



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

PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report Task 13 – Deliverable D58/D59

(for the period January 1 – March 31, 2018)

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PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report

January 1 – March 31, 2018

EXECUTIVE SUMMARY

The Plains CO₂ Reduction (PCOR) Partnership is one of seven Regional Carbon Sequestration Partnerships competitively awarded by the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) in 2003 as part of a national plan to mitigate greenhouse gas emissions. The PCOR Partnership is led by the Energy & Environmental Research Center at the University of North Dakota and continues to include stakeholders from the public and private sector in Phase III. The PCOR Partnership region includes all or part of nine U.S. states and four Canadian provinces.

Phase III, the 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 CO₂ 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 January 1 through March 31, 2018. The PCOR Partnership was pleased to add Scout Energy Management LLC as a new partner in March 2018.

PCOR Partnership activities continued to focus on the preparation and submittal of comprehensive deliverables and participation in conferences/meetings and workshops. Two deliverables will also serve as 14th Conference for Greenhouse Gas Control Technologies papers upon acceptance from the conference; 11 abstracts were submitted to the conference for consideration. Papers for a special issue of the *International Journal of Greenhouse Gas Control* (IJGGC) were submitted into the IJGGC peer review system.

The broadcast premiere of *Coal: Engine of Change* (Documentary Deliverable 22) was March 27, 2018, on Prairie Public Broadcasting stations.

Ten tasks continued. In addition to the foregoing, regional model development continued, work on the planned public Web site technical upgrade design continued, the final regulatory deliverable was submitted, preparation of the update of the final version of the CO₂ capture technologies overview value-added document continued, Bell Creek modeling and simulation activities continued, discussions of plans to upload PCOR Partnership data to NETL's Energy Data eXchange continued, planning for the PCOR Partnership Technical Advisory Board annual meeting continued, and development of a paper on the major research focuses for water and carbon capture and storage was completed.



PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III
Quarterly Technical Progress Report
January 1 – March 31, 2018

INTRODUCTION

The Plains CO₂ Reduction (PCOR) Partnership is one of seven regional partnerships operating under the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) Regional Carbon Sequestration Partnerships (RCSP) Program. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota (UND) in Grand Forks, North Dakota, and includes stakeholders from the public and private sectors. The membership, as of March 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 Program is part of NETL's Carbon Storage Program (Figure 1) and is a government–industry effort tasked with determining the most suitable technologies, regulations, and infrastructure needs for carbon capture and storage (CCS) on the North American continent.

The PCOR Partnership Program is being implemented in three phases:

- Phase I – Characterization Phase (2003–2005): characterized opportunities for carbon sequestration
- Phase II – Validation Phase (2005–2009): conducted small-scale field validation tests
- Phase III – Development Phase (2007–2018): 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	Halliburton	Otter Tail Power Company
UND EERC	Hess Corporation	Outsource Petrophysics, Inc.
Abengoa Bioenergy New Technologies	Huntsman Corporation	Oxand Risk & Project Management Solutions
Air Products and Chemicals, Inc.	Husky Energy Inc.	Peabody Energy
Alberta Department of Energy	Indian Land Tenure Foundation	Petro Harvester Oil & Gas
Alberta Department of Environment	Interstate Oil and Gas Compact Commission	Petroleum Technology Research Centre
Alberta Innovates – Technology Futures	Iowa Department of Natural Resources	Petroleum Technology Transfer Council
ALLETE	Lignite Energy Council	Pinnacle, a Halliburton Service
Ameren Corporation	Manitoba Geological Survey	Prairie Public Broadcasting
American Coalition for Clean Coal Electricity	Marathon Oil Company	Pratt & Whitney Rocketdyne, Inc.
American Lignite Energy	MBI Energy Services	Praxair, Inc.
Apache Canada Ltd.	MEG Energy Corporation	Ramgen Power Systems, Inc.
Aquistore	Melzer Consulting	Red Trail Energy, LLC
Baker Hughes Incorporated	Minnesota Power	RPS Energy Canada Ltd.
Basin Electric Power Cooperative	Minnkota Power Cooperative, Inc.	Saskatchewan Ministry of Industry and Resources
BillyJack Consulting Inc.	Missouri Department of Natural Resources	SaskPower
Biorecro AB	Missouri River Energy Services	Schlumberger
Blue Source, LLC	Montana–Dakota Utilities Co.	Scout Energy Management LLC
BNI Coal, Ltd.	Montana Department of Environmental Quality	Sejong University
British Columbia Ministry of Energy, Mines, and Petroleum Resources	National Commission on Energy Policy	Shell Canada Limited
British Columbia Oil and Gas Commission	Natural Resources Canada	Spectra Energy
C12 Energy, Inc.	Nebraska Public Power District	Statoil
The CETER Group, Ltd.	North American Coal Corporation	Suncor Energy Inc.
Computer Modelling Group Ltd.	North Dakota Department of Commerce	TAQA North, Ltd.
Continental Resources, Inc.	Division of Community Services	TGS Geological Products and Services
Dakota Gasification Company	North Dakota Department of Health	Tri-State Generation and Transmission Association, Inc.
Denbury Resources Inc.	North Dakota Geological Survey	Tundra Oil and Gas
Eagle Operating, Inc.	North Dakota Industrial Commission	University of Alberta
Eastern Iowa Community College District	Department of Mineral Resources, Oil and Gas Division	University of Regina
Enbridge Inc.	North Dakota Industrial Commission	WBI Energy, Inc.
Encore Acquisition Company	Lignite Research, Development and Marketing Program	Weatherford Advanced Geotechnology
Energy Resources Conservation Board/Alberta Geological Survey	North Dakota Industrial Commission	Western Governors' Association
Environment Canada	Oil and Gas Research Council	Westmoreland Coal Company
Excelsior Energy Inc.	North Dakota Natural Resources Trust	Wisconsin Department of Agriculture, Trade and Consumer Protection
General Electric Global Research Oil & Gas Technology Center	North Dakota Petroleum Council	Wyoming Office of State Lands and Investments
Great Northern Project Development, LP	North Dakota Pipeline Authority	Xcel Energy
Great River Energy	Omaha Public Power District	

The overall mission of the Phase III program is to 1) gather characterization data to verify the ability of the target formations to store carbon dioxide (CO₂), 2) facilitate the development of the infrastructure required to transport CO₂ from sources to the injection sites, 3) facilitate sensible development of the rapidly evolving North American regulatory and permitting framework, 4) develop opportunities for PCOR Partnership partners to capture and store CO₂, 5) facilitate the establishment of a technical framework by which carbon credits can be monetized for CO₂ stored in geologic formations, 6) continue collaboration with other RCSPs, and 7) provide outreach and education for 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

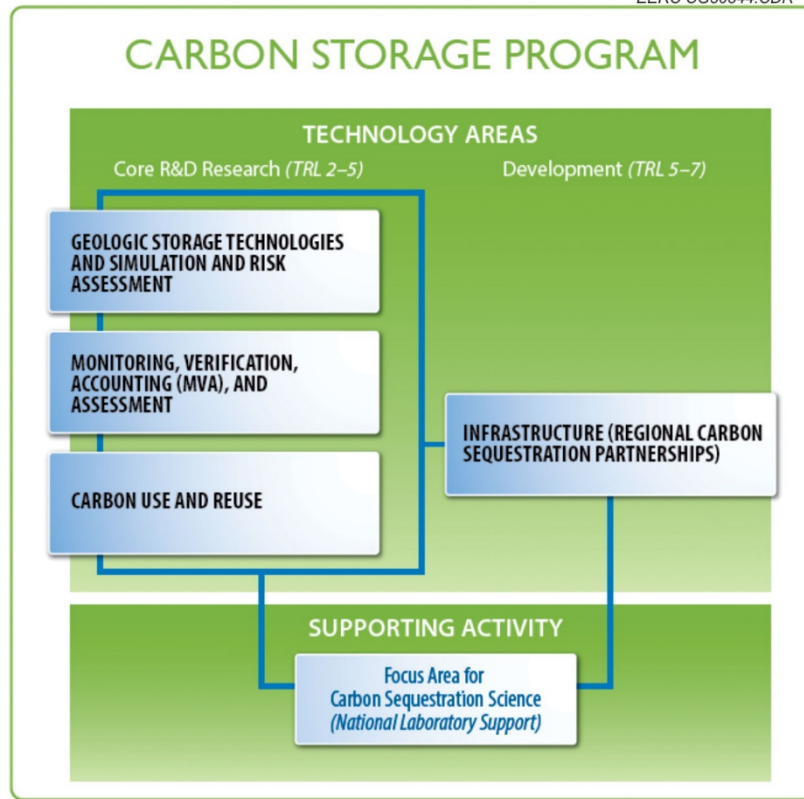


Figure 1. DOE Carbon Storage Program technology areas featuring regional partnerships (courtesy of DOE NETL; “TRL” stands for technology readiness level).

utilize the infrastructure of its region to maximize CO₂ injection volumes. A programmatic development phase (Phase III) goal is implementation of large-scale field testing involving at least 1 million tonnes of CO₂ per project. Each of the RCSP large-volume injection tests is designed to demonstrate that the CO₂ storage sites have the potential to store regional CO₂ emissions safely, permanently, and economically for hundreds of years.

