



# DECISION SUPPORT SYSTEM WEB SITE UPDATE

## Plains CO<sub>2</sub> Reduction (PCOR) Partnership Phase III Task 1 – Deliverable D9 Update 2

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## **DECISION SUPPORT SYSTEM WEB SITE UPDATE**

### **INTRODUCTION**

Information and products currently developed through the Plains CO<sub>2</sub> Reduction (PCOR) Partnership are disseminated to the U.S. Department of Energy (DOE) and partners through the Decision Support System (DSS, © 2007–2011 EERC Foundation) – a database-driven, password-protected Web site containing both traditional static pages and an interactive geographic information system (GIS).

### **SITE IMPROVEMENTS**

The following updates were made to the DSS from September 1, 2009, to August 31, 2011.

## Home Page

The DSS home page is continually updated to keep partners apprised of the latest PCOR Partnership activities. New sections are added to the left navigation column as necessary. The “New!” section in the center column is frequently revised to inform the reader of new content available on the DSS site. Also in the center column, the “CO<sub>2</sub> Storage News” is automatically updated throughout the day. The right column is revised to draw attention to key activities. As shown in Figure 1, the upcoming Annual Meeting is presently featured in the right column.

## Regulations

The Downloadable Resources page is continually updated with new resources dedicated to CO<sub>2</sub> regulations.

**DSS Partners-Only Decision Support System** **PCOR Partnership** **EERC**

DSS Home PCOR Partnership Partner Directory EERC Contacts Site Map

### Your Gateway to CO<sub>2</sub> Management

The PCOR Partnership Decision Support System (DSS) contains tools to help partners make decisions about CO<sub>2</sub> management.

- Carbon Management
- Regulations
- Carbon Markets
- Risk Management
- Field Validation Tests
- Demonstration Projects
- Interactive Maps
- Products Database
- Image Gallery
- Keep Me Informed
- 2010 Annual Meeting

**New!**  
Check out the new **Demonstration Project Reporting System (DPRS)** section for the latest updates on the Bell Creek and Fort Nelson demonstration projects.

**CO<sub>2</sub> Storage News**  
[Carbon sequestration study weeks away from drilling...](#)  
8 hours ago  
Carbon sequestration study weeks away from drilling 1st test well  
Craig Daily Press  
The idea of carbon dioxide being captured  
[Google](#)  
[Carbon sequestration study weeks away from drilling 1st test...](#)  
[West Coast Scientists Begin Work on Cheaper Carbon Captur...](#)  
[Carbon crunching at low price for the benefit of advanced nat...](#)  
[Richland gets its sequestration center project under way - He...](#)  
[New EPA Proposal Encourages Carbon Capture and Sequest...](#)  
[HDS secures cleantech license, financing - Mass High Tech](#)

**Join us for the Annual Meeting!**  
Get up-to-date on what is happening with the PCOR Partnership by attending a series of engaging presentations about CCS, risk management, regulations, and outreach strategies.

This year's meeting will feature a workshop entitled "Foundations of CCS Geology" on September 12, 2011, beginning at 12:30 p.m. This half-day introductory workshop is designed for nongeologists involved in or associated with CCS projects. The workshop is offered free of charge to members.

**PCOR PARTNERSHIP ANNUAL MEETING AND WORKSHOP**  
September 12-14, 2011, Denver, CO

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Figure 1. DSS home page.

## Carbon Markets

Several new pages were developed for the Carbon Markets section, as shown in Figure 2 (Carbon Markets previously contained one page for Trading Programs and one for Offset Providers). These pages will go live once they are approved by PCOR Partnership management.



Figure 2. New Carbon Markets landing page.



## Demonstration Projects

A new Demonstration Project Reporting System (DPRS) was created to provide structured access to data from the PCOR Partnership Phase III demonstration projects at Bell Creek and Fort Nelson. Each project has its own section with the following subcategories (see Figures 3 and 4):

