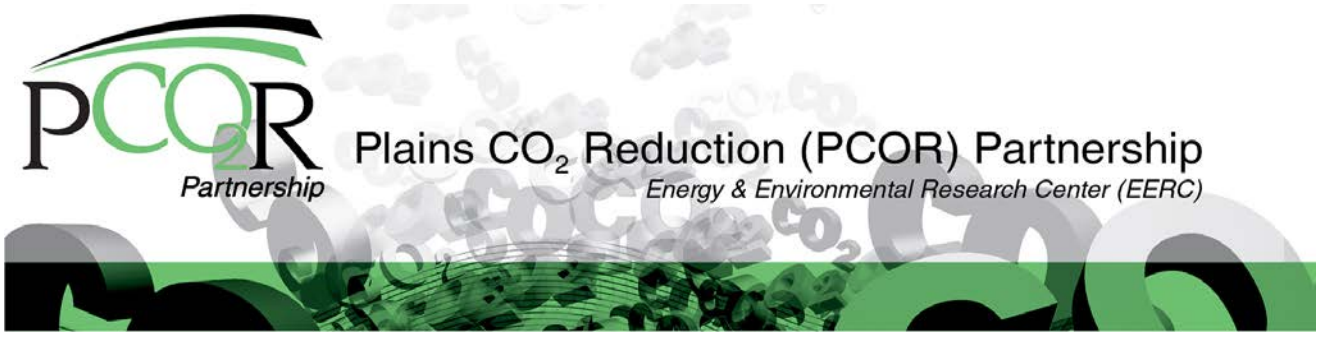

PLAINS CO_2 REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report
Task 13 – Deliverable D58/D59

(for the period July 1 – September 30, 2018)

Prepared for:

Federal Information Tracking System (FITS)
National Energy Technology Laboratory
U.S. Department of Energy

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EXECUTIVE SUMMARY

The Plains CO_2 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.

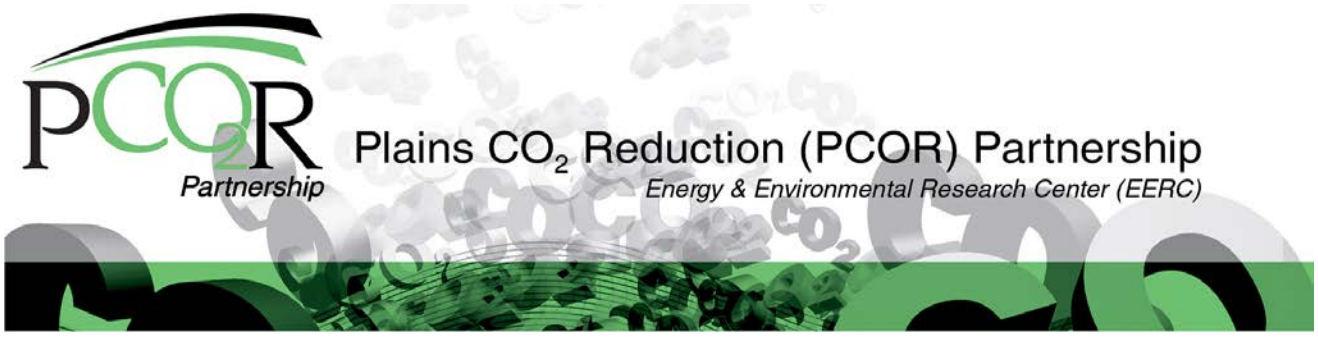
Phase III, the multiyear (2007–2018) development phase, is an extension of the characterization (Phase I) and validation (Phase II) phases and is intended to confirm that commercial-scale CO_2 capture, transportation, and storage can be achieved safely, permanently, and economically over extended periods in the PCOR Partnership region.

This progress report presents an update of Phase III PCOR Partnership activities from July 1 through September 30, 2018.

PCOR Partnership activities continued to focus on the preparation and submittal of comprehensive deliverables and participation in conferences/meetings and workshops. The 2018 PCOR Partnership Membership Meeting was held September 18–19, 2018, in Washington, D.C. Presentations included highlights of the last 15 years of the PCOR Partnership; an update on the Bell Creek project; and policy and economic considerations for carbon capture, utilization, and storage deployment. Two hearing-style panels were also conducted. The peer review process of the virtual special issue of *International Journal of Greenhouse Gas Control* entitled "PCOR Partnership Assessment of CO_2 Geologic Storage Associated with Enhanced Oil Recovery" was completed. Online publication of the special issue is anticipated in the last quarter of 2018. The Phase III draft final report was submitted.

PCOR Partnership Phase III data files to date were uploaded to NETL's Energy Data eXchange (EDX). Uploaded files included seismic and geographic information system (GIS) data files; files for the Zama, Fort Nelson, and Basal Cambrian studies; and Bell Creek laboratory data.

Three tasks continued. In addition to the foregoing, work on the planned public Web site technical upgrade design continued, Bell Creek field site decommissioning and reclamation discussions continued with Denbury Onshore, preparation and uploading of PCOR Partnership Phase II data files to NETL's EDX continued, and writing of value-added documents continued.



PLAINS CO_2 REDUCTION PARTNERSHIP PHASE III
Quarterly Technical Progress Report
July 1 – September 30, 2018

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 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 September 30, 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 (2007–2018): involves large-volume carbon storage demonstration tests

Phase III is divided into three budget periods (BPs), running from October 1, 2007, to December 31, 2018:

- BP3: October 1, 2007 – September 30, 2009
- BP4: October 1, 2009 – March 31, 2016
- BP5: April 1, 2016 – December 31, 2018

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.	
Alberta Department of Environment	Indian Land Tenure Foundation	Peabody Energy
Alberta Innovates – Technology Futures	Interstate Oil and Gas Compact Commission	Petro Harvester Oil & Gas
ALLETE		Petroleum Technology Research Centre
Ameren Corporation	Iowa Department of Natural Resources	Petroleum Technology Transfer Council
American Coalition for Clean Coal Electricity	Lignite Energy Council	
	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	Red Trail Energy, LLC
BillyJack Consulting Inc.	Minnkota Power Cooperative, Inc.	RPS Energy Canada Ltd.
Biorecro AB	Missouri Department of Natural Resources	Saskatchewan Ministry of Industry and Resources
Blue Source, LLC		
BNI Coal, Ltd.	Missouri River Energy Services	SaskPower
British Columbia Ministry of Energy, Mines, and Petroleum Resources	Montana–Dakota Utilities Co.	Schlumberger
	Montana Department of Environmental Quality	Scout Energy Management LLC
British Columbia Oil and Gas Commission		Sejong University
	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 Division of Community Services	TGS Geological Products and Services
Dakota Gasification Company		Tri-State Generation and Transmission Association, Inc.
Denbury Resources Inc.	North Dakota Department of Health	
Eagle Operating, Inc.	North Dakota Geological Survey	Tundra Oil and Gas
Eastern Iowa Community College District	North Dakota Industrial Commission Department of Mineral Resources, Oil and Gas Division	University of Alberta
Enbridge Inc.		University of Regina
Encore Acquisition Company		WBI Energy, Inc.
Energy Resources Conservation Board/Alberta Geological Survey	North Dakota Industrial Commission Lignite Research, Development and Marketing Program	Weatherford Advanced Geotechnology
		Western Governors' Association
Environment Canada		Westmoreland Coal Company
Equinor	North Dakota Industrial Commission Oil and Gas Research Council	Wisconsin Department of Agriculture, Trade and Consumer Protection
Excelsior Energy Inc.		
General Electric Global Research Oil & Gas Technology Center	North Dakota Natural Resources Trust	Wyoming Office of State Lands and Investments
	North Dakota Petroleum Council	
Great Northern Project Development, LP	North Dakota Pipeline Authority	Xcel Energy

