

October 30, 2015

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission
600 East Boulevard Avenue, Department 405
State Capitol, 14th Floor
Bismarck, ND 58505-0840


Dear Ms. Fine:

Subject: Plains CO₂ Reduction Partnership (PCOR) Phase III Quarterly Technical Progress
Report for the Period July 1 – September 30, 2015
Contract Nos. FY08-LXIII-162 and G-015-030; EERC Funds 16196 and 15631

Enclosed is a hard copy of the Energy & Environmental Research Center (EERC) Quarterly Technical Progress Report for the PCOR Partnership Program for Phase III. Also enclosed is a CD-ROM containing the quarterly technical progress report. A PDF version will also be sent via e-mail.

If you have any questions, please contact me by phone at (701) 777-5355 or by e-mail at cgorecki@undeerc.org.

Sincerely,


for Charles D. Gorecki
Director of Subsurface R&D

CDG/kal

Enclosures

c/enc: Michael Jones, Lignite Energy Council
Brent Brannan, North Dakota Industrial Commission (NDIC) Department of Mineral
Resources, Oil and Gas Division
Lynn Helms, NDIC Department of Mineral Resources, Oil and Gas Division
Andrea Holl Pfennig, North Dakota Department of Commerce

c: Corey Irion, EERC



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

PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report

(for the period July 1 – September 30, 2015)

Prepared for:

Karlene Fine

North Dakota Industrial Commission
600 East Boulevard Avenue, Department 405
State Capitol, 14th Floor
Bismarck, ND 58505-0840

Contract Nos. FY08-LXIII-162 and G-015-030
EERC Funds 16196 and 15631

Prepared by:

Charles D. Gorecki
John A. Harju
Edward N. Steadman
Lucia Romuld
James A. Sorensen
Daniel J. Daly
John A. Hamling
Melanie D. Jensen
Wesley D. Peck
Ryan J. Klapperich
Loreal V. Heebink
Tami J. Votava
Lawrence J. Pekot

Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

October 2015

EERC DISCLAIMER

LEGAL NOTICE This research report was prepared by the Energy & Environmental Research Center (EERC), an agency of the University of North Dakota, as an account of work sponsored by the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) and the North Dakota Industrial Commission. Because of the research nature of the work performed, neither the EERC nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement or recommendation by the EERC.

ACKNOWLEDGMENT

This material is based upon work supported by DOE NETL under Award Number DE-FC26-05NT42592.

DOE DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor any of their employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

NORTH DAKOTA INDUSTRIAL COMMISSION DISCLAIMER

This report was prepared by the EERC pursuant to an agreement partially funded by the Industrial Commission of North Dakota, and neither the EERC nor any of its subcontractors nor the North Dakota Industrial Commission nor any person acting on behalf of either:

- (A) Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or
- (B) Assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the North Dakota Industrial Commission. The views and opinions of authors expressed herein do not necessarily state or reflect those of the North Dakota Industrial Commission.

TABLE OF CONTENTS

LIST OF FIGURES	iii
LIST OF TABLES	iii
EXECUTIVE SUMMARY	iv
INTRODUCTION	1
PROGRESS OF WORK.....	5
Task 1 – Regional Characterization	5
Task 2 – Public Outreach and Education	7
Task 3 – Permitting and NEPA Compliance.....	14
Task 4 – Site Characterization and Modeling	15
Task 5 – Well Drilling and Completion	17
Task 6 – Infrastructure Development.....	17
Task 7 – CO ₂ Procurement.....	17
Task 8 – Transportation and Injection Operations	17
Task 9 – Operational Monitoring and Modeling.....	18
Task 10 – Site Closure	24
Task 11 – Postinjection Monitoring and Modeling.....	24
Task 12 – Project Assessment.....	24
Task 13 – Project Management.....	24
Task 14 – RCSP WWG Coordination.....	26
Task 15 – Further Characterization of the Zama Acid Gas EOR, CO ₂ Storage, and Monitoring Project	27
Task 16 – Characterization of the Basal Cambrian System	27
PHASE III COST STATUS.....	28
PHASE III SCHEDULE STATUS.....	28
PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES.....	48
Abstracts.....	48
Submitted.....	48
Submitted and Accepted for Presentation.....	48
Submitted and Accepted for Poster But Not Presented.....	48
Accepted for Poster.....	48
Accepted for Presentation and Declined by Author	49
Presentations.....	49
Poster Presentations.....	50

Continued . . .

TABLE OF CONTENTS (continued)

Deliverables/Milestones	51
Draft.....	51
Draft Submitted and Approved.....	52
Approved	52
Progress Reports.....	52
Monthlies	52
Quarterlies.....	53
Meeting Minutes	53
MEETINGS/TRAVEL	53

LIST OF FIGURES

1	DOE Carbon Storage Program technology areas featuring regional partnerships.....	3
2	Location of large-scale sites in PCOR Partnership Phase III	4
3	Map of PCOR Partnership Web site global traffic for this reporting period	11
4	Map of PCOR Partnership Web site regional visits for this reporting period	12
5	PCOR Partnership public Web site traffic sources for this reporting period.....	13
6	Map of existing 3-D seismic baseline	22
7	PCOR Partnership Phase III, BP4, Years 3–9 funding	28

LIST OF TABLES

1	PCOR Partnership Membership Phase III.....	2
2	Phase III Responsibility Matrix.....	5
3	Sessions/Visit Activity from the Top Ten Countries and the PCOR Partnership Region ..	10
4	Top “Page Views” on the PCOR Partnership Public Web Site	13
5	Top EERC PCOR Partnership-Related YouTube Channel Videos Accessed	13
6	PCOR Partnership Documentaries on PPB YouTube Channel Accessed	14
7	Bell Creek CO ₂ Injection Totals for April 2015	19
8	Cumulative Total Gas Purchased and Estimated Associated CO ₂ Storage Volumes for the Bell Creek Field.....	20
9	Phase III Budget – BP4	28
10	Phase III, BP4, Years 3–10 Spending Plan	29
11	Phase III Milestones and Deliverables	31
12	Phase III, BP4, Years 7–9 Gantt Chart.....	44

PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III
Quarterly Technical Progress Report
July 1 – September 30, 2015

EXECUTIVE SUMMARY

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

Phase III, the development phase, a 10-year effort (2007–2017), is an extension of the characterization (Phase I) and validation (Phase II) phases. The Phase III efforts of the PCOR Partnership include two large-volume demonstration tests—one in Canada and one in the United States—that focus on injecting carbon dioxide (CO₂) into deep geologic formations for CO₂ storage. Budget Period (BP) 4 (Years 3–8 of Phase III) began October 1, 2009.

This progress report presents an update of Phase III PCOR Partnership activities from July 1, 2015, through September 30, 2015.

The 6-month, \$4.5M extension to BP4 was awarded. Extended and enhanced work will be completed in the next 6 months, specifically in the Bell Creek activities. As of July 31, 2015, the most recent month of record, 2.383 million tonnes of total gas (composition of approximately 96% CO₂) has been purchased by Denbury Resources Inc. for injection into the Bell Creek Field since May 2013, equating to an estimated 2.301 million tonnes of CO₂ stored (a new method of reporting has been employed).

The 2015 PCOR Partnership Annual Membership Meeting and Workshop were held September 15–17, 2015, at the Embassy Suites in downtown Chicago, Illinois. The meeting attracted 71 attendees representing 40 organizations. A project update meeting with Denbury was held September 24–25, 2015, in Plano, Texas. The PCOR Partnership attended and presented at several other meetings and conferences to continue knowledge sharing and learning.

PCOR Partnership laboratory efforts were focused on the Williston Basin, and modeling and simulation activities were performed in support of the Aquistore and Bell Creek projects. Two Bell Creek surface and near-surface sampling events (quarterly and annual) were conducted.

Ten tasks continued. In addition to the foregoing, two milestones for Bell Creek test site activities were completed; the draft Bell Creek transportation and injection operations report was submitted (essentially completing Task 8); and updates to three deliverables were submitted.



PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III
Quarterly Technical Progress Report
July 1 – September 30, 2015

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 June 30, 2015, is listed in Table 1. The PCOR Partnership region includes all or part of nine states (Iowa, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, Wisconsin, and Wyoming) and four Canadian provinces (Alberta, British Columbia, Manitoba, and Saskatchewan).

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

The PCOR Partnership Program is being implemented in three phases:

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

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

- BP3: October 1, 2007 – September 30, 2009
- BP4: October 1, 2009 – March 31, 2016
- BP5: April 1, 2016 – September 30, 2017

BP1 and BP2 were effective in Phase II.

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

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

The overall mission of the Phase III program is to 1) gather characterization data to verify the ability of the target formations to store carbon dioxide (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 establishment of a technical framework by which carbon credits can be monetized for CO₂ stored in geologic formations, 6) continue collaboration with other RCSPs, and 7) provide outreach and education for CO₂ capture and storage stakeholders and the general public.

In Phase III, the PCOR Partnership is building on the information generated in its characterization (Phase I) and validation (Phase II) phases. The PCOR Partnership plans to fully utilize the infrastructure of its region to maximize CO₂ injection volumes. A programmatic

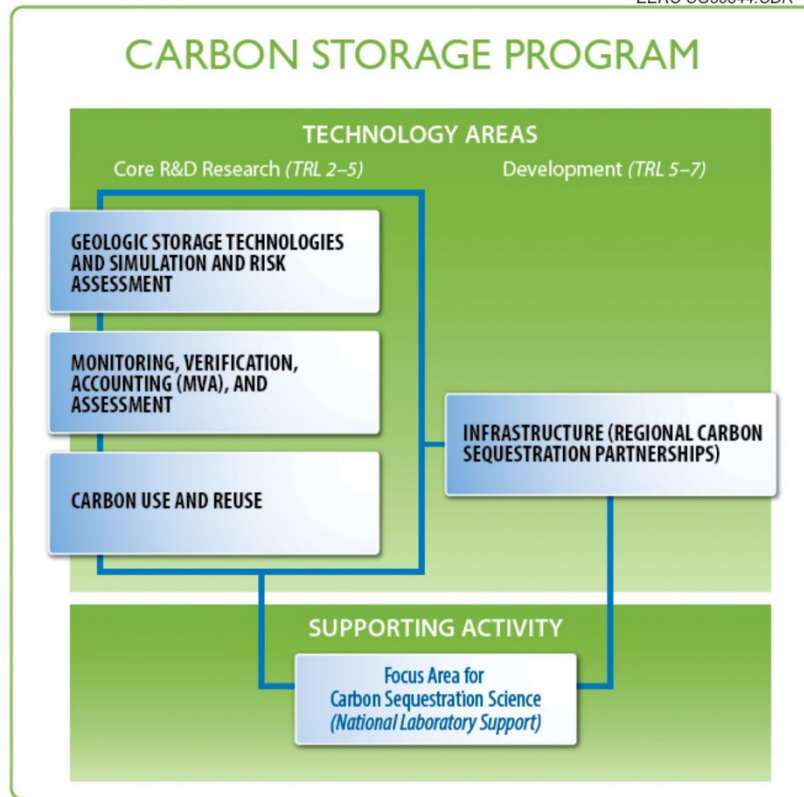


Figure 1. DOE Carbon Storage Program technology areas featuring regional partnerships (courtesy of Andrea Dunn, DOE NETL; “TRL” stands for technology readiness level).

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

The PCOR Partnership is working with Denbury Resources Inc. (Denbury) in the Denbury-operated Bell Creek oil field in Powder River County in southeastern Montana. The PCOR Partnership has also conducted a feasibility study for Spectra Energy Transmission’s (Spectra’s) Fort Nelson gas-processing facility, situated near Fort Nelson, British Columbia, Canada. In addition, the PCOR Partnership is collaborating with the Petroleum Technology Research Centre (PTRC) on site characterization, risk assessment, and monitoring, verification, and accounting (MVA) activities associated with the Aquistore Project near Estevan, Saskatchewan, Canada. The PCOR Partnership’s work has concluded with Apache Canada Ltd. to further characterize the Zama Acid Gas Enhanced Oil Recovery (EOR), CO₂ Storage, and Monitoring Project in Alberta, Canada, as well as its work on a multiyear, binational characterization effort of the basal Cambrian system (Figure 2).



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

The PCOR Partnership's objectives are as follows: 1) investigate the efficacy of various MVA strategies as a means of developing a CO₂ storage project in conjunction with a commercial EOR operation in order 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) verify the economic feasibility of using the region's carbonate saline formations for safe, long-term CO₂ storage. During Phase III, the PCOR Partnership will continue to refine storage resource estimates and evaluate other factors relevant to regional storage goals.

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

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

Table 2. Phase III Responsibility Matrix

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

* To be announced.

