

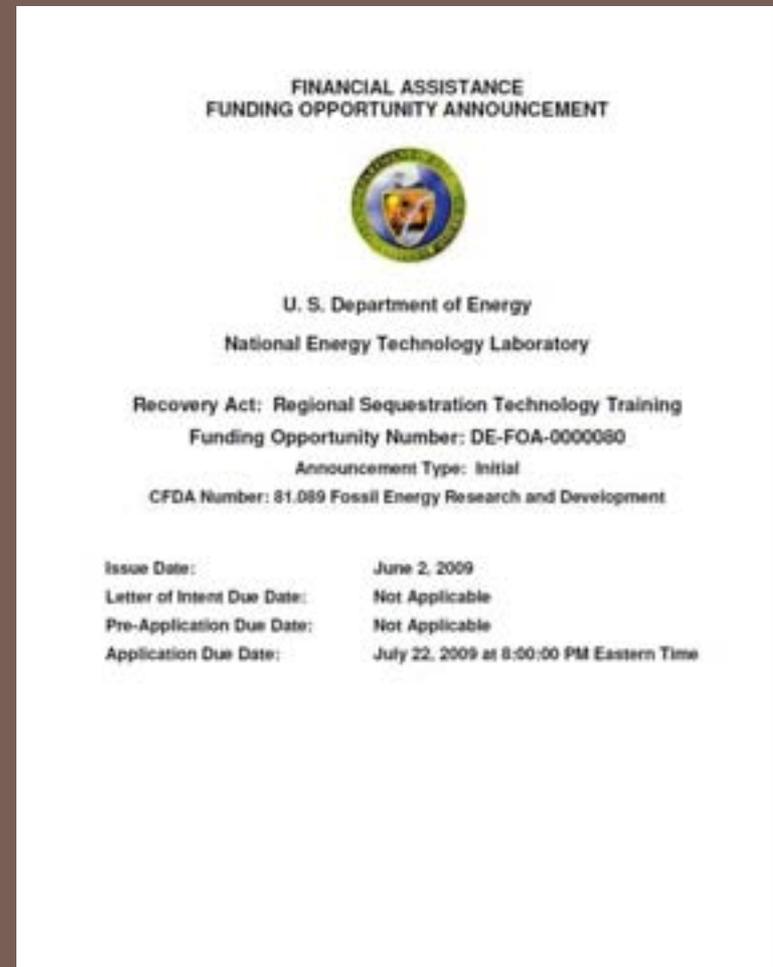
# Wyoming CCS Technology Institute (WCTI)

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# Recovery Act:

## Regional Sequestration Technology Training

- on June 2, 2009 DOE's National Energy Technology Laboratory issued the Regional Sequestration Technology Training funding opportunity
- the program was:
  - to award 7 projects
  - maximum amount: \$995,000
  - duration: 3 years



# Background

- deploying CCS industry will “...require a significantly expanded workforce trained in the various specialties that are currently under-represented in the United States.” (p. 5)
- project activities were to designed to “...develop a future generation of geologists and other scientists, and engineers that will provide the human capital and skills required for implementing and deploying CCS technologies.” (p. 5)

# Objectives

- *“...develop regional sequestration technology training to facilitate transfer of knowledge and technologies required for site development, operations, and monitoring of commercial CCS projects.” (p. 5)*
- *“...focus on the applied engineering and science of CCS for site developers, geologists, engineers, and technicians.” (p. 5)*
- *“...provide a technology transfer platform for CO<sub>2</sub> sequestration related technology information and insights on a basin scale level...” (p. 5)*
- *“...skills and competencies in geology, geophysics, geomechanics, geochemistry and reservoir engineering disciplines.” (p. 5)*

# Required Activities

- *Activity 1:* Implement an Organized Sponsorship Development Program
- *Activity 2:* Development of Short Courses on CCS Technologies
- *Activity 3:* Regional Training and other Activities through Outreach and Networking
- *Activity 4:* Perform Regional/Basin Technology Transfer Services
- *Activity 5:* Plan and Manage the Recipient's Regional Program