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 the 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 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

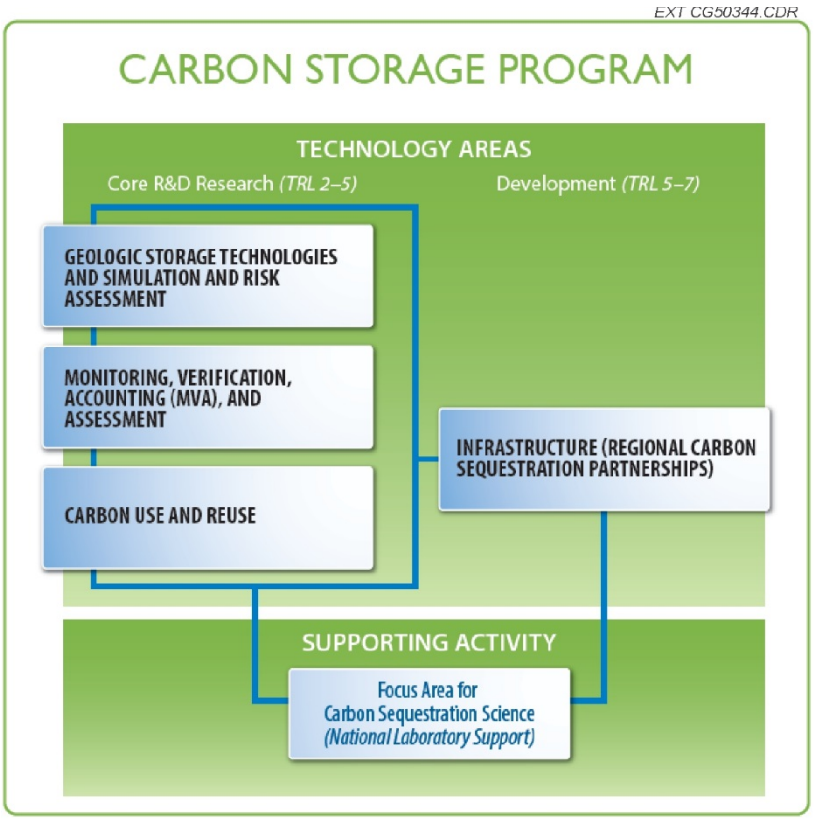


Figure 1. DOE Carbon Storage Program technology areas featuring regional partnerships (courtesy of DOE NETL; "TRL" stands for technology readiness level).

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

The PCOR Partnership is working with 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_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 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_2 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_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 (completed); 2) Public Outreach and Education; 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_2 Procurement (completed); 8) Transportation and Injection Operations (completed); 9) Operational Monitoring and Modeling (completed); 10) Site Closure; 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_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.

Table 2. Phase III Responsibility Matrix

Phase III Task Description	Task Leader
Task 1 – Regional Characterization (completed)	Wesley D. Peck
Task 2 – Public Outreach and Education	Daniel J. Daly
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_2 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	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_2 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 – Budget Period (BP) 5, Year 11 (March 2018).

Task 2 – Public Outreach and Education

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

- Dan Daly, Task 2 lead, retired from the EERC on September 28, 2018. Task 2 team members will continue efforts to complete the task activities, anticipating that Neil Wildgust will assume Task 2 lead in October 2018.
- Submitted a value-added report entitled "Household Energy and Carbon Web Pages Report" for the period of April 1 – June 30, 2018, for review on August 1, 2018.
- Submitted the outreach paper for the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14) entitled "PCOR Partnership Outreach: An Evolving Regional Capability Based on RCSP Outreach Best Practices," as noted in Task 13. Worked on preparation of the poster.
- During the quarter, the PCOR Partnership was represented by EERC personnel at ten meetings/conferences, one workshop, and one Webinar for the Technical Advisory Board (TAB). Specifically, the PCOR Partnership outreach activities included ten oral presentations.
- Completed the draft content and layout for the value-added update to the Phase II Zama fact sheet.

- Produced a version of the CO_2 EOR animation with Prairie Public Broadcasting (PPB) and EERC and UND logos to be used in a video short being produced for educational purposes.
- **Conference call** activity this quarter included the following:
  - No monthly Aquistore Outreach Advisory Group phone calls were held this quarter.
  - With regard to the monthly RCSP Program Outreach Working Group (OWG) conference calls:
    - No monthly conference call was held in July 2018.
    - Participated in the monthly conference call on August 16, 2018. Discussed the status and path forward for the OWG final report.
    - Participated in the monthly conference call on September 20, 2018. Helped finalize the OWG final report text, including providing a rewrite of the conclusion section for the group's consideration.
- Continued internal discussions and work on the PCOR Partnership **public Web site** (www.undeerc.org/pcor), including the following:
  - Worked on the technical upgrade design.
  - Worked on sections of the Coal: Engine of Change page.
  - Converted video clips for Web site streaming.
  - 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 2549 sessions/visits to the public Web site (www.undeerc.org/pcor). Traffic decreased 42% from last quarter (4411 sessions/visits).
  - There were 2232 unique visitors to the public Web site, representing a 41% decrease from last quarter (3786 visitors). In particular, over 91% of these visitors were new to the Web site (visitors whose visit was marked as a first-time visit in this quarter). Of the 2549 sessions/visits, 50% of the Web traffic was domestic, and 50% was international. Table 3 lists the top ten countries for visits to the PCOR Partnership Web site: United States, India, France, United Kingdom, Canada, Australia, Philippines, Malaysia, Germany, and Japan. There was traffic from 85 countries overall (Figure 3).
  - There were 267 sessions/visits originating from within the PCOR Partnership region (a 34% decrease from last quarter) (Figure 4). Approximately 82% of the regional visits originated from the United States, and 18% came from Canada. Visits from within the PCOR Partnership region represent over 10% 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

	Country	Sessions/ Visits*	PCOR Partnership State/Province	Visits*
1	United States	1272		
			North Dakota	78
			Minnesota	38
			Nebraska	38
			Wisconsin	17
			Wyoming	15
			Montana	12
			Missouri	9
			Iowa	9
			South Dakota	2
2	India	314		
3	France	183		
4	United Kingdom	99		
5	Canada	74		
			Alberta	22
			Saskatchewan	14
			British Columbia	8
			Manitoba	4
6	Australia	60		
7	Philippines	56		
8	Malaysia	29		
9	Germany	25		
10	Japan	24		
	Other 75 countries	413		
Total Sessions/Visits		**2549**	**Total PCOR Partnership Visits**	**267**

* 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 70% 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 “carbon sequestration,” “types of carbon sequestration,” and “carbon dioxide sequestration.”
- Direct traffic consists of those visitors who bookmark or type a specific URL (e.g., www.undeerc.org/pcor) into the Web address bar. It is likely that most of the direct traffic (17%) is from persons familiar with the PCOR Partnership.
- Referral site traffic (over 12%) corresponds to the traffic directed to the PCOR Partnership Web page from other sites via links. The top referring Web sites were arthapedia.in (Indian economy and government Web site) and eerc.und.nodak.edu (EERC).
- Less than 1% of site traffic (18 visitors) resulted from teacher campaigns and social interactions such as e-mail or social media sources (e.g., Facebook and YouTube).

