



Plains CO<sub>2</sub> Reduction (PCOR) Partnership  
Energy & Environmental Research Center (EERC)

## PLAINS CO<sub>2</sub> REDUCTION PARTNERSHIP PHASE III

### Quarterly Technical Progress Report Task 13 – Deliverable D58/D59

*(for the period October 1 – December 31, 2018)*

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**PLAINS CO<sub>2</sub> REDUCTION PARTNERSHIP PHASE III**  
**Quarterly Technical Progress Report**  
**October 1 – December 31, 2018**

**EXECUTIVE SUMMARY**

The Plains CO<sub>2</sub> Reduction (PCOR) Partnership is one of seven Regional Carbon Sequestration Partnerships competitively awarded by the U.S. Department of Energy 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 multiyear (2007–2019) development phase, is an extension of the characterization (Phase I) and validation (Phase II) phases and is intended to confirm that commercial-scale CO<sub>2</sub> capture, transportation, and storage can be achieved safely, permanently, and economically over extended periods in the PCOR Partnership region.

This progress report presents an update of Phase III PCOR Partnership activities from October 1 through December 31, 2018.

An approval was received to extend the PCOR Partnership project from December 31, 2018, to December 31, 2019.

PCOR Partnership activities continued to focus on the preparation and submittal of comprehensive deliverables and participation in conferences/meetings and workshops. Oral and poster presentations were given at the 14th International Conference on Greenhouse Gas Control Technologies. The virtual special issue of *International Journal of Greenhouse Gas Control* entitled “PCOR Partnership Assessment of CO<sub>2</sub> Geologic Storage Associated with Enhanced Oil Recovery” was published online. The writing of value-added documents continued.

The PCOR Partnership public Web site technical upgrade design was completed and went live. Signs that locate and provide construction and health, safety, and environment information were installed in the Bell Creek Field as part of the transfer agreement. PCOR Partnership Phase II data files were uploaded to NETL’s Energy Data eXchange (EDX). A plan was developed to push PCOR Partnership Phases II and III data to PCOR Partnership public EDX workspace.

The outreach and site closure tasks ended on December 31, 2018. All remaining PCOR Partnership efforts will be handled under the management task.



Plains CO<sub>2</sub> Reduction (PCOR) Partnership  
Energy & Environmental Research Center (EERC)

## **PLAINS CO<sub>2</sub> REDUCTION PARTNERSHIP PHASE III**

### **Quarterly Technical Progress Report**

### **October 1 – December 31, 2018**

## **INTRODUCTION**

The Plains CO<sub>2</sub> Reduction (PCOR) Partnership is one of seven regional partnerships operating under the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) Regional Carbon Sequestration Partnerships (RCSP) Initiative. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota (UND) in Grand Forks, North Dakota, and includes stakeholders from the public and private sectors. The membership, as of December 31, 2018, 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 Initiative 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 (2007–2019): involves large-volume carbon storage demonstration tests.

Phase III is divided into three budget periods (BPs), running from October 1, 2007, to December 31, 2019:

- BP3: October 1, 2007 – September 30, 2009
- BP4: October 1, 2009 – March 31, 2016
- BP5: April 1, 2016 – December 31, 2019

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

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<sub>2</sub>), 2) facilitate the development of the infrastructure required to transport CO<sub>2</sub> 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<sub>2</sub>, 5) facilitate the establishment of a technical framework by which carbon credits can be monetized for CO<sub>2</sub> stored in geologic formations, 6) continue collaboration with other RCSPs, and 7) provide outreach and education for CCS 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



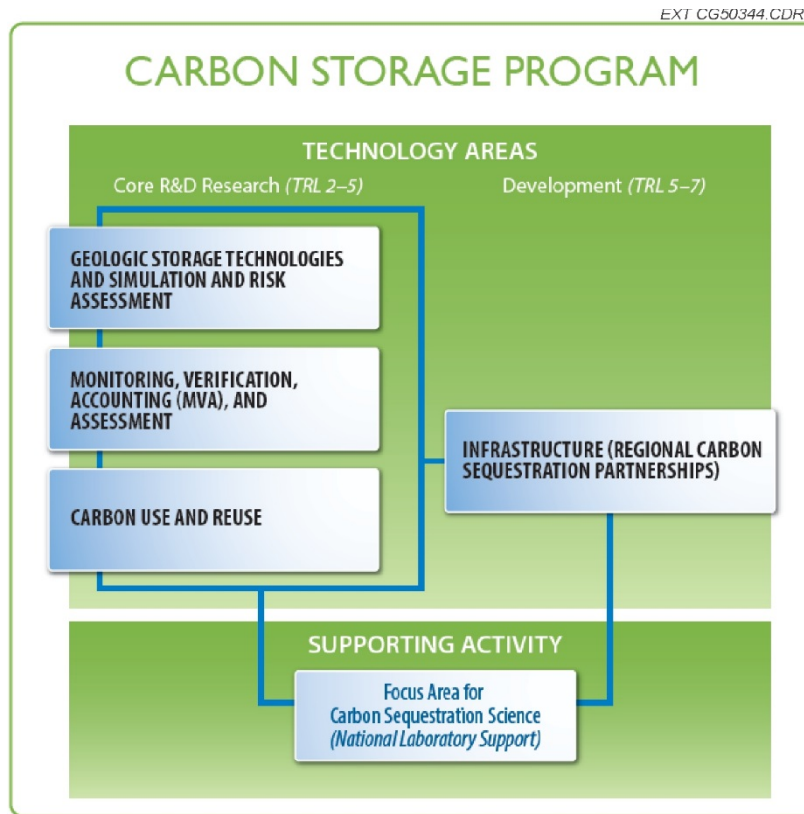


Figure 1. DOE Carbon Storage Program technology areas featuring regional partnerships (courtesy of DOE NETL; “TRL” stands for technology readiness level).

utilize the infrastructure of its region to maximize CO<sub>2</sub> injection volumes. A programmatic development phase (Phase III) goal is implementation of large-scale field testing involving at least 1 million tonnes of CO<sub>2</sub> per project. Each of the RCSP large-volume injection tests is designed to demonstrate that the CO<sub>2</sub> storage sites have the potential to store regional CO<sub>2</sub> emissions safely, permanently, and economically for hundreds of years.

The PCOR Partnership is working with Denbury Onshore LLC (Denbury) in the Denbury-operated Bell Creek oil field in Powder River County in southeastern Montana. The PCOR Partnership has also conducted a feasibility study for Spectra Energy Transmission’s (Spectra’s) Fort Nelson gas-processing facility, situated near Fort Nelson, British Columbia, Canada. In addition, the PCOR Partnership is collaborating with the Petroleum Technology Research Centre (PTRC) on site characterization, risk assessment, and MVA (monitoring, verification, and accounting) activities associated with the Aquistore project near Estevan, Saskatchewan, Canada. The PCOR Partnership’s work concluded with Apache Canada Ltd. to further characterize the Zama Acid Gas Enhanced Oil Recovery (EOR), CO<sub>2</sub> 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 with PCOR Partnership Phase III participation.

The PCOR Partnership's objectives for the demonstration projects are as follows:

- 1) conduct a successful Bell Creek demonstration to verify that the region's large number of oil fields have the potential to store significant quantities of CO<sub>2</sub> in a safe, economical, and environmentally responsible manner and
- 2) support Spectra's feasibility study of a Fort Nelson demonstration to verify the economic feasibility of using the region's carbonate saline formations for safe, long-term CO<sub>2</sub> 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 (completed);
- 2) Public Outreach and Education (completed);
- 3) Permitting and National Environmental Policy Act (NEPA) Compliance (completed);
- 4) Site Characterization and Modeling (completed);
- 5) Well Drilling and Completion (completed);
- 6) Infrastructure Development (completed);
- 7) CO<sub>2</sub> Procurement (completed);
- 8) Transportation and Injection Operations (completed);
- 9) Operational Monitoring and Modeling (completed);
- 10) Site Closure (completed);
- 11) Postinjection Monitoring and Modeling (completed);
- 12) Project Assessment (completed);
- 13) Project Management;
- 14) RCSP Water Working Group (WWG) Coordination (completed);
- 15) Further Characterization of the Zama Acid Gas EOR, CO<sub>2</sub> Storage, and Monitoring Project (completed);
- 16) Characterization of the Basal Cambrian System (completed).

Table 2 lists the responsibility matrix for these 16 tasks.

**Table 2. Phase III Responsibility Matrix**

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

## PROGRESS OF WORK

### Task 1 – Regional Characterization

This task ended in Quarter 1 –BP 5, Year 11 (March 2018).