PROGRESS OF WORK

Task 1 – Regional Characterization

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

- Downloaded a fresh data set of U.S. CO₂ sources from the U.S. Environmental Protection Agency (EPA) Web site. Data were integrated into Deliverable (D) 1, Review of Source Attributes (update), submitted on September 23, 2015.
- Continued efforts to update D81, Regional Carbon Sequestration Atlas (update), due August 31, 2016.
- Attended the Society of Core Analysts Symposium and associated field trip “Stratigraphy of the Neoproterozoic–Cambrian” near St. John’s, Newfoundland, Canada, August 16–22, 2015.
- Attended the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015.
- Continued gathering data for value-added formation evaluations within the PCOR Partnership region. Worked on compiling regional characterization data for the Mission Canyon Formation.
- Continued activities to update the content and function of the partners-only **Decision Support System (DSS)**, including the following:
 - Updated the PCOR Partnership Annual Membership Meeting information.

- Made changes and updated CO₂ sources.
- Continued activities to update the content of the **PCOR Partnership general database**, including the following:
 - Updated North Dakota and Montana Petra projects with the latest general well information from each state’s online resource as follows: added 550 new North Dakota wells and 18 new Montana wells.
 - Extracted the 2013 Saskatchewan oil pool into a database-friendly format. Updated the Saskatchewan oil fields shapefile with the updated oil pools information collected. Will be using the information collected to run analyses on ranking the oil fields/pools.
 - Updated North Dakota and Manitoba monthly production information.
 - Updated North Dakota well injection data.
 - Updated South Dakota, British Columbia, Saskatchewan, and Manitoba wells.
 - Worked on importing retrieved Wyoming LAS (log ASCII standard) logs into the Petra project.
- Continued work on several additional **value-added reports**, including the following:
 - Continued internal review of the draft Inyan Kara Formation report.
 - Continued work on the report summarizing methods of original oil in place and CO₂ storage calculations.
- With regard to the **Aquistore** project static modeling and dynamic predictive simulations effort:
 - Attended and presented a poster entitled “MVA Deployment Using Near-Real-Time History Matching at the Aquistore Site” at the DOE Carbon Storage R&D Project Review Meeting in Pittsburgh, Pennsylvania, August 18–20, 2015.
 - Held a side meeting in conjunction with the PCOR Partnership Annual Membership Meeting to discuss Aquistore injectivity with PTRC representatives.
 - With regard to **modeling and simulation** activities:
 - ◆ Continued to update the database with daily injection data from PTRC.
 - ◆ Worked on optimizing the simulation runs using CMOST history-matching software (part of Computer Modelling Group’s [CMG’s] GEM software package). The simulations were optimized to run twice as fast as the previous runs using new numerical parameters.
 - ◆ Updated the simulation model with thinner layers for selected zones to more accurately predict CO₂ arrival at observation wells and match pressure response.
 - ◆ Worked on comparing properties in the static model with the history-matched simulation model properties. The purpose is to compare the two models to ensure changes made to achieve a history match make sense with the known geologic data.
 - ◆ A summer graduate student intern has been helping with Aquistore modeling activities. He reviewed previously developed static and dynamic models, including comparing the current dynamic history-matched simulation model with the static model to compare properties. This information will be used to reinvestigate the model data for accuracy, and the static model will be updated as necessary.
 - ◆ Updated model properties to more closely match the pressure response in simulation results.
 - ◆ Filtered noise from the field data for use in the simulations.
 - ◆ Continued updating the simulation model. Used CMG software to run simulations.

- ◆ Gained access to the baseline 3-D seismic data to be incorporated into modeling efforts, and began preliminary geologic interpretation for the Winnipeg Group and Deadwood Formation.
- Began investigating potential options (e.g., stimulation) to increase injectivity.
- With regard to the **Williston Basin** CO₂ Storage Sink Relative Permeability laboratory characterization effort:
 - Modified the scope of work to include brine permeability and to include PCOR Partnership partner Stefan Bachu, Alberta Innovates – Technology Futures (AITF), as a coauthor on a peer-reviewed paper. Reviewed relative permeability and interfacial tension work conducted by Stefan Bachu and Brant Bennion in preparation for this work and to ensure the scope was adequate for creating a similar product. Provided to EERC PCOR Partnership managers for review.
 - Selected core intervals at the North Dakota Geological Survey Core Library from several wells for laboratory characterization. Drilled plugs from several intervals.
 - Worked on laboratory characterization efforts:
 - ◆ Completed x-ray fluorescence (XRF) analyses.
 - ◆ Received thin sections, and initiated petrographic analyses.
 - ◆ Completed Dean–Stark cleaning of hydrocarbons and salts from core plugs, and dried to a constant mass in a humidified oven.
 - ◆ Completed bulk volume determination of the core plugs using a 3-D scanner.
 - ◆ Initiated porosity measurements.
 - ◆ Worked on mercury injection capillary pressure (MICP) and x-ray diffraction (XRD) testing.

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

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

Task 2 – Public Outreach and Education

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

- Finalized and submitted an abstract and prepared a poster entitled “PCOR Partnership Outreach – A Multifaceted Program,” which was presented at the DOE Carbon Storage R&D Project Review Meeting in Pittsburgh, Pennsylvania, August 18–20, 2015.
- Attended the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015. Discussed potential interviews and location filming for Documentary D22.
- During the quarter, the PCOR Partnership was represented by EERC personnel at 19 conferences/meetings and four workshop/seminars. Specifically, the PCOR Partnership outreach activities included 18 oral presentations and two booths. The following quantities of PCOR Partnership outreach materials were distributed:
 - PCOR Partnership documentary entitled “Nature in the Balance: CO₂ Sequestration” – 8

- PCOR Partnership documentary entitled “Reducing Our Carbon Footprint: The Role of Carbon Markets” – 10
- PCOR Partnership documentary entitled “Out of the Air – Into the Soil” – 9
- PCOR Partnership documentary entitled “Managing Carbon Dioxide: The Geologic Solution” – 14
- PCOR Partnership documentary entitled “Global Energy and Carbon: Tracking Our Footprint” – 12
- “Plains CO₂ Reduction Partnership Atlas, 4th Edition, Revised” – 18
- Reviewed the content of the poster “PCOR Partnership Outreach – A Decade of Achievement” (created for the Carbon Storage R&D Project Review Meeting held in Pittsburgh, Pennsylvania, August 20–22, 2013). Made a list of elements that should be updated or modified for future meeting posters.
- Reviewed D11 (Outreach Action Plan) in anticipation of the next update.
- Continued discussions with PTRC regarding collaboration on a paper and presentation at the Greenhouse Gas Control Technologies (GHGT)-13 Conference to be held November 14–18, 2016.
- Prepared for and held two quarterly update sessions with PCOR Partnership senior managers. Prepared a list of action items resulting from the first session, and prepared draft slides for an internal follow-up session. The second session featured detailed discussions on next steps for Documentaries D21 (Bell Creek story) and D22 (“Coal and the Modern Age”).
- Continued to revise draft Phase II project fact sheets, including holding meetings with project personnel to discuss content, with a focus on addressing comments from senior management regarding Northwest McGregor and the results section of the Lignite fact sheet. EERC PCOR Partnership managers continued final review of the updated Phase II Northwest McGregor and Lignite fact sheets.
- Participated in a number of **conference calls** this quarter, including the following:
 - With regard to the Aquistore Outreach and Advisory Working Group monthly conference call:
 - ◆ On July 27, 2015, the Task 2 team took part in a monthly outreach update call with Aquistore personnel.
 - With regard to the monthly RCSP Outreach Working Group (OWG) conference calls:
 - ◆ No calls were held in July and August.
 - ◆ On September 17, 2015, the discussions were focused on the progress of the preparation and review of the NETL Outreach best practices manual (BPM).
- Continued efforts to update the **public Web site** (www.undeerc.org/pcor), including the following:
 - Completed review of the draft final PCOR Partnership Web site upgrade, dealt with reviewer comments, and finalized several sections of the Web site updates.
 - Continued preparation of key pages for topical reports and technical posters.
 - Compiled background and contact information on educators and other groups in the region to aid PCOR Partnership Web development and tracking.
 - Began working on potential content for the next round of updates for the public PCOR Partnership Web site.
 - Continued ongoing identification and repair of broken links.

- Continued collaborative efforts with **Prairie Public Broadcasting (PPB)**, including the following:
 - Submitted edits for the Meeting the Challenge education presentation video Parts 3 and 4.
 - With regard to D22, the Coal in the Modern Age 60-minute documentary (due January 2016):
 - ◆ Traveled to White Salmon, Washington, June 29 – July 1, 2015, for an interview.
 - ◆ Continued efforts to schedule interviews and location shoots.
 - ◆ Traveled to Fargo, North Dakota, July 27, 2015, to work with PPB on the upcoming documentary.
 - ◆ Interviewed Science Director Maggie Koerth-Baker in Minneapolis, Minnesota, on September 15, 2015.
 - ◆ Obtained permission for an interview and location filming at the Dakota Gasification Company facility in North Dakota and the adjacent Freedom Mine for use in the D22 documentary.
 - ◆ Completed review of all interview footage and transcription obtained prior to August 1, 2015, as the first step in D22 postproduction.
 - ◆ Completed an initial draft of the script using materials from the master file of interview transcripts obtained through August 1, 2015.
- During this reporting period, information regarding the **site sessions/visits** to the PCOR Partnership public Web site included the following:
 - There were 5697 sessions/visits to the public Web site (www.undeerc.org/pcor). Traffic decreased 19% from last quarter (7043 sessions/visits). While mobile traffic was also down, a larger percentage of overall sessions/visits (27%, up from 25%) came from mobile device or tablet than in the past quarter. The U.S. sessions showed the largest decrease at 29%; international sessions dropped the least at 9%; and the PCOR Partnership region sessions (including portions of both United States and Canada) dropped 16%.
 - There were 4932 unique visitors to the public Web site, representing a 19% decrease from last quarter (6110 visitors). In particular, 86% of these visitors were new to the Web site (visitors whose visit was marked as a first-time visit in this quarter).
 - Of the 5697 sessions/visits, 40% of the Web traffic was domestic, and 60% was international. Table 3 lists the top ten countries for visits to the PCOR Partnership Web site. These included the United States, India, Australia, United Kingdom Canada, Philippines, New Zealand, Malaysia, South Africa, and Kenya. There was traffic from 118 countries overall (Figure 3).
 - There were 364 sessions/visits originating from within the PCOR Partnership region (Figure 4). Approximately 71% of the regional visits originated from the United States, and 29% came from Canada. Visits from within the PCOR Partnership region comprised 6% 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	2262		
			North Dakota	77
			Minnesota	54
			Missouri	37
			Iowa	25
			Wisconsin	21
			Montana	16
			Nebraska	14
			Wyoming	12
			South Dakota	4
2	India	1045		
3	Australia	423		
4	United Kingdom	295		
5	Canada	193		
			Alberta	54
			British Columbia	34
			Saskatchewan	14
			Manitoba	2
6	Philippines	154		
7	New Zealand	85		
8	Malaysia	76		
9	South Africa	75		
10	Kenya	64		
	Other 108 countries	1025		
	Total Sessions/Visits	5697	Total PCOR Partnership Visits	364

*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 more than 83% 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 “what is CO₂,” “carbon sequestration,” and “what is carbon sequestration.”

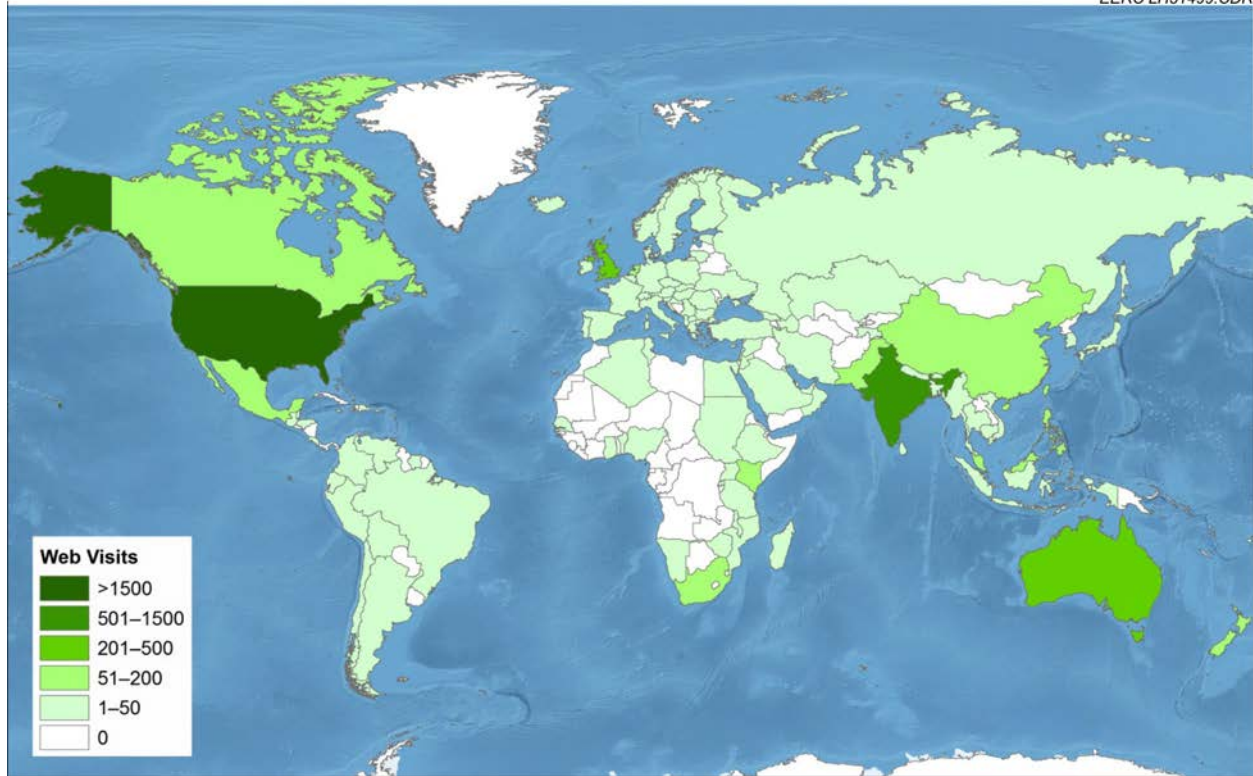


Figure 3. Map of PCOR Partnership Web site global traffic for this reporting period.