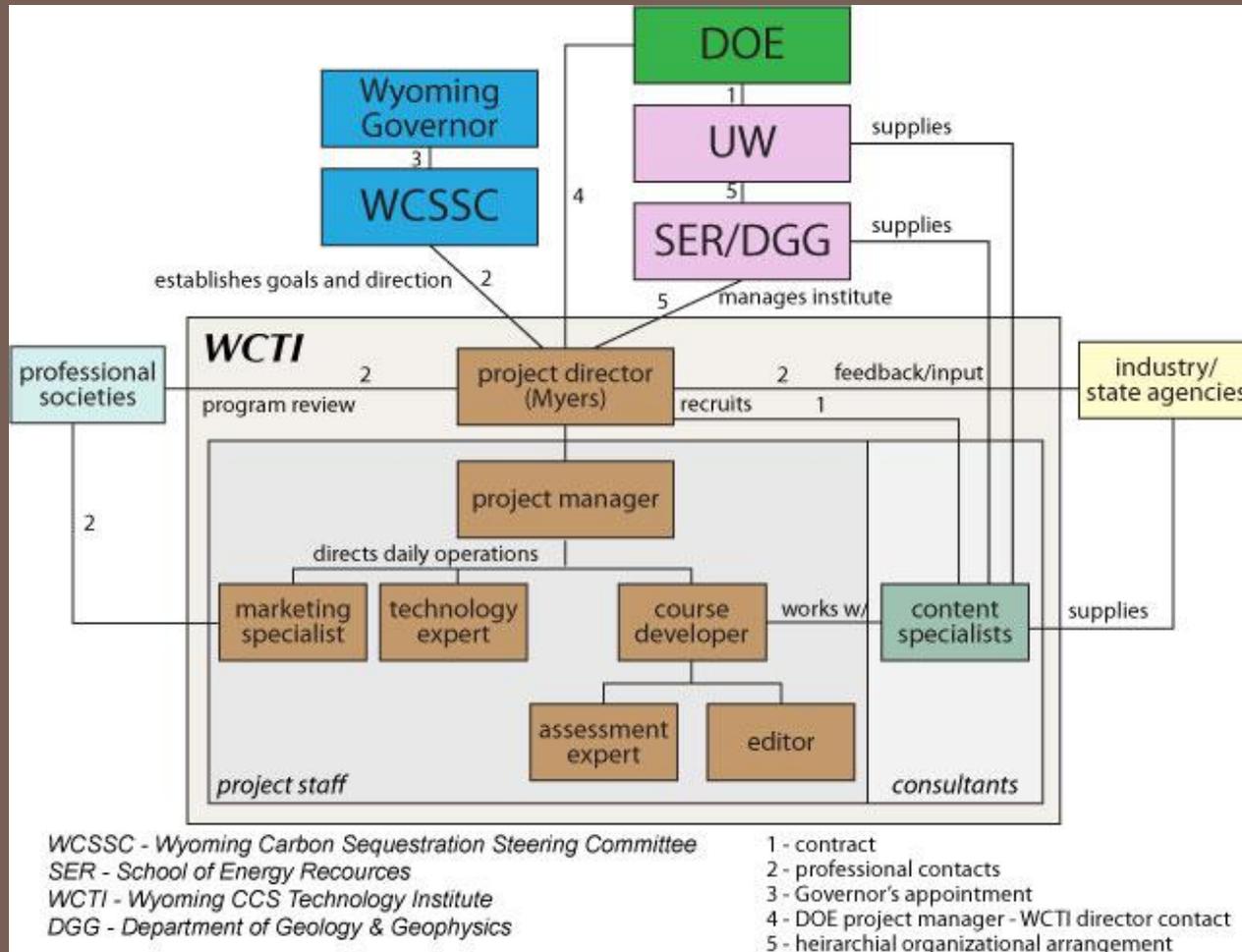
# Wyoming CCS Technology Institute

- total project funding: \$1,895,786
  - DOE: \$994,910
  - state match: \$900,876
- will be an administrative unit of UW's School of Energy Resources (SER)
  - interim housed in Department of Geology & Geophysics
  - upon completion of the project the institute will transfer to SER
- focus on training new graduates in Earth sciences and engineering fields as well as professionals from allied disciplines
  - provide them skills and knowledge to allow them to quickly enter the sequestration workforce

# WCTI Objectives

1. establish and manage the *Wyoming CCS Training Institute*
2. deploy the technological infrastructure necessary to support the WCTI's missions
3. train the future CCS workforce via the development and delivery of training short courses
4. promote regional CCS technology transfer through workshops and an online information clearinghouse

# Objective 1: Establish Institute Organizational Structure



# Objective 1: Establish Institute Institute Staff

- Project Director – Myers
- full time
  - Project Manager
  - Marketing specialist
  - Technology expert
  - Course developer
- half time
  - Assessment expert
  - Editor

