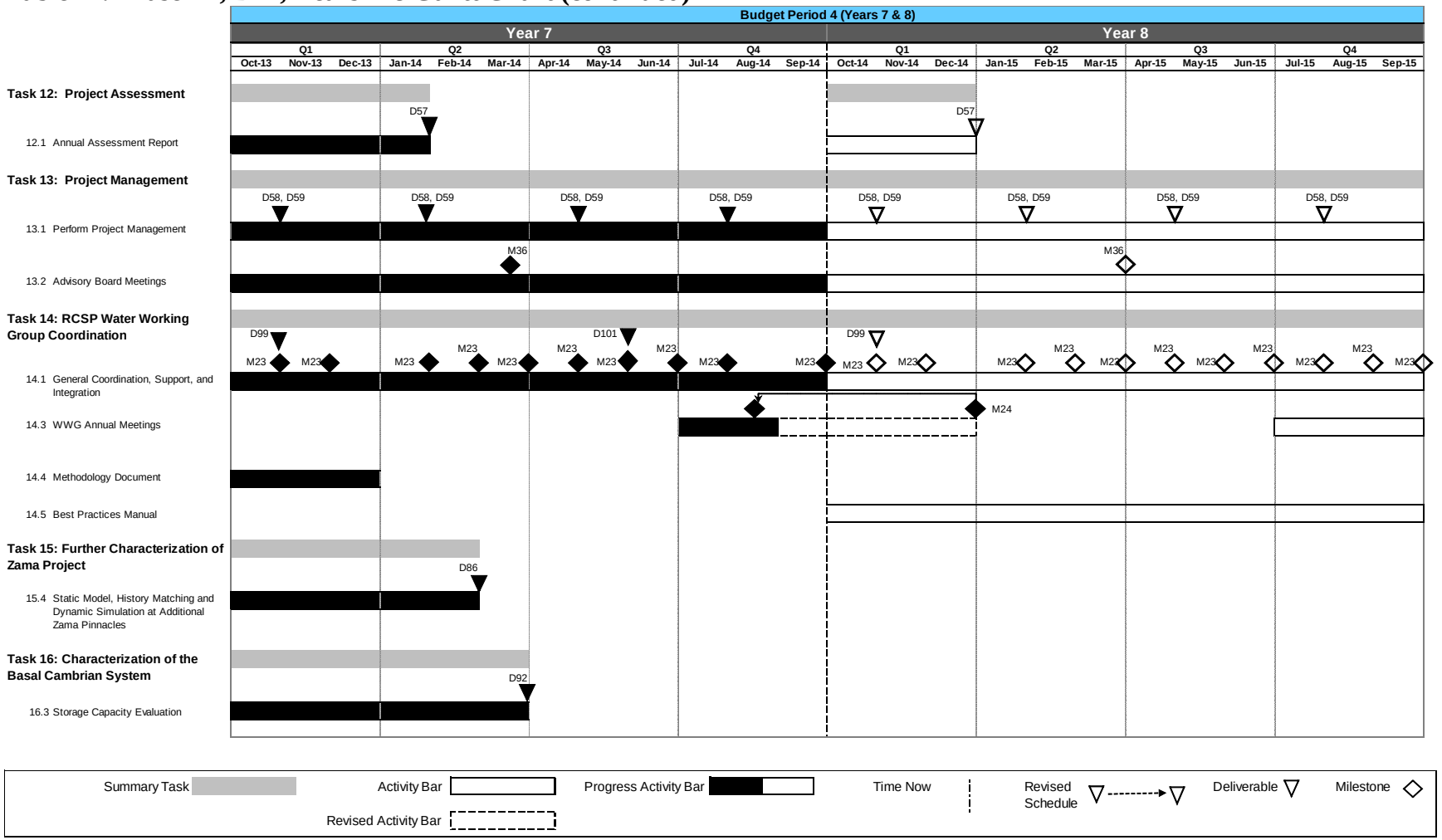

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Table 11. Phase III BP4, Years 7–8 Gantt Chart (continued)

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

10/30/2014

PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, three abstracts were submitted, four abstracts were accepted for poster presentation, and 28 presentations (19 oral and nine poster) were given at 23 different meetings/conferences/workshops. In addition, a quarterly progress report, six deliverables (four draft and two approved), and two value-added products were completed. In addition to the products cited below, staff also attended six project management site trips and one training opportunity. For more detail see the meetings/travel section.

