Oil & Natural Gas Technology

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Quarterly Report

Comprehensive Lifecycle Planning And Management System For Addressing Water Issues Associated With Shale Gas Development In New York, Pennsylvania, And West Virginia

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National Energy Technology Laboratory

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Quarterly Progress Report

Title: **Comprehensive Lifecycle Planning and Management System for Addressing Water Issues Associated With Shale Gas Development in New York, Pennsylvania, and West Virginia**

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Period: October 1, 2010 - December 31, 2010

Executive Summary

The objective of this project is to develop a modeling system to allow operators and regulators to plan all aspects of water management activities associated with shale gas development in the target project area of New York, Pennsylvania, and West Virginia ("target area"), including water supply, transport, storage, use, recycling, and disposal and which can be used for planning, managing, forecasting, permit tracking, and compliance monitoring.

The proposed project is a breakthrough approach to represent the entire shale gas water lifecycle in one comprehensive system with the capability to analyze impacts and options for operational efficiency and regulatory tracking and compliance, and to plan for future water use and disposition. It will address all of the major water-related issues of concern associated with shale gas development in the target area, including water withdrawal, transport, storage, use, treatment, recycling, and disposal. It will analyze the costs, water use, and wastes associated with the available options, and incorporate constraints presented by permit requirements, agreements, local and state regulations, equipment and material availability, etc.

By using the system to examine the water lifecycle from withdrawals through disposal, users will be able to perform scenario analysis to answer "what if" questions for various situations. The system will include regulatory requirements of the appropriate state and regional agencies and facilitate reporting and permit applications and tracking. These features will allow operators to plan for more cost effective resource production. Regulators will be able to analyze impacts of development over an entire area. Regulators can then make informed decisions about the protections and practices that should be required as development proceeds.

To ensure the success of this project, it has been segmented into nine tasks conducted in three phases over a three year period. The tasks will be overseen by a Project Advisory Council (PAC) made up of stakeholders including state and federal agency representatives and industry representatives. ALL Consulting will make the catalog and decision tool available on the Internet for the final year of the project.

In this, the first quarter of the second budget period, work progressed on schedule, and all project deliverables were submitted on time. No problems have been encountered to date. There was one milestone scheduled for completion during this quarter and it was met as scheduled.

Results of Work During the Reporting Period

Approach

Task 5.0: ALL is working to develop the final system requirements based on the issues and needs identified in the first budget period. Data structure, including data fields, table structure and data table relationships, is being planned for each module. ALL is working with SRBC, DRBC, and other regulators to obtain access to their data in order for the agencies to be able to seamlessly use the system with their data. ALL is also working to create GIS layers that will work with each of the agencies' data and support data entry by industry users as well.

ALL has experienced minor difficulty in obtaining data from SRBC because the individual who was Director of SRBC when the project proposal was planned is no longer in that job. The new Director has taken a cautious approach to sharing the data and has asked for additional information about the project and how the data will be used and has asked SRBC lawyers to craft a non-disclosure agreement between SRBC and ALL Consulting. SRBC has verbally reaffirmed its commitment to honor the original plan to participate in the project, but has expressed a desire to ensure the security of their data by securing written agreements as to its use. While this has slowed some aspects of system design, ALL is confident that the issues will be resolved in a timely manner and it does not appear, at this time that the data issues will affect the planned milestone date for completion of the system design. ALL will monitor this development, keep the DOE Project Officer informed, and will consult with the Project Officer if data access issues threaten to delay the milestone completion date.

ALL is also working to stay abreast of regulatory developments in the various jurisdictions within the project states. The model will incorporate some of those regulatory elements that affect shale gas water management. ALL gathered regulatory information at the beginning of the project, in order to begin crafting the system. Many of the regulatory elements originally gathered have changed and new ones have been added. ALL will update the regulatory information included in the system and make any needed changes to the data structure when the system is first launched for review and again before the project ends.

Task 7: Technology Transfer: ALL Consulting established a project web-site that is structured to provide updates to project team members, the PAC, and others. The project website can be accessed at http://www.all-llc.com/projects/shale_water_lifecycle/ . In addition to a project overview and basic information about the project, the site has a page for the issues identified and page with a list of project-related reports, papers, and presentations. ALL will continue to update this site throughout the project and will use the site to distribute information to the PAC and solicit feedback. The site can also be accessed by the NETL project officer at any time as a way to follow the latest project activities and results.