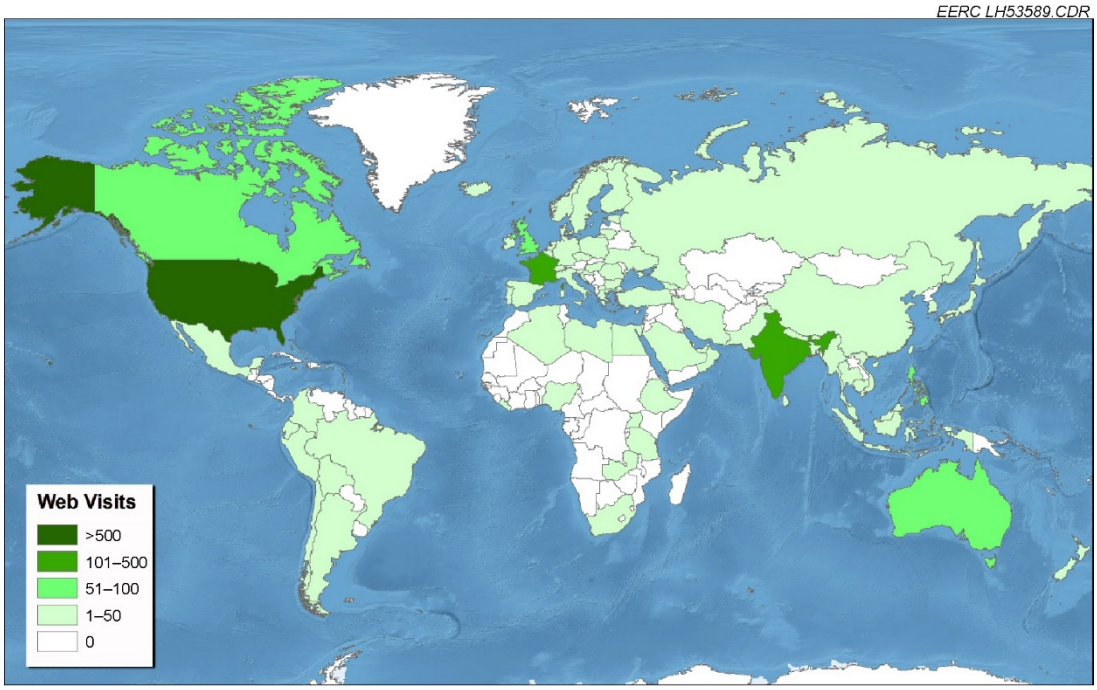


Figure 3. Map of PCOR Partnership Web site global traffic for this reporting period.

- During this reporting period, the **nature of the sessions** to the PCOR Partnership public Web site included 4530 page views (a decrease of approximately 42% from last quarter); the top five pages viewed are listed in Table 4. These five pages make up almost 56% 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.
- During this reporting period, the PCOR Partnership received **public television exposure** from documentaries broadcast in four states and one Canadian province. A total of seven broadcasts aired, with "The Bell Creek Story: CO_2 in Action" airing four times and "Coal: Engine of Change" airing three times. All broadcasts were televised in the PCOR Partnership region.

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.

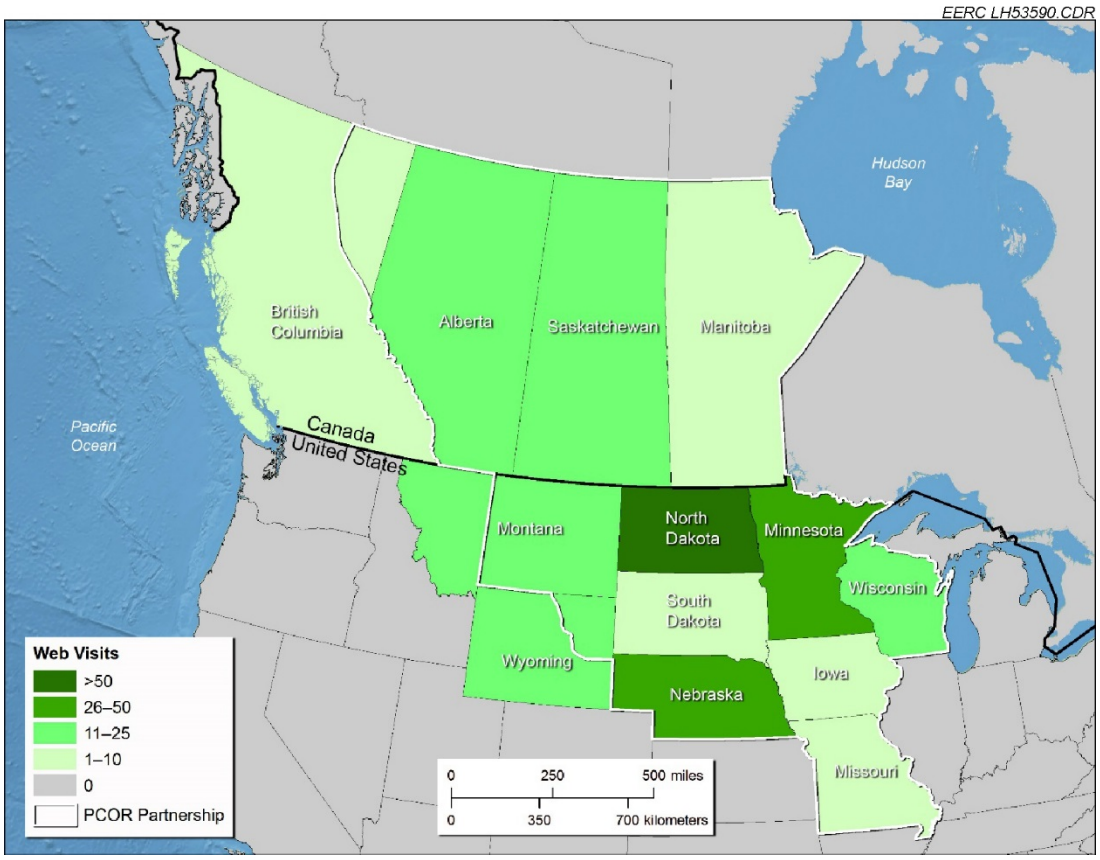


Figure 4. Map of PCOR Partnership Web site regional visits for this reporting period.

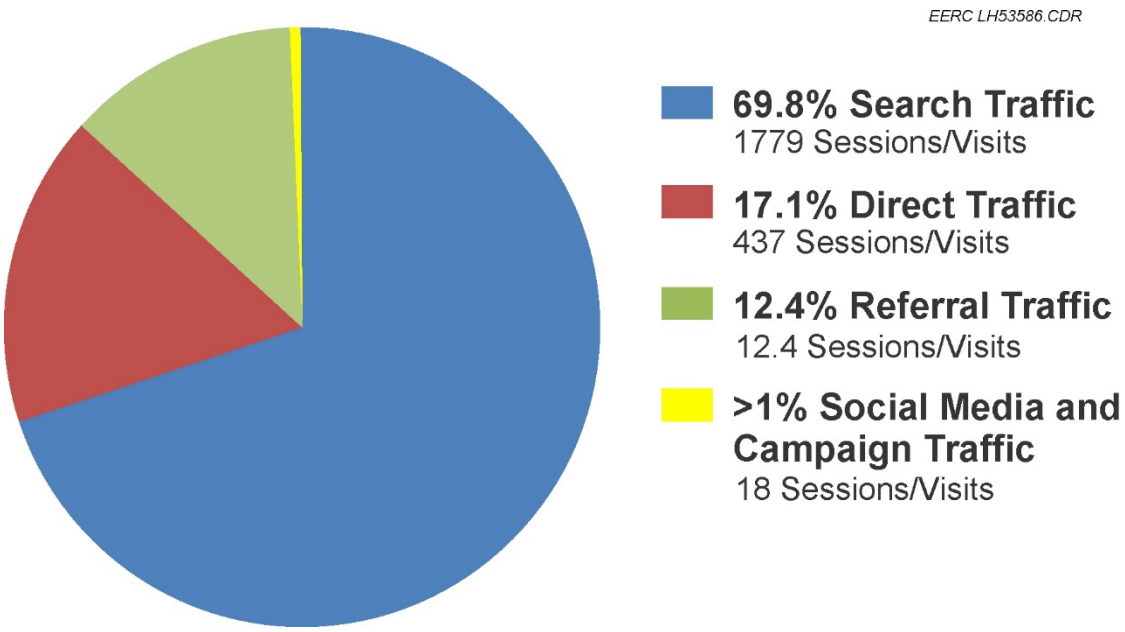


Figure 5. PCOR Partnership public Web site traffic sources for this reporting period.