- Direct traffic consists of those visitors who bookmark or type in the URL (www.undeerc.org/pcor). It is likely that most of the direct traffic (12%) is from persons familiar with the PCOR Partnership.
- Referral site traffic (about 3%) corresponds to the traffic directed to the PCOR Partnership Web page from other sites via links. The top three referring Web sites were energy.gov, globalccsinstitute.com, and energy.usgs.gov.
- Less than 1% of site traffic resulted from teacher campaigns and social interactions, such as e-mail or social media sources (e.g., Facebook and YouTube).
- During this reporting period, the **nature of the sessions** to the PCOR Partnership public Web site included 8269 page views (a 17% decrease from last quarter); the top five pages viewed are listed in Table 4. These five pages comprise 73% of total page views.
- All five documentaries and 50 video clips taken from the documentaries have been uploaded to the EERC's YouTube channel. The top five accessed YouTube videos are listed in Table 5. Because of the volume of material, the videos were organized into seven playlists. Each video description includes one or more links to the PCOR Partnership public Web site. Two PCOR Partnership full-length documentaries are also on the PPB YouTube Channel. These are listed in Table 6. These videos can also be streamed on the PCOR Partnership public Web site.

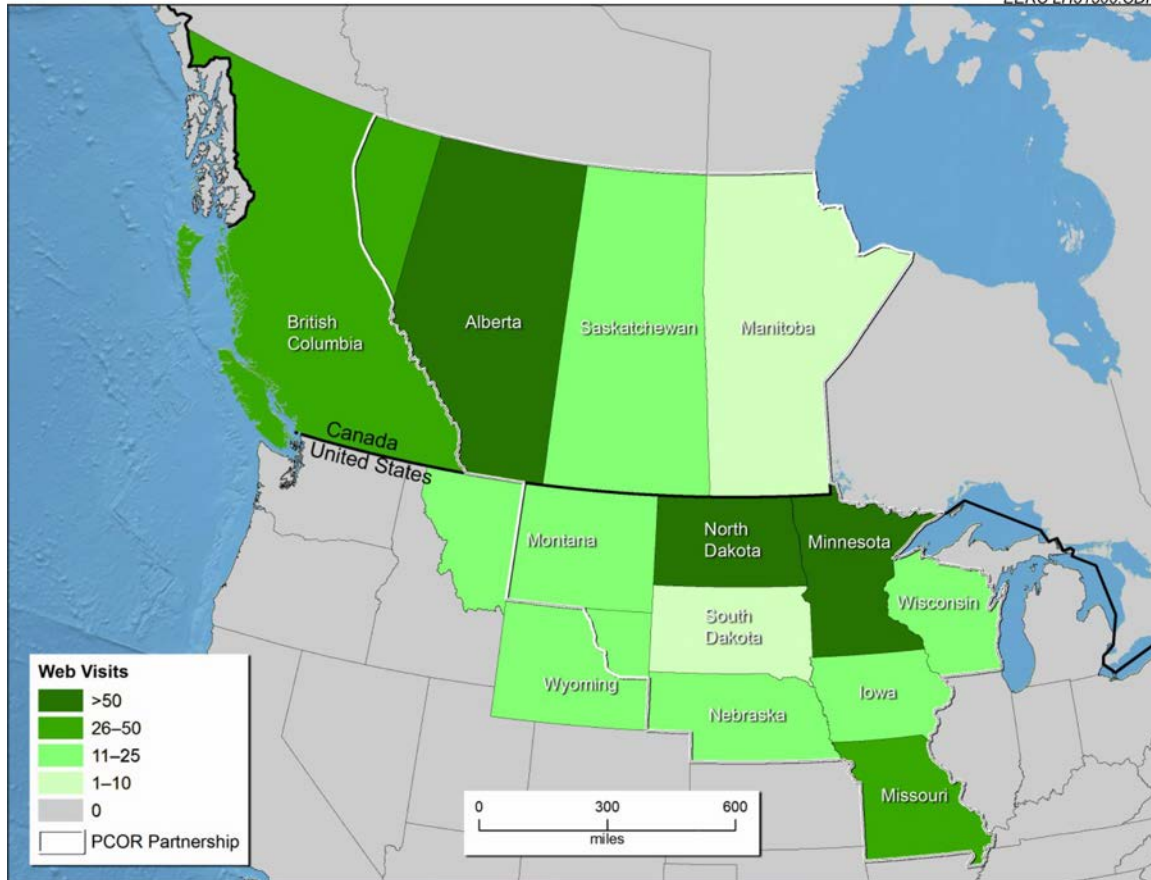


Figure 4. Map of PCOR Partnership Web site regional visits for this reporting period.

- During this reporting period, the PCOR Partnership received **public television exposure** from documentaries broadcast in North Dakota, northwestern Minnesota, and Manitoba. A total of three broadcasts aired of “Managing Carbon Dioxide: The Geologic Solution.”
- During this reporting period, there was no **media content** published regarding the PCOR Partnership.

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

- The interview for Documentary D22 in Minneapolis, Minnesota, during the week of July 27, 2015, was postponed at the request of the interviewee and rescheduled for September 15, 2015.

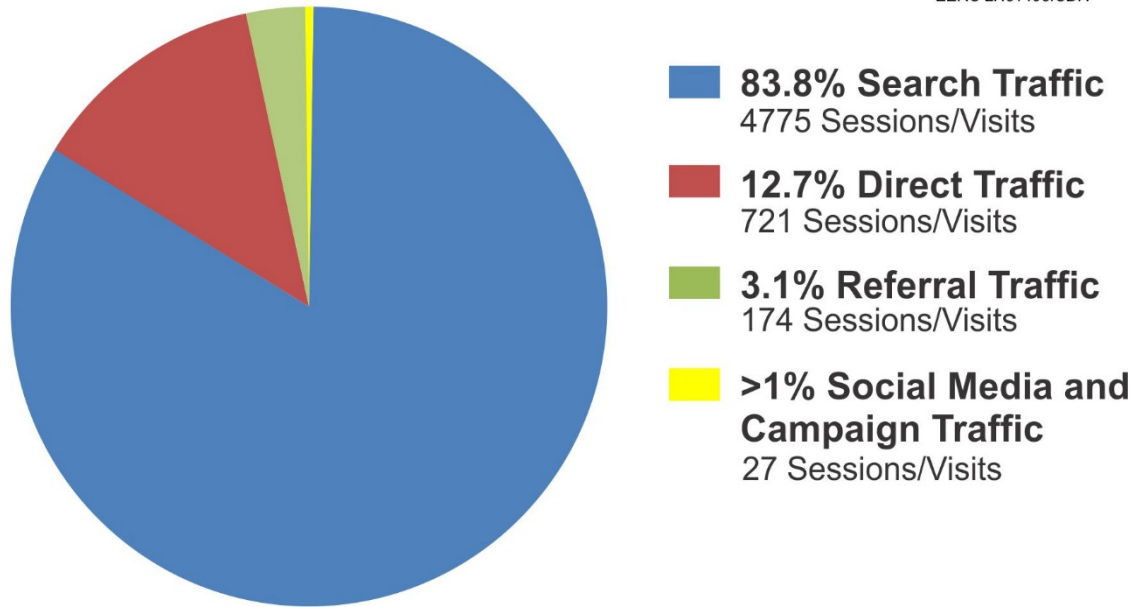


Figure 5. PCOR Partnership public Web site traffic sources for this reporting period.

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

Page Title	Page Views	% Page Views	Page
What Is CO ₂ Sequestration?	3345	40.5	www.undeerc.org/pcor/sequestration/whatissequestration.aspx
What Is CO ₂ ?	1808	21.9	www.undeerc.org/pcor/sequestration/whatisco2.aspx
Home Page	362	4.4	www.undeerc.org/pcor/default.aspx
CO ₂ Sequestration Projects	269	3.3	www.undeerc.org/pcor/co2sequestrationprojects/default.aspx
Video Clip Library	240	2.9	www.undeerc.org/pcor/video-clip-library/default.aspx

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

Video	Video Length	Views	Est. Minutes Watched	Avg. View Duration
Reducing Our Carbon Footprint documentary	26:49	757	3650	4:49
Reforestation in Brazil	4:41	539	1134	2:06
The Phases of Oil Recovery – So Far	2:40	235	414	1:45
Household Energy Around the World	5:34	111	497	4:28
Reservoir Geology 101: Fluid in the Rocks	1:50	69	98	1:25

Table 6. PCOR Partnership Documentaries on PPB YouTube Channel Accessed

Video	Video Length	Views	Est. Minutes Watched	Avg. View Duration
Global Energy and Carbon: Tracking Our Footprint	32:36	1693	15,728	7:99
Managing Carbon Dioxide: The Geologic Solution	31:40	302	3630	13:10

Task 3 – Permitting and NEPA Compliance

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

- With regard to the 2015 Regulatory Roundup meeting:
 - Staff traveled to Deadwood, South Dakota, July 22–23, 2015, to host and present at the 2015 PCOR Partnership Regulatory Roundup.
- Attended the University of Wyoming’s Enhanced Oil Recovery Institute’s 9th Annual CO₂ EOR Conference and workshops in Casper, Wyoming, July 14–16, 2015.
- Created a poster on CCS permitting in the PCOR Partnership Program region for the DOE Carbon Storage R&D Project Review meeting in August.
- Attended the Interstate Oil and Gas Compact Commission (IOGCC) Annual Meeting in Oklahoma City, Oklahoma, September 28–30, 2015.
- Attended the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015.
- Discussed regulatory issues with representatives from Alberta Energy, Saskatchewan Ministry of the Economy, and Tundra Oil and Gas Partnership at the PCOR Partnership Annual Membership Meeting.
- Continued planning for D8, Permitting Review – Update 2, due September 30, 2015, including checking the status of the North Dakota primacy application and changes to the Canadian and U.S. EPA regulations and information contained in the U.S. EPA’s Final Carbon Pollution Standards for New, Modified and Reconstructed Power Plants released August 3, 2015.
- Submitted D8, Permitting Review – Update 2, on September 30, 2015.
- With regard to U.S. EPA UIC (underground injection control) Class II Transition to Class VI:
 - Discussed recommendations on Class II to Class VI UIC transition with the IOGCC Environment and Safety Chairman through e-mail correspondence.
 - Provided comments to the North Dakota Industrial Commission (NDIC) on the IOGCC resolution and action plan “Clarifying Issues Related to Transitioning a Class II Carbon Dioxide Enhanced Oil or Gas Recovery Project to a Class VI Geologic Storage Project” for its submittal at the IOGCC Annual Meeting September 28–30, 2015, in Oklahoma City, Oklahoma.
- Continued gathering information for the value-added report on rules, regulations, and statutes for various scenarios of CCS geologic storage and for CO₂ EOR for each of the PCOR Partnership states and provinces. Searched partnership states and provinces for contact information for oil and natural gas and carbon capture, use, and storage regulators.

- Continued work on preparing descriptor language and flowcharts of North Dakota injection well-permitting requirements.