### Task 2 – Public Outreach and Education

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

- Named Neil Wildgust task leader following the retirement of Dan Daly.
- During the quarter, the PCOR Partnership was represented by EERC personnel at five meetings/conferences. Specifically, PCOR Partnership outreach activities included five oral presentations and five posters. The following quantities of PCOR Partnership outreach materials were distributed:
  - PCOR Partnership documentary entitled “Out of the Air – Into the Soil” – 5
  - PCOR Partnership documentary entitled “Global Energy and Carbon: Tracking Our Footprint” – 5
  - PCOR Partnership documentary entitled “The Bell Creek Story: CO<sub>2</sub> in Action” – 2
  - PCOR Partnership documentary entitled “Coal: Engine of Change” – 26
- Completed the PCOR Partnership public Web site technical upgrade design. The upgraded Web site went live November 29, 2018. This eliminated security issues associated with the now-obsolete Flash player that has been streaming the video content on the PCOR Partnership public Web site for several years. The hyperlink to the public

Web site remains [www.undeerc.org/PCOR/](http://www.undeerc.org/PCOR/). Note, if your browser has saved a cached version of the Web site, you may need to refresh your screen using Ctrl+F5.

- Continued editing and internal review of the draft updated Phase II Zama fact sheet.
- Met with Prairie Public Broadcasting (PPB) on December 11, 2018, in Fargo, North Dakota, for narration recut sessions for the video shorts for the Meeting the Challenge educational series Parts 3 and 4.
- Mailed a copy of the DVD of documentary Deliverable (D) 22 “Coal: Engine of Change” to all U.S. and international partner contacts.
- **Conference call** activity this quarter included the following:
  - With regard to the monthly RCSP Program Outreach Working Group (OWG) conference calls:
    - ◆ No monthly conference calls were held.
- Efforts continued on updates to the PCOR Partnership **public Web site** ([www.undeerc.org/pcor](http://www.undeerc.org/pcor)), including the following:
  - Added links to the CO<sub>2</sub> Enhanced Oil Recovery page and individual CO<sub>2</sub> project pages to the left navigation menu.
  - Continued work on text edits on the Options to Reduce CO<sub>2</sub> page.
  - Added 22 video clips containing content from Documentary D22 entitled “Coal: Engine of Change” to the PCOR Partnership public Web site Video Clip Library. Content went live November 29, 2018.
  - Determined a list of DOE NETL-approved final deliverables and milestones that are available to upload to the public Web site.
  - Continued ongoing identification and repair of broken links.
- Information regarding the **site sessions/visits** to the PCOR Partnership public Web site included the following:
  - There were 4212 sessions/visits to the public Web site ([www.undeerc.org/pcor](http://www.undeerc.org/pcor)). Traffic increased 65% from last quarter (2549 sessions/visits).
  - There were 3626 unique visitors to the public Web site, representing a 62% increase from last quarter (2232 visitors). In particular, over 90% of these visitors were new to the Web site (visitors whose visit was marked as a first-time visit in this quarter). Of the 4212 sessions/visits, 58% of the Web traffic was domestic, and 42% was international. Table 3 lists the top ten countries for visits to the PCOR Partnership Web site: United States, India, United Kingdom, Canada, Australia, Germany, Pakistan, United Arab Emirates, Japan, and Denmark. There was traffic from 101 countries overall (Figure 3).
  - There were 302 sessions/visits originating from within the PCOR Partnership region (a 13% increase from last quarter) (Figure 4). Approximately 76% of the regional visits originated from the United States, and 24% came from Canada. Visits from within the PCOR Partnership region represent over 7% of the overall traffic to the public Web site (it should be noted that the totals are exaggerated to some degree because the visit location data were aggregated at the state and province levels, even though the PCOR Partnership region formally includes only portions of British Columbia, Montana, and Wyoming).
- During this reporting period, a breakdown of how visitors came to the PCOR Partnership Web site, also referred to as **traffic sources** (Figure 5), was determined and is provided below:

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

	<b>Country</b>	<b>Sessions/ Visits*</b>	<b>PCOR Partnership State/Province</b>	<b>Visits*</b>
1	United States	2468		
			North Dakota	75
			Minnesota	48
			Wisconsin	31
			Missouri	22
			Montana	16
			Nebraska	14
			Iowa	12
			Wyoming	7
			South Dakota	6
2	India	278		
3	United Kingdom	221		
4	Canada	200		
			Alberta	32
			British Columbia	23
			Saskatchewan	12
			Manitoba	4
5	Australia	116		
6	Germany	60		
7	Pakistan	45		
8	United Arab Emirates	41		
9	Japan	40		
10	Denmark	33		
	Other 91 countries	710		
<b>Total Sessions/Visits</b>		<b>4212</b>	<b>Total PCOR Partnership Visits</b>	<b>302</b>

\* Arranged by the number of visits to the site.

- Search traffic refers to the use of search engines such as Google, Bing, and Yahoo. Search traffic accounted for approximately 76% of the overall traffic that came to the public Web site. Google Analytics provides keywords that visitors used to find the public Web site. The top three search phrases were “CO<sub>2</sub>,” “carbon sequestration,” and “carbon footprint calculator.”
- Direct traffic consists of those visitors who bookmark or type a specific URL (e.g., [www.undeerc.org/pcor](http://www.undeerc.org/pcor)) into the Web address bar. It is likely that most of the direct traffic (over 16%) is from persons familiar with the PCOR Partnership.
- Referral site traffic (over 8%) corresponds to the traffic directed to the PCOR Partnership Web page from other sites via links. The top referring Web sites were [classroom.google.com](http://classroom.google.com) (an education Web site), [arthapedia.in](http://arthapedia.in) (Indian economy and government Web site), [eerc.und.nodak.edu](http://eerc.und.nodak.edu) (EERC), and YouTube.
- Less than 1% of site traffic (three visitors) resulted from teacher campaigns and social interactions such as e-mail or social media sources (e.g., Facebook).

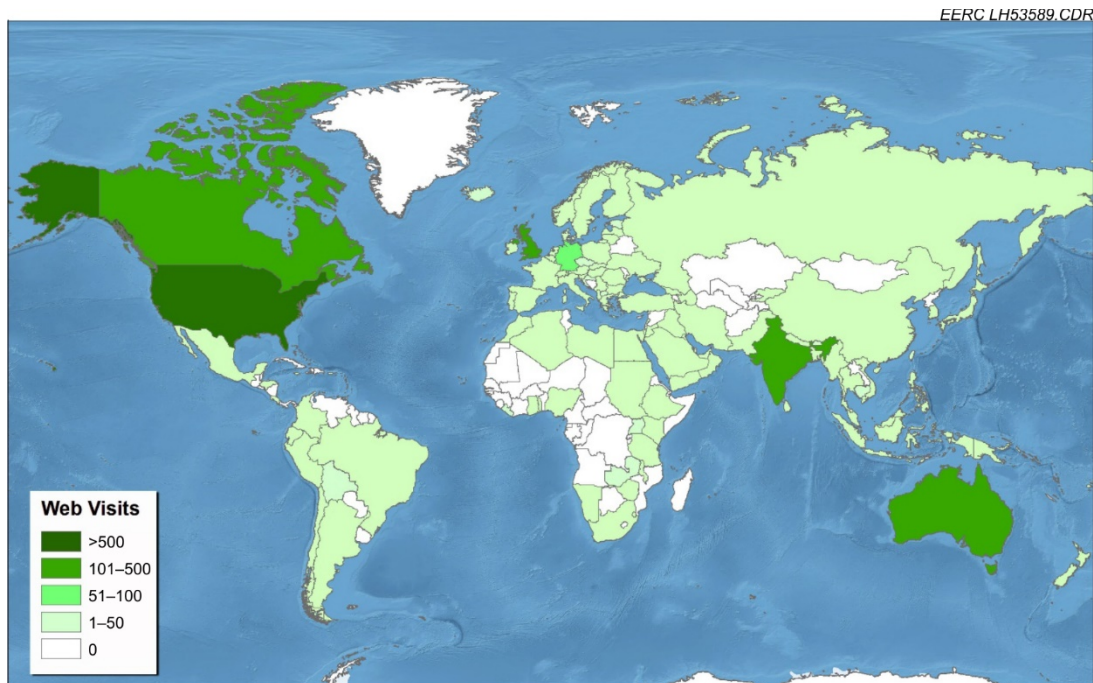


Figure 3. Map of PCOR Partnership Web site global traffic for this reporting period.

- During this reporting period, the **nature of the sessions** to the PCOR Partnership public Web site included 8720 page views (an increase of 92% from last quarter); the top five pages viewed are listed in Table 4. These five pages make up 47% of total page views.
- All seven full-length documentaries and 63 video clips taken from the documentaries have been uploaded to the EERC's YouTube channel. The top five accessed YouTube videos are listed in Table 5. Because of the volume of material, the videos were organized into seven playlists. Each video description includes one or more links to the PCOR Partnership public Web site. These PCOR Partnership full-length documentaries and video clips are also on the PPB YouTube Channel. These are listed in Table 6. These videos can also be streamed on the PCOR Partnership public Web site.