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

Page Title	Page Views	% Page Views	Page
What Is CO_2 Sequestration?	1135	25.1	www.undeerc.org/pcor/sequestration/whatissequestration.aspx
Home Page	498	11.0	www/undeerc.org/pcor/default.aspx
What Is CO_2?	375	8.3	www.undeerc.org/pcor/sequestration/whatisco2.aspx
Terrestrial	298	6.6	www.undeerc.org/pcor/region/terrestrial/default.aspx
Carbon Capture and Storage (CCS)	237	5.2	www.undeerc.org/pcor/sequestration/ccs.aspx

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

Video	Video Length	Views	Est. Minutes Watched	Avg. View Duration
Reforestation in Brazil	4:41	1739	4248	2:20
The Phases of Oil Recovery – So Far	2:40	809	1429	1:40
Reducing Our Carbon Footprint: The Role of Markets	26:49	475	2023	4:15
Installing a Casing-Conveyed Permanent Downhole Monitoring System	19:19	164	853	5:10
Reservoir Geology 101: Fluid in the Rocks	1:50	97	117	1:10

Table 6. PCOR Partnership Videos on PPB YouTube Channel Accessed

Video	Video Length	Views	Est. Minutes Watched
Global Energy and Carbon: Tracking Our Footprint	32:36	583	4382
CO_2 EOR and Geologic CO_2 Sequestration	3:13	205	409
Coal: Engine of Change	56:45	134	700
Clean Development Mechanism Projects	1:56	124	129
The Bell Creek Story: CO_2 in Action	26:26	67	306

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).

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_2 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:

- Traveled August 14–16, 2018, to the Bell Creek field office site to discuss decommissioning and reclamation plans for project field installations with a Denbury representative.
  - Disconnected the 04-03 OW (observation well) geophone cable from the electronics control and data recording unit and the satellite dish. Prepared mobile office trailer and control and data recording unit for decommissioning.
  - Received agreement from Denbury to abandon in place the ten soil gas profile stations and the 04-03 OW location and geophone installation, which effectively transfers operations and any reclamation responsibility to Denbury. This action retains the possibility of future access to the soil gas profile stations and the 04-03 OW location and geophone installation and is a more cost-efficient option for the project. The EERC is preparing documentation of the soil gas profile stations and 04-03 OW geophone array (included specifications, removal and reclamation procedure recommendations, and signage) as part of the agreement.
- Worked on text to accompany Milestone (M) 61 (Site Closure for Bell Creek Test Site Completed), which will occur at the end of Phase III (December 31, 2018).

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 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:

- Presented "Autonomous Monitoring Systems" at the Workshop on Real-Time Decision-Making for the Subsurface held July 17–18, 2018, in Pittsburgh, Pennsylvania.
- Attended the WBI Energy Customer Meeting held July 17–18, 2018, in Bismarck, North Dakota.
- Presented "Update—The Plains CO_2 Reduction (PCOR) Partnership and CarbonSAFE" at the Carbon Utilization Research Council General Membership Meeting held July 24–25, 2018, in Washington, D.C.
- Presented "Plains CO_2 Reduction (PCOR) Partnership" at the DOE NETL Mastering the Subsurface Through Technology Innovation, Partnerships, and Collaboration: Carbon Storage and Oil and Natural Gas Technologies Review Meeting held August 13–16, 2018, in Pittsburgh, Pennsylvania.
- Held a PCOR Partnership TAB Webinar on August 22, 2018. Six of the nine TAB members attended. Activities included the following:
  - Discussed PCOR Partnership Membership Meeting agenda.
  - Discussed and solicited input on final report key messages.
  - Provided the TAB with an update on the status of the *International Journal of Greenhouse Gas Control* (IJGGC) special issue and other journal manuscripts in preparation.
- Presented "PTRC & EERC: A History of Partnership" at the Aquistore Project 2018 General Meeting held September 13, 2018, in Regina, Saskatchewan, hosted by PTRC.
- Hosted the 2018 PCOR Partnership Membership Meeting September 18–19, 2018, in Washington, D.C. The meeting was held in the Russell and Dirksen Senate buildings.
  - Sixty-seven people attended the meeting. Attendees are shown in Figure 6.
  - Speakers from the EERC, DOE, and partner organizations presented on various carbon capture, utilization, and storage (CCUS)-related topics, including highlights of the last 15 years of the PCOR Partnership, an update on the Bell Creek project, and policy and economic considerations for CCUS deployment.
  - Two hearing-style panels were conducted. For each panel, technical and policy experts interrogated PCOR Partnership management and members regarding the subject matter of the panel. Panel participants included the following:
    - The Technical Readiness for CCUS Deployment panel featured Lynn Helms (North Dakota Industrial Commission [NDIC]) as chair; Dave Nakles as Secretariat; and interrogatory panelists Stefan Bachu (InnoTech Alberta), Lynn Brickett (DOE), Jim Erdle (Computer Modelling Group Ltd.), John Gale (IEA Greenhouse Gas R&D Programme), and Sallie Greenberg (Illinois State Geological Survey) (Figure 7). PCOR Partnership witnesses included Charles Gorecki, John Hamling, Ed Steadman, and Neil Wildgust (Figure 8).

Figure 6. PCOR Partnership Member Meeting attendees.

Figure 7. Technical Readiness for CCUS Deployment Interrogator Panel at the PCOR Partnership Member Meeting.

Figure 8. Technical Readiness for CCUS Deployment Witness Panel at the PCOR Partnership Member Meeting.

- ♦ The Policy to Support CCUS Deployment panel featured Fred Eames (Hunton Andrews Kurth) as chair; Dave Nakles as Secretariat; and interrogatory panelists Gerry Baker (Interstate Oil & Gas Compact Commission), Jason Bohrer (Lignite Energy Council), Matt Dahan (Denbury Resources Inc.), Stacey Dahl (Minnkota Power Cooperative, Inc.), Lynn Helms (NDIC), and Justin Ong (ClearPath Foundation). PCOR Partnership witnesses included Tom Doll, Charles Gorecki, John Harju, and William Sawyer (ALLETE Clean Energy, Inc.), as shown in Figure 9.

– The PCOR Partnership Pioneer Award was presented to the Honorable John Hoeven, U.S. Senator, prior to his keynote welcome address (Figure 10).
– Presented "Lessons Learned in the PCOR Partnership: An Adaptive Management Approach" at the 5th North America Energy Trilateral Joint Meeting in Mexico City, Mexico, held September 19–21, 2018.
– Presented "How We Use Energy in America and the World" at the North Dakota Petroleum Council (NDPC) Annual Meeting held September 24–26, 2018, in Fargo, North Dakota.

- Presented "Quantifying Associated CO_2 Storage Incidental to CO_2 Enhanced Oil Recovery (EOR)" at the SPE Annual Technical Conference held September 24–26, 2018, in Dallas, Texas.

Figure 9. Policy to Support CCUS Deployment Panel at the PCOR Partnership Member Meeting.

Figure 10. PCOR Partnership Pioneer Award presented to the Honorable John Hoeven, U.S. Senator.