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

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

Task 4 – Site Characterization and Modeling

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

- Attended and presented a poster entitled “Multiscale Reservoir Modeling for CO₂ Storage and Enhanced Oil Recovery Using Multiple-Point Statistics” at the 2015 European Association of Geoscientists and Engineers (EAGE) Petroleum Geostatistics Conference in Biarritz, France, September 7–11, 2015.
- Attended the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015.
- Held a 4-day JewelSuite software training session July 28–31. Baker Hughes led this training at the EERC facilities. Several EERC staff attended. The software package will be used in future geomodeling and simulation activities. One advantage of this software package is the use of VARI grids, which offer better flexibility for CMG in near-wellbore region phenomena simulation.
- Attended a COMSOL software workshop in Grand Forks, North Dakota, to determine potential application of this software to the Bell Creek geomechanical simulations.
- Traveled to Denver, Colorado, to view cores at the U.S. Geological Survey Core Research Center August 9–12, 2015. Information gained from viewing the core will support the new understanding of the Bell Creek depositional model.
- Continued work on the PCOR Partnership site characterization BPM (D35).
- **Bell Creek** test site activities included the following:
 - Updated databases with well information to ensure the most accurate data are available for use on the PCOR Partnership DSS and in future products.
 - Updated project shapefiles and database files and added metadata.
 - With regard to **geomechanical** efforts, the following activities occurred:
 - ◆ Worked on the inversion of the reprocessing of the 3-D surface seismic data, including building the initial model for prestack inversion, extracting statistical wavelets from the data, and correlating wells with the seismic data. Held an internal meeting to discuss results and a path forward on using 3-D seismic data inversion to compute geomechanical properties to support the modeling efforts.
 - ◆ Continued updating the 3-D rock mechanical properties using additional information from well logs, pulsed-neutron logs (PNLs), lab data, and 3-D seismic data.
 - ◆ Reviewed the values for Young’s modulus and Poisson’s ratio derived from the 3-D seismic amplitude versus offset (AVO) inversion, and compared them with previous values.

- ◆ Worked on testing the time shift between previous and newly processed seismic data to assess any differences.
- ◆ Finished picking horizons using the 3-D baseline seismic data.
- ◆ Reviewed the process for creating a 1-D mechanical earth model (MEM) using JewelSuite Geomechanics software. This recently acquired software may serve as an alternate means of developing these types of models.
- ◆ Used JewelSuite Geomechanics software to investigate potential improvements to the rock mechanics in the 1-D MEM and perform 1-D geomechanical analyses (including wellbore stability).
- ◆ Worked on the stress regime calculations with the 3-D seismic data.
- ◆ Continued using Hampson–Russell seismic interpretation software to review the workflow for seismic inversion of the Bell Creek seismic data.
- ◆ Used Petrel to improve the geologic properties of the 3-D MEM using data from the 3-D seismic inversion.
- ◆ Continued seismic horizon interpretation in the reprocessed baseline 3-D and repeat 4-D seismic surveys, and linked the Hampson–Russell outputs with the geologic modeling software (Petrel).
- ◆ Worked on comparing PNL data to history match results. Used curve interpolation to quantify the variation between PNLs and history match fluid saturation and porosity.
- Continued work on Bell Creek **characterization**, including the following:
 - ◆ Worked on creating facies logs for wells in the Bell Creek Field. These logs will be important as control points for a multiple-point statistics facies distribution that will be performed in the model.
 - ◆ Worked on creating detailed cross sections in Phases 3–6 to determine both lateral and vertical facies associations. This will serve as a knowledge base for modeling efforts in Phases 3–6.
 - ◆ Conducted literature review regarding geostatistical applications in geological modeling, including multiple-point statistics for facies modeling processes.
 - ◆ Continued analyzing the formation tops in the Version 2 geologic model. Tops are being adjusted as needed to create a more realistic structure which, in turn, will lead to better simulation and history-matching results.
 - ◆ Worked on adding core logs into the model to reflect wells with core samples.
 - ◆ Adjusted the well tops for several formations for a number of wells.
 - ◆ Continued working on the construction of regional- and basin-scale Bell Creek Muddy Formation models.
 - ◆ Worked on individual well log and core data comparison in Phase 1 and 2 areas for the Version 3 geologic model update.

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

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

Task 5 – Well Drilling and Completion

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

Task 6 – Infrastructure Development

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

- Attended the International Energy Agency Greenhouse Gas (IEAGHG) Third Post-Combustion Capture Conference (PCCC3) held in Regina, Saskatchewan, Canada, September 8–9, 2015.
- Attended the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015.
- Internal PCOR Partnership management review was completed for a value-added report entitled “Assessing Temporary Storage Options to Manage Variable-Rate CO₂ Emissions for Use During Enhanced Oil Recovery.” Following DOE review, the authors plan to submit the manuscript for possible publication in *Energy & Environmental Science*.
- Answered questions regarding the Dresser-Rand supercompressor and CO₂ capture costs for a PCOR Partnership partner.

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

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

Task 7 – CO₂ Procurement

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

Task 8 – Transportation and Injection Operations

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

- Submitted D49, Bell Creek Test Site Transportation and Injection Operations Report, on September 29, 2015.

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

- This task ended on September 30, 2015.

Task 9 – Operational Monitoring and Modeling

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

- Attended the 2015 U.S. Rock Mechanics Geomechanics Symposium and Workshop in San Francisco, California, held June 27 – July 1, 2015.
- Staff traveled to Houston, Texas, to attend CMG’s CMOST, WINPROP, and reservoir training July 8–15, 2015.
- Attended CMG EOR Modeling Using GEM training course in Calgary, Alberta, Canada, August 1–9, 2015.
- EERC personnel attended the CMG Webinar: Mechanistic Modelling of Low-Salinity Waterflooding in Clastics and Carbonates.
- Prepared posters entitled “Effects of Reservoir Temperature and Percent Levels of Methane and Ethane on CO₂/Oil MMP (minimum miscibility pressure) Values as Determined Using Vanishing Interfacial Tension/Capillary Rise” and “The Adaptive Management Approach to CCS Project Planning: The Fort Nelson CCS Project as a Case Study,” presented at the DOE Carbon Storage R&D Project Review Meeting in Pittsburgh, Pennsylvania, August 18–20, 2015.
- Attended the CO₂ and Monitoring, Verification, and Accounting Workshop in Oslo, Norway, September 4–7, 2015.
- Attended the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015.
- Attended the North Dakota GIS (geographic information system) User Conference in Fargo, North Dakota, September 28–29, 2015.
- Attended Petrel Fundamentals Training in Houston, Texas, September 28–29, 2015.
- Prepared a presentation entitled “The Value of Multiple Rounds of Risk Assessment to CCS Project Planning: The Fort Nelson CCS Project as a Case Study” for the IEAGHG Risk Management & Environmental Research Combined Networks Meeting in Southampton, United Kingdom, September 29 – October 2, 2015. A PCOR Partnership consultant attended on behalf of EERC personnel.
 - The poster was never presented; it was shipped to the hotel and signed for, but was not able to be located by hotel staff upon arrival. However, the oral presentation was presented as planned.
- Submitted Milestone (M) 50 “2 Years of Near-Surface Assurance Monitoring Completed” (due July 31, 2015).
- Submitted M51 “Bell Creek Test Site – Initial Analysis for First Large-Scale Repeat Pulsed-Neutron Logging Campaign Post-Significant CO₂ Injection Completed” (due August 31, 2015).
- Submitted D66, “Bell Creek Test Site – Simulation Report (Update 4)” (due August 31, 2015).
- With regard to DOE BPMs:
 - DOE BPM for MVA:
 - ◆ Reviewed the final draft of the BPM with compiled DOE–RCSP team comments for submission to DOE.

- Participated in the DOE Carbon Storage and Well Management Systems BPM conference calls.
 - ◆ Reviewed the final draft of the BPM with compiled DOE–RCSP team comments, submitted to DOE on July 10.
- Replied to DOE working group coordinators with comments on the DOE Simulation and Risk Assessment BPM outline.
- Continued work on a draft of the PCOR Partnership MVA BPM.
- Continued **Bell Creek** site activities, including the following:
 - Traveled to Plano, Texas, September 24–25, 2015, to meet with Denbury personnel. Presented on the EERC’s Bell Creek activities.
 - Used the most recent publicly available data to determine that cumulative total CO₂ gas injection is 2,539,042 metric tons through April 30, 2015. It should be noted that this value includes the combined purchased and recycled gas streams for total volume injected and is not corrected for gas composition of approximately 96% CO₂ (Table 7).
 - Completed an update of MBOG CO₂ injection data through April 2015 for estimating CO₂ net storage. The data were provided to DOE as an update to the PCOR Partnership weekly update e-mail and added to the April–June quarterly report.
 - New methodology has been implemented to provide DOE with cumulative total gas purchase volumes for injection (not corrected for gas composition) and estimated associated CO₂ storage volumes (corrected for gas composition) in addition to total gas injection volumes. Custody transfer meter data supplied by Denbury provide monthly total gas purchase volumes, which are then corrected using gas compositional data. As of July 31, 2015, the most recent month of record, 2.383 million tonnes of total gas (composition of approximately 96% CO₂) has been purchased for injection into the Bell Creek Field, equating to an estimated 2.301 million tonnes of CO₂ stored (Table 8).
 - Continued miscible-phase sampling and verification experimentation of mobilized hydrocarbons using methane, CO₂, and ethane. Continued data evaluation.

Table 7. Bell Creek CO₂ Injection Totals for April 2015 (cumulative totals May 2013 to April 2015)*

	April 2015 Injection
Total, Mscf	3,280,561
Total, U.S. tons [†]	187,643
Total, metric tons [†]	170,392
Cumulative Total, Mscf [‡]	48,884,167
Cumulative Total, U.S. tons ^{†‡}	2,796,097
Cumulative Total, metric tons ^{†‡}	2,539,042

Source: Montana Board of Oil and Gas (MBOG) database.

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

[†] This was calculated utilizing a conversion of 17.483 Mscf/U.S. ton and 19.253 Mscf/metric ton.

[‡] Cumulative totals are for the period from May 2013 to the month listed.

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

	July 2015 Gas Volume
Monthly Total Gas Purchased, MMscf ²	1928
Monthly Total Gas Purchased, million tons ²	0.110
Monthly Total Gas Purchased, million tonnes ²	0.100
Cumulative Total Gas Purchased, MMscf ^{2,3}	45,876
Cumulative Total Gas Purchased, million tons ^{2,3}	2.624
Cumulative Total Gas Purchased, million tonnes ^{2,3}	2.383
Cumulative Total CO ₂ Stored, MMscf ^{3,4}	44,299
Cumulative Total CO ₂ Stored, million tons ^{3,4}	2.534
Cumulative Total CO ₂ Stored, million tonnes ^{3,4}	2.301

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

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

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

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

- Continued determination of Bell Creek crude oil density to get API (American Petroleum Institute) gravity.
- Started mixing methane–CO₂ ratios to fill in the gaps in the related MMP experiments.
- Communicated with Core Labs regarding invoicing and shipping of 05-06 OW SCAL (special core analysis) samples from Houston to the EERC.
- Discussed the completed SCAL work conducted by Core Labs. Samples arrived from Core Labs for the SCAL work performed on the 33-14R cores. A new scope of work is being developed for the EERC to conduct a series of relative permeability tests using oil and CO₂ on these rocks in the determination of the hysteresis effect with multiple injections.
- With regard to **modeling and simulation** activities:
 - ◆ Seismic inversion of the reprocessed baseline 3-D was completed. Three depth domain volumes of elastic parameters were delivered for import to Petrel for the geomechanical model analysis.
 - ◆ Continued Bell Creek Field simulation and history-matching efforts of the Phase 1 and 2 dynamic model.
 - ◆ Began efforts to develop a Bell Creek Phase 3–7 simulation model. Before starting the history-matching process, work includes quality control of well locations, formation tops, and completion intervals. Also processing the production and injection data for the Phase 3 area.
 - ◆ Requested and received velocity data for the reprocessed 3-D survey from Denbury.
 - ◆ Completed building model for seismic 3-D baseline.
 - ◆ Continued work on numerical tuning for the simulation model to reduce run time and improve computational efficiency.
 - ◆ Worked on analyzing flow boundaries for Phase 1 and 2 areas to ensure simulations accurately match connectivity and fluid flow between the phases.
 - ◆ Compared continuous CO₂ injection and water-alternating-gas (WAG) cases in the Phase 1 and 2 areas. Investigated the effect of variable water injection rates on reservoir performance.