1. **Background and Scope of Work.** This page describes the objectives of the demonstration project and provides basic information about the effort.
2. **Benefits to the Region.** This page discusses how the individual demonstration projects fit into the broader context of carbon capture and storage (CCS) within the PCOR Partnership region.
3. **Characterization Data.** This section includes subsurface information on geological characteristics, overlying seal(s) and formations, and formation storage injectivity and capacity.
4. **Modeling.** Modeling activities will feed into the monitoring, verification, and accounting (MVA) and risk management components of the project development. Approved results of modeling runs and the input parameters will be provided in this section.
5. **Monitoring, Verification, and Accounting.** Once available, data in this category will include information on the MVA techniques being employed at the sites. As the MVA activities mature, this area will contain summaries of monitoring results and interpretations.
6. **Risk Management.** An integrated risk management concept is central to the PCOR Partnership approach to the demonstration projects. Discussion and products related to this concept will be housed in this section.
7. **Regulations and Permitting.** This section includes discussions on how regulatory and permitting issues are being addressed at the two demonstration sites.
8. **Site Operations.** Material pertinent to how the site is operating, including injection rates and cumulative injection data, will be included in this section, which will also include information on the transportation of the CO<sub>2</sub> to the site.
9. **Products.** Topical reports, final reports, posters, presentations, and fact sheets directly related to the demonstration project are accessible in this portion of the DPRS. Programming allowed for a dynamic link to the DSS Products Database, which houses all PCOR Partnership products, to allow automatic updates.

**Partners-Only**  
**Decision Support System**

DSS Home

PCOR Partnership

Partner Directory

EERC Contacts

Site Map

[Carbon Management](#)  
[Regulations](#)  
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**Demonstration Projects**  
▶ Bell Creek  
[Scope of Work](#)  
[Benefits to the Region](#)  
[Characterization Data](#)  
[Modeling](#)  
[MVA](#)  
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## Bell Creek Demonstration



The Bell Creek carbon capture and storage (CCS) and enhanced oil recovery (EOR) project will demonstrate that commercial EOR operations, with simultaneous CO<sub>2</sub> storage, can safely and cost-effectively store regionally significant amounts of CO<sub>2</sub>.

Over the lifespan of the project, at least 14 million tonnes of CO<sub>2</sub> will be transported 232 miles by pipeline from the ConocoPhillips Lost Cabin natural gas-processing plant in central Wyoming to the Bell Creek oil field, where it will be injected into the oil-bearing rock of the Muddy Sandstone Formation at a depth of 4400 feet (1370 m). This project will produce an estimated 30+ million barrels of incremental oil.

Denbury Resources, Inc., a major independent oil and gas exploration and production company, will perform the CO<sub>2</sub> capture, transport, and injection. Within this operation, the PCOR Partnership will design and implement a comprehensive monitoring, verification, and accounting (MVA) program designed to demonstrate the best methods for verifying that the CO<sub>2</sub> injected for EOR ultimately remains in place. The PCOR Partnership's effort will occur during the early part of Denbury's 20 year commercial EOR activity.

**Research Partners**

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**Regulatory Partners**

<b>Wyoming Office of State Lands and Investments</b> 	<b>Montana Board of Oil and Gas Conservation</b> 		<b>Wyoming Oil and Gas Conservation Commission</b> 
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Figure 3. Bell Creek DPRS landing page.



**Partners-Only**  
**Decision Support System**

DSS Home
PCOR Partnership
Partner Directory
EERC Contacts
Site Map

Carbon Management

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Regulations

---

Carbon Markets

---

Risk Management

---

Field Validation Tests

**Demonstration Projects**

Bell Creek

► **Fort Nelson**

Scope of Work

Benefits to the Region

Characterization Data

Modeling

MVA

Risk Management

Permitting

Site Operations

Products

Interactive Maps

---

Products Database

---

Image Gallery

---

Keep Me Informed

---

2010 Annual Meeting

### Fort Nelson Demonstration



The PCOR Partnership and Spectra Energy Transmission (SET) are investigating the feasibility of a carbon capture and storage (CCS) project near Fort Nelson, British Columbia, Canada. The project aims to reduce CO<sub>2</sub> emissions from SET's Fort Nelson sour gas-processing plant by injecting approximately 2.5 million tons of sour CO<sub>2</sub> (approximately 95% CO<sub>2</sub>, 4% hydrogen sulfide, and 1% methane) annually into a deep carbonate reef for long-term geologic storage.