# Objective 1: Establish Institute Business Model

**Table 4: Estimated Short Course and Workshop Expenses**

instructional costs							
	# courses	frequency	contact hours	instructor fee	travel		total
overviews	3	12	8	\$65			\$18,720
professional	8	12	24	\$65			\$149,760
workshops	2	1	8	\$65	\$5,186		\$6,226
						Sum:	\$174,706
development costs							
	# courses	contact hours	develop. hours	develop. fee	subtotal	other	total
overviews	1	40	200	\$65	\$13,000	\$1,500	\$14,500
professional	2	40	200	\$65	\$13,000	\$3,000	\$16,000
workshops	2	8	40	\$65	\$2,600	\$3,000	\$5,600
						Sum:	\$36,100
Instructional Total:							\$210,806

**Table 3: Estimated Short Course and Workshop Income**

	# courses	frequency	enrollment	course fee	total
overview intro	1	260	1	\$200	\$52,000
other overviews	3	12	15	\$400	\$216,000
professional	8	12	20	\$2,000	\$3,840,000
workshops	2	1	50	\$700	\$70,000
					Sum: \$4,178,000

- project funding will create infrastructure, start course catalog, workshop directory
  - won't try to recover this costs through revenue
- revenue will go towards maintaining organization, expanding course catalog

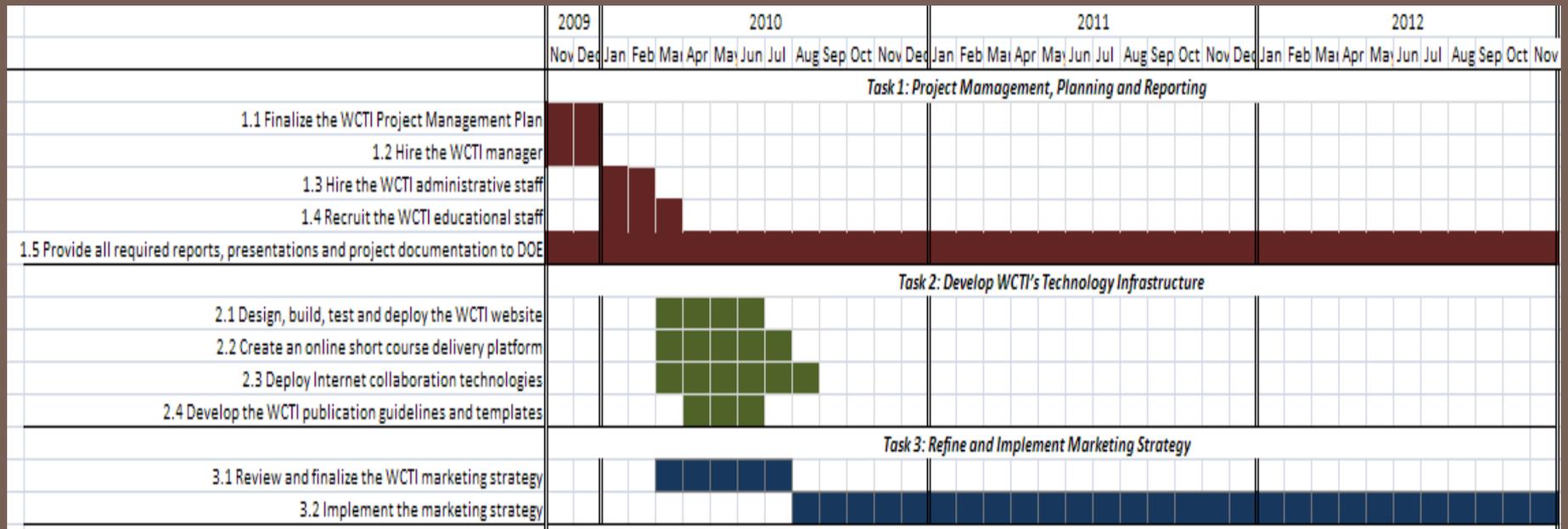
# Objective 2: Tech Infrastructure

## Web site

- WCTI website functionality:
  - interactive event calendar
  - display advertizing and promotional announcements
  - identify different user categories, e.g. paying subscribers vs. casual visitors
  - host and distribute CSS information and announcements
  - accept staff and CCS stakeholder submissions
  - deliver online classes
  - handle electronic commerce
  - stream Webinars and RSS feeds
  - host and manage forums and threaded discussions