- ◆ Integrated the new oil–water relative permeability curves into the SCAL database. The total number of relative permeability curves includes five individual sets from two wells: three sets from BC 22-03 and two sets from BC 05-06 OW.
- ◆ Worked on analyzing individual well performance in the Phase 1 and 2 simulation areas. Well properties are being updated based on well log and core analysis data. This work is to improve simulation results on an individual well basis. Results have been successful thus far.
- ◆ Used predictive simulation results to investigate several parameters, including hydrocarbon pore volume injected for continuous CO₂ injection (CCI) and WAG, incremental oil recovery, CO₂ utilization factor, and CO₂ storage amount.
- ◆ Held weekly Bell Creek modeling and simulation meeting. Work completed to date on the history-matching of single wells in the Bell Creek Phase 1 and 2 areas was presented.
- With regard to **injection-phase seismic** efforts:
 - ◆ On July 6–8, 2015, EERC personnel with guidance from Geospace (the recoding system vendor) representatives traveled to Hulett, Wyoming, to fix the 04-03 OW borehole seismic array at the Bell Creek Field. The system was troubleshot, repaired, and returned to operation. Evidence suggested the issue was related to an extreme weather event in the field.
 - ◆ The borehole seismic array in 04-03 OW ceased recording on July 29, 2015. The passive seismic observation GeoRes computer was completely shut down (first occurrence). Successfully rebooted the system via remote power controls. Continued to monitor the system. New drives were installed.
 - ◆ Continued to monitor the seismic acquisition system via remote check-in and e-mail updates.
 - ◆ The acquisition of the 2015 enhanced 3-D seismic acquisition was completed on September 7, 2015 (Figure 6). This acquisition expanded the area covered by seismic baseline data and acquired time-lapse seismic data over additional areas with active CO₂ injection. In total, the survey covered approximately 26 square miles and consisted of successful acquisition of 6622 receiver locations and 7253 source locations.
 - ◆ Successfully installed GeoTomo MiVu software for processing microseismic data on the geophysics workstation.
 - ◆ A graduate student intern continued working on processing the microseismic data using GeoTomo software. Worked on constructing the 3-D velocity model.
 - ◆ Worked on analyzing 3-D seismic data, including creating difference maps and preparing for joint 4-D inversion using the baseline and monitoring data sets.
 - ◆ Continued 4-D seismic analysis.
- With regard to **injection-phase PNL** activities:
 - ◆ Continued operations planning for an enhanced PNL campaign centering on Phases 1–4. This process included identifying wells important for monitoring CO₂ saturation changes during injection, wells needing additional characterization data, and wells important for understanding sweep efficiency in specific geologic conditions and the impacts of WAG compared to CCI.

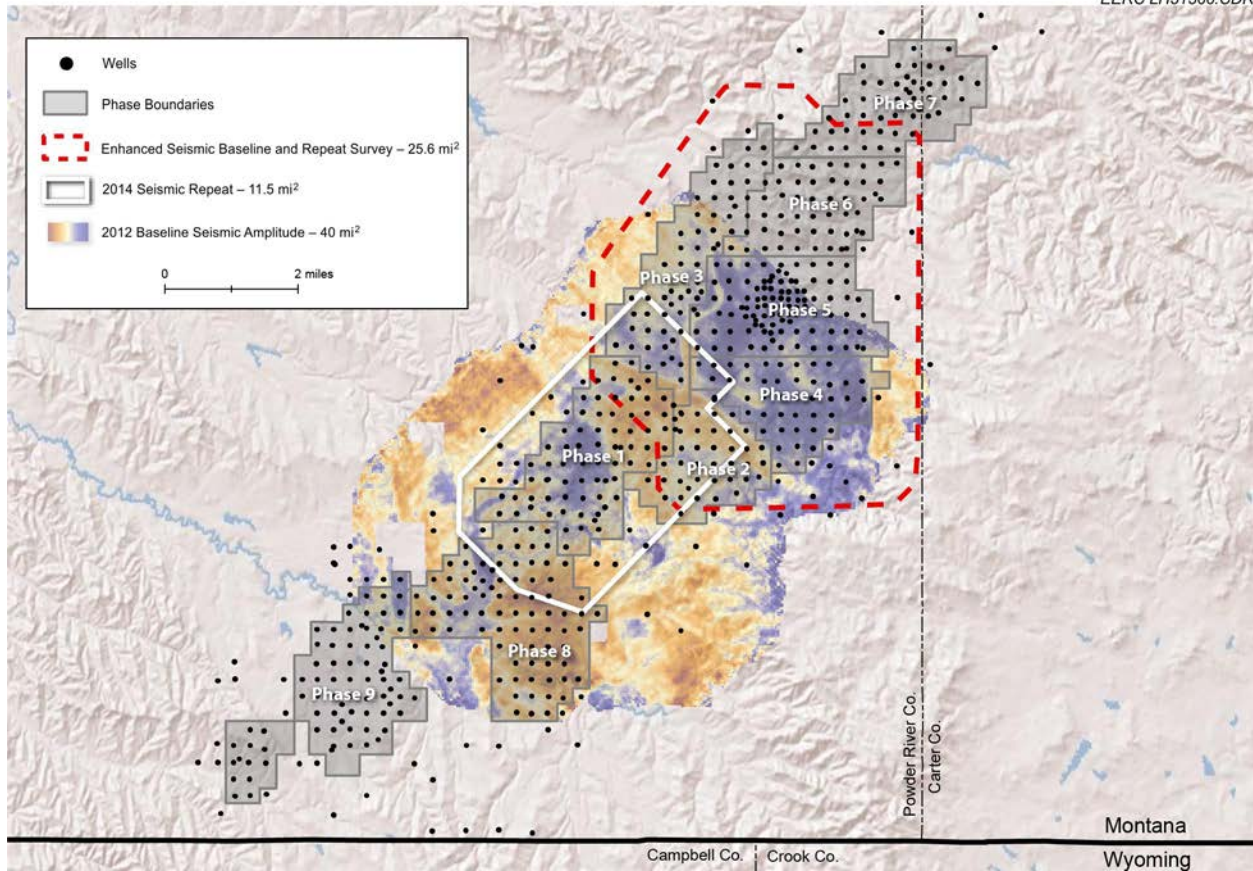


Figure 6. Map of existing 3-D seismic baseline. Fall 2014 time-lapse 3-D monitor seismic survey and planned 2015 extended baseline and coincident time-lapse 3-D monitor seismic survey extent.

- ◆ Received authorization from Denbury to proceed with the 18-well expanded fall 2015 PNL campaign as proposed. Logging is anticipated to commence in late October.
- With regard to **injection-phase sampling** activities:
 - ◆ Permanent downhole monitoring (PDM) system:
 - Completed data download from the MOREVision and Qorex systems as well as swapped out the GeoPro HDDs (hard disk drives).
 - Processed PDM data through June 2015.
 - Received replacement MOREVision unit to install in Bell Creek PDM system.
 - ◆ Activities completed from the semiannual Bell Creek surface and near-surface sampling event conducted April 24–29, 2015:
 - Completed laboratory gas chromatography (GC) confirmation analyses (26 samples).
 - Landowner packages (groundwater results) previously approved by Denbury were finalized and printed to be distributed to landowners during later site visits.

- Completed quality assurance and quality control (QA/QC) review of database; minor corrections and updates were made.
- ◆ Activities completed from the quarterly Bell Creek MVA sampling event (June 22–27, 2015):
 - Completed QA/QC and data inventory of handheld meter field data sheets and gas bag samples.
 - Completed Micro GC analysis on over 200 total soil gas samples, including QA/QC samples (i.e., blanks and duplicates) from all of Phases 1 and 2.
 - Completed data compilation, archiving, QA/QC, and processing for over 200 total soil gas samples from the micro GC and handheld meter analysis data sheets.
 - Selected 15 Bell Creek soil gas samples for laboratory GC QA/QC verification analyses.
 - Completed QA/QC verification analysis for nine confirmation samples.
 - Completed processing results from the seven collected groundwater parameter readings in Phases 1 and 2 and the surrounding region, including the two Fox Hills Formation wells (MW0504 and MW3312) as all parameters are within expected ranges.
 - Statistical analyses (i.e., outlier tests, boxplots, etc.) were completed based on all baseline field results by water type as well as compared to operational monitoring results for possible outliers. No outliers of significance were observed.
 - Based on the results, there is no need to conduct detailed laboratory analyses on the two groundwater samples from the Fox Hills Formation.
 - Completed general maintenance at EERC field office and SGPSs (soil gas profile stations).
- ◆ Analyzed purchase, recycle, and produced gas Summa canisters sampled July 17–23, 2015.
- ◆ Travel for Bell Creek activities:
 - Gillette, Wyoming, to meet with landowners August 4–6, 2015.
 - Gillette, Wyoming, for sampling August 23 – September 1, 2015.
 - Miles City, Montana, for sampling August 24–28, 2015.
- ◆ Activities completed from the annual full-field Bell Creek MVA sampling event (August 24–28, 2015):
 - Distributed remaining finalized landowner packages (April 2015 groundwater results) previously approved by Denbury to landowners.
 - The initial April 2015 packages were delivered to the landowners during the August 4–6 site visit.
 - Collected approximately 350 total soil gas samples, including original samples, field blanks, and duplicates.
 - Submitted samples for GC analyses.
 - Initiated review of preliminary soil gas results from the samples.
 - Sampled 19 out of 20 groundwater planned groundwater locations, including the two Fox Hills Formation groundwater-monitoring wells.
 - One groundwater site could not be sampled as no power was available to pump the sample.

- Submitted samples for laboratory analyses.
 - Reviewed the preliminary water chemistry data.
 - Reviewed landowner results (groundwater) letters and cover pages.
- Worked with landowners to schedule revisits to collect groundwater parameter readings.
- ◆ Continued development of Bell Creek near-surface MVA sampling strategies for FY2016.
- With regard to the **Fort Nelson** project:
 - There were no activities related to Fort Nelson in this quarter.

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

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

Task 10 – Site Closure

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

Task 11 – Postinjection Monitoring and Modeling

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

Task 12 – Project Assessment

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

- No activity this quarter.

Task 13 – Project Management

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

- Submitted supporting documentation for the 6-month, \$4.5M extension to BP4, including an update to the PCOR Partnership statement of project objectives and in-kind cost-share backup documentation.
- Received award for the PCOR Partnership BP4 extension (September 25, 2015). Working on revising the project management plan accordingly. The additional time and funding will be used to extend and enhance Task 4 – Characterization and Modeling, Task 9 – Operational Monitoring and Modeling, specifically for Bell Creek activities, and attendant activities under Task 13. Continuation of other ongoing tasks will be paid for by using carryover funding. The BP4 extension moves the start of BP5 to April 2016.
- Hosted and presented at the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015. The final participant count was

71 people, including EERC staff and 49 partners, presenters, or guests from 40 organizations. Continued final preparations this quarter leading up to the meeting.

- Held the following side meetings in conjunction with the PCOR Partnership Annual Membership Meeting:
 - Technical Advisory Board (TAB) meeting
 - Aquistore project meeting
- Attended the WBI Energy Customer Meeting in Deadwood, South Dakota, July 21–22, 2015.
- Attended the U.S.–Norway data-sharing workshop/meeting on August 17, 2015, in Pittsburgh, Pennsylvania.
- Attended the DOE Carbon Storage R&D Project Review Meeting in Pittsburgh, Pennsylvania, August 18–20, 2015. Five PCOR Partnership posters and a booth that included PCOR Partnership materials were presented at the meeting. The posters covered the following topics: Aquistore history matching, outreach, Fort Nelson BPM, WWG, and laboratory minimum miscibility testing. A poster regarding the PCOR Partnership’s regulatory activities was planned but never developed. The abstract covering this topic was withdrawn from the conference. A Bell Creek talk was given during a plenary session. A booth backdrop was created for the conference.
- Attended the National Risk Assessment Partnership (NRAP) Stakeholders Meeting in Pittsburgh, Pennsylvania, August 20–21, 2015.
- Traveled to Billings, Montana, to attend the China Inaugural Clean Coal Initiative meeting August 24–28, 2015.
- Attended the North Dakota Petroleum Council (NDPC) Annual Meeting in Fargo, North Dakota, September 21–23, 2015.
- Met with Denbury personnel for presentation on the EERC’s Bell Creek activities in Plano, Texas, September 24–25, 2015.
- Attended the IOGCC Annual Meeting in Oklahoma City, Oklahoma, September 28–30, 2015.
- Held a task leader meeting July 9, 2015. Topics discussed included hiring; the BP4 extension, including budgets and deliverables; project updates; upcoming conferences/meetings; and task leader updates.
- Held a task leader meeting August 4, 2015. Topics discussed included the BP4 extension; brief updates on Bell Creek and Aquistore; upcoming conferences/meetings, including the DOE Carbon Storage R&D Program Review meeting; and task leader updates.
- Held a task leader meeting September 1, 2015. Topics discussed included the preparations for the PCOR Partnership Annual Membership Meeting and Workshop, brief updates on Bell Creek and Aquistore, upcoming conferences/meetings, and task leader updates.
- At DOE’s request, submitted a memo for injection volume at Bell Creek.
- At DOE’s request, submitted a response regarding fiscal year (FY) 2016 DOE-tracked milestones, one a quarter. Submitted revised M58 title to DOE upon request following discussion with DOE representatives.
- Met with task leaders to discuss how the PCOR Partnership might be involved with beta-testing various NRAP tools.
- Deliverables and milestones completed in July:
 - June monthly update

- Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
- Task 9: M50 – Bell Creek Test Site – 2 years of Near-Surface Assurance Monitoring Completed
- Deliverables and milestones completed in August:
 - July monthly update
 - Task 13: D66 – Bell Creek Test Site – Simulation Report (Update 4)
 - Task 9: M51 – Bell Creek Test Site – Initial Analysis for First Large-Scale Repeat Pulsed-Neutron Logging Campaign Post-Significant CO₂ Injection Completed
- Deliverables and milestones completed in September:
 - August monthly update
 - Task 1: D1 – Review of Source Attributes (update)
 - Task 3: D8 – Permitting Review (Update 2)
 - Task 8: D49 – Bell Creek Test Site – Transportation and Injection Operations Report
 - Task 14: M23 – Monthly WWG Conference Call Held

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

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

Task 14 – RCSP WWG Coordination

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

- With regard to the Special Issue of the *International Journal of Greenhouse Gas Control* (IJGGC) on the “Nexus of Water and Carbon Capture and Storage”:
 - Distributed a reminder e-mail that the abstract deadline was approaching. Abstracts were due July 17, 2015.
 - Received one abstract submission from a WWG member and several others from outside authors. Received two additional special journal entries resulting from conversations at the DOE Carbon Storage R&D Project Review Meeting.
 - Sent confirmation e-mails along with instructions to authors responding to the abstract call.
 - Began drafting text for an introductory paper to be published in the issue.
 - Continued development of a draft journal article on behalf of the WWG.
 - Completed Elsevier Editorial System training in preparation for handling submissions.
 - Contacted contributors to remind each of the submission deadline.
- With regard to monthly conference calls (M23):
 - Distributed an agenda and Doodle for the July Conference Call. With DOE’s approval, the July call was waived because of lack of participation.
 - Request to waive August call was received due to the scheduling of the WWG Annual Meeting on August 18, 2015.
 - Held the monthly conference call on September 30, 2015. Discussed the outcomes of the annual meeting and path forward. Discussed the time lines of DOE’s BPMs and how additional items would be designed and added.