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

- This task ended on December 31, 2018. Any further efforts in this area will be handled in Task 13.

### **Task 3 – Permitting and NEPA Compliance**

This task ended in Quarter 1 – BP5, Year 11 (March 2018).

### **Task 4 – Site Characterization and Modeling**

This task ended in Quarter 1 – BP5, Year 10 (March 2017).



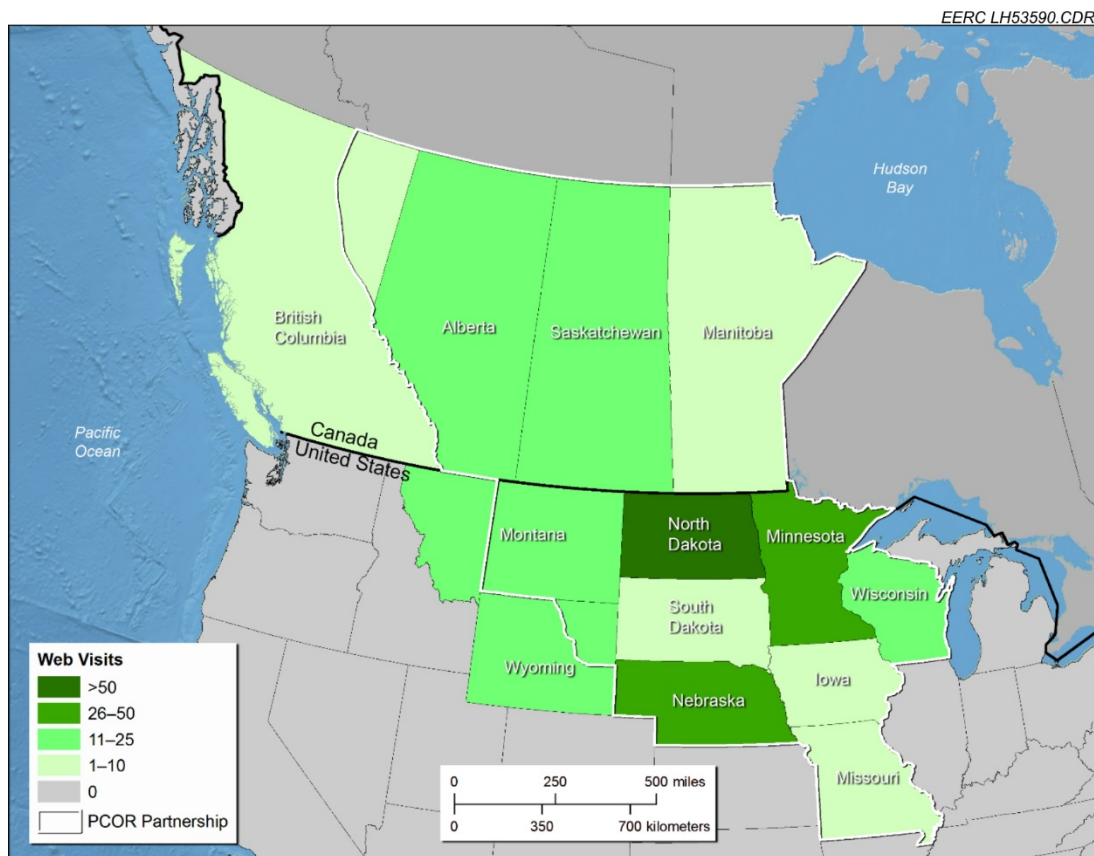


Figure 4. Map of PCOR Partnership Web site regional visits for this reporting period.

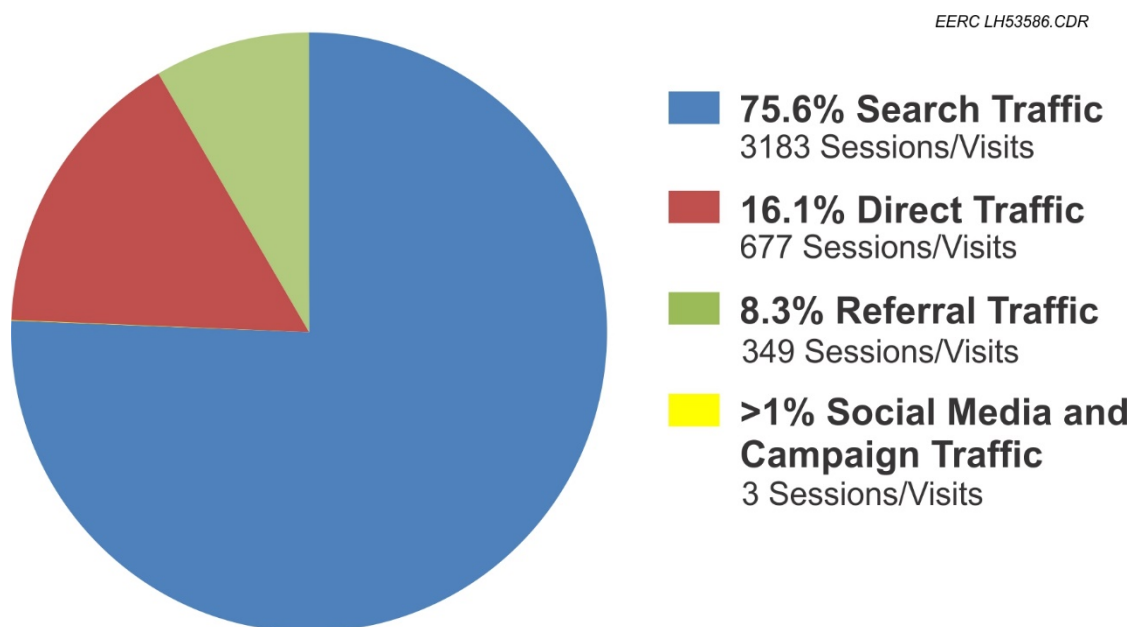


Figure 5. PCOR Partnership public Web site traffic sources for this reporting period.

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

<b>Page Title</b>	<b>Page Views</b>	<b>% Page Views</b>	<b>Page</b>
What Is CO <sub>2</sub> Sequestration?	1687	19.3	<a href="http://www.undeerc.org/pcor/sequestration/whatissequestration.aspx">www.undeerc.org/pcor/sequestration/whatissequestration.aspx</a>
What Is CO <sub>2</sub> ?	930	10.7	<a href="http://www.undeerc.org/pcor/sequestration/whatisco2.aspx">www.undeerc.org/pcor/sequestration/whatisco2.aspx</a>
Terrestrial Sequestration	758	8.7	<a href="http://www.undeerc.org/pcor/region/terrestrial/default.aspx">www.undeerc.org/pcor/region/terrestrial/default.aspx</a>
Carbon Capture and Storage (CCS)	409	4.7	<a href="http://www.undeerc.org/pcor/sequestration/ccs.aspx">www.undeerc.org/pcor/sequestration/ccs.aspx</a>
CO <sub>2</sub> Sequestration Projects	351	4.0	<a href="http://www.undeerc.org/pcor/co2sequestrationprojects/default.aspx">www.undeerc.org/pcor/co2sequestrationprojects/default.aspx</a>

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

<b>Video</b>	<b>Video Length</b>	<b>Views</b>	<b>Est. Minutes Watched</b>	<b>Avg. View Duration</b>
Reforestation in Brazil	4:41	1583	3994	2:30
The Phases of Oil Recovery – So Far	2:40	1130	1848	1:35
Reducing Our Carbon Footprint: The Role of Markets	26:49	533	2577	4:50
Installing a Casing-Conveyed Permanent Downhole Monitoring System	19:19	194	1012	5:10
Sequestering Carbon in Wetlands	3:08	127	250	2:00

**Table 6. PCOR Partnership Videos on PPB YouTube Channel Accessed**

<b>Video</b>	<b>Video Length</b>	<b>Views</b>	<b>Est. Minutes Watched</b>
Global Energy and Carbon: Tracking Our Footprint	32:36	3237	23,695
CO <sub>2</sub> EOR and Geologic CO <sub>2</sub> Sequestration	3:13	894	1717
Clean Development Mechanism Projects	1:56	854	829
Coal: Engine of Change	56:45	613	5052
The Bell Creek Story: CO <sub>2</sub> in Action	26:26	244	1040

**Task 5 – Well Drilling and Completion**

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

**Task 6 – Infrastructure Development**

This task ended in Quarter 1 – BP5, Year 11 (March 2018).



### **Task 7 – CO<sub>2</sub> Procurement**

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

### **Task 8 – Transportation and Injection Operations**

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

### **Task 9 – Operational Monitoring and Modeling**

This task ended in Quarter 1 – BP5, Year 11 (March 2018).