# Objectives 1 & 2

## Proposed Timeline



# Objective 3: Training Short Courses

## Educational Model

- prepare professionals for the CCS industry
  - target audience is individuals with advanced degrees and/or related work experience
- course structures and organization will follow successful training models used by:
  - Microsoft™ for software training
  - Oracle™ for database development and administration
  - ESRI™ for geographical information system
- courses organized around professional strands
  - geologist/reservoir engineer
  - geochemist/chemical engineer

# Objective 3: Training Short Courses

## Course Catalog

Table 1: Workforce Preparation Course Catalog						
	geologist/ reservoir engineer	geochemist/ chemical engineer	geophysicist/ petroleum engineer	permit writer/ regulatory/lawyer		
overview classes	An Introduction to the CCS Industry (online - asynchronous)					developed during project
	Underground Injection Control (UIC <sup>1</sup> ): Overview (online - synchronous)					
	CCS Regulatory and Legal Framework (online - synchronous)					
	CCS Site Characterization: Best Practices (online - synchronous)					
professional classes	Site Characterization: Estimating Storage Capacity	Site Characterization: Baseline Geochemical Data	Site Characterization: Geophysical Methods	Site Characterization: NEPA <sup>2</sup> Review	developed during project	
	CCS Site Well Databases: Building	CCS Site Well Databases: Geochemical Uses	CCS Site Well Databases: Geophysical Uses	CCS Site Well Databases: Evaluating		
overview classes	Measurement, Verification and Accounting (online - synchronous)					developed after project
	Carbon Sequestration Site Evaluation (online - synchronous)					
professional classes	Assessing the Seal: Methods and Procedures	CO <sub>2</sub> : Chemistry and Fluid Properties	Monitoring CO <sub>2</sub> : Geophysical Methods	Sequestration Site Permitting: ES <sup>3</sup> & EIS <sup>4</sup> Preparation		
	Estimating Reservoir Storage Capacity	Water Geochemistry	Well Construction: Assessing Leakage Risks	CWA <sup>5</sup> and CAA <sup>6</sup> ; Implications for Sequestration		
	Displaced Fluids: Estimating Pathways	Displaced Fluids: Geochemistry & Treatment		Displaced Fluids: Dealing with Permitting Issues		
		Geochemical Modeling: Principles & Pitfalls		UCI Class IV Wells: A New Class of Injection Wells		
		Brine/CO <sub>2</sub> /rock interactions				

<sup>1</sup>Underground Injection Control; <sup>2</sup>National Environmental Protection Act; <sup>3</sup>Environmental Statement; <sup>4</sup>Environmental Impact Statement; <sup>5</sup>Clean Water Act; <sup>6</sup>Clean Air Act;

# Objective 3: Training Short Courses Educational Model

- WCTI will co-operate with societies to award professional development or continuing education credit
- must pass a comprehensive exam to receive course credit
- after completing all required courses in a professional strand, an individual will take a proficiency test in that area
  - upon passing the test they will earn certification in a specific field

# Objective 3: Training Short Courses

## Workforce Preparation Course Catalog

- independent, 1-5 days, online and face-to-face training classes
- divided into:
  - general overview courses (4)
  - specialized courses for particular professional fields (8)
- extensively tested and refined before being offered for credit
- WTCI's catalog will be offered on a continuing basis
  - foundation for development of additional courses after the WCTI becomes self-sustaining

# Objective 3: Training Short Courses Online, Overview Courses

**Table 1: Workforce Preparation Course Catalog**

	geologist/ reservoir engineer	geochemist/ chemical engineer	geophysicist/ petroleum engineer	permit writer/ regulatory affairs	
overview classes	An Introduction to the CCS Industry (online - asynchronous)				developed during project
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	Estimating Reservoir Storage Capacity	Water Geochemistry	Well Construction: Assessing Leakage Risks	CWA <sup>5</sup> and CAA <sup>6</sup> : Implications for Sequestration	
	Displaced Fluids: Estimating Pathways	Displaced Fluids: Geochemistry & Treatment		Displaced Fluids: Dealing with Permitting Issues	
		Geochemical Modeling: Principles & Pitfalls		UCI Class IV Wells: A New Class of Injection Wells	
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# Objective 3: Training Short Courses