Abstracts

Submitted and Accepted for Poster Presentation

Gao, P., Gorecki, C.D., Braunberger, J.R., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Modeling and simulation of acid gas injection for enhanced oil recovery and long-term storage in Zama pinnacle reefs [abs.]: IEAGHG Combined Monitoring and Modelling Network Meeting, Morgantown, West Virginia, August 4–8, 2014.

Liu, G., Peck, W.D., Klenner, R.C.L., Braunberger, J.R., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Carbon dioxide storage potential of the basal saline system in the Alberta and Williston Basins of North America [abs.]: IEAGHG Combined Monitoring and Modelling Network Meeting, Morgantown, West Virginia, August 4–8, 2014.

Peck, W.D., Bailey, T.P., Klenner, R.C.L., Liu, G., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Model development of the Aquistore CO_2 storage project [abs.]: IEAGHG Combined Monitoring and Modelling Network Meeting, Morgantown, West Virginia, August 4–8, 2014.

Accepted for Poster

Gao, P., Gorecki, C.D., Braunberger, J.R., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Modeling and simulation of acid gas injection for enhanced oil recovery and long-term storage in Zama pinnacle reefs [abs.]: Carbon Storage R&D Project Review Meeting: Developing the Technologies and Infrastructure for CCS, Pittsburgh, Pennsylvania, August 12–14, 2014.

Presentations

Braunberger, J.R., Bosshart, N.W., Klenner, R.C.L., Liu, G., Peck, W.D., and Gorecki, C.D., 2014, Characterization and 3-D modeling of Devonian pinnacle reefs for CO_2 storage and enhanced oil recovery: Presented at the 2014 Rocky Mountain Section AAPG Annual Meeting, Denver, Colorado, July 20–22, 2014.

Burnison, S.A., and Gorecki, C.G., 2014, Geophysics at the Energy & Environmental Research Center: Presented to Denbury Resources Inc. personnel, Plano, Texas, July 25, 2014.

Daly, D.J., 2014, Energy, carbon, and CO_2 management—geologic CO_2 sequestration: Presented to the Lions Club, Grand Forks, North Dakota, August 20, 2014.

Daly, D.J., Crocker, C.R., Dambach, B., Pearson, B., and Anderson, D., 2014, A collaboration among Prairie Public Broadcasting, classroom teachers, and the PCOR Partnership to produce classroom-ready CCS lessons: Presented at the International Workshop on Public Education, Training, and Community Outreach for Carbon Capture, Utilization, and Storage, Decatur, Illinois, July 30, 2014.

Dotzenrod, N.W., Braunberger, J.R., Klenner, R.C.L., Liu, G., and Gorecki, C.D., 2014, Workflow optimization using Python programming, a tool kit for every geoscientist: Presented at the 2014 Rocky Mountain Section AAPG Annual Meeting, Denver, Colorado, July 20–22, 2014.

Glazewski, K.A., Hamling, J.A., Peck, W.D., Doll, T.E., Laumb, J.D., Gorecki, C.D., Azzolina, N., Nakles, D.V., Steadman, E.N., and Harju, J.A., 2014, Development of an MVA plan for a potential CCS project at Fort Nelson, British Columbia, Canada: Presented at the Carbon Storage R&D Project Review Meeting: Developing the Technologies and Infrastructure for CCS, Pittsburgh, Pennsylvania, August 12–14, 2014.

Gorecki, C.D., 2014, PCOR Partnership Technical Advisory Board (TAB) side meeting: Presentation for the PCOR Partnership Technical Advisory Board Meeting, Denver, Colorado, September 15, 2014.

Gorecki, C.D., 2014, Plains CO_2 Reduction (PCOR) Partnership Program highlights: Presented at the PCOR Partnership Annual Membership Meeting, Denver, Colorado, September 16–17, 2014.

Gorecki, C.D., Hamling, J.A., Pu, H., Braunberger, J.R., Gao, P., Liu, G., Steadman, E.N., and Harju, J.A., 2014, Modeling and monitoring associated CO_2 storage at the Bell Creek field: Presented at the IEAGHG Combined Monitoring and Modelling Network Meeting, Morgantown, West Virginia, August 4–8, 2014.