The PCOR Partnership is working with Denbury 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), CO₂ Storage, and Monitoring Project in Alberta, Canada, as well as its work on a multiyear, binational characterization effort of the basal Cambrian system (Figure 2).



Figure 2. Location of large-scale sites 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 CO₂ in a safe, economical, and environmentally responsible manner and 2) support Spectra's feasibility study of a Fort Nelson demonstration to verify the economic feasibility of using the region's carbonate saline formations for safe, long-term CO₂ storage. During Phase III, the PCOR Partnership will continue to refine storage resource estimates and evaluate other factors relevant to regional storage goals.

The PCOR Partnership plans to achieve its Phase III mission through a series of 16 tasks: 1) Regional Characterization; 2) Public Outreach and Education; 3) Permitting and National Environmental Policy Act (NEPA) Compliance; 4) Site Characterization and Modeling (completed); 5) Well Drilling and Completion (completed); 6) Infrastructure Development; 7) CO₂ Procurement (completed); 8) Transportation and Injection Operations (completed); 9) Operational Monitoring and Modeling; 10) Site Closure; 11) Postinjection Monitoring and Modeling; 12) Project Assessment; 13) Project Management; 14) RCSP Water Working Group (WWG) Coordination; 15) Further Characterization of the Zama Acid Gas EOR, CO₂ Storage, and Monitoring Project (completed); and 16) Characterization of the Basal Cambrian System (completed). Table 2 lists the responsibility matrix for these 16 tasks.

Table 2. Phase III Responsibility Matrix

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

PROGRESS OF WORK

Task 1 – Regional Characterization

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

- Continued activities to update the content of the **PCOR Partnership partners-only Decision Support System (DSS) Web site**, including the following:
 - Uploaded updated CO₂ emission sources GIS (geographic information system) files to the PCOR Partnership partners-only DSS interactive map.
 - Completed text review and modifications and programming efforts for the Bell Creek section of the PCOR Partnership members-only DSS Web site. The Bell Creek section under Demonstration Projects is now live.
- Continued work on integrating data for modeling and simulation efforts related to CO₂ storage in mature and depleted oil fields within the region, including the following:
 - Continued to digitize wells for the Fryburg and Medora Field models.
 - Completed the Lodgepole static model.
 - Completed the history match of oil, gas, and water production data for the Gooseneck Field. Updated the equation-of-state (EOS) model. Ran cases with different CO₂ injection pressures to investigate the void replacement (VREP) for the Gooseneck Field.
 - Collected well production and perforation data of the Beaver Creek Field. Updated the EOS model. Obtained a good history match on all three types of fluid production data. Completed simulation work on the estimation of the VREP ratio by CO₂ storage after calibrating the simulation model with the field history data. Ran a few cases of VREP ratio estimation for the Beaver Creek Field using four (fewer) wells

to inject CO₂ instead of all wells that produced over the life of the field, analyzed the results, and updated the summary.

- Continued internal review of a value-added report on the geologic characterization and CO₂ storage potential of the state of Nebraska.
- Continued internal review of a value-added report on Williston Basin CO₂ storage sink relative permeability laboratory characterization activities.
- With regard to the **Aquistore** project:
 - Received approval from PTRC on January 5, 2018, for a draft abstract subsequently submitted for consideration to the 14th Conference for Greenhouse Gas Control Technologies (GHGT-14) (to be held October 21–26, 2018, in Melbourne, Australia).
 - Participated in a Science and Engineering Research Committee (SERC) conference call March 7, 2018. Injection continues at Aquistore at rates ranging from 350 to 450 tonnes per day. A modeling workshop is being planned for April 5, 2018, in Regina, Saskatchewan.
 - As of February 28, 2018, approximately 138,000 tonnes of CO₂ has been injected at the Aquistore site.
 - With regard to static **modeling** and dynamic predictive **simulation** activities:
 - ◆ Downloaded and processed injection and pressure data through January 2018.

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

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

Task 2 – Public Outreach and Education

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

- Submitted a value-added report entitled “Household Energy and Carbon Web Pages Report” for the period of October 1 – December 31, 2017, for review on January 8, 2018.
- Submitted Deliverable (D) 13 entitled “Public Site Updates” for review on January 29, 2018, and received approval on January 30, 2018.
- The broadcast premiere of *Coal: Engine of Change* (Documentary D22) was March 27, 2018, at 7:00 P.M. CDT on Prairie Public Broadcasting (PPB) stations.
- During the quarter, the PCOR Partnership was represented by EERC personnel at six meetings/conferences. Specifically, the PCOR Partnership outreach activities included two oral presentations. The following quantities of PCOR Partnership outreach materials were distributed:
 - PCOR Partnership documentary entitled “Nature in the Balance: CO₂ Sequestration” – 1
 - PCOR Partnership documentary entitled “Reducing Our Carbon Footprint: The Role of Carbon Markets” – 1
 - PCOR Partnership documentary entitled “Out of the Air – Into the Soil” – 2

- PCOR Partnership documentary entitled “Managing Carbon Dioxide: The Geologic Solution” – 1
- PCOR Partnership documentary entitled “Global Energy and Carbon: Tracking Our Footprint” – 2
- PCOR Partnership video training guide entitled “Installing a Casing-Conveyed Permanent Downhole Monitoring System” – 1
- PCOR Partnership documentary entitled “The Bell Creek Story: CO₂ in Action” – 32
- PCOR Partnership Atlas, 5th Edition – 20
- Continued writing a draft outreach paper for GHGT-14.
- Continued work related to Documentary D22 “Coal: Engine of Change,” including the following:
 - Worked on promotional content, including DVD jacket text and images, definition of video clips for the PCOR Partnership Web site, and draft marketing language for the broadcast premiere.
 - Submitted captioning edits to the captioner.
 - Finalized the documentary content, including all script, graphics, image changes, title, and credits.
 - Promoted broadcast premiere on social media.
- **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:
 - ◆ Participated in the monthly conference call on January 18, 2018. The call focused on finalizing the 2018 call schedule, reviewing the subjects for upcoming calls (focus on content for final report), and reviewing two initial workshops (storytelling and risk communication) and the utility of those activities to subsequent partnership outreach activities.
 - ◆ No OWG conference calls were held in February or March 2018.
- Continued efforts to update the **public Web site** (www.undeerc.org/pcor), including the following:
 - Completed internal review and changes to a page related to PCOR Partnership member Red Trail Energy’s CCS efforts and to the Video Clip Library, Carbon and CO₂ on Earth, and CO₂ Sequestration Projects pages.
 - Added a page related to PCOR Partnership member Red Trail Energy’s CCS efforts and video clips from “The Bell Creek Story – CO₂ in Action” in the Video Clip Library to the live Web site on January 22, 2018.
 - Continued internal discussions related to the planned public Web site technical upgrade design, including a new template for the Web site. Selected a new header image and page colors.
 - Worked on text updates for the individual pages on the public Web site.
 - Completed preparations of new thumbnails for Video Clip Library and individual Web pages. Prepared title images for older video clips.
 - Continued to discuss progress and needs of programming.
 - The following Web pages went live on the PCOR Partnership public Web site in conjunction with the Documentary D22 premiere:

- ◆ The Coal and Documentaries Web pages went live March 26, 2018, in advance of the premiere. These pages included all changes except the full-length documentary.
 - ◆ The Coal, Documentaries, and Home Web pages went live March 28, 2018, following the premiere, including the full-length documentary.
- Continued ongoing identification and repair of broken links.
- Continued collaborative efforts with **PPB** with regard to **Documentary D22**, including the following:
 - Selected a final title of “Coal: Engine of Change.”
 - Received and reviewed several iterations of the draft version from PPB, working with PPB on areas that needed adjustments.
 - Traveled to Fargo, North Dakota, on February 5 and 14, 2018, to meet with PPB. Activities included production of the final narration track, a final review of the draft Documentary D22, and development of a plan to meet a scheduled broadcast on March 27, 2018, at 7:00 p.m. CDT in the PPB viewing area. Several iterations of an updated draft version were received from PPB, reviewed, and changes sent back to PPB.
 - Completed promotional script, b-roll, and description for publicity to PPB.
 - Reviewed and approved final version of promotional video publicizing the documentary.
 - Continued to prepare materials for the video library clips and sent notes to PPB.
 - Prepared DVD menus and sent to PPB.
- Information regarding the **site sessions/visits** to the PCOR Partnership public Web site included the following:
 - There were 5779 sessions/visits to the public Web site (www.undeerc.org/pcor). Traffic decreased 39% from last quarter (9502 sessions/visits).
 - There were 5078 unique visitors to the public Web site, representing a 39% decrease from last quarter (8274 visitors). In particular, over 92% of these visitors were new to the Web site (visitors whose visit was marked as a first-time visit in this quarter). Of the 5779 sessions/visits, 52% of the Web traffic was domestic, and 48% was international. Table 3 lists the top ten countries for visits to the PCOR Partnership Web site: United States, India, United Kingdom, Canada, Philippines, Pakistan, Germany, Japan, Australia, and Malaysia. There was traffic from 121 countries overall (Figure 3).
 - There were 495 sessions/visits originating from within the PCOR Partnership region (a 22% decrease from last quarter) (Figure 4). Approximately 78% of the regional visits originated from the United States, and 22% came from Canada. Visits from within the PCOR Partnership region represent almost 9% of the overall traffic to the public Web site (it should be noted that the totals are exaggerated to some degree because the visit location data were aggregated at the state and province levels, even though the PCOR Partnership region formally includes only portions of British Columbia, Montana, and Wyoming).