- Submitted Draft Deliverable (D) 62 entitled "Plains CO_2 Reduction Partnership Phase III Final Report" to the federal project manager on September 28, 2018. This report is undergoing further review and revision, including consultation with Denbury. Revisions to the draft may include outcomes from the 2018 PCOR Partnership Membership Meeting, which occurred too late for incorporation into the draft. Once all revisions are incorporated, a revised draft will be submitted for review and approval.
- Submitted M60 entitled "Data Submitted to EDX [Energy Data eXchange]" to the federal project manager on September 28, 2018, for review.
- Published "Lab and Reservoir Study of Produced Hydrocarbon Molecular Weight Selectivity During CO_2 Enhanced Oil Recovery" in *Energy & Fuels*. It can be cited using DOI: 10.1021/acs.energyfuels.8b01645.
- Submitted a manuscript entitled "A Comparison of Crude Oil Hydrocarbon Mobilization by Vaporization Gas Drive into Methane, Ethane, and Carbon Dioxide at 15.6 MPa and 42°C" to *Fuel*.
- Completed peer review process of the virtual special issue (VSI) of IJGGC entitled "PCOR Partnership Assessment of CO_2 Geologic Storage Associated with Enhanced Oil Recovery." Seven new papers have been accepted, added to the three previously accepted by the journal. Online publication of the special issue is anticipated in the last quarter of 2018. The paper titles are provided in Table 7.

Table 7. IJGGC VSI Paper Titles and Publication Status

Title	Publication Status
CO_2 Storage Associated with CO_2 Enhanced Oil Recovery: A Statistical Analysis of Historical Operations	Previously published
How Green is My Oil? A Detailed Look at Greenhouse Gas Accounting for CO_2 Enhanced Oil Recovery (CO_2 EOR) Sites	Previously published
Quantifying CO_2 Storage Efficiency Factors in Hydrocarbon Reservoirs: A Detailed Look at CO_2 Enhanced Oil Recovery	Previously published
Effects of Gas Relative Permeability Hysteresis and Solubility on Associated CO_2 Storage Performance	New
Evaluation of Recycle Gas Injection on CO_2 Enhanced Oil Recovery and Associated Storage Performance	New
Implementing Adaptive Scaling and Dynamic Well-Tie for Quantitative 4-D Seismic Evaluation of a Reservoir Subjected to CO_2 Enhanced Oil Recovery and Associated Storage	New
Lessons Learned and Best Practices Derived from Environmental Monitoring at a Large-Scale CO_2 Injection Project	New
A Screening-Level Life Cycle Greenhouse Gas Analysis of CO_2 Enhanced Oil Recovery with CO_2 Sourced from the Shute Creek Gas-Processing Facility	New
Statistical Analysis of Pulsed-Neutron Well Logs in Monitoring Injection Carbon Dioxide	New
Laboratory Determination of Oil Draining CO_2 Hysteresis Effects During Multiple Floods of a Conventional Clastic Oil Reservoir	New

- Submitted papers to accompany oral or poster presentations at GHGT-14 to be held October 21–26, 2018, in Melbourne, Australia. Continued preparation of presentations and posters for the conference. Table 8 provides the paper title and status of oral or poster presentation development.

Table 8. GHGT-14 Conference Paper Title and Presentation Status

Title	Oral or Poster	Presentation Status
Passive Microseismic Monitoring of CO_2 EOR and Associated Storage Using a Downhole Array in a Noisy Subsurface Environment	Oral	Continued development of content
An Improved Numerical Modeling and Simulation Study of the Aquistore CO_2 Storage Project	Oral	Submitted draft to PTRC for review
Successes and Lessons Learned from 15 years of the PCOR Partnership	Oral	Continued development of content
Determining the Long-Term Fate of CO_2 Storage Associated with an Enhanced Oil Recovery Project	Poster	Draft graphics development
PCOR Partnership Outreach: An Evolving Regional Capability Based on RCSP Outreach Best Practices	Poster	Prepared for internal review
Viability of InSAR as a Monitoring Tool in Challenging Terrain: Bell Creek, Montana	Poster	Continued development of content
Evaluation of Measured Differences in Liquid Versus Gas Permeability and Identification of Potential Causes	Poster	Continued development of content
Nexus of Water and CCS: Findings of the Water Working Group (WWG) of the Regional Carbon Sequestration Partnerships	Poster	Draft graphics development

- Submitted a memo on August 10, 2018, regarding official updated quantities of CO_2 purchased for injection and stored at Bell Creek. As of July 31, 2018, the most recent month of record, 5.944 million tonnes of total gas (composition of approximately 98% CO_2) has been purchased for injection into the Bell Creek Field, equating to an estimated ***5.876 million tonnes of CO_2 stored***. At the end of BP4, 2.979 million tonnes of CO_2 had been stored.
- Continued writing text and making modifications to D62 – Final Report.
- Continued addressing comments from an internal review of a value-added report on the geologic characterization and CO_2 storage potential of the state of Nebraska (continuation of a Task 1 activity).
- Continued work on value-added documents discussing PCOR Partnership technical work. These will be submitted to appropriate subject matter journals.
- Continued compiling and writing text for a value-added document from the PCOR Partnership best practices manuals.
- Received request to upload PCOR Partnership Phase II data into the DOE NETL EDX in addition to Phase III data. The focus of efforts has been to compile Phase III data. Efforts will now include evaluating Phase II data to determine appropriate content for

EDX. Continued discussions of plans to upload PCOR Partnership data to EDX and a pathway for long-term data management, including the following:

- Worked on evaluation and preparation of Phase II data. Began Phase II data upload on September 4, 2018, with files related to the Zama Field test. Preparation of the metadata to be included with the data has taken longer than anticipated, and the planned schedule has been updated. The Phase II schedule will be revised as needed as the preparation continues to be evaluated.
- Began Phase III data upload on August 15, 2018. Revised ReadMe files and metadata associated with data. Completed the upload of Phase III files to date, including seismic and geographic information system (GIS) data files; files for the Zama, Fort Nelson, and Basal Cambrian studies; and Bell Creek laboratory data.
- The upload status is provided in Table 9.
- If additional Phase III files are determined to be appropriate and useful for inclusion on EDX, these will be uploaded through the end of the project.

Table 9. Proposed EDX Upload Schedule

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

- Continued work on compiling information for sharing with Denbury. Created seismic amplitude raster data sets from the 2017 survey.
- Met with Denbury representatives in Plano, Texas, on September 26, 2018. EERC staff presented the Bell Creek life cycle analysis work and the Bell Creek documentary.
- Uploaded 2018 PCOR Partnership Membership Meeting presentations to the Decision Support System (DSS) on the Partners-Only Web site.
- Held a task leader meeting July 20, 2018. The focus of discussion was activities leading to the close out of PCOR Partnership Phase III, including deliverables, journal articles, conference papers, best practice manuals, site closure, public Web site upgrade, data management and transfer, and the 2018 PCOR Partnership Membership Meeting.
- Held a task leader meeting August 23, 2018. The focus of discussion was activities leading to the closeout of PCOR Partnership Phase III, including the final report, journal articles including the special issue of IJGGC, conference papers, site closure, and the 2018 PCOR Partnership Membership Meeting.
- Deliverables and milestones completed in July:
  - June monthly update
  - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
- Deliverables and milestones completed in August:
  - July monthly update

- Deliverables and milestones completed in September:
  - August monthly update
  - Task 13: D62 – Plains CO_2 Reduction Partnership Phase III Final Report
  - Task 13: M60 – Data Submitted to EDX

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

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

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 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 9–12).

Table 10. Phase III Budget – BP5

Organization	Approved Budget, $*	Actual Costs Incurred, $
DOE Share – Cash	13,946,212	13,071,323
Nonfederal Share	5,711,194	5,781,243
Total	19,657,406	18,852,566

* As of Modification No. 38.