### **Task 10 – Site Closure**

Significant accomplishments for Task 10 for the reporting period included the following:

- Submitted Milestone (M) 61 entitled "Site Closure for Bell Creek Test Site Completed" on December 28, 2018.
- Prepared metal signs for installation at each of the ten soil gas profile stations and the 04-03 OW (observation well) geophone array. The signs are part of decommissioning (abandoning in place) and transfer of operation of the installations to Denbury, which is a preferred alternative to removal and reclamation. The signs locate and provide construction and health, safety, and environment information as part of the transfer agreement.
- Traveled to the Bell Creek Field the week of November 19, 2018, to install signs at soil gas profile stations and the 04-03 OW geophone array location.
- Inventoried stored core material collected from Wells 05-06 OW, 33-14R, and 56-14R through PCOR Partnership Bell Creek activities.
- Arranged transport of core temporarily housed at third-party laboratories to the EERC for long-term archiving and storage.

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

- This task ended on December 31, 2018. Any further efforts in this area will be handled in Task 13.

### **Task 11 – Postinjection Monitoring and Modeling**

This task ended in Quarter 1 – BP5, Year 11 (March 2018).

### **Task 12 – Project Assessment**

This task ended in Quarter 1 – BP5, Year 11 (March 2018).

## Task 13 – Project Management

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

- Submitted a notice of project extension from December 31, 2018, to December 31, 2019, to DOE NETL on December 13, 2018. Received approval of the PCOR Partnership project extension from DOE NETL in Modification 40 on December 31, 2018.
- Presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14) held October 21–25, 2018, in Melbourne, Australia.
  - Oral presentations included the following:
    - ◆ Session 2C: “Successes and Lessons Learned from 15 years of the PCOR Partnership”
    - ◆ Session 9B: “Passive Microseismic Monitoring of CO<sub>2</sub> EOR and Associated Storage Using a Downhole Array in a Noisy Subsurface Environment”
    - ◆ Session 11E: “An Improved Numerical Modeling and Simulation Study of the Aquistore CO<sub>2</sub> Storage Project”
  - Poster presentations included the following:
    - ◆ Poster 192: “Evaluation of Measured Differences in Liquid Versus Gas Permeability and Identification of Potential Causes”
    - ◆ Poster 205: “Determining the Long-Term Fate of CO<sub>2</sub> Storage Associated with an Enhanced Oil Recovery Project”
    - ◆ Poster 263: “Viability of InSAR [interferometric synthetic aperture radar] as a Monitoring Tool in Challenging Terrain: Bell Creek, Montana”
    - ◆ Poster 373: “Nexus of Water and CCS: Findings of the Water Working Group (WWG) of the Regional Carbon Sequestration Partnerships”
    - ◆ Poster 463: “PCOR Partnership Outreach: An Evolving Regional Capability Based on RCSP Outreach Best Practices”
  - Charlie Gorecki chaired or cochaired Sessions 4F “Injectivity,” 5B “Geological Site Characterization,” and 10F “Geochemical Modeling.” Neil Wildgust cochaired Sessions 3F “Novel Storage Concepts” and 7F “Field Scale Modeling.” Chantsalmaa Dalkhaa cochaired Session 8F “Pore Scale Modeling.” Wes Peck cochaired Session 3B “Risk Assessment for Geological Storage.”
- Attended the Midwest Regional Carbon Sequestration Partnership (MRCSP) 2018 Partners & Stakeholders Annual Meeting held November 14–15, 2018, in Annapolis, Maryland.
- The project manager served as a discussion leader and presented “Session III Storage Incidental to CO<sub>2</sub> EOR” at the SPE (Society of Petroleum Engineers) Carbon Capture, Utilization, and Sequestration Forum held November 27–30, 2018, in San Antonio, Texas. This forum was focused on technical and nontechnical challenges associated with implementing carbon capture, utilization, and storage (CCUS) on a commercial scale.
- Presented “Landscape of CCUS in North Dakota” at CO<sub>2</sub> & ROZ (residual oil zone) Conference Week held December 3–6, 2018, in Midland, Texas.
- Submitted fiscal year 2017 International Energy Agency Greenhouse Gas R&D Programme (IEAGHG) Peer Review R1, R2, and R5 milestone responses to the DOE project manager on December 26, 2018.

- Provided Draft D62 entitled “Plains CO<sub>2</sub> Reduction Partnership Phase III Final Report” to Stefan Bachu, Alberta Innovates – Technology Futures, for technical review and to Denbury for consultation. KeyLogic on behalf of DOE NETL and Stefan Bachu, InnoTech Alberta, completed external technical reviews. The authors worked to address the comments. Started internal review of the initial modifications. Once all revisions are incorporated, a revised draft will be submitted for review and approval.
- Received notification that the virtual special issue of *International Journal of Greenhouse Gas Control* (IJGGC) entitled “PCOR Partnership Assessment of CO<sub>2</sub> Geologic Storage Associated with Enhanced Oil Recovery” has been compiled and is available online.
- Continued addressing comments from an internal review of a value-added report on the geologic characterization and CO<sub>2</sub> storage potential of the state of Nebraska (continuation of a Task 1 activity). Additional modeling was completed to update CO<sub>2</sub> storage potential estimates. Figures and CO<sub>2</sub> storage potential ranges were updated.
- Worked on internal review of a value-added overview document based on the PCOR Partnership best practices manuals. A meeting was held to discuss formatting and graphics development for the document. Worked on modifications based on comments.
- Continued work on value-added documents discussing PCOR Partnership technical work. These will be submitted to appropriate subject matter journals.
- Continued to evaluate data to determine appropriate content to upload into the DOE NETL Energy Data eXchange (EDX). Continued discussions of plans to upload PCOR Partnership data to EDX and a pathway for long-term data management, including the following:
  - Completed preparation, review, and upload of Phase II files on December 7, 2018.
  - Participated in a WebEx hosted by DOE to discuss pushing files to the PCOR Partnership public EDX work space.
  - Met to discuss plans to push PCOR Partnership Phases II and III data to the PCOR Partnership public EDX work space. A plan was developed to push several items to the public work space in the coming weeks. Most of the uploaded data will eventually be pushed to the public work space.
  - The upload schedule is provided in Table 9.
- Uploaded the group photo from the 2018 PCOR Partnership Membership Meeting to the meeting Web site: [www.undeerc.org/PCOR18/Default.aspx](http://www.undeerc.org/PCOR18/Default.aspx).
- Continued to add DOE-approved reports to the decision support system (DSS) on the members-only Web site.
- Deliverables and milestones completed in October:
  - September monthly update
  - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
- Deliverables and milestones completed in November:
  - October monthly update
- Deliverables and milestones completed in December:
  - November monthly update
  - Task 10: M61 – Site Closure for Bell Creek Test Site Completed

**Table 7. EDX Upload Schedule**

<b>Webinar</b>				
<b>January 22, 2018</b>				
<b>RCSP Phase</b>	<b>Phase II</b>		<b>Phase III</b>	
<b>Phase Completion Date</b>	<b>9/30/2009</b>		<b>12/31/2019</b>	
<b>Milestone</b>	<b>Planned Completion</b>	<b>Actual Completion</b>	<b>Planned Completion</b>	<b>Actual Completion</b>
Begin Data Transfer	9/4/18	9/4/18	8/15/18	8/15/18
50% Data Uploaded	10/31/18	10/31/18	9/5/18	9/5/18
75% Data Uploaded	11/16/18	11/16/18	9/21/18	9/21/18
100% Data Uploaded	12/7/18	12/7/18	9/30/18	9/28/18

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

- Submitted a notice of project extension from December 31, 2018, to December 31, 2019, to DOE NETL on December 13, 2018. Received approval of the PCOR Partnership project extension from DOE NETL in Modification 40 on December 31, 2018.

#### **Task 14 – RCSP WWG Coordination**

This task ended in Quarter 1 – BP5, Year 11 (March 2018).

#### **Task 15 – Further Characterization of the Zama Acid Gas EOR, CO<sub>2</sub> 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 BP5 budget along with actual costs incurred and in-kind cost share reported are shown in Table 10. A spending plan for BP5 and actual incurred cost by quarter of cash funds for BP5 are provided in Figure 11 and Table 11.

### **PHASE III SCHEDULE STATUS**

Table 12 lists all deliverables and milestones by quarter, with completion dates, through the end of the reporting period (see Table 13 for the Gantt chart for BP5, Years 12–13).

**Table 8. Phase III Budget – BP5**

Organization	Approved Budget, \$*	Actual Costs Incurred, \$
DOE Share – Cash	13,946,212	13,672,502
Nonfederal Share	5,711,194	5,781,249
<b>Total</b>	<b>19,657,406</b>	<b>19,453,751</b>

\* As of Modification No. 38.