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

	Country	Sessions/ Visits*	PCOR Partnership State/Province	Visits*
1	United States	3026		
			North Dakota	107
			Minnesota	70
			Wisconsin	66
			Missouri	38
			Iowa	35
			Montana	29
			Wyoming	17
			Nebraska	16
			South Dakota	9
2	India	687		
3	United Kingdom	408		
4	Canada	220		
			Alberta	56
			British Columbia	32
			Saskatchewan	13
			Manitoba	7
5	Philippines	98		
6	Pakistan	89		
7	Germany	66		
8	Japan	66		
9	Australia	62		
10	Malaysia	55		
	Other 111 countries	1002		
Total Sessions/Visits		5779	Total PCOR Partnership Visits	495

* Arranged by the number of visits to the site.

- During this reporting period, a breakdown of how visitors came to the PCOR Partnership Web site, also referred to as **traffic sources** (Figure 5), was determined and is provided below:
 - Search traffic refers to the use of search engines such as Google, Bing, and Yahoo. Search traffic accounted for almost 81% 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,” “CO₂,” 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 (14%) is from persons familiar with the PCOR Partnership.

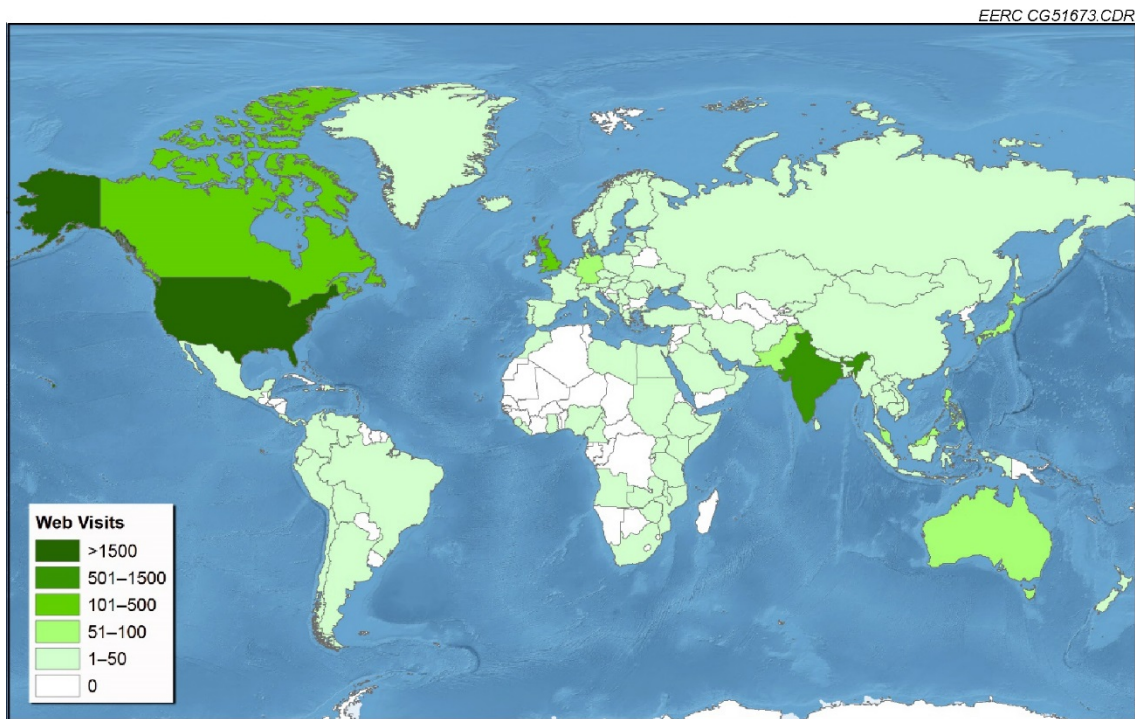


Figure 3. Map of PCOR Partnership Web site global traffic for this reporting period.

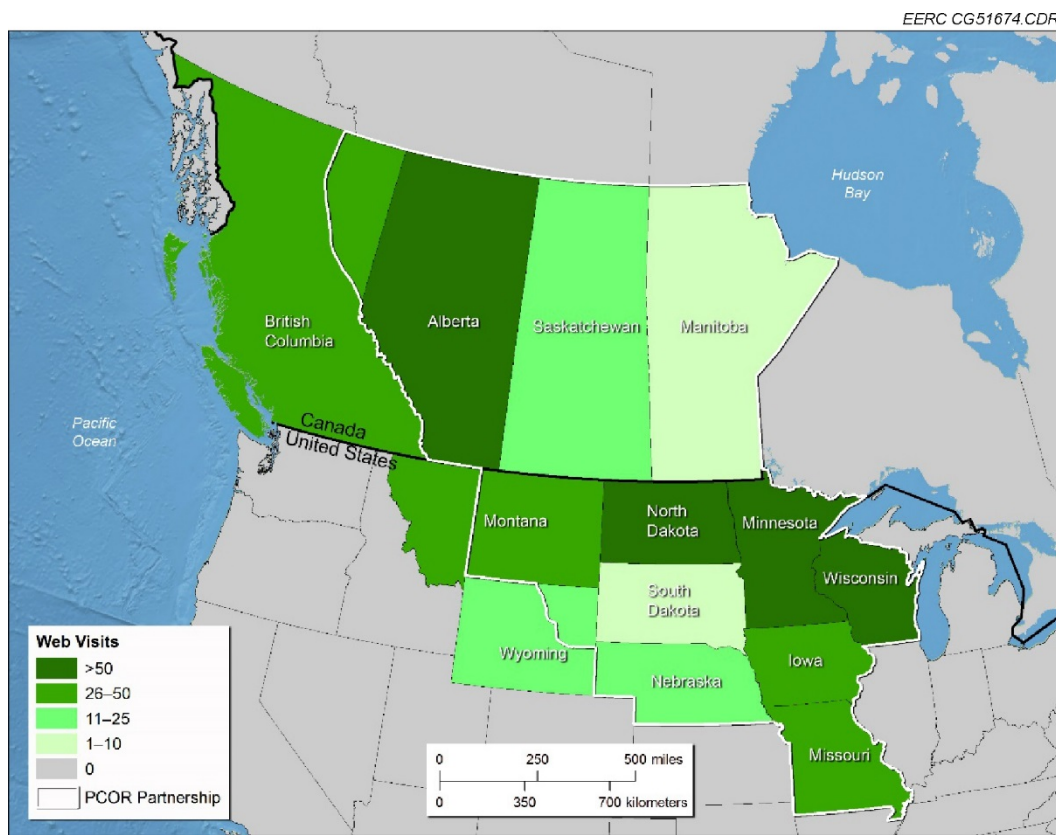


Figure 4. Map of PCOR Partnership Web site regional visits for this reporting period.

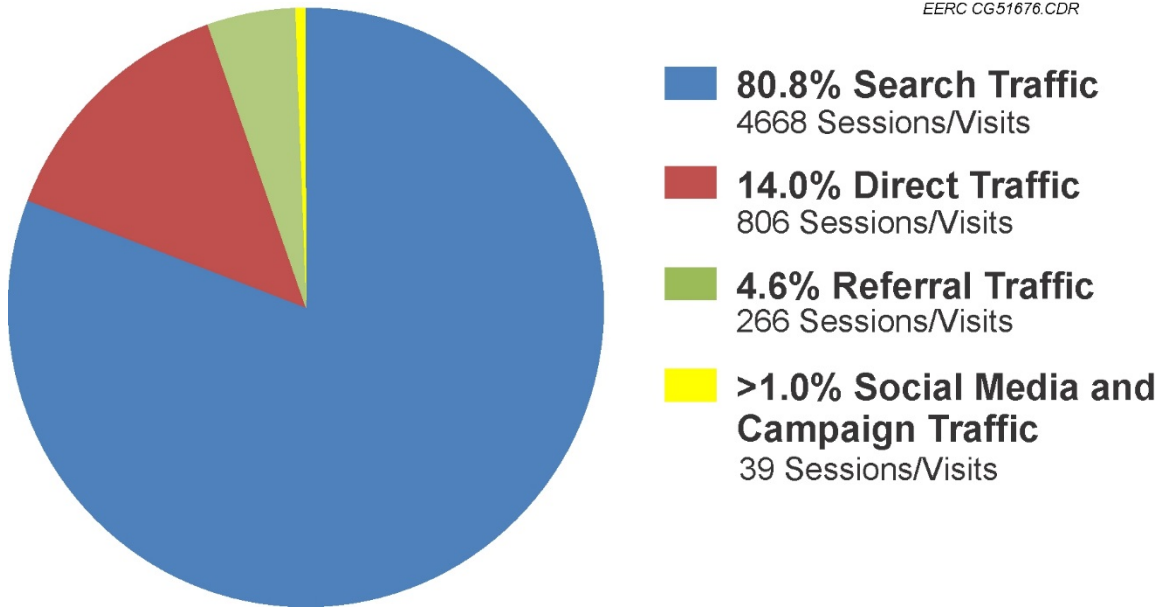


Figure 5. PCOR Partnership public Web site traffic sources for this reporting period.