Gorecki, C.D., and Jensen, M.D., 2014, Overview of carbon management, storage, and EOR: Presented to Japan Coal Energy Center (JCOAL) personnel, Grand Forks, North Dakota, August 25, 2014.

Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Plains CO_2 Reduction (PCOR) Partnership – Phase III: Presented at the Carbon Storage R&D Project Review Meeting: Developing the Technologies and Infrastructure for CCS, Pittsburgh, Pennsylvania, August 12–14, 2014.

Hamling, J.A., and Braunberger, J.R., 2014, Bell Creek update – 2014 Plains CO_2 Reduction (PCOR) Partnership Program activities: Presented at the PCOR Partnership Annual Membership Meeting, Denver, Colorado, September 16–17, 2014.

Klenner, R.C.L., Braunberger, J.R., Dotzenrod, N.W., Bosshart, N.W., Peck, W.D., and Gorecki, C.D., 2014, Training image characterization and multipoint statistical modeling of clastic and carbonate formations: Presented at the 2014 Rocky Mountain Section AAPG Annual Meeting, Denver, Colorado, July 20–22, 2014.

Peck, W.D., 2014, EERC/PTRC review of the Aquistore modeling effort: Presented via WebEX/Conference Call with PTRC personnel for the Aquistore Modeling Review and Discussion, July 17, 2014.

Peck, W.D., 2014, Update on EERC Aquistore efforts: Presented at the PTRC–EERC Project Status Update Meeting, Denver, Colorado, September 15, 2014.

Steadman, E.N., 2014, Cradle to BEYOND the grave—the PCOR Partnership's approach to CCUS: Presented at the South Carolina Energy Leadership Institute Forum on CCUS, Columbia, South Carolina, September 11, 2014.

Steadman, E.N., 2014, EOR is storage: Presented at the Advanced Workshop for CO_2 Storage, Mexico City, Mexico, August 26–27, 2014.

Steadman, E.N., 2014, PCOR Partnership Program—accomplishments and path forward: Presented to Basin Electric Power Cooperative personnel, Grand Forks, North Dakota, August 6, 2014.

Stepan, D.J., 2014, Surface and shallow subsurface soil gas and water monitoring at the Bell Creek oil field: Presented to Denbury Resources Inc. personnel, Plano, Texas, July 25, 2014.

Poster Presentations

Gao, P., Gorecki, C.D., Braunberger, J.R., Klenner, R.C.L., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Acid gas injection for enhanced oil recovery and long-term storage in Zama pinnacle reefs: Poster presented at the Carbon Storage R&D Project Review Meeting: Developing the Technologies and Infrastructure for CCS, Pittsburgh, Pennsylvania, August 12–14, 2014.

Gao, P., Gorecki, C.D., Braunberger, J.R., Klenner, R.C.L., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Acid gas injection for enhanced oil recovery and long-term storage in Zama pinnacle reefs: Poster presented at the IEAGHG Combined Monitoring and Modelling Network Meeting, Morgantown, West Virginia, August 4–8, 2014.

Gao, P., Gorecki, C.D., Braunberger, J.R., Klenner, R.C.L., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Acid gas injection for enhanced oil recovery and long-term storage in Zama pinnacle reefs: Poster presented at the PCOR Partnership Annual Membership Meeting, Denver, Colorado, September 16–17, 2014.

Klapperich, R.J., Stepan, D.J., Jensen, M.D., Gorecki, C.D., Steadman, E.N., Harju, J.A., Nakles, D.V., and McNemar, A.T., 2014, Regional Carbon Sequestration Partnership Water Working Group: Poster presented at the PCOR Partnership Annual Membership Meeting, Denver, Colorado, September 16–17, 2014.

Liu, G., Braunberger, J.R., Gorecki, C.D., Gao, P., Peck, W.D., Steadman, E.N., and Harju, J.A., 2014, Integrated modeling and simulation for CO_2 EOR and CO_2 storage in the Zama pinnacle reefs of the Alberta Basin, Canada: Poster presented at the 2014 SEG/SPE/AAPG/SPWLA/EAGE Summer Research Workshop, San Diego, California, August 3–8, 2014.