The Fort Nelson CCS project provides a unique opportunity to develop a set of cost-effective, risk-based monitoring techniques for large-scale storage of sour CO<sub>2</sub> in deep saline formations. An approach is being developed that integrates characterization, modeling, risk assessment, and monitoring into an iterative process to produce superior-quality results during each phase of the project. Elements of any of these activities are crucial for understanding and developing the other activities. The lessons learned and best practices employed will provide the data, information, and knowledge needed to develop similar CCS projects across the region.

**Research Partners**

**Regulatory Partners**

Figure 4. Fort Nelson DPRS landing page.

## Products Database

New PCOR Partnership products are regularly added to the database once they are approved for release to partners. Currently, the database contains over 600 products produced by the PCOR Partnership since its inception in 2003. With the growth of the database, it became necessary to revise the search page to provide a more user-friendly interface, as shown in Figure 5.

## Keep Me Informed

The Keep Me Informed page is periodically updated to provide partners with information pertinent to the partnership. As new items are added, old updates are removed.

EERC WP42105.CDR

**DSS** Partners-Only  
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### Products Database

**Search for**

*Tip: Use this option to look for specific words or phrases in the entire database. The search can be limited by checking Title, and/or Authors boxes.*

**In:** ☐ Title ☐ Authors

**Search by file type**  
*Tip: Check the boxes next to specific file type(s) you would like to find.*

<input type="checkbox"/> Abstract	<input type="checkbox"/> Monthly Report	<input type="checkbox"/> Progress Report
<input type="checkbox"/> Agenda	<input type="checkbox"/> News Article	<input type="checkbox"/> Quarterly Technical Progress Report
<input type="checkbox"/> Atlas	<input type="checkbox"/> Paper	<input type="checkbox"/> Technical Report
<input type="checkbox"/> Fact Sheet	<input type="checkbox"/> Poster	<input type="checkbox"/> Topical Report
<input type="checkbox"/> Final Report	<input type="checkbox"/> Presentation	

**Search by date**  
*Tip: Select one date search option and enter the date in the mm/dd/yyyy format.*

☒ Search by publication date    After:  mm/dd/yyyy    Before:  mm/dd/yyyy

☐ Search by date added    After:  mm/dd/yyyy    Before:  mm/dd/yyyy

**Browse by**

Figure 5. Revised Products Database search page.

## 2010 Annual Meeting

An Annual Meeting section (see Figure 6) was added to the DSS to showcase highlights from the PCOR Partnership 2010 Annual Meeting and Workshop held October 19–21, 2010, in Minneapolis, Minnesota. Partners can get results from the Implications Wheel Workshop, download meeting presentations and handouts, and get a transcript of the round-table discussion.



Figure 6. 2010 Annual Meeting landing page.

## **PCOR Partnership**

As new partners join the PCOR Partnership, their name and URL are updated on this page.

## **Partner Directory**

The Partner Directory is a database-driven page that is continuously updated to include the partners' most recent contact information.

## **Site Map**

The Site Map is revised as changes to the DSS site are made.

## **Interactive Maps**

The GIS portion of the DSS has undergone significant redesign. These modifications are most apparent from the user interface perspective, but also extend behind the scenes. The less obvious changes have taken place with the GIS layers moving to a geodatabase platform to take advantage of data management and performance benefits.

After considering multiple programming options such as Adobe® Flex™, Microsoft® Silverlight™, and Sun Microsystems JavaScript™, we opted for Flex. Flex provides for a fast and more intuitive user interface, much like is seen in popular mapping applications like Google Maps™ and Microsoft's Bing™. Flex technology is also very widely used and is supported on multiple platforms and devices. The latest version of Flex also provides the option to design native applications for popular mobile platforms such as Android™ and iPhone®.

The latest user interface redesign integrates seamless background maps provided as map services by ESRI. This allows for the presentation of the regional characterization data on high-resolution satellite and aerial photography, as well as topographic and thematic-based road maps (Figure 7). Data exploration can now be easily performed by simply moving the mouse pointer over a feature to get summary data.

Performance improvements include screen-size independent display (large monitors will no longer pose a display issue), faster redraw times, and few mouse clicks between when exploring the data. All of the improvements will bring the data closer to the user with greater ease. A full array of the tools and their functionality will be compiled when the next release of the GIS interface is released in early 2012.