- Referral site traffic (almost 5%) corresponds to the traffic directed to the PCOR Partnership Web page from other sites via links. The top referring Web sites were wired.com and arthapedia.in (Indian economy and government Web site).
- Less than 1% of site traffic (39 visitors) resulted from teacher campaigns and social interactions, such as e-mail or social media sources (e.g., Facebook and YouTube).
- During this reporting period, the **nature of the sessions** to the PCOR Partnership public Web site included 10,481 page views (a decrease of approximately 38% from last quarter); the top five pages viewed are listed in Table 4. These five pages make up almost 66% of total page views.
- All six 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 five broadcasts aired, with "Global Energy and Carbon: Tracking our Footprint" airing once, "The Bell Creek Story: CO₂ in Action" airing twice, and "Coal: Engine of Change" airing twice. All broadcasts were televised in the PCOR Partnership region.

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

Page Title	Page Views	% Page Views	Page
What Is CO ₂ Sequestration?	3934	37.5	www.undeerc.org/pcor/sequestration/whatissequestration.aspx
What Is CO ₂ ?	1250	11.9	www.undeerc.org/pcor/sequestration/whatisco2.aspx
Carbon Capture and Storage (CCS)	734	7.0	www.undeerc.org/pcor/sequestration/ccs.aspx
Terrestrial CO ₂ Sequestration Projects	637	6.1	www.undeerc.org/pcor/region/terrestrial/default.aspx
	393	3.7	www.undeerc.org/pcor/co2sequestrationprojects/default.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	1014	2081	2:05
The Phases of Oil Recovery – So Far	2:40	950	1616	1:45
Reducing Our Carbon Footprint: The Role of Markets Documentary	26:49	787	3889	5:00
Reducing Our Carbon Footprint with Biomass Fuels	1:54	284	417	1:30
Reservoir Geology 101: Fluid in the Rocks	1:50	173	213	1:15

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	791	5262
CO ₂ EOR and Geologic CO ₂ Sequestration	3:13	236	435
Clean Development Mechanism Projects	1:56	140	139
Coal: Engine of Change	56:45	94	942
The Bell Creek Story: CO ₂ in Action	26:45	55	257

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.
- Activities related to data acquisition and management, public Web site, fact sheets, and documentaries and video products subtasks have been extended beyond the previous March 31, 2018, end date to accommodate for a planned public Web site technical upgrade and additional value-added products.

Task 3 – Permitting and NEPA Compliance

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

- Submitted for review and received approval for D8 entitled “Permitting Review – Update 4” on February 23, 2018.
- Responded to a request from DOE NETL regarding pore space and mineral rights.

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

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

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

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

- Completed preparation of the update of the final version of the CO₂ capture technologies overview value-added document, which will summarize trends in CO₂ capture. Worked on internal review.
- Assisted a PCOR Partnership partner with information to potentially use in its response on the two portions of the U.S. Environmental Protection Agency’s Advance Notice of Proposed Rulemaking (for replacement of the Clean Power Plan) related to CCS monitoring, recordkeeping, and reporting.

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

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

Task 7 – CO₂ Procurement

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

Task 8 – Transportation and Injection Operations

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

Task 9 – Operational Monitoring and Modeling

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

- Traveled to Plano, Texas, to meet with Denbury Onshore (Denbury) representatives on February 23, 2018. Discussed Bell Creek engagement, review process with priority of *International Journal of Greenhouse Gas Control* (IJGGC) papers and deliverables, final invoicing, data sharing, and scheduling of a knowledge-sharing workshop in Dallas, Texas, in May or June 2018.
- Presented “Regional Update of CCUS Field Projects within the PCOR Partnership Region: Improving the Commercial Viability of CO₂ Storage Through Improved Performance Monitoring and Operational Management” at the CCUS (Carbon Capture, Utilization, and Storage) Conference held March 20–22, 2018, in Nashville, Tennessee.
- Based on mutual agreement with the DOE NETL Project Manager, the PCOR Partnership submitted updates to two best practices manuals that incorporate additional technical expert reviewer perspectives and findings, as follows:
 - D69 entitled “Best Practices for Modeling and Simulation of CO₂ Storage” was originally submitted May 31, 2017. Submitted a revised version for review on March 12, 2018, and received approval March 14, 2018.
 - D51 entitled “Best Practices Manual – Monitoring for CO₂ Storage” was originally submitted October 31, 2017. Submitted a revised version for review on March 9, 2018. Received approval on March 13, 2018, with DOE comments. Submitted the finalized revised version incorporating DOE comments on March 29, 2018.
- Submitted a memo on January 25, 2018, regarding official updated quantities of CO₂ purchased for injection and stored at Bell Creek. As of December 31, 2017, the most recent month of record, 4.803 million tonnes of total gas (composition of approximately 98% CO₂) has been purchased for injection into the Bell Creek Field, equating to an estimated **4.739 million tonnes of CO₂ stored**. At the end of BP4, 2.979 million tonnes of CO₂ had been stored.
- Received all client reviews of and continued modifications to papers for the planned special issue of IJGGC.
- Continued writing draft GHGT-14 papers.
- Continued discussions of plans to upload PCOR Partnership data to the NETL’s Energy Data eXchange (EDX) in 2018 and a pathway for long-term data management, including the following:
 - Participated in a DOE-hosted EDX introductory WebEx on January 22, 2018, explaining the data submission process.
 - A collaborative workspace has been created in EDX for the PCOR Partnership to store data in the future.
- Worked on compiling information for a knowledge-sharing workshop with Denbury in May 2018.

- Completed a draft manuscript entitled “Lab and Reservoir Study of Produced Hydrocarbon Molecular Weight Selectivity during CO₂ Enhanced Oil Recovery” to be submitted to a journal such as *Energy & Fuels*. Provided to Denbury for initial review.
- Continued **Bell Creek** site activities, including the following:
 - Used the most recent publicly available data to determine that cumulative CO₂ gas injection is 9,636,651 tonnes through January 31, 2018. This value represents the total gas injected, which includes purchase and recycle streams and is NOT corrected for a gas composition of approximately 98% CO₂ (Table 7).
 - As of December 31, 2017, the most recent month of record, 4.803 million tonnes of total gas (composition of approximately 98% CO₂) has been purchased for injection into the Bell Creek Field, equating to an estimated 4.739 million tonnes of CO₂ stored (Table 8), with the difference comprising other trace gases in the purchase gas stream. A separate method from that used to calculate estimated total gas injected was used to calculate cumulative associated CO₂ storage by correcting the gas purchase volume (approximately 98% CO₂) obtained from Denbury’s custody transfer meter with gas compositional data.

**Table 7. Bell Creek CO₂ Gas Injection Totals for January 2018
(cumulative totals May 2013 to January 2018)¹**

	January 2018 Injection
Total, Mscf	6,450,305
Total, tons ²	368,947
Total, tonnes ³	335,029
Cumulative Total, Mscf ⁴	185,534,444
Cumulative Total, tons ^{2,4}	10,612,277
Cumulative Total, tonnes ^{3,4}	9,636,651

Source: Montana Board of Oil and Gas database.

¹ Total gas injection quantities are **NOT CORRECTED** for gas composition and include the combined purchased and recycled gas streams.

² Calculated utilizing a conversion of 17.483 Mscf/ton.

³ Calculated utilizing a conversion of 19.253 Mscf/tonne.

⁴ Cumulative totals are for the period from May 2013 to the month listed.

Table 8. Cumulative Total Gas Purchased and Estimated Associated CO₂ Storage for the Bell Creek Field¹

	December 2017 Gas Totals
Monthly Total Gas Purchased, MMscf ²	3929
Monthly Total Gas Purchased, million tons ²	0.225
Monthly Total Gas Purchased, million tonnes ²	0.204
Cumulative Total Gas Purchased, MMscf ^{2,3}	92,474
Cumulative Total Gas Purchased, million tons ^{2,3}	5.289
Cumulative Total Gas Purchased, million tonnes ^{2,3}	4.803
Cumulative Total CO ₂ Stored, MMscf ^{3,4}	91,238
Cumulative Total CO ₂ Stored, million tons ^{3,4}	5.219
Cumulative Total CO ₂ Stored, million tonnes ^{3,4}	4.739

¹ Conversion factors of 17.483 Mscf/ton and 19.253 Mscf/tonne were used to calculate equivalent purchase and storage quantities.