Liu, G., Peck, W.D., Klenner, R.C.L., Braunberger, J.R., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Evaluation of large-scale carbon dioxide storage potential in the basal saline system in the Alberta and Williston Basins in North America: Poster presented at the IEAGHG Combined Monitoring and Modelling Network Meeting, Morgantown, West Virginia, August 4–8, 2014.

Liu, G., Peck, W.D., Braunberger, J.R., Klenner, R.C.L., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Evaluation of large-scale carbon dioxide storage potential in the basal saline system in the Alberta and Williston Basins in North America: Poster presented at the PCOR Partnership Annual Membership Meeting, Denver, Colorado, September 16–17, 2014.

Peck, W.D., Klenner, R.C.L., Liu, G., Gorecki, C.D., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Model development of the Aquistore CO_2 storage project: Poster presented at the Carbon Storage R&D Project Review Meeting: Developing the Technologies and Infrastructure for CCS, Pittsburgh, Pennsylvania, August 12–14, 2014.

Peck, W.D., Klenner, R.C.L., Liu, G., Gorecki, C.D., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2014, Model development of the Aquistore CO_2 storage project: Poster presented at the IEAGHG Combined Monitoring and Modelling Network Meeting, Morgantown, West Virginia, August 4–8, 2014.

Deliverables/Milestones

Draft

Liu, G., Braunberger, J.R., Pu, H., Gao, P., Gorecki, C.D., Ge, J., Klenner, R.C.L., Bailey, T.P., Dotzenrod, N.W., Bosshart, N.W., Ayash, S.C., Hamling, J.A., Steadman, E.N., and Harju, J.A., 2014, Bell Creek test site – simulation report: Plains CO_2 Reduction (PCOR) Partnership Phase III draft Task 9 Deliverable D66 (update 3) executive summary for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, August.

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

Peck, W.D., Glazewski, K.A., Klenner, R.C.L., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Improvements in the application of CO_2 storage efficiency values for deep saline formations: Plains CO_2 Reduction (PCOR) Partnership Phase III draft Task 1 Deliverable D7 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

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

Approved

Bengal, L.E., Bliss, K., Connors, K., Botnen, L.S., and Harju, J.A., 2014, Guidance for states and provinces on operational and post-operational liability: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 3 Deliverable D98 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, August 2013.

Peck, W.D., Klenner, R.C.L., Liu, G., Gorecki, C.D., and Steadman, E.N., 2014, Geologic modeling and simulation report for the Aquistore project: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 1 Deliverable D93 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2014-EERC-07-09, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Draft Submitted and Approved

Crocker, C.R., Crossland, J.L., Chimote, S.A., Daly, D.J., Anagnost, K.K., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Public site updates: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 2 Deliverable D13 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2014-EERC-09-06, Grand Forks, North Dakota, Energy & Environmental Research Center, July.

Jensen, M.D., Glazewski, K.A., Peck, W.D., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, Review of source attributes: Plains CO_2 Reduction (PCOR) Partnership Phase III Task 1 Deliverable D1 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2014-EERC-09-21, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Value-Added Products

Submitted

Botnen, L.S., Gorecki, C.D., Steadman, E.N., Harju, J.A., Nakles, D.V., and Azzolina, N.A., 2014, Programmatic risk management plan: Plains CO_2 Reduction (PCOR) Partnership Phase III draft Task 3 value-added report (originally submitted as D88) (update 1) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, August.

Submitted and Approved

Peck, W.D., Glazewski, K.A., Braunberger, J.R., Grove, M.M., Bailey, T.P., Bremer, J.M., Gorz, A.J., Sorensen, J.A., Gorecki, C.D., and Steadman, E.N., 2014, Broom Creek Formation outline: Plains CO_2 Reduction (PCOR) Partnership Phase III value-added report for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement

No. DE-FC26-05NT42592, EERC Publication 2014-EERC-09-09, Grand Forks, North Dakota, Energy & Environmental Research Center, August.

Progress Reports

Monthlies

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

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

Quarterlies

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

Conference Papers

Botnen, L.S., Connors, K.C., Bliss, K.J., Bengal, L.E., and Harju, J.A., 2014, Guidance for states and provinces on operational and postoperational liability in the regulation of carbon geologic storage: Paper for the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

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

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

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

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

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

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

Peck, W.A., Glazewski, K.A., Klenner, R.C.L., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2014, A workflow to determine CO_2 storage potential in deep saline formations: Paper for the International Conference on Greenhouse Gas Technologies (GHGT-12), Austin, Texas, October 5–9, 2014.