- Distributed the June WWG conference call notes.
- Received permission to drop the “BPM” title from D80 because of lack of research leading to “best practices” in the field of water and CCS.
- Received outlines of the DOE BPMs from Andrea McNemar, and began review.
- Continued review of DOE BPMs for inclusion of water-focused material. Prepared 1-page draft/example document for the Site Characterization BPM. Discussed potential ideas with a consultant from the CETER Group (CETER).
- Provided Key Logic Systems with a copy of the updated WWG presentation for the WWG Web site, and began a review of content. Sent updates for the WWG Web site.
- With regard to the WWG Annual Meeting:
 - Reviewed hotel arrangements and the menu. The meeting focused on the development of the WWG BPM and its relation to the DOE BPMs being developed.
 - Hosted the RCSP WWG Annual Meeting in Pittsburgh, Pennsylvania, August 18, 2015.
 - Reviewed notes and action items from the WWG Annual Meeting.
- Prepared a poster entitled “Long-Term Protection of Freshwater Resources,” presented at the DOE Carbon Storage R&D Project Review Meeting in Pittsburgh, Pennsylvania, August 18–20, 2015. Attended the meeting.
- Attended the PCOR Partnership Annual Membership Meeting and Workshop in Chicago, Illinois, September 15–17, 2015.
- Continued collaborative efforts with CETER, including the following:
 - Discussed the WWG conference calls.
 - Discussed potential ideas related to the DOE BPMs.
 - Continued development of the WWG Summary Document (D80, due November 30, 2016) draft with a consultant from CETER, discussing draft text and revisions.

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

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

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

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

Task 16 – Characterization of the Basal Cambrian System

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

PHASE III COST STATUS

The approved BP4 (Modification No. 33) budget along with actual costs incurred and in-kind cost share reported are shown in Table 9. A spending plan for BP4 and actual incurred cost by quarter of cash funds for BP4 are provided in Figure 7 and Table 10.

Table 9. Phase III Budget – BP4

Organization	Approved Budget,* \$	Actual Costs Incurred, \$
DOE Share – Cash	65,123,437	56,004,764
Nonfederal Share – Cash	2,411,971	2,995,751
Nonfederal Share – In-Kind	35,766,276	34,228,295
Total	103,301,684	93,228,810

*As of Modification No. 33.

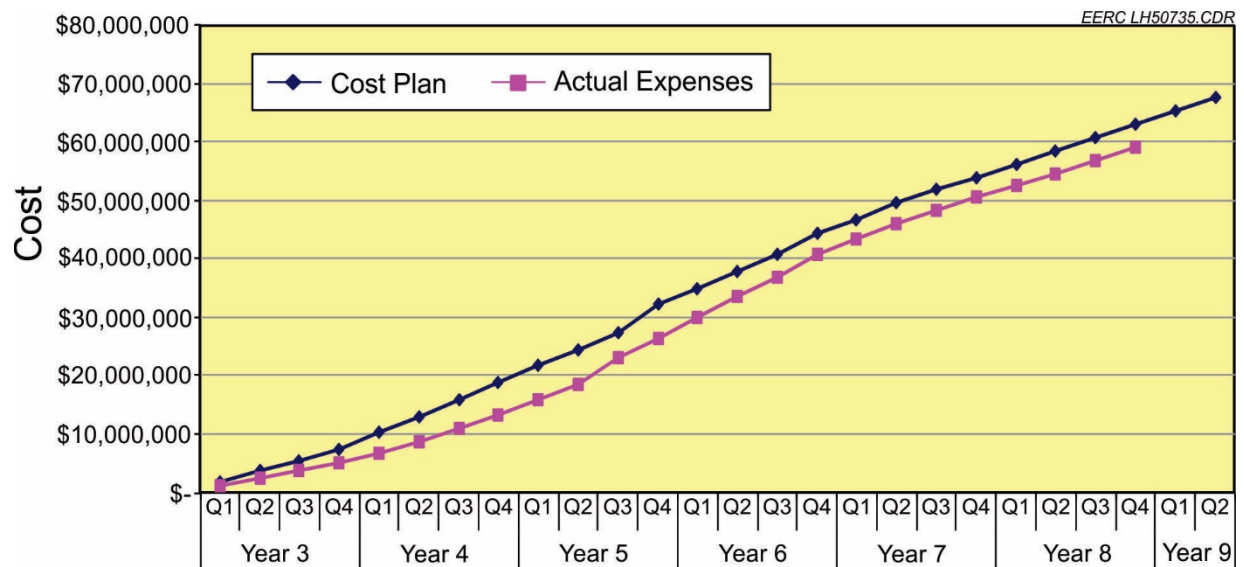


Figure 7. PCOR Partnership Phase III, BP4, Years 3–9 funding (cash only).

PHASE III SCHEDULE STATUS

Table 11 lists all deliverables and milestones by quarter, with completion dates, through the end of the reporting period (see Table 12 for the Gantt chart for BP4, Years 7 and 8).

Table 10. Phase III, BP4, Years 3–10 Spending Plan

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

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

Baseline Reporting Quarter	Year 7								Year 8							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
Baseline Cost Plan																
Federal Share	\$ 2,253,496	\$ 44,092,387	\$ 2,977,355	\$ 47,069,742	\$ 2,253,496	\$ 49,323,237	\$ 2,253,496	\$ 51,576,733	\$ 2,136,847	\$ 53,713,580	\$ 2,303,285	\$ 56,016,865	\$ 2,303,286	\$ 58,320,151	\$ 2,303,286	\$ 60,623,437
Nonfederal Share	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971
Total Planned	\$ 2,253,496	\$ 46,504,358	\$ 2,977,355	\$ 49,481,713	\$ 2,253,496	\$ 51,735,208	\$ 2,253,496	\$ 53,988,704	\$ 2,136,847	\$ 56,125,551	\$ 2,303,285	\$ 58,428,836	\$ 2,303,286	\$ 60,732,122	\$ 2,303,286	\$ 63,035,408
Actual Incurred Cost																
Federal Share	\$ 2,579,307	\$ 40,488,302	\$ 2,644,052	\$ 43,132,354	\$ 2,349,302	\$ 45,481,656	\$ 2,087,549	\$ 47,569,205	\$ 2,171,628	\$ 49,740,833	\$ 1,707,622	\$ 51,448,455	\$ 2,350,008	\$ 53,798,463	\$ 2,206,301	\$ 56,004,764
Nonfederal Share	\$ 62,881	\$ 2,748,257	\$ 14,980	\$ 2,763,237	\$ 15,096	\$ 2,778,333	\$ 90,494	\$ 2,868,827	\$ 2,587	\$ 2,871,414	\$ 44,275	\$ 2,915,689	\$ 16,621	\$ 2,932,310	\$ 63,441	\$ 2,995,751
Total Incurred Cost	\$ 2,642,188	\$ 43,236,559	\$ 2,659,032	\$ 45,895,591	\$ 2,364,398	\$ 48,259,989	\$ 2,178,043	\$ 50,438,032	\$ 2,174,215	\$ 52,612,247	\$ 1,751,897	\$ 54,364,144	\$ 2,366,629	\$ 56,730,773	\$ 2,269,742	\$ 58,999,515
Variance																
Federal Share	\$ (325,811)	\$ 3,604,085	\$ 333,303	\$ 3,937,388	\$ (95,806)	\$ 3,841,581	\$ 165,947	\$ 4,007,528	\$ (34,781)	\$ 3,972,747	\$ 595,663	\$ 4,568,410	\$ (46,722)	\$ 4,521,688	\$ 96,985	\$ 4,618,673
Nonfederal Share	\$ (62,881)	\$ (336,286)	\$ (14,980)	\$ (351,266)	\$ (15,096)	\$ (366,362)	\$ (90,494)	\$ (456,856)	\$ (2,587)	\$ (459,443)	\$ (44,275)	\$ (503,718)	\$ (16,621)	\$ (520,339)	\$ (63,441)	\$ (583,780)
Total Variance	\$ (388,692)	\$ 3,267,799	\$ 318,323	\$ 3,586,122	\$ (110,902)	\$ 3,475,219	\$ 75,453	\$ 3,550,672	\$ (37,368)	\$ 3,513,304	\$ 551,388	\$ 4,064,692	\$ (63,343)	\$ 4,001,349	\$ 33,544	\$ 4,034,893

Continued . . .

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

Baseline Reporting Quarter	Year 9								Year 10							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
Baseline Cost Plan																
Federal Share	\$2,250,000	\$62,873,437	\$ 2,250,000	\$65,123,437	\$ 1,611,384	\$66,734,821	\$1,611,384	\$68,346,205	\$1,611,384	\$69,957,589	\$ 1,611,385	\$71,568,974	\$1,611,385	\$73,180,359	\$1,611,385	\$74,791,744
Nonfederal Share	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971	\$ -	\$ 2,411,971
Total Planned	\$2,250,000	\$65,285,408	\$ 2,250,000	\$67,535,408	\$ 1,611,384	\$69,146,792	\$1,611,384	\$70,758,176	\$1,611,384	\$72,369,560	\$ 1,611,385	\$73,980,945	\$1,611,385	\$75,592,330	\$1,611,385	\$77,203,715
Actual Incurred Cost																
Federal Share																
Nonfederal Share																
Total Incurred Cost																
Variance																
Federal Share																
Nonfederal Share																
Total Variance																

Table 11. 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 11. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 11. 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 11. 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 11. 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 11. 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 11. 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 11. Phase III Milestones and Deliverables (continued)

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

Continued . . .

Table 11. 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 11. 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

Continued...

Table 11. 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 11. Phase III Milestones and Deliverables (continued)

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

Continued . . .

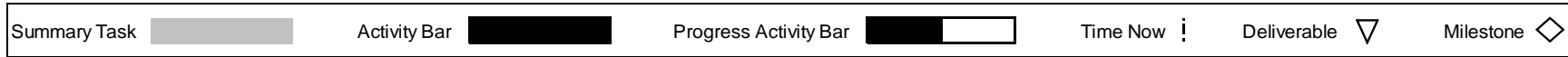
Table 11. Phase III Milestones and Deliverables (continued)

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	
D22: Task 2 – Energy from Coal 60-minute Documentary	1/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	1/31/16	
M54: Task 9 – Initial Processing and Analysis of Historic InSAR Data Completed	1/31/16	
D14: Task 2 – General Phase III Fact Sheet (Update)	2/29/16	
D93: Task 1 – Geological Modeling and Simulation Report for the Aquistore Project (Update 2)	2/29/16	
M23: Task 14 – Monthly WWG Conference Call Held	2/29/16	
D11: Task 2 – Outreach Plan (Update)	3/31/16	
D45: Task 6 – Bell Creek Test Site – Infrastructure Development Report	3/31/16	
D53: Task 9 – Fort Nelson Test Site – Monitoring for CO ₂ Storage in a Brine Formation Best Practices Manual	3/31/16	
D69: Task 9 – Bell Creek Test Site – Best Practices Manual – Simulation Report	3/31/16	
M23: Task 14 – Monthly WWG Conference Call Held	3/31/16	
M56: Task 9 – Life Cycle Analysis for Primary and Secondary Recovery Oil Completed	3/31/16	
M58: Task 9 – Bell Creek Test Site – Completion of 2.75 Million Metric Tons of CO ₂ Stored	3/31/16	