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

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

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

- With regard to **injection-phase monitoring** efforts:
 - ◆ Continued reservoir pressure and distributed temperature monitoring of 05-06 OW (observation well) from the permanent downhole monitoring system using the casing-conveyed pressure–temperature gauges and fiber-optic DTS:
 - Near-continuous operation since April 2012.
- With regard to **injection-phase sampling** activities:
 - ◆ Completed collection of the ninth round of oil samples from a select group of wells in the Bell Creek Field with Denbury personnel. Two samples broke in transit. Resampled one well to complete collection.
 - ◆ A summary of all oil and CO₂ gas stream samples collected for analyses to date is provided in Table 9.
 - ◆ Completed oil composition analyses of oil samples collected from Bell Creek Oil Field from Phase Areas 1 and 4. Worked on completing data analyses and continuing interpretation of field-collected oil samples and laboratory CO₂ pressure/crude oil mobilization studies.
 - ◆ Worked on development of a PVT (pressure, volume, temperature) model for asphaltene deposition of the Bell Creek oil based on experimental and field monitoring data. Completed sensitivity analysis, focused on the low-pressure side, on the PVT model. Integrated the asphaltene deposition PVT model into the Peng–Robinson EOS model, which will be used for reservoir simulation and prediction of asphaltene deposition behavior in the field.
- With regard to **modeling** and **simulation** efforts:
 - ◆ Continued dynamic reservoir pressure and multiphase fluid flow simulation efforts. The modeling and simulation focus remains on Bell Creek Field Phase Areas 1–4. Accomplishments and activities include the following:
 - History matching of the updated simulation model is complete for Phase Areas 1–3. Predictive simulation is complete for Phase Areas 1 and 2. Long-term simulations of CO₂ migration are complete for Phase Areas 3–7. History matching of the simulation model is complete for the primary depletion, waterflooding, and CO₂-flooding stages for Phase Area 4 using the simulation model based on the Version 3 geologic model.
 - Continued work on relating measured and/or simulated CO₂ thickness at a particular well with the seismic amplitude difference between the baseline and monitoring 3-D seismic.
 - ◆ Continued work with the 2012/2014/2015 4-D seismic data set. Accomplishments and activities include the following:
 - Applied interpretation workflow to newly processed vertical seismic profile (VSP) baseline data.
 - ◆ Continued processing the passive seismic data set.
 - ◆ Continued work on estimating magnitudes of microseismic events in the Bell Creek Field.

Table 9. Oil and CO₂ Gas Stream Sampling and Analyses

		Production Stream by Development Phase, Well ¹														
Date Sampled	Purchase/ Recycle ¹	Phase 1				Phase 3			Phase 4							
		56-14R	32-02	05-06	04-04	28-02	21-10	21-14	34-09	34-07	34-03	34-05	35-03	35-13	34-01	35-11
Jan 2014		O	O	O												
Mar 2014		O	O													
May 2014	P	O	O	O												
Jun 2014	PR	O	O	O												
Jul 2014	PR	O	O	O												
Sep 2014	PR	OG	OG	O												
Oct 2014	PR	O	O													
Nov/Dec 2014		OG	OG	G												
Jan 2015			O	OG												
Mar 2015		G	G	G												
Apr 2015	PR															
Jun 2015		O	O	O												
Jul 2015	PR	G	G	G												
Sep 2015	PR															
Nov 2015		O		O												
Jan 2016	PR															
Apr/May 2016		O	O	O	O	O	O	O								
Jun/Jul 2016	PR	O		O	O	O	O	O								
Aug/Sep 2016		O	O		O	O	O	O	O							
Oct 2016				O												
Nov/Dec 2016 ²	PR	O	O	O	O	O	O	O	O	O	O					
Feb 2017 ²		O	O		O	O	O	O	O	O	O					
May 2017 ²	PR	O	O	O	O	O	O	O	O	O	O					
Jul 2017 ²		O			O	O	O	O	O	O	O		O	O		
Oct 2017				O			O	O	O	O	O	O	O	O	O	O
Nov 2017		O	O		O	O										
Dec 2017		O	O		O	O	O	O		O			O	O	O	O
Jan 2018									O			O				

¹ P = purchase CO₂ gas stream, R = recycle CO₂ gas stream, O = produced oil stream, and G = produced CO₂ gas stream.

² Oil samples collected but not yet analyzed.

- ◆ Evaluated different relationships and constraints for transforming seismic amplitude differences to CO₂ saturation height, and generated grids for each scenario. Developed workflow for incorporating gridded amplitude corrections as a consequence to changes in pressure for calculating CO₂ saturation height from seismic amplitude difference.
- ◆ Continued work with InSAR data evaluation. Accomplishments and activities include the following:
 - Continued time series analysis to compare dynamic operational data with InSAR deformation. Integrated geomodel grids of porosity–height to assess impact of static reservoir parameters to rate of deformation.
 - Continued working on the InSAR surface deformation data and the reservoir pressure data, improving the geomechanical modeling to match the results.
 - Compared InSAR surface deformation results to the simulated surface deformation based on pore pressure change and geomechanical modeling.
 - Compared recent time-lapse data with InSAR maps.
 - Revised the model to match the simulated surface deformation and the InSAR surface deformation.
- ◆ Used synthetic events to work on the establishment of detectability limits of the downhole array.
- ◆ Efforts related to VSP, passive seismic, InSAR, and modeling and simulation activities will be reported in IJGGC and/or GHGT-14 papers.

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

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

Task 10 – Site Closure

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

- Discussed the field activity transition plan with Denbury representatives during a meeting in Plano, Texas, on February 23, 2018.
- Held a conference call with Denbury representatives to discuss handoff of the 05-06 OW PDM system. A PCOR Partnership representative is scheduled to travel to the Bell Creek Field April 4–6, 2018, to download data from the PDM system, train a Denbury representative on operation of the system, and perform the handoff to Denbury, the site operator.

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

- Tasks 1, 3, 6, 9, 11, and 14 ended on March 31, 2018. Any further efforts in this area will be handled in the remaining open Tasks 2, 10, and 13.

Task 11 – Postinjection Monitoring and Modeling

Significant accomplishments for Task 11 for the reporting period included the following:

- Submitted D73 entitled “Applied Modeling, Forecasting, and Monitoring of the Fate of Injected CO₂ for the Management of Geologic CO₂ Storage” on January 31, 2018. This deliverable will also serve as a GHGT-14 paper upon acceptance from the conference. The deliverable was sent to Denbury for concurrent review.
- Worked on compiling information for a knowledge-sharing workshop with Denbury in May 2018.

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

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

Task 12 – Project Assessment

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

- Received approval for D57 entitled “Annual Assessment Report” on January 1, 2018.

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

- This task ended on March 31, 2018.

Task 13 – Project Management

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

- Scout Energy Management LLC joined the PCOR Partnership in March 2018.
- The PCOR Partnership Project Manager presented “Plains CO₂ Reduction Partnership (PCOR)” at the Southeast Regional Carbon Sequestration Partnership (SECARB) 13th Annual Meeting held March 7–8, 2018, in Atlanta, Georgia.
- The PCOR Partnership Project Manager attended the GLOBE Forum 2018 – Carbon Capture, Utilization, and Storage Technology Cluster held March 14–16, 2018, in Vancouver, British Columbia.
- Received approval for Milestone (M) 65 entitled “PCOR Partnership Annual Membership Meeting and Workshop Held” on January 1, 2018.
- Submitted abstracts under several tasks for consideration at GHGT-14 to be held October 21–26, 2018, in Melbourne, Australia, listed in Table 10. PDF files were provided to the DOE Project Manager. Worked on internal reviews of draft papers.
- Submitted a PCOR Partnership overview abstract to the International Brown Coal Mining Congress, which will be held in Betchatow, Poland, April 16–18, 2018. The

conference will include discussion of modern CCS technologies. The abstract was withdrawn.

- Submitted M66 entitled “Submission of Draft Papers on Associated Storage to Special Issue of IJGGC” on March 29, 2018, and received approval March 30, 2018. Continued work on a planned special issue. Team members continued writing text for potential papers related to all active tasks. Worked on internal reviews. Began editing papers submitted. Identified additional candidate reviewers.
- Submitted the quarterly international activity update on March 20, 2018.
- Worked on D62 – Final Report.
- Worked on planning the PCOR Partnership Technical Advisory Board (TAB) annual meeting to be held April 10–11, 2018, in Miami, Florida, including the following:
 - Received a fully executed hotel contract. Worked with the hotel hosting the meeting.
 - Finalized the agenda. Continued preparation of presentation materials.
- Worked on planning the 2018 PCOR Partnership Annual Membership Meeting, including the following:
 - Continued discussions on the timing and location for the 2018 PCOR Partnership Annual Membership Meeting.
 - Traveled to Washington, D.C., March 22–23, 2018, for a site visit. Held a planning meeting on March 27, 2018, to discuss the site visit.
- Held a task leader meeting January 12, 2018. Topics discussed included deliverables, including planned journal articles and conference papers, best practice manuals, the final report, and task updates.
- Held a task leader meeting March 9, 2018. The focus of discussion was activities leading to the closeout of PCOR Partnership Phase III, including final task activities, deliverables, journal articles, conference papers, best practice manuals, site closure, and data management and transfer. Additionally, upcoming conferences and meetings, including the 2018 TAB meeting and the 2018 PCOR Partnership Annual Membership Meeting, were discussed.
- Deliverables and milestones completed in January:
 - December monthly update
 - Task 2: D13 – Public Site Updates
 - Task 11: D73 – Applied Modeling, Forecasting, and Monitoring of the Fate of Injected CO₂ for the Management of Geologic CO₂ Storage
 - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
- Deliverables and milestones completed in February:
 - January monthly update
 - Task 3: D8 – Permitting Review – Update 4
 - Task 14: D107 – Nexus of Water and CCS [Carbon Capture and Storage]: Findings of the Water Working Group (WWG) of the Regional Carbon Sequestration Partnerships
 - Task 14: M23 – Monthly WWG Conference Call Held
- Deliverables and milestones completed in March:
 - February monthly update
 - Task 13: M66 – Submission of Draft Papers on Associated Storage to Special Issue of IJGGC