## Overview Courses

- introduce the CCS industry's broad structure and technological, regulatory and legal frameworks
- goals:
  - demonstrate the industry's interdisciplinary nature
  - provide the common knowledge, background and vocabulary different professions need to effectively communicate with each other
  - describe the procedures and processes necessary to characterize potential sequestration sites
- offered:
  - online either in synchronous or asynchronous mode
  - face-to-face meetings at national professional conferences not primarily focused on CCS
- introduce the CCS industry and WCTI to individuals who have the knowledge set to join the industry's workforce

# Objective 3: Training Short Courses

## Overview Courses

- An Introduction to the CCS Industry
  - on-line, asynchronous
- Underground Injection Control (UIC): Overview
  - on-line, synchronous
- CCS Regulatory and Legal Framework
  - on-line, synchronous
- CCS Site Characterization: Best Practices
  - on-line, synchronous

# Objective 3: Training Short Courses

## Online Courses

- delivered using Elluminate *Live!*<sup>®</sup>
  - a virtual classroom with two-way voice over Internet
  - instant messaging
  - shared, interactive whiteboard
  - multi-platform support
- virtual class sessions can be recorded and posted online as podcasts, Flash videos or QuickTime movies

# Objective 3: Training Short Courses

## Professional Courses

**Table 1: Workforce Preparation Course Catalog**

	geologist/ reservoir engineer	geochemist/ chemical engineer	geophysicist/ petroleum engineer	permit writer/ regulatory/lawyer	
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	Underground Injection Control (UIC <sup>1</sup> ): Overview (online - synchronous)				
	CCS Regulatory and Legal Framework (online - synchronous)				
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# Objective 3: Training Short Courses

## Professional Courses

- two to five day, professional strand courses
  - face-to-face
  - offered in Laramie as well as other venues
- prepare individuals with appropriate educational or work experience for professional positions in the CCS industry
- complement traditional educational or industry training by focusing specifically on CCS issues
- designed and taught by industry, business, academic and government experts working in CCS
- each course will use a variety of technologies, e.g. chats, blogs, Facebook pages, etc., to build a student community centered on the particular course and its content

# Objective 3: Training Short Courses

## Professional Courses

- Site Characterization: Estimating Storage Capacity
- Site Characterization: Baseline Geochemical Data
- Site Characterization: Geophysical Methods
- Site Characterization: NEPA Review
- CCS Site Well Databases: Building
- CCS Site Well Databases: Geochemical Uses
- CCS Site Well Databases: Geophysical Uses
- CCS Site Well Databases: Evaluating

# Objective 3: Training Short Courses

## Future Courses

**Table 1: Workforce Preparation Course Catalog**

	geologist/ reservoir engineer	geochemist/ chemical engineer	geophysicist/ petroleum engineer	permit writer/ regulatory/lawyer	
overview classes	An Introduction to the CCS Industry (online - asynchronous)				developed during project
	Underground Injection Control (UIC <sup>1</sup> ): Overview (online - synchronous)				
	CCS Regulatory and Legal Framework (online - synchronous)				
	CCS Site Characterization: Best Practices (online - synchronous)				
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# Objective 4: Workshops

## Workshops

- transfer geological, technological, scientific, regulatory and legal information about Wyoming/Rocky Mountain region CCS activities
- aimed at CCS experts in industry, academia and government as well as companies considering sequestration activities in the Rocky Mountains
- highly technical with specific, focused subjects
- have durations of one to two days
- be presented at CCS-focused conferences
- archived on WTCI's website creating an online, electronic library of regional CCS geological and technological information