Table 12. Phase III, BP4, Years 7–9 Gantt Chart

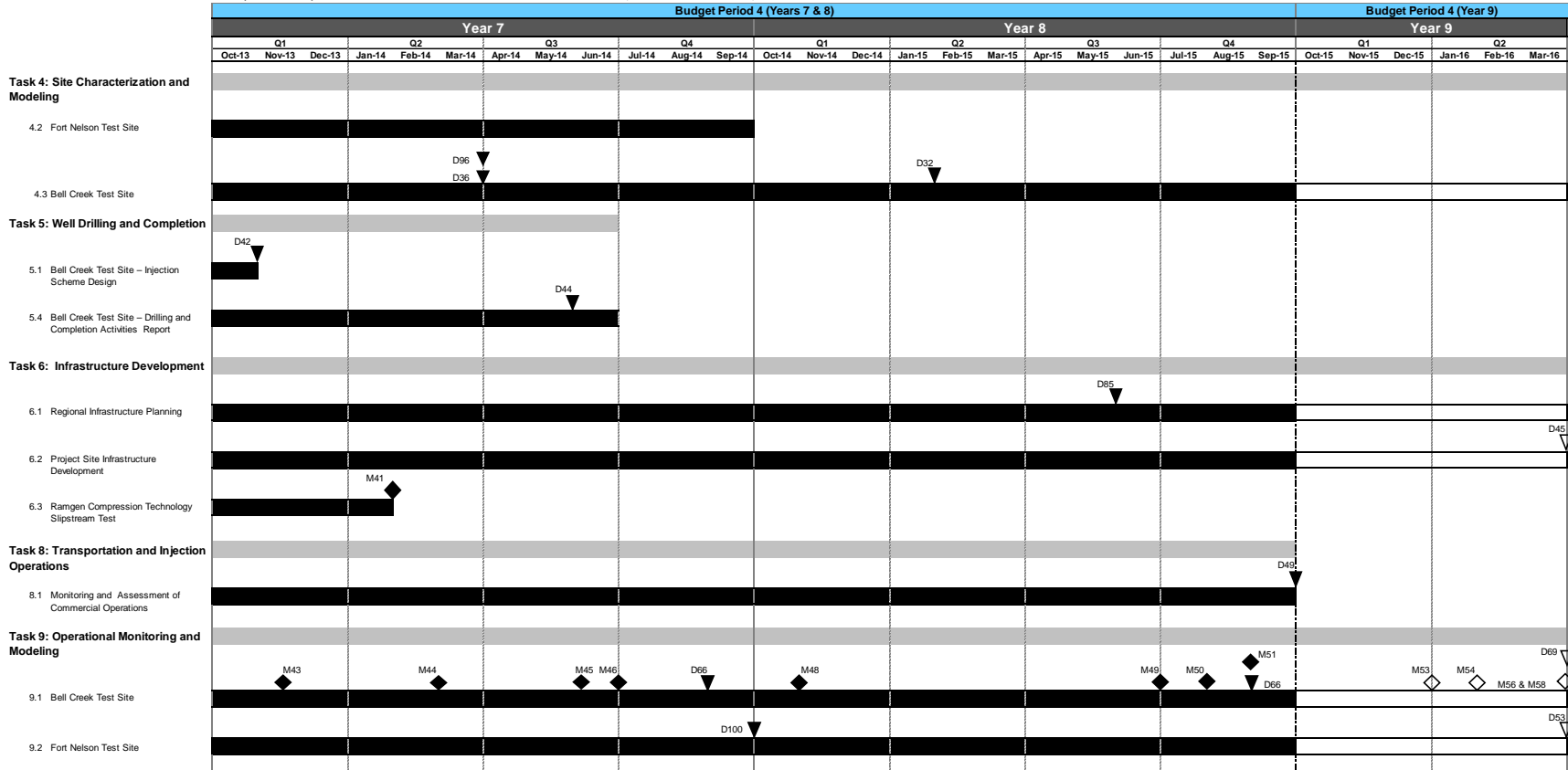


44

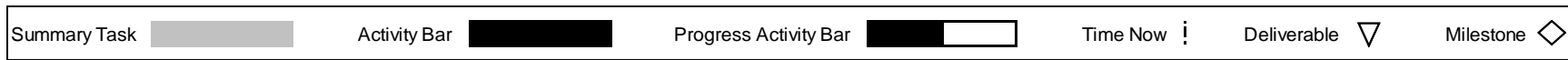


Continued . . .

Table 12. Phase III, BP4, Years 7–9 Gantt Chart (continued)

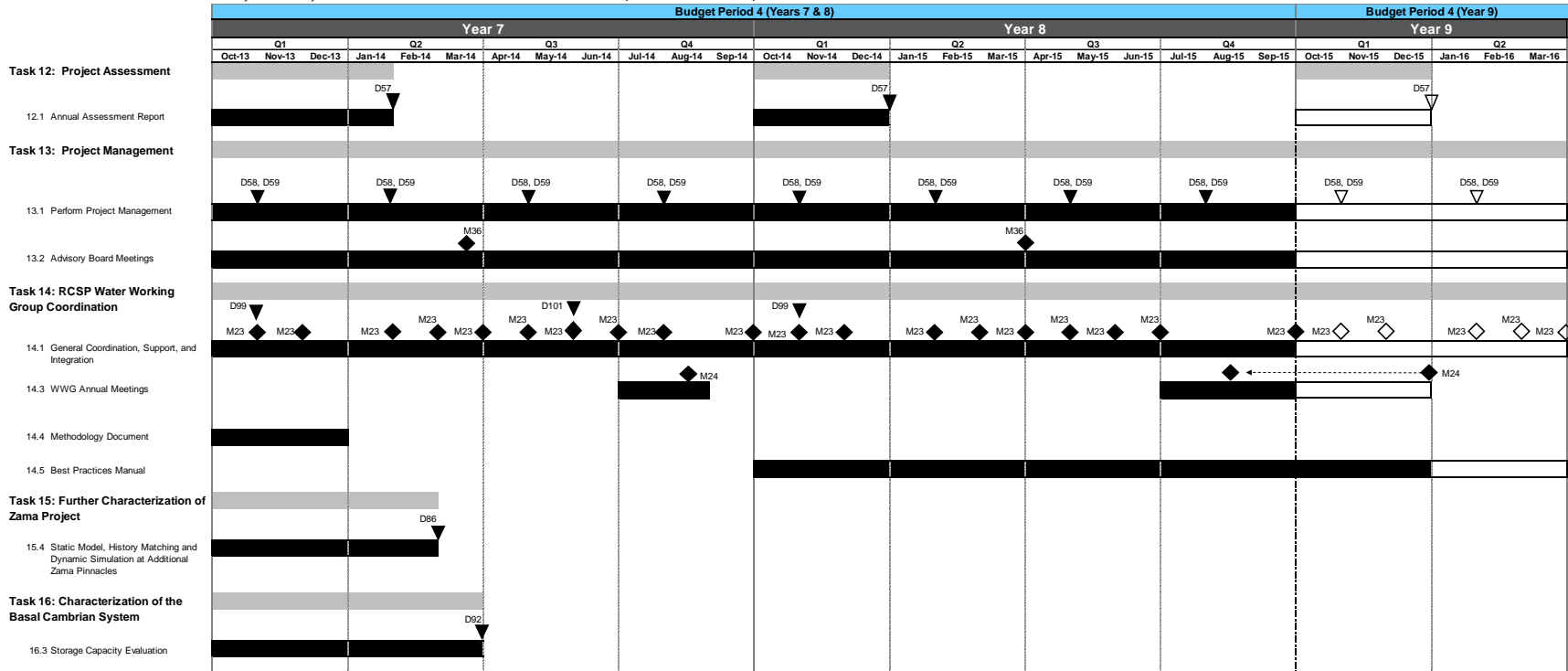


45



Continued . . .

Table 12. Phase III, BP4, Years 7–9 Gantt Chart (continued)



Summary Task Activity Bar Progress Activity Bar Time Now Deliverable Milestone

Continued . . .

Table 12. Phase III BP4, Years 7–9 Gantt Chart (continued)

Key for Deliverables ▼		Key for Milestones ◆	
D1	Review of Source Attributes	D53	FN Test Site – Best Practices Manual – Monitoring for CO ₂ Storage in a Brine Formation
D7	Third Target Area Completed	D57	Project Assessment Annual Report
D8	Permitting Review – Update 2	D58	Quarterly Progress Report
D11	Outreach Plan	D59	Milestone Quarterly Report
D13	Public Site Updates	D66	BC Test Site – Simulation Report
D14	General Phase III Fact Sheet	D69	BC Test Site – Best Practices Manual – Simulation
D17	General Phase III Information PowerPoint Presentation	D85	Report – Opportunities and Challenges Associated with CO ₂ Compression and Transportation During CCUS Activities
D22	Energy from Coal 60-Minute Documentary	D86	Updated Regional Technology Implementation Plan for Zama
D24	PCOR Partnership Region CO ₂ Storage General Poster	D92	Report – Storage Capacity and Regional Implications for Large-Scale Storage in the Basal Cambrian System
D25	BC Test Site Poster (Update)	D93	Report – Geological Modeling and Simulation for the Aquistore Project
D32	BC Test Site – Geomechanical Report	D96	BC Test Site – 3-D Seismic Acquisition and Characterization Report
D36	BC Test Site – Wellbore Leakage Final Report	D99	Nexus of Water and CCS Fact Sheet
D42	BC Test Site – Injection Experimental Design Package	D100	FN Test Site – Best Practices Manual– Feasibility Study
D44	BC Test Site – Drilling and Completion Activities Report	D101	WWG Web Site Content Update
D45	Report – Infrastructure Development		
D49	BC Test Site – Transportation and Injection Operations Report		
		M23	Monthly WWG Conference Call Held
		M24	WWG Annual Meeting Held
		M36	Annual Advisory Board Meeting Scheduled
		M41	Decision to Incorporate Ramgen Compression Technology into BC Project
		M43	BC Test Site – First Full-Repeat Sampling of the Groundwater- and Soil Gas- Monitoring Program Completed
		M44	BC Test Site – First 3-D VSP Repeat Surveys Completed
		M45	BC Test Site – First Full-Repeat of Pulsed-Neutron Logging Campaign Completed
		M46	BC Test Site – 1 Year of Injection Completed
		M48	BC Test Site – 1 Million Metric Tons of CO ₂ Injected
		M49	BC Test Site – 1.5 Million Metric Tons of CO ₂ Injected
		M50	BC Test Site – 2 Years of Near-Surface Assurance Monitoring Completed
		M51	BC Test Site – Initial Analysis for First Large-Scale Repeat Pulsed-Neutron Logging Campaign Post-Significant CO ₂ Injection
		M53	BC Test Site – Expanded Baseline and Time-Lapse 3-D Surface Seismic Survey Completed
		M54	BC Test Site – Initial Processing and Analysis of Historic InSAR Data Completed
		M56	BC Test Site – Life Cycle Analysis for Primary and Secondary Recovery Oil Completed
		M58	BC Test Site – Injection of 2.75 Million Metric Tons of CO ₂ Completed

Revised 10/29/15

PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, three abstracts were submitted for presentation, seven were accepted for presentation, and 18 oral presentations and eight poster presentations were given at 23 different meetings/conferences/workshops. In addition, a quarterly progress report and seven deliverables/milestones (four draft, three approved) were completed. In addition to the products cited below, staff also undertook seven project management site trips. For more detail, see the Meetings/Travel section.

Abstracts

Submitted

Hawthorne, S.B., Miller, D.J., Gorecki, C.D., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2015, Effects of reservoir temperature and percent levels of methane and ethane on CO₂/oil MMP values as determined using vanishing interfacial tension/capillary rise [abs.]: Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Submitted and Accepted for Presentation

Daly, D.J., Crocker, C.R., Crossland, J.L., Gorecki, C.D., and Steadman, E.N., 2015, PCOR Partnership outreach – a multifaceted program [abs.]: Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Submitted and Accepted for Poster But Not Presented

Hamling, J.A., Klapperich, R.J., and Kalenze, N.S., 2015, Risk assessment using an adaptive management approach to CO₂ storage projects [abs.]: IEAGHG Risk Management and Environmental Research Combined Networks Meeting, Southampton, UK, September 29 – October 1, 2015.

Accepted for Poster

Hawthorne, S.B., Miller, D.J., Gorecki, C.D., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2015, Effects of reservoir temperature and percent levels of methane and ethane on CO₂/oil MMP values as determined using vanishing interfacial tension/capillary rise [abs.]: Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Klapperich, R.J., Jensen, M.D., Stepan, D.J., Gorecki, C.D., and Nakles, D.V., 2015, Long-term protection of freshwater resources [abs.]: Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Peck, W.D., and Gorecki, C.D., 2015, Guiding MVA deployment using near-real-time history matching at the Aquistore site [abs.]: Transforming Technology Through Integration and

Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Sorensen, J.A., Smith, S.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2015, The adaptive management approach to CCS project planning—the Fort Nelson CCS project as a case study [abs.]: Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Accepted for Presentation and Declined by Author

Wilson, W.I., Doll, T.E., Gorecki, C.D., Ayash, S.C., Steadman, E.N., and Harju, J.A., 2015, Permitting for carbon capture and storage in the Plains CO₂ Reduction Partnership region [abs.]: Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Presentations

Bosshart, N.W., 2015, Bell Creek version 3 geologic model update: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.