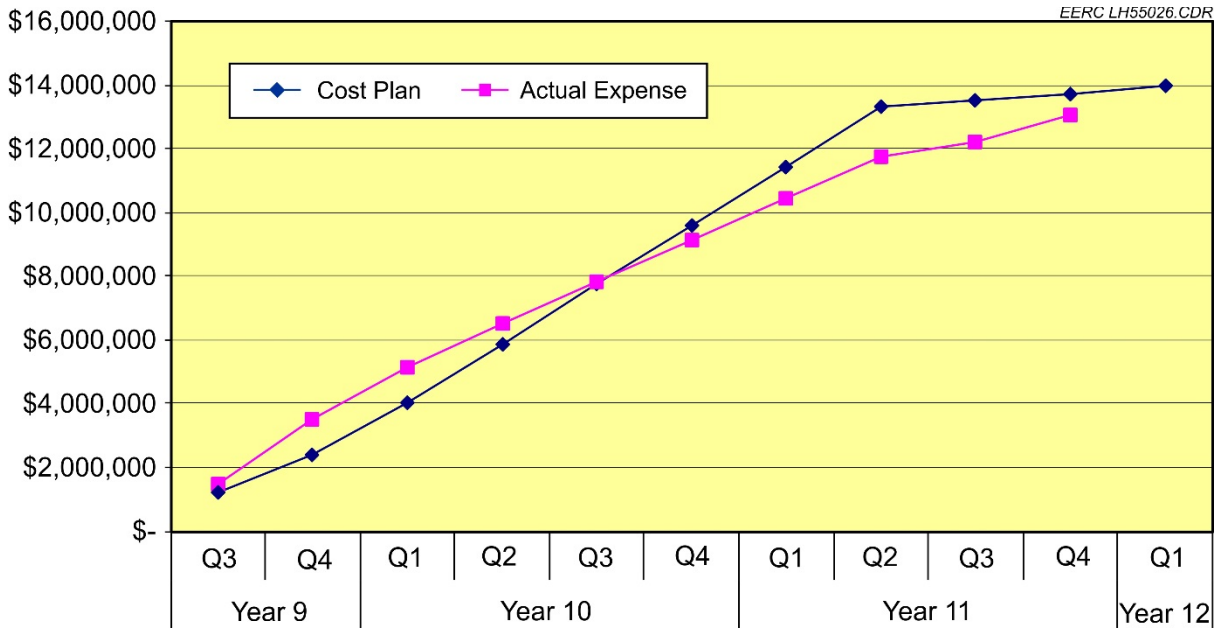


Figure 11. PCOR Partnership Phase III, BP5, Years 9–12 funding (cash only).

Table 11. 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	Q1	Cum. BP Total						
Baseline Cost Plan																
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	$ 13,946,212						
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	$ 13,946,212						
Actual Incurred Cost																
Federal Share	$ 1,274,215	$ 10,382,590	$ 1,280,520	$ 11,663,110	$ 446,850	$ 12,109,960	$ 961,363	$ 13,071,323								
Nonfederal Share	$ 20,159	$ 69,549	$ -	$ 69,549	$ 500	$ 70,049	$ -	$ 70,049								
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								
Variance																
Federal Share	$ 581,772	$ 1,070,289	$ 575,467	$ 1,645,756	$ (234,401)	$ 1,411,355	$ (748,914)	$ 662,441								
Nonfederal Share	$ (20,159)	$ (69,549)	$ -	$ (69,549)	$ (500)	$ (70,049)	$ -	$ (70,049)								
Total Variance	$ 561,613	$ 1,000,740	$ 575,467	$ 1,576,207	$ (234,901)	$ 1,341,306	$ (748,914)	$ 592,392								

Table 12. 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 12. 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 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)

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

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

Continued . . .

Table 12. 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 9 – Bell Creek Test Site – CO_2 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
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 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)

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 12. 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

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Table 12. 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. 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
Year 8 – Quarter 1 (October–December 2014)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/14	10/31/14
D99: Task 14 – Water/CCS Nexus-Related Fact Sheet	10/31/14	10/31/14
M23: Task 14 – Monthly WWG Conference Call Held	10/31/14	10/28/14
M48: Task 9 – Bell Creek Test Site – 1 Million Metric Tons of CO_2 Injected	10/31/14	10/29/14
M23: Task 14 – Monthly WWG Conference Call Held	11/30/14	11/25/14
D57: Task 12 – Project Assessment Annual Report	12/31/14	12/30/14
M24: Task 14 – WWG Annual Meeting Held	12/31/14	8/11/14
Year 8 – Quarter 2 (January–March 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/15	1/30/15
D32: Task 4 – Bell Creek Test Site – Geomechanical Report (Update 1)	1/31/15	1/28/15
M23: Task 14 – Monthly WWG Conference Call Held	1/31/15	1/27/15
M23: Task 14 – Monthly WWG Conference Call Held	2/28/15	2/26/15
D25: Task 2 – Bell Creek Test Site Poster (update)	3/31/15	2/5/15
M23: Task 14 – Monthly WWG Conference Call Held	3/31/15	3/25/15
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/15	3/31/15

Continued . . .

Table 12. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 8 – Quarter 3 (April–June 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/15	4/29/15
M23: Task 14 – Monthly WWG Conference Call Held	4/30/15	4/28/15
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/15	6/1/15
M23: Task 14 – Monthly WWG Conference Call Held	5/30/15	5/28/15
D85: Task 6 – Report – Opportunities and Challenges Associated with CO_2 Compression and Transportation During CCUS (carbon capture, utilization, and storage) Activities (update)	5/31/15	5/29/15
M23: Task 14 – Monthly WWG Conference Call Held	6/30/15	6/23/15
M49: Task 9 – Bell Creek Test Site – 1.5 million metric tons of CO_2 Injected	6/30/15	6/30/15
Year 8 – Quarter 4 (July–September 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/15	7/31/15
M23: Task 14 – Monthly WWG Conference Call Held	7/31/15	Waived by DOE
M50: Task 9 – Bell Creek Test Site – 2 years of Near-Surface Assurance Monitoring Completed	7/31/15	7/21/15
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/15	8/27/15 Exec. Sum. 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_2 Injection Completed	8/31/15	8/31/15
D1: Task 1 – Review of Source Attributes (update)	9/30/15	9/23/15
D8: Task 3 – Permitting Review – Update 2	9/30/15	9/30/15
D49: Task 8 – Bell Creek Test Site – Transportation and Injection Operations Report	7/31/15	9/29/15
M23: Task 14 – Monthly WWG Conference Call Held	9/30/15	9/30/15
Year 9 – Quarter 1 (October–December 2015)		
D59/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/15	10/31/15
M23: Task 14 – Monthly WWG Conference Call Held	10/31/15	10/29/15
M23: Task 14 – Monthly WWG Conference Call Held	11/30/15	Waived by DOE
D57: Task 12 – Project Annual Assessment Report	12/31/15	12/31/15
M24: Task 14 – WWG Annual Meeting Held	12/31/15	8/20/15
M53: Task 9 – Expanded Baseline and Time-Lapse 3-D Surface Seismic Survey Completed	12/31/15	12/17/15

Continued . . .

Table 12. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 9 – Quarter 2 (January–March 2016)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/16	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_2 Stored	3/31/16	3/22/16
Year 9 – Quarter 3 (April–June 2016)		
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
Year 9 – Quarter 4 (July–September 2016)		
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)

Title/Description	Due Date	Actual Completion Date
Year 9 – Quarter 4 (July–September 2016) (continued)		
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
Year 10 – Quarter 1 (October–December 2016)		
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
Year 10 – Quarter 2 (January–March 2017)		
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
Year 10 – Quarter 3 (April–June 2017)		
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_2 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
Year 10 – Quarter 4 (July–September 2017)		
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_2 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
Year 11 – Quarter 1 (October–December 2017)		
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_2 Storage and CO_2 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 . . .