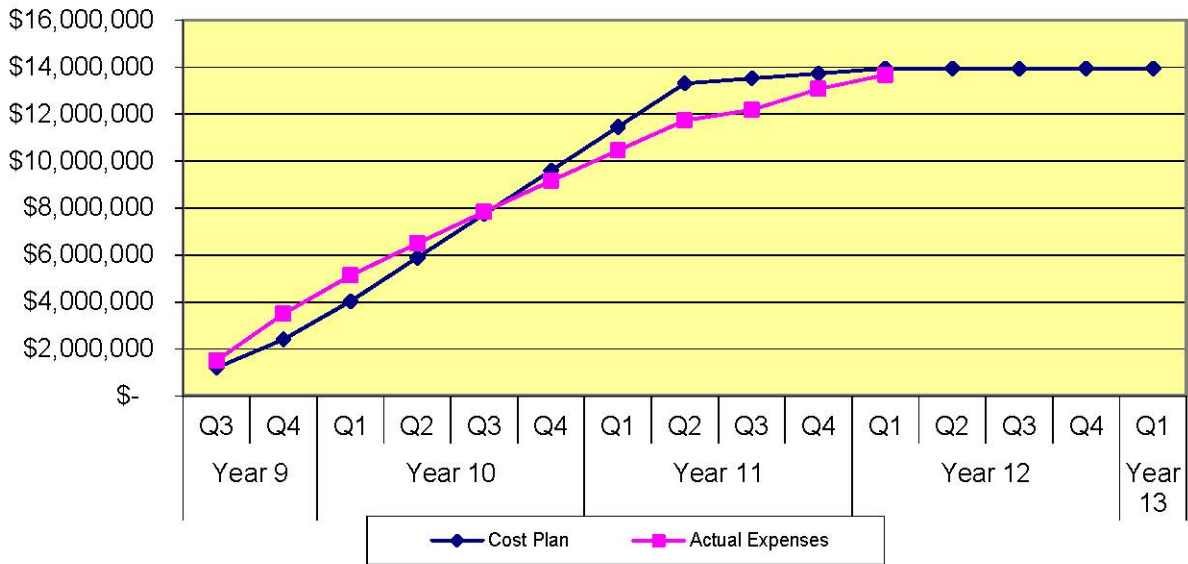


Figure 6. PCOR Partnership Phase III, BP5, Years 9–12 funding (cash only).

**Table 9. Phase III, BP5, Years 9–12 Spending Plan**

Budget Period 4					Budget Period 5											
Baseline Reporting Quarter	Year 9								Year 10							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
Baseline Cost Plan																
Federal Share	\$ 2,250,000	\$ 62,873,437	\$ 2,250,000	\$ 65,123,437	\$ 1,202,894	\$ 1,202,894	\$ 1,202,894	\$ 2,405,788	\$ 1,623,146	\$ 4,028,934	\$ 1,855,986	\$ 5,884,920	\$ 1,855,986	\$ 7,740,906	\$ 1,855,986	\$ 9,596,892
Nonfederal Share	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Planned	\$ 2,250,000	\$ 65,285,408	\$ 2,250,000	\$ 67,535,408	\$ 1,202,894	\$ 1,202,894	\$ 1,202,894	\$ 2,405,788	\$ 1,623,146	\$ 4,028,934	\$ 1,855,986	\$ 5,884,920	\$ 1,855,986	\$ 7,740,906	\$ 1,855,986	\$ 9,596,892
Actual Incurred Cost																
Federal Share	\$ 1,909,898	\$ 57,914,662	\$ 2,562,356	\$ 60,477,018	\$ 1,497,211	\$ 1,497,211	\$ 1,962,929	\$ 3,460,140	\$ 1,623,146	\$ 5,083,286	\$ 1,362,782	\$ 6,446,068	\$ 1,342,971	\$ 7,789,039	\$ 1,319,336	\$ 9,108,375
Nonfederal Share	\$ (4,110)	\$ 2,991,641	\$ 10,655	\$ 3,002,296	\$ 7,501	\$ 7,501	\$ 30,340	\$ 37,841	\$ 10,788	\$ 48,629	\$ 530	\$ 49,159	\$ 14	\$ 49,173	\$ 217	\$ 49,390
Total Incurred Cost	\$ 1,905,788	\$ 60,906,303	\$ 2,573,011	\$ 63,479,314	\$ 1,504,712	\$ 1,504,712	\$ 1,993,269	\$ 3,497,981	\$ 1,633,934	\$ 5,131,915	\$ 1,363,312	\$ 6,495,227	\$ 1,342,985	\$ 7,838,212	\$ 1,319,553	\$ 9,157,765
Variance																
Federal Share	\$ 340,102	\$ 4,958,775	\$ (312,356)	\$ 4,646,419	\$ (294,317)	\$ (294,317)	\$ (760,035)	\$ (1,054,352)	\$ -	\$ (1,054,352)	\$ 493,204	\$ (561,148)	\$ 513,015	\$ (48,133)	\$ 536,650	\$ 488,517
Nonfederal Share	\$ 4,110	\$ (579,670)	\$ (10,655)	\$ (590,325)	\$ (7,501)	\$ (7,501)	\$ (30,340)	\$ (37,841)	\$ (10,788)	\$ (48,629)	\$ (530)	\$ (49,159)	\$ (14)	\$ (49,173)	\$ (217)	\$ (49,390)
Total Variance	\$ 344,212	\$ 4,379,105	\$ (323,011)	\$ 4,056,094	\$ (301,818)	\$ (301,818)	\$ (790,375)	\$ (1,092,193)	\$ (10,788)	\$ (1,102,981)	\$ 492,674	\$ (610,307)	\$ 513,001	\$ (97,306)	\$ 536,433	\$ 439,127

Budget Period 5									
Baseline Reporting Quarter	Year 11								Year 12
	Q1		Q2		Q3		Q4		Q1
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Cum. BP Total
<b>Baseline Cost Plan</b>									
Federal Share	\$ 1,855,987	\$ 11,452,879	\$ 1,855,987	\$ 13,308,866	\$ 212,449	\$ 13,521,315	\$ 212,449	\$ 13,733,764	\$ 212,448
Nonfederal Share	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Planned	\$ 1,855,987	\$ 11,452,879	\$ 1,855,987	\$ 13,308,866	\$ 212,449	\$ 13,521,315	\$ 212,449	\$ 13,733,764	\$ 212,448
<b>Actual Incurred Cost</b>									
Federal Share	\$ 1,274,215	\$ 10,382,590	\$ 1,280,520	\$ 11,663,110	\$ 446,850	\$ 12,109,960	\$ 961,363	\$ 13,071,323	\$ 601,179
Nonfederal Share	\$ 20,159	\$ 69,549	\$ -	\$ 69,549	\$ 500	\$ 70,049	\$ -	\$ 70,049	\$ 6
Total Incurred Cost	\$ 1,294,374	\$ 10,452,139	\$ 1,280,520	\$ 11,732,659	\$ 447,350	\$ 12,180,009	\$ 961,363	\$ 13,141,372	\$ 601,185
<b>Variance</b>									
Federal Share	\$ 581,772	\$ 1,070,289	\$ 575,467	\$ 1,645,756	\$ (234,401)	\$ 1,411,355	\$ (748,914)	\$ 662,441	\$ (388,731)
Nonfederal Share	\$ (20,159)	\$ (69,549)	\$ -	\$ (69,549)	\$ (500)	\$ (70,049)	\$ -	\$ (70,049)	\$ (6)
Total Variance	\$ 561,613	\$ 1,000,740	\$ 575,467	\$ 1,576,207	\$ (234,901)	\$ 1,341,306	\$ (748,914)	\$ 592,392	\$ (388,737)

The above table reflects the planned and actual expenses of BP5 through December 31, 2018 at which time a no cost extension was executed. The below table is a spending plan for the final year provided by the no cost extension based on the remaining dollars available (\$273,710) as of December 31, 2018.