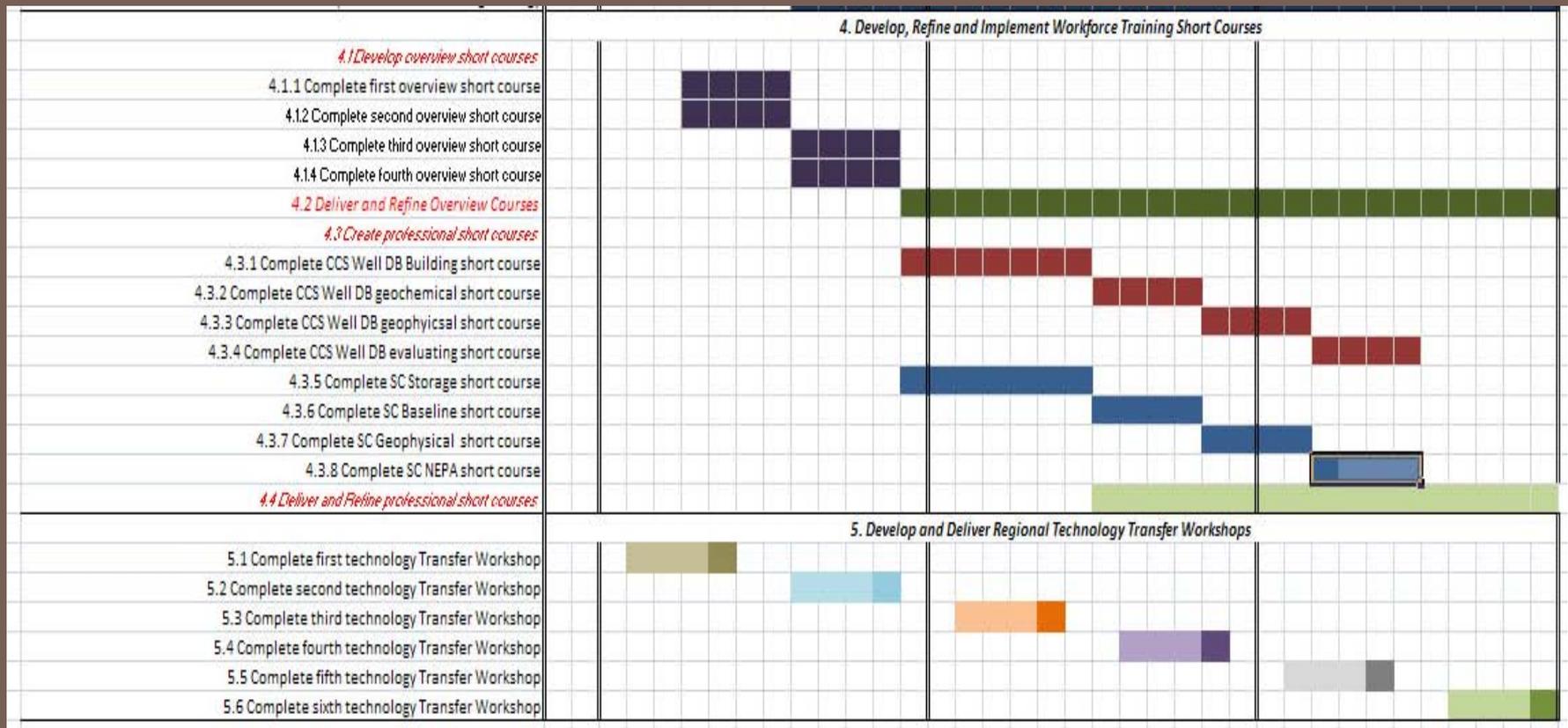
# Objective 4: Workshops Schedule

Table 2: Regional Technology Transfer Workshop Directory

date	workshop	location
Spring, 2010	Wyomings EOR and AGI Activities and CCS	Pittsburgh, PA
Fall/Winter, 2010	Wyoming's Evolving CCS Regulatory and Legal Framework	TBD
Spring, 2011	Rock Springs Uplift, Wyoming: Evaluating a Potential CCS Site	Pittsburgh, PA
Fall/Winter, 2011	Moxa Arch, SW Wyoming: Site Characterization	TBD

# Objectives 3 & 4

## Development Schedule



# WCTI: Current Status

- UW
  - establishing legal status of WCTI within UW
  - working on intellectual property issues
  - doing HR paperwork for project manager position
    - start advertising immediately
    - hope to hire by end of December
  - finding a home – space crunch

# Summary

- WCTI primary objectives:
  - train the future CCS workforce via the development and delivery of training short courses
  - promote regional CCS technology transfer through workshops and an online information clearinghouse
- accomplished primarily through:
  - short courses
  - workshops
  - technology transfer
- staff of six

# Summary

- train the future CCS workforce via the development and delivery of training short courses
- focus on professionals needed by CCS industry
  - address engineering, scientific, legal and regulatory issues
- two types of classes:
  - overview: give all specialists same foundation, recruit new talent
  - professional: prepare specialists (geologists, regulators, engineers, etc.)
- courses offered online and face-to-face
- courses created through collaboration between:
  - content specialists: contracted to develop and teach courses
  - training experts (staff): use sound training/pedagogical techniques, ensure consistency and quality

# Wyoming CCS Technology Institute

- questions?