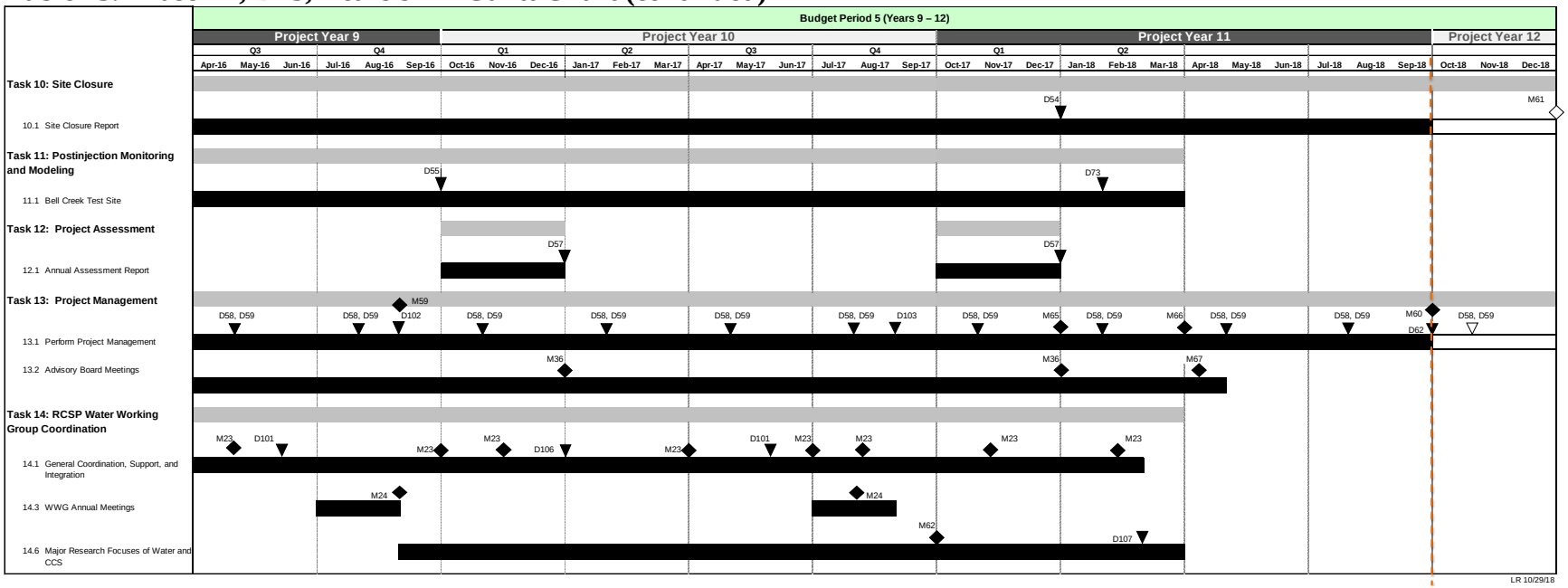
Table 12. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 11 – Quarter 1 (October–December 2017) (continued)		
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
Year 11 – Quarter 2 (January–March 2018)		
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_2 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 *International Journal of Greenhouse Gas Control (IJGGC)*	3/31/18	3/29/18
Year 11 – Quarter 3 (April–June 2018)		
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
Year 11 – Quarter 4 (July–September 2018)		
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
Year 12 – Quarter 1 (October–December 2018)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/18	
M61: Task 10 – Site Closure for Bell Creek Test Completed	12/31/18	

Table 13. Phase III, BP5, Years 9–12 Gantt Chart

Continued . . .

Table 13. Phase III, BP5, Years 9–12 Gantt Chart (continued)



Summary Task | Activity Bar | Progress Activity Bar | Time Now | Deliverable ▽ | Milestone ◇

Key for Deliverables (D) ▼				Key for Milestones (M) ◆	
D1	Review of Source Attributes	D62	Final Report	M23	WWG Conference Call Held
D8	Permitting Review	D66	BC Test Site – Simulation Report	M24	WWG Annual Meeting Held
D13	Public Site Updates	D69	BC Test Site – Best Practices Manual – Simulation	M36	Annual Advisory Board Meeting Scheduled
D14	General Phase III Fact Sheet	D73	Report – Monitoring and Modeling Fate of Stored CO_2	M47	BC Test Site 30-minute Video Broadcast
D15	BC Test Site Fact Sheet	D76	Regional Regulatory Perspective	M52	BC Test Site – Initial Analysis of Extended Pulsed-Neutron Logging Campaign Data Completed
D16	Fort Nelson Test Site Fact Sheet	D81	Regional Carbon Sequestration Atlas	M55	Investigation of Crude Oil Compositional Changes During CO_2 EOR Completed
D17	General Phase III Information PowerPoint Presentation	D85	Report – Opportunities and Challenges Associated with CO_2 Compression	M57	Life Cycle Analysis for EOR Completed
D21	BC Test Site 30-minute Documentary	D93	Report – Geological Modeling and Simulation for the Aquistore Project	M59	Adaptive Management Approach Best Practices Manual Completed
D22	Energy from Coal 60-minute Documentary	D101	WWG Web Site Content Update	M60	Data Submitted to EDX
D35	BC Test Site – Best Practices Manual – Site Characterization	D102	Best Practices Manual – Adaptive Management Approach	M61	Site Closure for Bell Creek Test Completed
D51	BC Test Site – Best Practices Manual – Monitoring for CO_2 Storage and CO_2 EOR	D103	Best Practices Manual – Programmatic Risk Management	M62	Research Related to Water and CCS Nexus Completed
D54	Report – Site Closure Procedures	D104	BC Test Site – Analysis of Expanded Seismic Campaign	M63	Initial Analysis of Processed InSAR Data Completed
D55	BC Test Site – Cost-Effective Long-Term Monitoring Strategies Report	D105	Comparison of Non-EOR and EOR Life Cycle Assessment	M64	Initial Analysis of Expanded Seismic Campaign Data Completed
D57	Project Assessment Annual Report	D106	Special Issue of IJGGC – Nexus of Water and Carbon Capture and Storage	M65	2017 PCOR Partnership Annual Meetingand Workshop Held
D58	Quarterly Progress Report	D107	Journal Article or Topical Report – Major Research Focuses of Water and CCS	M66	Submission of Draft Papers on Associated Storage to Special Issue of IJGGC
D59	Milestone Quarterly Report			M67	Annual PCOR Partnership Advisory Board Meeting Held

PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, ten oral presentations were given. In addition, a quarterly progress report, one deliverable, and one milestone were completed. For more detail, see the Meetings/Travel section.

Presentations

Ayash, S.C., and Gorecki, C.D., 2018, PCOR Partnership path forward and EERC CCUS: Presented at the 2018 PCOR Partnership Annual Meeting, Washington, D.C., September 18–19, 2018.

Ayash, S.C., and Gorecki, C.D., 2018, How we use energy in America and the world: Presented at the North Dakota Petroleum Council Annual Meeting Bakken 2.0 Education Session for the Public, Fargo, North Dakota, September 24, 2018.

Azzolina, N.A., 2018, Quantifying associated CO_2 storage incidental to CO_2 enhanced oil recovery (EOR): Presented at the Society of Petroleum Engineers Annual Technical Conference and Exhibition, Dallas, Texas, September 24–26, 2018.