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

Meeting Minutes

Ayash, S.C., and Nakles, D., 2014, Minutes—Plains CO_2 Reduction (PCOR) Partnership Technical Advisory Board (TAB) WebEx Presentation: June 27, 2014.

Klapperich, R.J., 2014, Minutes—Regional Carbon Sequestration Partnership Water Working Group monthly conference call: June 26, 2014.

Klapperich, R.J., 2014, Minutes—Regional Carbon Sequestration Partnership Water Working Group monthly conference call: July 17, 2014.

Klapperich, R.J., 2014, Minutes—Regional Carbon Sequestration Partnership Program Water Working Group annual meeting: August 11, 2014.

MEETINGS/TRAVEL

Representatives from the PCOR Partnership incurred travel costs for their participation in the following meetings/conferences, workshops, project management site trips, and training opportunities in this reporting period:

- *June 1–4, 2014: Traveled to Minneapolis, Minnesota, to attend the American Rock Mechanics Association 48th U.S. Rock Mechanics/Geomechanics Symposium.
- July 7–11, 2014: Traveled to Casper, Wyoming, to attend the 8th Annual Wyoming CO_2 Conference.
- July 16, 2014: Traveled to Kenmare, North Dakota, to inspect the lignite site.
- July 18–22, 2014: Traveled to Denver, Colorado, to present at the American Association of Petroleum Geologists (AAPG) Rocky Mountain Section Meeting and attend the short course.
- July 20–24, 2014: Traveled to Gillette, Wyoming, for sampling work at the Bell Creek Field.
- July 21–24, 2014: Traveled to Denver, Colorado, to attend COMSOL Multiphysics Intensive Training.
- July 24–27, 2014: Traveled to Plano, Texas, to attend project meetings with Denbury.
- July 28 – August 1, 2014: Traveled to Pittsburgh, Pennsylvania, for the DOE NETL 2014 CO_2 Capture Technology Meeting.
- July 29–31, 2014: Traveled to Decatur, Illinois, to present at the National Sequestration Education Workshop on Public Education, Training, and Community Outreach for Carbon Capture, Utilization, and Storage.
- July 29 – August 2, 2014: Traveled to Gillette, Wyoming, for site sampling work at the Bell Creek Station.
- August 3–8, 2014: Traveled to San Diego, California, to present at the 2014 SEG/SPE/AAPG/SPWLA/EAGE (Scientific Ecology Group, Inc.–Society of Petroleum Engineers—AAPG–Society of Petrophysicists and Well Log Analysts–European Association of Geoscientists and Engineers) Summer Research Workshop.
- August 3–9, 2014: Traveled to Gillette, Wyoming, for site work at Bell Creek.
- August 4–7, 2014: Traveled to Morgantown, West Virginia, to present at the IEAGHG Combined Monitoring and Modelling Network Meeting.
- August 9–16, 2014: Traveled to Gillette, Wyoming, for site sampling work at the Bell Creek Station.
- August 10–17, 2014: Traveled to Pittsburgh, Pennsylvania, to present at the 2014 Carbon Storage R&D Project Review Meeting, host the WWG Annual Meeting, and attend the NRAP Stakeholder's Meeting.
- August 25–28, 2014: Traveled to Mexico City, Mexico, to present at the Advanced Workshop for CO_2 Storage.
- September 9–12, 2014: Traveled to Columbia, South Carolina, to present at the University of South Carolina Energy Leadership Institute's Cradle to Grave: CO_2 Opportunities and Challenges.

*Inadvertently omitted from the previous quarterly report.

- September 14–18, 2014: Traveled to Denver, Colorado, to host the PCOR Partnership Annual Membership Meeting and two premeeting side meetings.
- September 17–19, 2014: Traveled to Bismarck, North Dakota, to attend the NDLA Annual Meeting and Exhibit.
- September 17–28, 2014: Traveled to Gillette, Wyoming, for sampling and site work at Bell Creek oil field.
- September 23–26, 2014: Traveled to Dickinson, North Dakota, to attend the NDPC Annual Meeting.

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