Table 10. GHGT-14 Abstracts Submitted for Consideration

Title	Task
Clarifying the Relationship Between Enhanced Oil Recovery and the Associated Storage of Injected CO ₂	9
Determining the Long-Term Fate of CO ₂ Storage Associated with an Enhanced Oil Recovery Project	9
Passive Microseismic Monitoring of CO ₂ EOR and Associated Storage Using a Downhole Array in a Noisy Subsurface Environment	9
An Improved Numerical Modeling and Simulation Study of the Aquistore CO ₂ Storage Project	1
Applications and Benefits of Observation Wells for Commercial CO ₂ Storage	9
PCOR Partnership Outreach: An Evolving Regional Capability Based on RCSP Outreach Best Practices	2
Nexus of Water and CCS: Findings of the Water Working Group (WWG) of the Regional Carbon Sequestration Partnerships	14
Viability of InSAR as a Monitoring Tool in Challenging Terrain: Bell Creek, Montana	9
Successes and Lessons Learned from 15 years of the PCOR Partnership	13
Applied Modeling and Monitoring of the Fate of Injected CO ₂ for the Management of Geologic Storage	11
Evaluation of Measured Differences in Liquid Versus Gas Permeability and Identification of Potential Causes	9

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

- Tasks 1, 3, 6, 9, 11, and 14 ended on March 31, 2018. Any further efforts in this area will be handled in the remaining open Tasks 2, 10, and 13.

Task 14 – RCSP WWG Coordination

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

- Held the quarterly conference call for February 6, 2018. This was the last conference call for this project effort. The focus was reviewing comments regarding the WWG GHGT-14 draft paper/final deliverable (D107), discussing the status of early WWG deliverables (white paper, etc.), and concluding WWG activities. Distributed notes from the call in March 2018.
- Submitted D107 entitled “Nexus of Water and CCS: Findings of the Water Working Group (WWG) of the Regional Carbon Sequestration Partnerships” on February 28, 2018. This deliverable will also serve as a GHGT-14 paper upon acceptance from the conference. Received approval on March 1, 2018.

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

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

Task 15 – Further Characterization of the Zama Acid Gas EOR, CO₂ Storage, and Monitoring Project

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

Task 16 – Characterization of the Basal Cambrian System

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

PHASE III COST STATUS

The approved BP5 budget along with actual costs incurred and in-kind cost share reported are shown in Table 11. A spending plan for BP5 and actual incurred cost by quarter of cash funds for BP5 are provided in Figure 6 and Table 12.

Table 11. Phase III Budget – BP5

Organization	Approved Budget, \$*	Actual Costs Incurred, \$
DOE Share – Cash	13,946,212	11,663,110
Nonfederal Share	5,711,194	5,771,194
Total	19,657,406	17,434,304

* As of Modification No. 38.

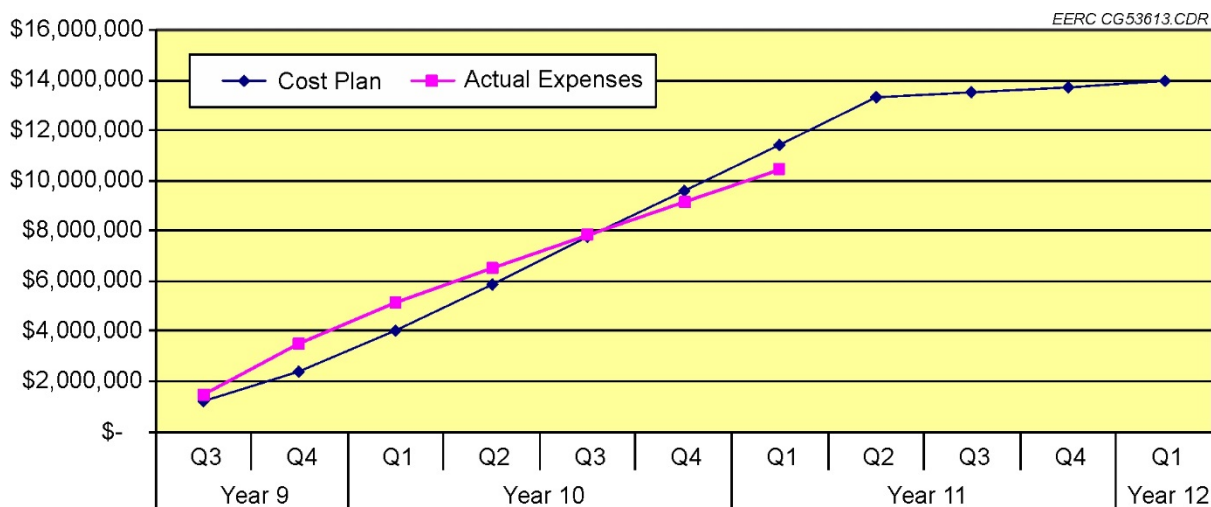


Figure 6. PCOR Partnership Phase III, BP5, Years 9–12 funding (cash only).

PHASE III SCHEDULE STATUS

Table 13 lists all deliverables and milestones by quarter, with completion dates, through the end of the reporting period (see Table 14 for the Gantt chart for BP5, Years 9–12).

Table 12. 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	
		Cum. BP		Cum. BP		Cum. BP		Cum. BP		Cum. BP		Cum. BP		Cum. BP		Cum. BP
	Q1	Total	Q2	Total	Q3	Total	Q4	Total	Q1	Total	Q2	Total	Q3	Total	Q4	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												
Nonfederal Share	\$ 20,159	\$ 69,549	\$ -	\$ 69,549												
Total Incurred Cost	\$ 1,294,374	\$ 10,452,139	\$ 1,280,520	\$ 11,732,659												
Variance																
Federal Share	\$ 581,772	\$ 1,070,289	\$ 575,467	\$ 1,645,756												
Nonfederal Share	\$ (20,159)	\$ (69,549)	\$ -	\$ (69,549)												
Total Variance	\$ 561,613	\$ 1,000,740	\$ 575,467	\$ 1,576,207												

Table 13. 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 13. 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 13. 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 13. 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 13. 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 13. 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 13. 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 13. 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
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 13. 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 13. Phase III Milestones and Deliverables (continued)

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

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Table 13. Phase III Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 7 – Quarter 4 (July–September 2014)		
D13: Task 2 – Public Site Updates	7/31/14	7/29/14
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/14	7/31/14
M23: Task 14 – Monthly WWG Conference Call Held	7/31/14	7/17/14 WebEx
D66: Task 9 – Bell Creek Test Site – Simulation Report	8/31/14	8/27/14 Exec. Sum.
M23: Task 14 – Monthly WWG Conference Call Held	8/31/14	Waived by DOE
D1: Task 1 – Review of Source Attributes	9/30/14	9/24/14
D7: Task 1 – Third Target Area Completed	9/30/14	9/26/14
D93: Task 1 – Geological Modeling and Simulation Report for the Aquistore Project	9/30/14	9/30/14
D100: Task 9 – Fort Nelson Test Site – Best Practices Manual – Feasibility Study	9/30/14	9/30/14
M23: Task 14 – Monthly WWG Conference Call Held	9/30/14	9/30/14
Year 8 – Quarter 1 (October–December 2014)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/14	10/31/14
D99: Task 14 – Water/CCS Nexus-Related Fact Sheet	10/31/14	10/31/14
M23: Task 14 – Monthly WWG Conference Call Held	10/31/14	10/28/14
M48: Task 9 – Bell Creek Test Site – 1 Million Metric Tons of CO ₂ Injected	10/31/14	10/29/14
M23: Task 14 – Monthly WWG Conference Call Held	11/30/14	11/25/14
D57: Task 12 – Project Assessment Annual Report	12/31/14	12/30/14
M24: Task 14 – WWG Annual Meeting Held	12/31/14	8/11/14
Year 8 – Quarter 2 (January–March 2015)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/15	1/30/15
D32: Task 4 – Bell Creek Test Site – Geomechanical Report (Update 1)	1/31/15	1/28/15
M23: Task 14 – Monthly WWG Conference Call Held	1/31/15	1/27/15
M23: Task 14 – Monthly WWG Conference Call Held	2/28/15	2/26/15
D25: Task 2 – Bell Creek Test Site Poster (update)	3/31/15	2/5/15
M23: Task 14 – Monthly WWG Conference Call Held	3/31/15	3/25/15
M36: Task 13 – Annual Advisory Board Meeting Scheduled	3/31/15	3/31/15

Continued . . .