As a result of the project presentation made for AIPG during the first budget period, ALL was contacted by the New York Water Environment Association (NYWEA) and asked to provide an article about the Lifecycle project for the NYWEA quarterly magazine, "Clearwaters." The article was published in the Winter 2010 issue (Vol. 40, No. 4). Because this is a subscription magazine, the magazine article is not available on-line, but ALL has requested a PDF of the ar-

ticle that can be posted on our project website and shared with NETL for posting if desired. Clearwaters' staff has indicated that the PDF will be made available, but as of the date of this report, the file has not been received.

In addition, the SPE Americas E&P Health, Safety, Security & Environmental Conference has accepted an ALL paper based on this project, entitled, Cumulative Impacts of Shale Gas Water Management: Considerations and Challenges." The paper will be presented at the March 21-23, 2011 conference in Houston, TX.

Results

Based on work completed in the first Budget Period, the final system requirements and design for the Lifecycle model are being created. This work will guide the actual programming and data entry required to construct the model.

Milestone Status: In September 2010, ALL Consulting recognized that completing Milestone 6, "Deliver topical report" as scheduled would require preparation of the report before all of the Budget Period 1 activities were completed. ALL contacted the DOE Project Officer and rescheduled the milestone completion date for 10/30/2010. In the first quarter of this budget period, the Topical Report was submitted as scheduled and was subsequently revised and finalized based on NETL comments.

Milestone Status Table

Budget Period/ Milestone No.	Milestone Description	Planned Completion Date	Actual Completion Date
I			
1	Completion of PMP	12/04/09	12/01/09
2	Completion of Technology Status Assessment	11/14/09	11/14/09
3	Develop project web-site	12/04/09	12/04/09
4	Completion of Initial Issue Analysis	03/30/10	03/29/10
5	Complete Site Visits	09/30/10	9/26/10
II			
6	Deliver topical report	10/30/10	10/29/10
7	Complete final system requirements and deliver topical report with final system requirements and design	4/30/2011	On-track
8	Complete model development and internal company testing	9/30/2011	On-track
9	Deliver draft operating water management modeling system for testing	9/30/2011	On-track
III			
10	Deliver final operating water management model	3/31/2012	
11	Complete delivery of five conference papers and presentations	9/30/2012	

COST/PLAN STATUS

Baseline Reporting Quarter	YEAR 1 Start:10/01/09 End: 09/30/10 Q1	Q2	Q3	Q4	YEAR 2 Start: 10/01/10 End: 09/30/11 Q1	Q2	Q3	Q4	YEAR 3 Start: 10/01/11 End: 09/30/12 Q1	Q2	Q3	Q4
Baseline Cost Plan (from SF-424A)												
Federal Share	114,998	114,998	114,998	114,998	81,619	81,619	81,619	81,619	64,652	34,546	34,546	34,552
Non-Federal Share	29,281	29,281	29,281	29,281	26,643	21,232	21,232	21,232	16,708	11,025	11,025	11,025
Total Planned (Federal and Non-Federal)	144,279	144,279	144,279	144,279	108,263	108,263	108,263	108,263	81,360	45,570	45,570	45,570
Cumulative Baseline Cost	144,279	288,558	432,839	577,115	108,263	644,912	749,655	854,398	935,758	1,017,118	1,098,478	1,179,838
Actual Incurred Costs												
Federal Share	140,061	14,462	106,276	199,129	66,053							
Non-Federal Share	1,260	40,000	12,858	77,858	0							
Total Incurred Cost-Quarterly (Federal and Non-Federal)	141,321	54,462	119,134	276,987	66,053							
Cumulative Incurred Costs	141,321	195,783	314,917	591,904	66,053							
Variance												
Federal Share	(25,063)	100,536	8,722	(84,131)	15,567							
Non-Federal Share	28,021	(10,719)	16,422	(48,578)	26,643							
Total Variance-Quarterly (Federal and Non-Federal	2,958	89,817	25,145	(142,708)	42,210							
Cumulative Variance	2,958	92,775	117,919	(14,789)	42,210							

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