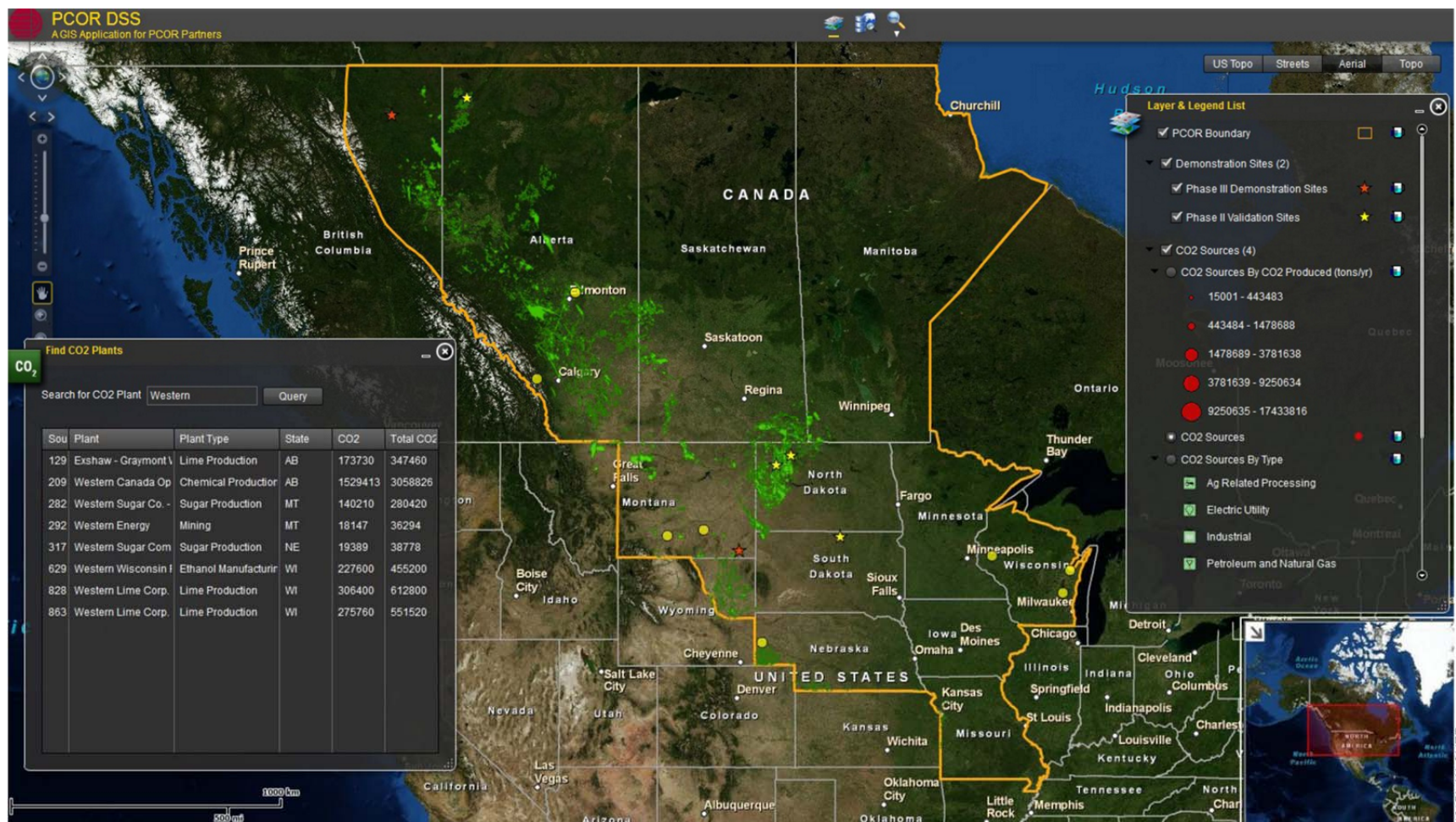


Figure 7. Draft screen shot of the revised Interactive GIS Map.



## **Next Steps**

In order to keep partners and DOE apprised of the latest PCOR Partnership activities, the DSS site will continue to be revised as needed. In particular, the DPRS will undergo major revisions as the Phase III demonstration projects continue to develop. The products database will remain a central database where partners will continue to get immediate access to all PCOR Partnership activities. With respect to the GIS portion of the DSS, new functionality will be created, allowing for interaction with the saline storage distribution map layers. New efforts are also under way to streamline content on the DSS and public PCOR Partnership Web site.