Table 13. Phase III Milestones and Deliverables (continued)

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

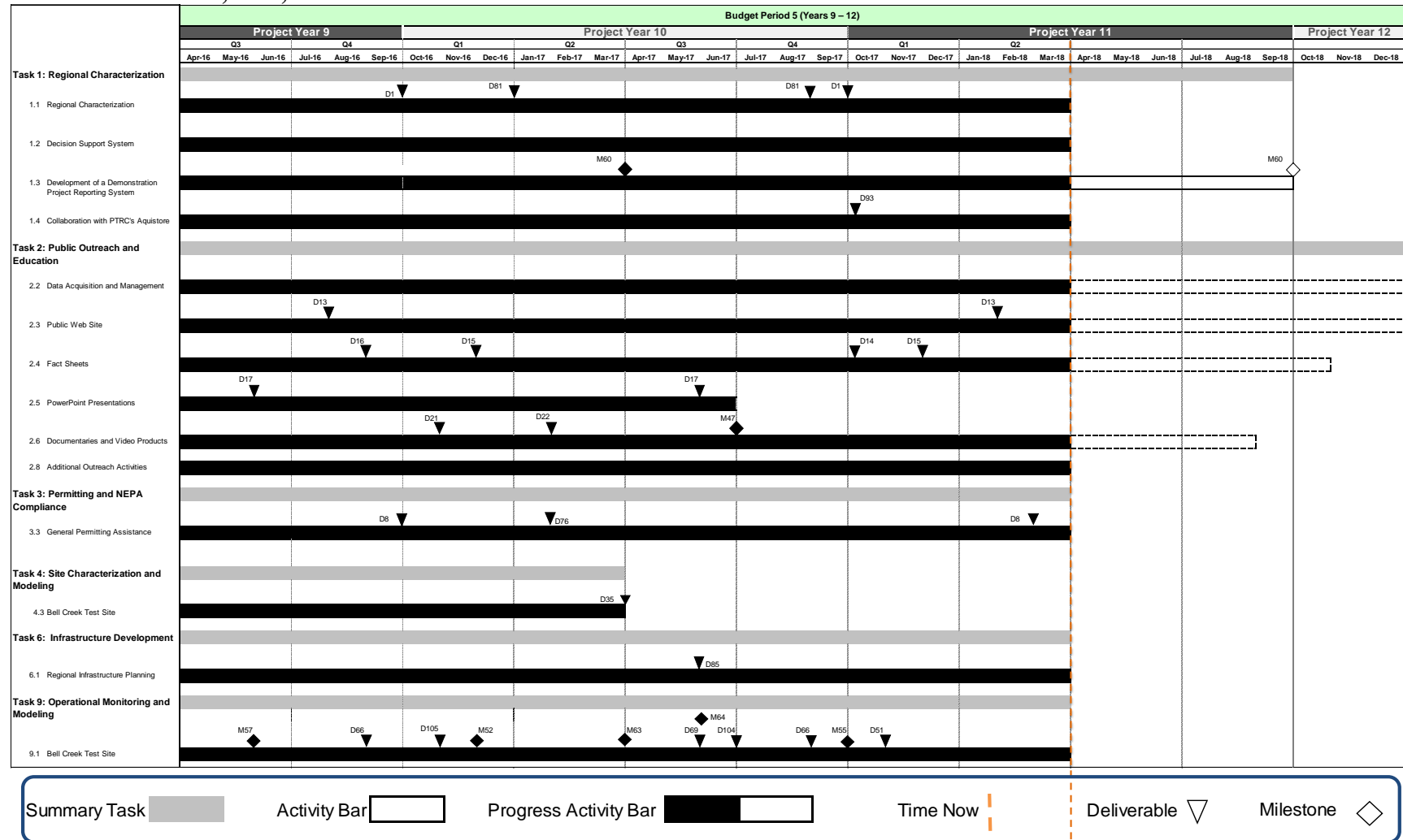
Title/Description	Due Date	Actual Completion Date
Year 10 – Quarter 3 (April–June 2017)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/17	4/27/17
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	5/31/17	5/31/17
D69: Task 9 – Best Practices Manual – 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
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
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	10/7/17
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 13. Phase III Milestones and Deliverables (continued)

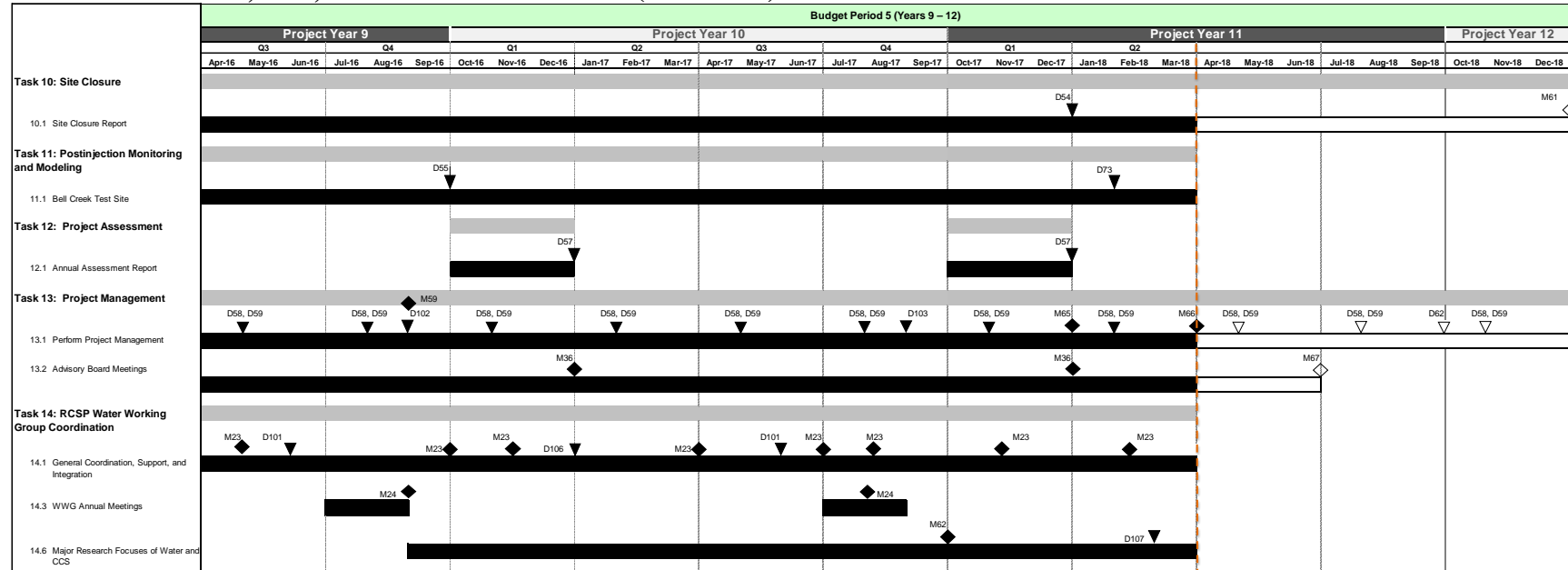
Title/Description	Due Date	Actual Completion Date
Year 11 – Quarter 1 (October–December 2017) (continued)		
D54: Task 10 – Report – Site Closure Procedures	12/31/17	12/28/17
D57: Task 12 – Project Assessment Annual Report	12/31/17	12/29/17
M23: Task 14 – WWG Conference Call Held	12/31/17	11/9/17
M24: 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 <i>International Journal of Greenhouse Gas Control (IJGGC)</i>	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	
M67: Task 13 – Annual PCOR Partnership Technical Advisory Board Meeting Held	6/30/18	
Year 11 – Quarter 4 (July–September 2018)		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/18	
M60: Task 1 – Data Submitted to EDX	9/30/18	
D62: Task 13 – Final Report	9/30/18	
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 14. Phase III, BP5, Years 9–12 Gantt Chart



Continued . . .

Table 14. 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 Aqstore 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 Meeting and 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

December-17

PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, 12 abstracts were submitted, one abstract was withdrawn, and two oral presentations were given at six different meetings and conferences. In addition, a quarterly progress report, seven deliverables/milestones (one draft and six approved), and one value-added product were completed. Two deliverables from the previous quarter also received approval. For more detail, see the Meetings/Travel section.

Abstracts

Submitted

- Barajas-Olalade, C., Burnison, S.A., Hamling, J.A., and Gorecki, C.D., 2018, Passive microseismic monitoring of CO₂ EOR and associated storage using a downhole array in a noisy subsurface environment [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- 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, An improved numerical modeling and simulation study of the Aquistore CO₂ storage project [abs.]: 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 capability based on RCSP outreach best practices [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 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 [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Hamling, J.A., Nakles, D.V., Bosshart, N.W., Botnen, B.W., and Leroux, K.M., 2017, Applications and benefits of observation wells for commercial CO₂ storage [abs.]: 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., Peterson, K.J., Burnison, S.A., Bosshart, N.W., Jiang, T., Hamling, J.A., Wildgust, N., and Gorecki, C.D., 2018, Determining the long-term fate of CO₂ storage associated with an enhanced oil recovery project [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Klapperich, R.J., Nakles, D.V., Steadman, E.N., Gorecki, C.D., Locke, R., III, McPherson, B., McNemar, A., and McLing, T., 2018, Nexus of water and CCS—findings of the Water Working Group (WWG) of the Regional Carbon Sequestration Partnerships [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.