Bosshart, N.W., and Hamling, J.A., 2015, Bell Creek pulsed-neutron well-logging update: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.

Burnison, S., 2015, Geophysics at the EERC—overview of projects, status, and plans: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.

Burnison, S., 2015, Scalable, automated, semipermanent seismic array (SASSA) for detecting CO₂ plume extent during geological CO₂ injection: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.

Gorecki, C.D., and Ayash, S.C., 2015, A Bell Creek road map...: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.

Gorecki, C.D., and Ayash, S.C., 2015, The Plains CO₂ Reduction Partnership's approach to risk management: Presented at the U.S.–Norway Bilateral Initiative on Energy Working Group for CO₂ Storage and MVA Workshop, Oslo, Norway, September 6, 2015.

Gorecki, C.D., and Ayash, S.C., 2015, The Plains CO₂ Reduction (PCOR) Partnership—Bell Creek Field project: Presented at Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Gorecki, C.D., and Ayash, S.C., 2015, Plains CO₂ Reduction (PCOR) Partnership highlights: Presented at the PCOR Partnership Annual Membership Meeting, Chicago, Illinois, September 16–17, 2015.

Hamling, J.A., Gorecki, C.D., and Ayash, S.C., 2015, The Plains CO₂ Reduction (PCOR) Partnership—Bell Creek Field project: Presented at the PCOR Partnership Annual Membership Meeting, Chicago, Illinois, September 16–17, 2015.

- Jin, L., 2015, History match and performance prediction for Bell Creek Phase 1 and 2 area: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.
- Klapperich, R.J., Nakles, D.V., and McNemar, A.T., 2015, RCSP Water Working Group annual meeting: Presented at the Regional Carbon Sequestration Partnerships Water Working Group Annual Meeting, Pittsburgh, Pennsylvania, August 18, 2015.
- Leroux, K.M., and Hamling, J.A., 2015, 05-06 OW AZMI pressure analysis: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.
- Peck, W.D., 2015, CO₂ EOR—a framework for CO₂ storage: Presented at the CO₂ Enhanced Oil Recovery (EOR) Workshop, PCOR Partnership Annual Membership Meeting, Chicago, Illinois, September 15, 2015.
- Sorensen, J.A., Hamling, J.A., and Azzolina, N., 2015, The value of multiple rounds of risk assessment to CCS project planning—the Fort Nelson CCS project as a case study: Presented at the IEAGHG Risk Management and Environmental Research Combined Networks Meeting, Southampton, UK, September 29 – October 1, 2015.
- Steadman, E.N., 2015, Plains CO₂ Reduction (PCOR) Partnership and oil and gas overview: Presented to Praxair, Inc., personnel, Grand Forks, North Dakota, July 14, 2015.
- Steadman, E.N., 2015, The Plains CO₂ Reduction (PCOR) Partnership—project updates: Presented at the Plains CO₂ Reduction (PCOR) Partnership Regulatory Roundup, Deadwood, South Dakota, July 22–23, 2015.
- Steadman, E.N., 2015, Research that is making a difference at the Energy & Environmental Research Center: Presented at the North Dakota Member Services Association (NDMSA) 2015 Summer Meeting, Carrington, North Dakota, August 12, 2015.
- Stepan, D.J., and Hamling, J.A., 2015, Surface and shallow subsurface soil gas and water monitoring at the Bell Creek oil field: Presented to Denbury Resources Inc. personnel, Bell Creek Project Update Meeting, Plano, Texas, September 24–25, 2015.

Poster Presentations

- Bosshart, N.W., Braunberger, J.R., Burton-Kelly, M., Dotzenrod, N.W., and Gorecki, C.D., 2015, Multiscale reservoir modeling for CO₂ storage and enhanced oil recovery using multiple point statistics: Poster presented at the EAGE Petroleum Geostatistics 2015 Conference, Biarritz, France, September 7–11, 2015.
- Daly, D.J., Crocker, C.R., Crossland, J.L., Gorecki, C.D., and Steadman, E.N., 2015, PCOR Partnership—multifaceted and multilevel outreach: Poster presented at the Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.
- Hawthorne, S.B., Miller, D.J., Gorecki, C.D., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2015, Effects of reservoir temperature and percent levels of methane and ethane on CO₂/oil MMP values as determined using vanishing interfacial tension/capillary rise: Poster presented

at the PCOR Partnership Annual Membership Meeting, Chicago, Illinois, September 16–17, 2015.

Hawthorne, S.B., Miller, D.J., Gorecki, C.D., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2015, Effects of reservoir temperature and percent levels of methane and ethane on CO₂/oil MMP values as determined using vanishing interfacial tension/capillary rise: Poster presented at Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Klapperich, R.J., Jensen, M.D., Stepan, D.J., Gorecki, C.D., and Nakles, D.V., 2015, Long-term protection of freshwater resources: Poster presented at the PCOR Partnership Annual Membership Meeting, Chicago, Illinois, September 16–17, 2015.

Klapperich, R.J., Jensen, M.D., Stepan, D.J., Gorecki, C.D., and Nakles, D.V., 2015, Long-term protection of freshwater resources: Poster presented at Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Peck, W.D., and Gorecki, C.D., 2015, Guiding MVA deployment using near-real-time history matching at the Aquistore site: Poster presented at the Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Sorensen, J.A., Smith, S.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2015, The adaptive management approach to CCS project planning—the Fort Nelson CCS project as a case study: Poster presented at the Transforming Technology Through Integration and Collaboration Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 18–20, 2015.

Deliverables/Milestones

Draft

Bosshart, N.W., Jin, L., Dotzenrod, N.W., Burnison, S.A., Ge, J., He, J., Burton-Kelly, M.E., Ayash, S.C., Gorecki, C.D., Hamling, J.A., Steadman, E.N., and Harju, J.A., 2015, Bell Creek test site – simulation report: Plains CO₂ Reduction (PCOR) Partnership Phase III draft Task 9 Deliverable D66 (update 4) executive summary for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, August.

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

Jensen, M.D., Hamling, J.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2015, Bell Creek test site – transportation and injection operations report: Plains CO₂ Reduction Partnership Phase III draft Task 8 Deliverable D49 for U.S. Department of Energy National Energy

Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

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

Draft Submitted and Approved

Glazewski, K.A., Kovacevich, J.T., Jensen, M.D., Peck, W.D., and Gorecki, C.D., 2015, Review of source attributes: Plains CO₂ Reduction Partnership Phase III Task 1 Deliverable D1 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2015-EERC-09-13, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Gorecki, C.D., Leroux, K.M., Kalenze, N.S., Hamling, J.A., Glazewski, K.A., Stepan, D.J., Klapperich, R.J., Steadman, E.N., and Harju, J.A., 2015, Bell Creek test site – 2 years of near-surface assurance monitoring completed: Plains CO₂ Reduction Partnership Phase III Task 9 Milestone M50 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2015-EERC-07-10, Grand Forks, North Dakota, Energy & Environmental Research Center, July.

Approved

Gorecki, C.D., Kalenze, N.S., Hamling, J.A., Steadman, E.N., and Harju, J.A., 2015, Bell Creek test site – 1.5M metric tons of CO₂ injected: Plains CO₂ Reduction Partnership Phase III Task 9 Milestone M49 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2015-EERC-07-01, Grand Forks, North Dakota, Energy & Environmental Research Center, June.

Progress Reports

Monthlies

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Harju, J.A., Heebink, L.V., and Klapperich, R.J., 2015, Plains CO₂ Reduction (PCOR) Partnership: Phase III monthly report (June 1–30, 2015) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, July.

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Harju, J.A., Heebink, L.V., and Klapperich, R.J., 2015, Plains CO₂ Reduction (PCOR) Partnership: Phase III monthly report (July 1–31, 2015) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, August.

Gorecki, C.D., Steadman, E.N., Peck, W.D., Daly, D.J., Sorensen, J.A., Hamling, J.A., Jensen, M.D., Harju, J.A., Heebink, L.V., and Klapperich, R.J., 2015, Plains CO₂ Reduction (PCOR) Partnership: Phase III monthly report (August 1–31, 2015) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Quarterlies

Gorecki, C.D., Harju, J.A., Steadman, E.N., Romuld, L., Sorensen, J.A., Daly, D.J., Hamling, J.A., Jensen, M.D., Peck, W.D., Klapperich, R.J., Heebink, L.V., and Votava, T.J., 2015, Plains CO₂ Reduction Partnership Phase III Task 13 Deliverable D58/59 quarterly technical progress report (April 1 – June 30, 2015) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592 and North Dakota Industrial Commission Contract Nos. FY08-LX111-162 and G-015-030, Grand Forks, North Dakota, Energy & Environmental Research Center, July.

Meeting Minutes

Klapperich, R.J., 2015, Minutes—Regional Carbon Sequestration Partnership Program Water Working Group annual meeting: August 18, 2015.

Klapperich, R.J., 2015, Minutes—Regional Carbon Sequestration Partnership Water Working Group conference call: June 23, 2015.

MEETINGS/TRAVEL

Representatives from the PCOR Partnership incurred travel costs for their participation in the following 19 meetings/conferences, four workshops, and six project management site trips in this reporting period:

- June 26 – July 8, 2015: Traveled to San Francisco, California, to attend the 2015 U.S. Rock Mechanics Geomechanics Symposium and Workshop.
- June 29 – July 1, 2015: Traveled to White Salmon, Washington, to work as a technical advisor on the Coal and the Modern Age documentary.
- July 6–8, 2015: Traveled to Hulett, Wyoming, to do maintenance on the 04-03 OW borehole array recording system at Bell Creek.
- July 8–18, 2015: Traveled to Houston, Texas, to attend three CMG courses (CMOST July 9–10, WINPROP July 13–14, and Reservoir Simulation July 15–17).
- July 13–17, 2015: Traveled to Casper, Wyoming, to attend the EOR CO₂ Conference and workshops.
- July 20–22, 2015: Traveled to Deadwood, South Dakota, to attend the WBI Energy Customer Meeting.
- July 21–23, 2015: Traveled to Deadwood, South Dakota, to host the PCOR Partnership Regulatory Roundup.
- July 27–28, 2015: Traveled to Fargo, North Dakota, to work with PPB for the upcoming documentary.

- August 1–9, 2015: Traveled to Calgary, Alberta, Canada, to attend CMG’s EOR Modeling Using GEM training course.
- August 4–6, 2015: Traveled to Gillette, Wyoming, to meet with landowners for the Bell Creek project.
- August 9–12, 2015: Traveled to Denver, Colorado, to view cores at the U.S. Geological Survey Core Research Center.
- August 12, 2015: Traveled to Carrington, North Dakota, to present at the North Dakota Member Services Association summer meeting.
- August 16–22, 2015: Traveled to St. John’s, Newfoundland, Canada, to attend the Society of Core Analysts Symposium and field trip “Stratigraphy of the Neoproterozoic–Cambrian” near St. John’s.
- August 17–20, 2015: Traveled to Pittsburgh, Pennsylvania, to host the WWG Annual meeting and attend the U.S.–Norway data-sharing workshop/meeting, present at the 2015 DOE Carbon Storage R&D Project Review Meeting, and attend the NRAP Stakeholders Meeting.
- August 24–27, 2015: Traveled to Billings, Montana, to attend the China Inaugural Clean Coal Initiative meeting.
- August 24–28, 2015: Traveled to Miles City, Montana, for Bell Creek site sampling work.
- August 23 – September 1, 2015: traveled to Gillette, Wyoming, for sampling at the Bell Creek site.
- September 4–7, 2015: Traveled to Oslo, Norway, to present at the CO₂ and Monitoring, Verification, and Accounting Workshop.
- September 4–12, 2015: Traveled to Biarritz, France, to present at the EAGE Petroleum Geostatistics Conference.
- September 7–11, 2015: Traveled to Regina, Saskatchewan, Canada, to attend the IEAGHG PCCC3.
- September 12–17, 2015: Traveled to Chicago, Illinois, to host and present at the PCOR Partnership Annual Membership Meeting, the CO₂ EOR Workshop, the TAB Meeting, and an Aquistore project update meeting.
- September 21–23, 2015: Traveled to Fargo, North Dakota, to attend the NDPC Annual Meeting.
- September 24–25, 2015: Traveled to Plano, Texas, to attend meetings with and present to Denbury.
- September 26–27, 2015: Traveled to Houston, Texas, to attend Next Training with Schlumberger.
- September 26 – October 1, 2015: Traveled to Oklahoma City, Oklahoma, to attend the IOGCC Annual Meeting.
- September 27 – October 1, 2015: Traveled to Southampton, United Kingdom, to present at the IEAGHG Risk Management & Environmental Research Combined Network Meetings.
- September 28–29, 2015: Traveled to Houston, Texas, to attend Petrel Fundamentals training.
- September 28–29, 2015: Traveled to Fargo, North Dakota, to attend the GIS Users Conference.

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