Budget Period 5								
Baseline Reporting Quarter	Year 12						Year 13	
	Q2		Q3		Q4		Q1	
	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total
<b>Baseline Cost Plan</b>								
Federal Share	\$ 68,430	\$ 68,430	\$ 68,430	\$ 136,860	\$ 68,430	\$ 205,290	\$ 68,420	\$ 273,710
Nonfederal Share	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Planned	\$ 68,430	\$ 68,430	\$ 68,430	\$ 136,860	\$ 68,430	\$ 205,290	\$ 68,420	\$ 273,710
<b>Actual Incurred Cost</b>								
Federal Share	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Nonfederal Share	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Incurred Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Variance</b>								
Federal Share	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Nonfederal Share	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Variance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

**Table 10. Phase III Milestones and Deliverables**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 1 – Quarter 1 (October–December 2007)</b>		
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
<b>Year 1 – Quarter 2 (January–March 2008)</b>		
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
<b>Year 1 – Quarter 3 (April–June 2008)</b>		
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
<b>Year 1 – Quarter 4 (July–September 2008)</b>		
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
<b>Year 2 – Quarter 1 (October–December 2008)</b>		
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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 2 – Quarter 2 (January–March 2009)</b>		
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 <sub>2</sub> 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
<b>Year 2 – Quarter 3 (April–June 2009)</b>		
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
<b>Year 2 – Quarter 4 (July–September 2009)</b>		
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 3 – 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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 3 – Quarter 1 (October–December 2009)</b>		
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
<b>Year 3 – Quarter 2 (January–March 2010)</b>		
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
<b>Year 3 – Quarter 3 (April–June 2010)</b>		
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
<b>Year 3 – Quarter 4 (July–September 2010)</b>		
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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 4 – Quarter 1 (October–December 2010)</b>		
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
<b>Year 4 – Quarter 2 (January–March 2011)</b>		
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 <sub>2</sub> 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
<b>Year 4 – Quarter 3 (April–June 2011)</b>		
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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 4 – Quarter 3 (April–June 2011) (continued)</b>		
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
<b>Year 4 – Quarter 4 (July–September 2011)</b>		
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 <sup>+</sup>	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
<b>Year 5 – Quarter 1 (October–December 2011)</b>		
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

<sup>+</sup> Name change requested September 28, 2011, and approved October 3, 2011.

Continued . . .

**Table 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 5 – Quarter 2 (January–March 2012)</b>		
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
<b>Year 5 – Quarter 3 (April–June 2012)</b>		
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 <sub>2</sub> 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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 5 – Quarter 4 (July–September 2012)</b>		
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
<b>Year 6 – Quarter 1 (October–December 2012)</b>		
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
<b>Year 6 – Quarter 2 (January–March 2013)</b>		
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 <sub>2</sub> 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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 6 – Quarter 3 (April–June 2013)</b>		
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 9 – Bell Creek Test Site – CO <sub>2</sub> Injection Initiated	6/30/13	May 2013 – sent 6/25/13
M37: Task 3 – IOGCC (Interstate Oil and Gas Compact Commission) Task Force Subgroup Meeting 2 Held	5/9/13	5/29/13
M42: Task 3 – Findings and Recommendations of the Operational and Postoperational Subgroups Presented to the Carbon Geologic Storage (CGS) Task Force	6/30/13	6/20/13 – sent 6/28/13
<b>Year 6 – Quarter 4 (July–September 2013)</b>		
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 Exec. Summ. 5/4/18 Full Report
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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 6 – Quarter 4 (July–September 2013) (continued)</b>		
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 <sub>2</sub> Storage, and Monitoring Project Completed	9/30/13	9/24/13
<b>Year 7 – Quarter 1 (October–December 2013)</b>		
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
<b>Year 7 – Quarter 2 (January–March 2014)</b>		
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 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 7 – Quarter 2 (January–March 2014) (continued)</b>		
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
<b>Year 7 – Quarter 3 (April–June 2014)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/14	4/30/14
M23: Task 14 – Monthly WWG Conference Call Held	4/30/14	4/24/14
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/14	5/30/14
D101: Task 14 – WWG Web Site Content Update	5/31/14	5/30/14
M23: Task 14 – Monthly WWG Conference Call Held	5/31/14	5/21/14
D44: Task 5 – Bell Creek Test Site – Drilling and Completion Activities Report	6/30/14	5/30/14
M23: Task 14 – Monthly WWG Conference Call Held	6/30/14	6/26/14
M45: Task 9 – Bell Creek Test Site – First Full-Repeat of Pulsed Neutron Logging Campaign Completed	6/30/14	6/9/14
M46: Task 9 – Bell Creek Test Site – 1 year of Injection Completed	6/30/14	6/26/14

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**Table 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 7 – Quarter 4 (July–September 2014)</b>		
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. 5/4/18 Full Report
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
<b>Year 8 – Quarter 1 (October–December 2014)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/14	10/31/14
D99: Task 14 – Water/CCS Nexus-Related Fact Sheet	10/31/14	10/31/14
M23: Task 14 – Monthly WWG Conference Call Held	10/31/14	10/28/14
M48: Task 9 – Bell Creek Test Site – 1 Million Metric Tons of CO <sub>2</sub> Injected	10/31/14	10/29/14
M23: Task 14 – Monthly WWG Conference Call Held	11/30/14	11/25/14
D57: Task 12 – Project Assessment Annual Report	12/31/14	12/30/14
M24: Task 14 – WWG Annual Meeting Held	12/31/14	8/11/14
<b>Year 8 – Quarter 2 (January–March 2015)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/15	1/30/15
D32: Task 4 – Bell Creek Test Site – Geomechanical Report (Update 1)	1/31/15	1/28/15
M23: Task 14 – Monthly WWG Conference Call Held	1/31/15	1/27/15
M23: Task 14 – Monthly WWG Conference Call Held	2/28/15	2/26/15
D25: Task 2 – Bell Creek Test Site Poster (update)	3/31/15	2/5/15
M23: Task 14 – Monthly WWG Conference Call Held	3/31/15	3/25/15
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/15	3/31/15

Continued . . .

**Table 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 8 – Quarter 3 (April–June 2015)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/15	4/29/15
M23: Task 14 – Monthly WWG Conference Call Held	4/30/15	4/28/15
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/15	6/1/15
M23: Task 14 – Monthly WWG Conference Call Held	5/30/15	5/28/15
D85: Task 6 – Report – Opportunities and Challenges Associated with CO <sub>2</sub> Compression and Transportation During CCUS (carbon capture, utilization, and storage) Activities (update)	5/31/15	5/29/15
M23: Task 14 – Monthly WWG Conference Call Held	6/30/15	6/23/15
M49: Task 9 – Bell Creek Test Site – 1.5 million metric tons of CO <sub>2</sub> Injected	6/30/15	6/30/15
<b>Year 8 – Quarter 4 (July–September 2015)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/15	7/31/15
M23: Task 14 – Monthly WWG Conference Call Held	7/31/15	Waived by DOE
M50: Task 9 – Bell Creek Test Site – 2 years of Near-Surface Assurance Monitoring Completed	7/31/15	7/21/15
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/15	8/27/15 Exec. Sum. 8/25/16 Full Report
M23: Task 14 – Monthly WWG Conference Call Held	8/31/15	Waived by DOE
M51: Task 9 – Bell Creek Test Site – Initial Analysis for First Large-Scale Repeat Pulsed-Neutron Logging Campaign Post-Significant CO <sub>2</sub> Injection Completed	8/31/15	8/31/15
D1: Task 1 – Review of Source Attributes (update)	9/30/15	9/23/15
D8: Task 3 – Permitting Review – Update 2	9/30/15	9/30/15
D49: Task 8 – Bell Creek Test Site – Transportation and Injection Operations Report	7/31/15	9/29/15
M23: Task 14 – Monthly WWG Conference Call Held	9/30/15	9/30/15
<b>Year 9 – Quarter 1 (October–December 2015)</b>		
D59/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/15	10/31/15
M23: Task 14 – Monthly WWG Conference Call Held	10/31/15	10/29/15
M23: Task 14 – Monthly WWG Conference Call Held	11/30/15	Waived by DOE
D57: Task 12 – Project Annual Assessment Report	12/31/15	12/31/15
M24: Task 14 – WWG Annual Meeting Held	12/31/15	8/20/15
M53: Task 9 – Expanded Baseline and Time-Lapse 3-D Surface Seismic Survey Completed	12/31/15	12/17/15

Continued . . .

**Table 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 9 – Quarter 2 (January–March 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/16	1/31/16
M23: Task 14 – Monthly WWG Conference Call Held	1/31/16	1/27/16
M54: Task 9 – Initial Processing and Analysis of Historic InSAR Data Completed	1/31/16	1/26/16
D14: Task 2 – General Phase III Fact Sheet (update)	2/29/16	2/26/16
D93: Task 1 – Geological Modeling and Simulation Report for the Aquistore Project (Update 2)	2/29/16	2/29/16
M23: Task 14 – Monthly WWG Conference Call Held	2/29/16	Waived by DOE
D11: Task 2 – Outreach Plan (update)	3/31/16	3/28/16
D45: Task 6 – Bell Creek Test Site – Infrastructure Development Report	3/31/16	3/31/16
M23: Task 14 – Monthly WWG Conference Call Held	3/31/16	Waived by DOE
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/16	3/31/16
M56: Task 9 – Life Cycle Analysis for Primary and Secondary Recovery Oil Completed	3/31/16	3/31/16
M58: Task 9 – Bell Creek Test Site – Completion of 2.75 million metric tons of CO <sub>2</sub> Stored	3/31/16	3/22/16
<b>Year 9 – Quarter 3 (April–June 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/16	4/29/16
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/16	5/31/16
D101: Task 14 – WWG Web Site Content Update 1	5/31/16	5/31/16
M57: Task 9 – Life Cycle Analysis for EOR at the Bell Creek Field Completed	5/31/16	5/26/16
M23: Task 14 – WWG Conference Call Held	6/30/16	4/27/16
<b>Year 9 – Quarter 4 (July–September 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/16	7/29/16
D13: Task 2 – Public Site Updates	7/31/16	7/21/16
D16: Task 2 – Fort Nelson Test Site Fact Sheet (update)	8/31/16	8/29/16
D66: Task 9 – Bell Creek Test Site – Simulation Report (update)	8/31/16	8/31/16 Exec. Sum.
D102: Task 13 – Best Practices Manual – Adaptive Management Approach	8/31/16	8/31/16
M59: Task 9 – Completed the PCOR Partnership Adaptive Management Approach Best Practices Manual	8/31/16	8/31/16

Continued . . .