- Pekot, L.J., Hamling, J.A., Klapperich, R.J., and Wildgust, N., 2018, Applied modeling and monitoring of the fate of injected CO₂ for the management of geologic CO₂ storage [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Reed, S.Y.F., Burnison, S.A., Bosshart, N.W., Hamling, J.A., Ge, J., and Gorecki, C.D., 2017, Viability of InSAR as a monitoring tool in challenging terrain—Bell Creek, Montana [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Smith, S.A., Beddoe, C.J., Heebink, L.V., Kurz, B.A., and Hamling, J.A., 2018, Evaluation of measured differences in liquid versus gas permeability and identification of potential causes [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.
- Wildgust, N., Hamling, J.A., and Gorecki, C.D., 2017, Clarifying the relationship between enhanced oil recovery and the associated storage of injected CO₂ [abs.]: 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, October 21–25, 2018.

Submitted and Withdrawn

- Gorecki, C.D., Ayash, S.C., and Steadman, E.N., 2018, The Plains CO₂ Reduction Partnership—a regional approach to carbon capture and storage [abs.]: 10th Jubilee International Brown Coal Mining Congress, Belchatow, Poland, April 16–18, 2018.

Presentations

- Gorecki, C.D., 2018, Plains CO₂ Reduction (PCOR) Partnership Program highlights: Presented at the 13th Annual SECARB Stakeholders' Briefing, Atlanta, Georgia, March 7–8, 2018.
- Hamling, J.A., 2018, Regional update of CCUS field projects within the Plains CO₂ Reduction (PCOR) Partnership region: Presented at the Carbon Capture, Utilization, and Storage Conference, Nashville, Tennessee, March 20, 2018.

Deliverables/Milestones

Draft Submitted

- Hamling, J.A., Glazewski, K.A., Pekot, L.J., Jin, L., Leroux, K.M., Klapperich, R.J., Wildgust, N., and Gorecki, C.D., 2018, Applied monitoring of the fate of injected CO₂ for the management of geologic CO₂ storage: Plains CO₂ Reduction (PCOR) Partnership Phase III draft Task 11 Deliverable D73 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, January.

Draft Submitted and Approved

- Bosshart, N.W., Pekot, L.J., Wildgust, N., Gorecki, C.D., Torres, J.A., Jin, L., Ge, J., Jiang, T., Heebink, L.V., Kurz, M.C., Dalkhaa, C., Peck, W.D., and Burnison, S.A., 2018, Best

practices for modeling and simulation of CO₂ storage: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 9 Deliverable D69 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-03-13, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Crossland, J.L., Crocker, C.R., Daly, D.J., and Gorecki, C.D., 2018, Public site updates: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 2 Deliverable D13 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-01-04, Grand Forks, North Dakota, Energy & Environmental Research Center, January.

Glazewski, K.A., Aulich, T.R., Wildgust, N., Nakles, D.V., Azzolina, N.A., Hamling, J.A., Burnison, S.A., Livers-Douglas, A.J., Peck, W.D., Klapperich, R.J., Sorensen, J.A., Ayash, S.C., Gorecki, C.D., Steadman, E.N., Harju, J.A., Stepan, D.J., Kalenze, N.S., Musich, M.A., Leroux, K.M., and Pekot, L.J., 2018, Best practices manual – monitoring for CO₂ storage: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 9 Deliverable D51 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-03-15, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Klapperich, R.J., Nakles, D.V., Steadman, E.N., and Gorecki, C.D., 2018, Nexus of water and CCS—findings of the Water Working Group (WWG) of the regional carbon sequestration partnerships: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 14 Deliverable D107 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Wilson IV, W.I., Doll, T.E., Nakles, D.V., and Gorecki, C.D., 2018, Permitting review – Update 4: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 3 Deliverable D8 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-03-03, Grand Forks, North Dakota, Energy & Environmental Research Center, February.

Wildgust, N., and Gorecki, C.D., 2018, Submission of draft papers on associated storage to special issue of International Journal of Greenhouse Gas Control: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 13 Milestone M66 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Approved

Ensrud, J.R., Ayash, S.C., Wildgust, N., and Gorecki, C.D., 2017, PCOR Partnership annual membership meeting and workshop held: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 13 Milestone 65 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-01-07, Grand Forks, North Dakota, Energy & Environmental Research Center, December.

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

N.W., Votava, T.F., Ayash, S.C., and Ensrud, J.R., 2017, Annual assessment report: Plains CO₂ Reduction (PCOR) Partnership Phase III Task 12 Deliverable D57 (October 1, 2016 – September 30, 2017) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-01-06, Grand Forks, North Dakota, Energy & Environmental Research Center, December.

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 CO₂ Reduction (PCOR) Partnership: Phase III monthly report (December 1–31, 2017) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, January.

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 CO₂ Reduction (PCOR) Partnership: Phase III monthly report (January 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, February.

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 CO₂ Reduction (PCOR) Partnership: Phase III monthly report (February 1–28, 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, March.

Quarterlies

Gorecki, C.D., Harju, J.A., Steadman, E.N., Romuld, L., Sorensen, J.A., Daly, D.J., Hamling, J.A., Jensen, M.D., Peck, W.D., Klapperich, R.J., Heebink, L.V., Pekot, L.J., Ensrud, J.R., and Votava, T.J., 2018, Plains CO₂ Reduction Partnership Phase III: draft Task 13 Deliverable D58/D59 quarterly technical progress report (October 1 – December 31, 2017) 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, January.

Value-Added Products

Draft Submitted and Approved

Crossland, J.L., Daly, D.J., and Gorecki, C.D., 2018, Household energy and carbon Web pages report: Plains CO₂ Reduction (PCOR) Partnership Phase III value-added report (October 1 –

December 31, 2017) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2018-EERC-01-10, Grand Forks, North Dakota, Energy & Environmental Research Center, January.

Journal Articles

Draft Submitted

- 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 (PNLs) in monitoring injected carbon dioxide (CO₂): International Journal of Greenhouse Gas Control [in review].
- Jensen, M.D., Azzolina, N.A., Schlasner, S.M., Hamling, J.A., Ayash, S.C., and Gorecki, C.D., 2018, Life cycle analysis—a case study of associated storage with enhanced oil recovery: International Journal of Greenhouse Gas Control [in review].
- 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 CO₂ enhanced oil recovery and associated storage performance: International Journal of Greenhouse Gas Control [in review].
- 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 CO₂ storage performance: International Journal of Greenhouse Gas Control [in review].
- 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 CO₂ injection project: International Journal of Greenhouse Gas Control [in review].
- Salako, O., Burnison, S.A., Bosshart, N.W., Jin, L., Kalenze, N.S., Hamling, J.A., and Gorecki, C.D., 2018, 4-D seismic amplitude interpretation improves understanding of reservoir heterogeneity at a mature oil field undergoing CO₂ enhanced oil recovery and associated storage: International Journal of Greenhouse Gas Control [in review].
- Salako, O., Burnison, S.A., 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 CO₂ enhanced oil recovery and associated storage: International Journal of Greenhouse Gas Control [in review].
- 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 CO₂ hysteresis effects during multiple floods of a conventional clastic oil reservoir: International Journal of Greenhouse Gas Control [in review].
- Wildgust, N., Nakles, D.V., and Klapperich, R.J., 2018, PCOR Partnership assessment of CO₂ geologic storage associated with enhanced oil recovery: International Journal of Greenhouse Gas Control [in review].

Meeting Minutes

Klapperich, R.J., 2018, Minutes—Regional Carbon Sequestration Partnerships Water Working Group conference call: February 6, 2018.

MEETINGS/TRAVEL

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

- January 8–12, 2018: Off-site staff traveled to Grand Forks, North Dakota, for project activities and a meeting.
- February 5, 2018: traveled to Fargo, North Dakota, to work on postproduction for the PCOR Partnership coal documentary with PPB.
- February 12–16, 2018: off-site staff member traveled to the EERC to attend meetings and work on specific projects.
- February 14, 2018: traveled to Fargo, North Dakota, to work on the final version of the PCOR Partnership coal documentary with PPB.
- February 22–23, 2018: traveled to Plano, Texas, for a meeting with Denbury.
- March 7–8, 2018: traveled to Atlanta, Georgia, to present at the Annual SECARB Meeting.
- March 14–16, 2018: traveled to Vancouver, British Columbia, to attend the GLOBE Forum: Leadership Summit for Sustainable Business.
- March 18–22, 2018: traveled to Nashville, Tennessee, to attend the 2018 CCUS Conference.
- March 22–23, 2018: traveled to Washington, D.C., for a site visit to determine possible venues for the 2018 PCOR Partnership Annual Membership Meeting.

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