Gorecki, C.D., 2018, Plains CO_2 Reduction (PCOR) Partnership: Presented at the U.S. Department of Energy National Energy Technology Laboratory Mastering the Subsurface Through Technology Innovation, Partnerships and Collaboration: Carbon Storage and Oil and Natural Gas Technologies Review Meeting, Pittsburgh, Pennsylvania, August 13–16, 2018.

Gorecki, C.D., and Ayash, S.D., 2018, Autonomous monitoring systems: Presented at Real-Time Decision-Making for the Subsurface, Wilton E. Scott Institute for Energy Innovation at Carnegie Mellon University, Pittsburgh, Pennsylvania, July 17–18, 2018.

Gorecki, C.D., and Ayash, S.C., 2018, Update—The Plains CO_2 Reduction (PCOR) Partnership and CarbonSAFE: Presented at the Carbon Utilization Research Council (CURC) Technical Subcommittee Meeting, Washington, D.C., July 24, 2018.

Hamling, J.A., 2018, PCOR activities at Bell Creek: Presented at the 2018 PCOR Partnership Annual Meeting, Washington, D.C., September 18–19, 2018.

Sorensen, J.A., 2018, PTRC & EERC—a history of partnership: Presented at the Aquistore Project – 2018 General Meeting, Regina, Saskatchewan, September 13, 2018.

Steadman, E.N., 2018, Lessons learned in the Plains CO_2 Reduction (PCOR) Partnership—an adaptive management approach: Presented at the 5th North American Energy Ministers Trilateral Meeting—Carbon Capture, Utilization, and Storage, Mexico City, Mexico, September 20, 2018.

Wildgust, N., 2018, Plains CO_2 Reduction (PCOR) Partnership program highlights: Presented at the 2018 PCOR Partnership Annual Meeting, Washington, D.C., September 18–19, 2018.

Deliverables/Milestones

Draft Submitted

Gorecki, C.D., 2018, Plains CO_2 Reduction Partnership Phase III draft final report: Plains CO_2 Reduction (PCOR) Partnership Phase III draft Task 13 Deliverable D62 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.

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_2 Reduction (PCOR) Partnership Phase III draft Task 13 Milestone M60 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.

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_2 Reduction (PCOR) Partnership: Phase III monthly report (June 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, July.

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_2 Reduction (PCOR) Partnership: Phase III monthly report (July 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, August.

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_2 Reduction (PCOR) Partnership: Phase III monthly report (August 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, September.

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., Ensrud, J.R., and Votava, T.J., 2018, Plains CO_2 Reduction Partnership Phase III: Task 13 Deliverable D58/D59 quarterly technical progress report (April 1 – June 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, July.

Journal Articles

Hawthorne, S.B., Miller, D.J., Jin, L., and Gorecki, C.D., 2018, Lab and reservoir study of produced hydrocarbon molecular weight selectivity during CO_2 enhanced oil recovery: Energy & Fuels, v. 32, no. 9, p. 9070–9080.

Klapperich, R.J., Wildgust, N., and Nakles, D.V., eds., 2018, PCOR Partnership assessment of CO_2 geological storage associated with enhanced oil recovery: Special virtual issue of International Journal of Greenhouse Gas Control, v. 79, p. 34–37.

Azzolina, N.A., Bosshart, N.W., Burton-Kelly, M.E., Hamling, J.A., and Peck, W.D., 2018, Statistical analysis of pulsed-neutron well logs in monitoring injected carbon dioxide: International Journal of Greenhouse Gas Control, v. 75, p. 125–133.

Jensen, M.D., Azzolina, N.A., Schlasner, S.M., Hamling, J.A., Ayash, S.C., and Gorecki, C.D., 2018, A screening-level life cycle greenhouse gas analysis of CO_2 enhanced oil recovery with CO_2 sources from the Shute Creek natural gas-processing facility: International Journal of Greenhouse Gas Control, v. 78, p. 236–243.

Jin, L., Pekot, L.J., Smith, S.A., Salako, O., Peterson, K.J., Bosshart, N.W., Hamling, J.A., Mibeck, B.A.F., Hurley, J.P., Beddoe, C.J., and Gorecki, C.D., 2018, Effects of gas relative permeability hysteresis and solubility on associated CO_2 storage performance: International Journal of Greenhouse Gas Control, v. 75, p. 140–150.

Jin, L., Pekot, L.J., Hawthorne, S.B., Salako, O., Peterson, K.J., Bosshart, N.W., Jiang, T., Hamling, J.A., Wildgust, N., and Gorecki, C.D., 2018, Evaluation of recycle gas injection on CO_2 enhanced oil recovery and associated storage performance: International Journal of Greenhouse Gas Control, v. 75, p. 151–161.

Leroux, K.M., Azzolina, N.A., Glazewski, K.A., Kalenze, N.S., Botnen, B.W., Kovacevich, J.T., Abongwa, P.T., Thompson, J.S., Zacher, E.J., Hamling, J.A., and Gorecki, C.D., 2018, Lessons learned and best practices derived from environmental monitoring at a large-scale CO_2 injection project: International Journal of Greenhouse Gas Control, v. 78. p. 254–270.

Salako, O., Jin, L., Barajas-Olalde, C., Hamling, J.A., and Gorecki, C.D., 2018, Implementing adaptive scaling and dynamic well-tie for quantitative 4-D seismic evaluation of a reservoir subjected to CO_2 enhanced oil recovery and associated storage: International Journal of Greenhouse Gas Control, v. 78, p. 306–326.

Smith, S.A., Mibeck, B.A.F., Hurley, J.P., Beddoe, C.J., Jin, L., Hamling, J.A., and Gorecki, C.D., 2018, Laboratory determination of oil draining CO_2 hysteresis effects during multiple floods of a conventional clastic oil reservoir: International Journal of Greenhouse Gas Control, v. 78, p. 1–6.

MEETINGS/TRAVEL

Representatives from the PCOR Partnership incurred travel costs for their participation in the following ten meetings/conferences, one workshop, one field trip, and two project management site trips:

- July 16–19, 2018: traveled to Pittsburgh, Pennsylvania, to present at the Workshop on Real-Time Decision-Making for the Subsurface.
- July 16–19, 2018: traveled to Bismarck, North Dakota, to attend the WBI Energy Customer Meeting.
- July 23–25, 2018: traveled to Washington, D.C., to attend the General Membership Meeting and Rollout Briefing for Carbon Utilization Research Council.
- July 26, 2018: traveled to Park River, North Dakota, to visit the Meadowlark Hydroponic Greenhouse.
- August 12–17, 2018: traveled to Pittsburgh, Pennsylvania, to attend and present at the Mastering the Subsurface Through Technology Innovation, Partnerships, and Collaboration: Carbon Storage & Oil National Gas Technologies Review Meeting.
- August 14–16, 2018: traveled to Miles City, Montana, for the Bell Creek Project.
- September 11–14, 2018: traveled to Regina, Saskatchewan, to attend the Aquistore Annual General Meeting.
- September 12–14, 2018: traveled to Casper, Wyoming, to present at the Wyoming Oil & Gas Fair.
- September 14–20, 2018: traveled to Washington, D.C., to host the PCOR Partnership Membership Meeting and networking events.
- September 19–21, 2018: traveled to Mexico City, Mexico, to present at the 5th North America Energy Trilateral Meeting.
- September 24–25, 2018: traveled to Fargo, North Dakota, to attend the NDPC Annual Meeting.
- September 24–28, 2018: off-site staff traveled to Grand Forks, North Dakota, for PCOR Partnership project work and meetings.
- September 25–26, 2018: traveled to Dallas, Texas, to attend the SPE Annual Technical Conference and Exhibition.
- September 25–27, 2018: traveled to Plano, Texas, to meet with Denbury personnel.

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