**Table 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 9 – Quarter 4 (July–September 2016) (continued)</b>		
D1: Task 1 – Review of Source Attributes (update)	9/30/16	9/29/16
D8: Task 3 – Permitting Review – Update 3	9/30/16	9/29/16
D55: Task 11 – Bell Creek Test Site – Cost-Effective Long-Term Monitoring Strategies Report	9/30/16	9/30/16
M23: Task 14 – WWG Conference Call Held	9/30/16	9/28/16
<b>Year 10 – Quarter 1 (October–December 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/16	10/27/16
D21: Task 2 – Bell Creek Test Site 30-minute Documentary	10/31/16	10/31/16
D105: Task 9 – Comparison of Non-EOR and EOR Life Cycle Assessments	10/31/16	10/31/16
D15: Task 2 – Bell Creek Test Site Fact Sheet (update)	11/30/16	11/30/16
M52: Task 9 – Initial Analysis of Extended Pulsed-Neutron Logging Campaign Data Completed	11/30/16	11/29/16
D57: Task 12 – Project Assessment Annual Report	12/31/16	12/30/16
D81: Task 1 – Regional Carbon Sequestration Atlas (update)	12/31/16	12/30/16
D106: Task 14 – Special Issue of IJGGC – Nexus of Water and Carbon Capture and Storage	12/31/16	12/29/16
M23: Task 14 – WWG Conference Call Held	12/30/16	11/16/16
M24: Task 14 – WWG Annual Meeting Held	12/31/16	8/18/16
M36: Task 13 – Annual Advisory Board Meeting Scheduled	12/31/16	12/28/16
<b>Year 10 – Quarter 2 (January–March 2017)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/17	1/31/17
D22: Task 2 – Energy from Coal 60-minute Documentary	1/31/17	1/31/17
D76: Task 3 – Regional Regulatory Perspective	1/31/17	1/31/17
D35: Task 4 – Bell Creek Test Site – Best Practices Manual – Site Characterization	3/31/17	3/31/17
M23: Task 14 – WWG Conference Call Held	3/31/17	3/30/17
M60: Task 1 – Data Submitted to EDX	3/31/17	3/7/17
M63: Task 9 – Initial Analysis of Processed InSAR Data Completed	3/31/17	3/31/17

Continued . . .

**Table 12. Phase III Milestones and Deliverables (continued)**

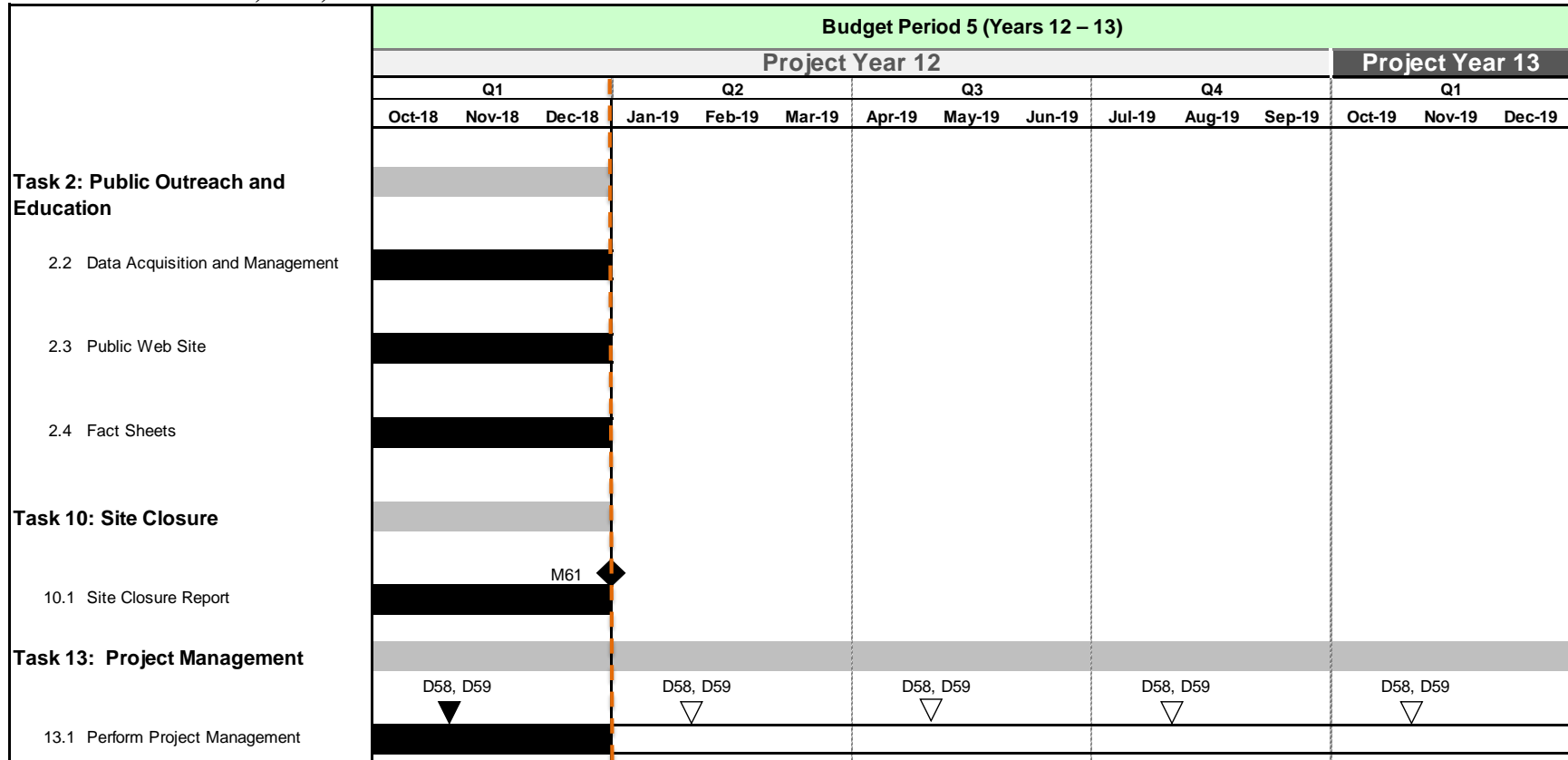
Title/Description	Due Date	Actual Completion Date
<b>Year 10 – Quarter 3 (April–June 2017)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/17	4/27/17
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/17	5/31/17
D69: Task 9 – Best Practices Manual – Simulation Report	5/31/17	5/31/17
D85: Task 6 – Report – Opportunities and Challenges Associated with CO <sub>2</sub> Compression and Transportation During CCUS Activities	5/31/17	5/31/17
D101: Task 14 – WWG Web Site Content Update 1	5/31/17	5/23/17
D104: Task 9 – Analysis of Expanded Seismic Campaign	6/30/17	6/30/17
M64: Task 9 – Initial Analysis of Expanded Seismic Campaign Data Completed	6/30/17	6/27/17
M23: Task 14 – WWG Conference Call Held	6/30/17	6/28/17
M47: Task 2 – Bell Creek Test Site 30-minute Documentary Broadcast	6/30/17	6/19/17 – sent 6/29/17
<b>Year 10 – Quarter 4 (July–September 2017)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/17	7/27/17
D66: Task 9 – Bell Creek Test Site – Simulation Report (Update 6)	8/31/17	8/30/17 Exec. Sum.
D81: Task 1 – PCOR Partnership Atlas (update)	8/31/17	8/31/17
D103: Task 13 – Best Practices Manual – Programmatic Risk Management	8/31/17	8/29/17
D1: Task 1 – Review of Source Attributes (update)	9/30/17	9/27/17
M23: Task 14 – WWG Conference Call Held	9/30/17	8/2/17
M55: Task 9 – Investigation of Crude Oil Compositional Changes during CO <sub>2</sub> EOR Completed	9/30/17	9/25/17
M62: Task 14 – Research Related to Water and CCS Nexus Completed	9/30/17	9/25/17
<b>Year 11 – Quarter 1 (October–December 2017)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/17	10/31/17
D14: Task 2 – General Phase III Fact Sheet (update)	10/31/17	10/3/17
D51: Task 9 – Best Practices Manual – Monitoring for CO <sub>2</sub> Storage and CO <sub>2</sub> EOR	10/31/17	10/31/17
D93: Task 1 – Geological Modeling and Simulation Report for the Aquistore Project (Update 3)	10/31/17	10/7/17
D15: Task 2 – Bell Creek Test Site Fact Sheet (update)	11/30/17	10/7/17

Continued . . .

**Table 12. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 11 – Quarter 1 (October–December 2017) (continued)</b>		
D54: Task 10 – Report – Site Closure Procedures	12/31/17	12/28/17
D57: Task 12 – Project Assessment Annual Report	12/31/17	12/29/17
M23: Task 14 – WWG Conference Call Held	12/31/17	11/9/17
M24: Task 14 – WWG Annual Meeting Held	12/31/17	8/2/17
M36: Task 13 – Annual Advisory Board Meeting Scheduled	12/31/17	12/28/17
M65: Task 13 – PCOR Partnership Annual Membership Meeting and Workshop Held	12/31/17	12/29/17
<b>Year 11 – Quarter 2 (January–March 2018)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/18	1/31/18
D13: Task 2 – Public Site Updates	1/31/18	1/29/18
D73: Task 11 – Bell Creek Test Site –Monitoring and Modeling Fate of CO <sub>2</sub> Progress Report	1/31/18	1/31/18
D8: Task 3 – Permitting Review – Update 4	2/28/18	2/23/18
D107: Task 14 – Journal Article or Topical Report – Major Research Focuses for Water and CCS	2/28/18	2/28/18
M23: Task 14 – Monthly WWG Conference Call Held	3/31/18	2/6/18
M66: Task 13 – Submission of Draft Papers on Associated Storage to Special Issue of <i>International Journal of Greenhouse Gas Control (IJGGC)</i>	3/31/18	3/29/18
<b>Year 11 – Quarter 3 (April–June 2018)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/18	4/30/18
M67: Task 13 – Annual PCOR Partnership Technical Advisory Board Meeting Held	6/30/18	4/9/18
<b>Year 11 – Quarter 4 (July–September 2018)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/18	7/31/18
M60: Task 13 – Data Submitted to EDX	9/30/18	9/28/18
D62: Task 13 – Final Report	9/30/18	9/28/18
<b>Year 12 – Quarter 1 (October–December 2018)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/18	10/30/18
M61: Task 10 – Site Closure for Bell Creek Test Completed	12/31/18	12/28/18

Table 11. Phase III, BP5, Years 12–13 Gantt Chart



LR 1/22/19

Summary Task



Activity Bar



Progress Activity Bar



Time Now



Deliverable ▽

Milestone



## Key for Deliverables (D) ▽

D58 Quarterly Progress Report  
D59 Milestone Quarterly Report

## Key for Milestones ◆

M61 Bell Creek Test Completed

## PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, four oral and five poster presentations were given. In addition, a quarterly progress report and two milestones (one approved) were completed. For more detail, see the Meetings/Travel section.

### **Presentations**

#### *Oral*

- Barajas-Olalde, C., Burnison, S.A., Hamling, J.A., and Gorecki, C.D., 2018, Passive microseismic monitoring of CO<sub>2</sub> EOR and associated storage using a downhole array in a noisy subsurface environment: Presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Gorecki, C.D., and Ayash, S.C., 2018, Session III storage incidental to CO<sub>2</sub> EOR. Presented at the SPE Forum: Carbon Capture, Utilization and Sequestration, San Antonio, Texas, November 26–30, 2018.
- Gorecki, C.D., Ayash, S.C., Peck, W.D., Wildgust, N., Hamling, J.A., Sorensen, J.A., Pekot, L.J., Daly, D.J., Klapperich, R.J., Jensen, M.D., Steadman, E.N., and Harju, J.A., 2018, Successes and lessons learned from 15 years of the PCOR Partnership: Presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Hamling, J.A., 2018, Landscape of CCUS in North Dakota: Presented at the 2018 CO<sub>2</sub> and ROZ Conference Week, Midland, Texas, December 3–6, 2018.

#### *Poster*

- Dalkhaa, C., Pekot, L.J., Oster, B.S., Bosshart, N.W., Jiang, T., Salako, O., Sorensen, J.A., Wildgust, N., Nickel, E., and Gorecki, C.D., 2018, Updated numerical modeling and simulation study of the Aquistore CO<sub>2</sub> storage project: Poster presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Daly, D.J., Crocker, C.R., Crossland, J.L., and Gorecki, C.D., 2018, PCOR Partnership outreach—an evolving regional framework based on RCSP outreach best practices: Poster presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Jin, L., Pekot, L.J., Salako, O., Ge, J., Burnison, S., Bosshart, N.W., Jiang, T., Hamling, J.A., Wildgust, N., and Gorecki, C.D., 2018, Predicting postinjection CO<sub>2</sub> migration associated with enhanced oil recovery: Poster presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Klapperich, R.J.; Nakles, D.V.; Gorecki, C.D.; Steadman, E.N.; McNemar, A., 2018, Nexus of water and CCS—findings of the Water Working Group of the Regional Carbon Sequestration Partnerships. Poster presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.



Reed, S., Burnison, S.A., Bosshart, N.W., Hamling, J.A., Ge, J., and Gorecki, C.D., 2018, InSAR as a monitoring tool in challenging terrain—Bell Creek, Montana: Poster presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.

### **Deliverables/Milestones**

#### ***Draft Submitted***

Botnen, B.W., Wilson, W.I., Vettleson, H.M., Glazewski, K.A., Hamling, J.A., Wildgust, N., and Gorecki, C.D., 2018, Site closure for Bell Creek test site completed: Plains CO<sub>2</sub> Reduction (PCOR) Partnership Phase III draft Task 10 Milestone M61 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, December.

#### ***Submitted and Approved***

Kalenze, N.S., Glazewski, K.A., Vettleson, H.M., Heebink, L.V., Ayash, S.C., Peck, W.D., Smith, S.A., Hamling, J.A., and Wildgust, N., 2018, Data submitted to EDX: Plains CO<sub>2</sub> Reduction (PCOR) Partnership Phase III Task 13 Milestone M60 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-12-02, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

### **Progress Reports**

#### ***Monthlies***

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Hamling, J.A., Jensen, M.D., Harju, J.A., Pekot, L.J., Heebink, L.V., Klapperich, R.J., and Ensrud, J.R., 2018, Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Phase III monthly report (September 1–30, 2018) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, October.

Gorecki, C.D., Steadman, E.N., Peck, W.D., Wildgust, N., Gorecki, C.D., Hamling, J.A., Jensen, M.D., Harju, J.A., Pekot, L.J., Heebink, L.V., Klapperich, R.J., and Ensrud, J.R., 2018, Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Phase III monthly report (October 1–31, 2018) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, November.

Gorecki, C.D., Steadman, E.N., Peck, W.D., Wildgust, N., Hamling, J.A., Jensen, M.D., Harju, J.A., Pekot, L.J., Heebink, L.V., Klapperich, R.J., and Ensrud, J.R., 2018, Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Phase III monthly report (November 1–30, 2018) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, December.

### *Quarterlies*

Gorecki, C.D., Wildgust, N., Harju, J.A., Steadman, E.N., Romuld, L., Sorensen, J.A., Daly, D.J., Hamling, J.A., Jensen, M.D., Peck, W.D., Klapperich, R.J., Heebink, L.V., Pekot, L.J., Ensrud, J.R., and Votava, T.J., 2018, Plains CO<sub>2</sub> Reduction Partnership Phase III: Task 13 Deliverable D58/D59 quarterly technical progress report (July 1 – September 30, 2018) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592 and North Dakota Industrial Commission Contract Nos. FY08-LX111-162 and G-015-030, Grand Forks, North Dakota, Energy & Environmental Research Center, October.

### **MEETINGS/TRAVEL**

Representatives from the PCOR Partnership incurred travel costs for their participation in the following five meetings/conferences and two project management site trips:

- October 18–29, 2018: traveled to Melbourne, Australia, to attend, present, and cochair at GHGT-14.
- November 13–16, 2018: traveled to Annapolis, Maryland, to attend the MRCSP 2018 Partners & Stakeholders Annual Meeting.
- November 16–25, 2018: traveled to Belle Creek, Montana, for fieldwork.
- November 25–30, 2018: traveled to San Antonio, Texas, to attend the SPE Carbon Capture, Utilization, and Sequestration Forum.
- December 2–8, 2018: traveled to Midland, Texas, to attend CO<sub>2</sub> & ROZ Conference Week.
- December 3–6, 2018: off-site staff traveled to Grand Forks, North Dakota, for project work and meetings.
- December 11, 2018: traveled to Fargo, North Dakota, for narration work on “Meeting the Challenge” video series with PPB.

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