

Technical Progress Report for the
Gas Storage Technology Consortium

4th Quarterly Report for the Period
7/1/2004 – 9/30/2004

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ABSTRACT

Gas storage is a critical element in the natural gas industry. Producers, transmission and distribution companies, marketers, and end users all benefit directly from the load balancing function of storage. The unbundling process has fundamentally changed the way storage is used and valued. As an unbundled service, the value of storage is being recovered at rates that reflect its value. Moreover, the marketplace has differentiated between various types of storage services, and has increasingly rewarded flexibility, safety, and reliability. The size of the natural gas market has increased and is projected to continue to increase towards 30 trillion cubic feet (TCF) over the next 10 to 15 years. Much of this increase is projected to come from electric generation, particularly peaking units. Gas storage, particularly the flexible services that are most suited to electric loads, is critical in meeting the needs of these new markets.

In order to address the gas storage needs of the natural gas industry, an industry-driven consortium was created – the Gas Storage Technology Consortium (GSTC). The objective of the GSTC is to provide a means to accomplish industry-driven research and development designed to enhance operational flexibility and deliverability of the Nation's gas storage system, and provide a cost effective, safe, and reliable supply of natural gas to meet domestic demand. To accomplish this objective, the project is divided into three phases that are managed and directed by the GSTC Coordinator.

The first phase, Phase 1A, was initiated on September 30, 2003, and was completed on March 31, 2004. Phase 1A of the project included the creation of the GSTC structure, development and refinement of a technical approach (work plan) for deliverability enhancement and reservoir management. This report deals with Phase 1B and encompasses the period July 1, 2004, through September 30, 2004. During this time period there were three main activities. First was the ongoing negotiations of the four sub-awards working toward signed contracts with the various organizations involved. Second, an Executive Council meeting was held at Penn State September 9, 2004. And third, the GSTC participated in the SPE Eastern Regional Meeting in Charleston, West Virginia, on September 16th and 17th. We hosted a display booth with the Stripper Well Consortium.

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EXECUTIVE SUMMARY

Gas storage is a critical element in the natural gas industry. Producers, transmission and distribution companies, marketers, and end users all benefit directly from the load balancing function of storage. The unbundling process has fundamentally changed the way storage is used and valued. As an unbundled service, the value of storage is being recovered at rates that reflect its value. Moreover, the marketplace has differentiated between various types of storage services, and has increasingly rewarded flexibility, safety, and reliability. The size of the natural gas market has increased and is projected to continue to increase towards 30 trillion cubic feet (TCF) over the next 10 to 15 years. Much of this increase is projected to come from electric generation, particularly peaking units. Gas storage, particularly the flexible services that are most suited to electric loads, is critical in meeting the needs of these new markets.

In order to address the gas storage needs of the natural gas industry, an industry-driven consortium was created – the Gas Storage Technology Consortium (GSTC). The objective of the GSTC is to provide a means to accomplish industry-driven research and development designed to enhance operational flexibility and deliverability of the Nation’s gas storage system, and provide a cost effective, safe, and reliable supply of natural gas to meet domestic demand. To accomplish this objective, the project is divided into three phases that are managed and directed by the GSTC Coordinator.

The first phase, Phase 1A, was initiated on September 30, 2003, and was completed on March 31, 2004. Phase 1A of the project included the creation of the GSTC structure, development and refinement of a technical approach (work plan) for deliverability enhancement and reservoir management. This report deals with Phase 1B and encompasses the period July 1, 2004, through September 30, 2004. During this time period there were three main activities. First was the ongoing negotiations of the four sub-awards working toward signed contracts with the various organizations involved. Second, an Executive Council meeting was held at Penn State September 9, 2004. And third, the GSTC participated in the SPE Eastern Regional Meeting in Charleston, West Virginia, on September 16th and 17th. We hosted a display booth with the Stripper Well Consortium.

EXPERIMENTAL

This project is a consortium between industries, academia, and the U.S. Department of Energy. As a consortium, there are no experimental results to report.

RESULTS and DISCUSSION

The process of creating the Gas Storage Technology Consortium (GSTC) began on September 30, 2003. During the first six months of its existence, the gas storage industry worked with Penn State University and the Department of Energy to develop a constitution that governs the operation of the GSTC. Part of this constitution (or by-laws) was the formation of a nine member Executive Council which was intended to be mostly comprised of individuals directly involved in the gas storage industry. To insure this, a two person limit was placed on the number of individuals from academia serving on the Executive Council at any given time. This was done to insure that the research direction of the consortium was inline with the current needs of the gas storage industry.

A nine member Executive Council was elected, and the first round of Request For Proposals (RFP) was made public with a proposal due date of May 27, 2004. Seventeen proposals were received and a proposal selection meeting was held June 9th and 10th, 2004 in Morgantown, West Virginia. The result of this meeting was the selection of six projects for funding. More complete details of this meeting can be found in the 3rd quarterly report¹, previously submitted to the DOE.

This report deals with the activities of the fourth quarter of the current contract, from July 1, 2004 through September 30, 2004. During this time period efforts were directed to three main areas. 1) negotiation of the sub-awards to get signed contracts in place between the GSTC and the organizations whose proposals were selected by the EC for funding, 2) a meeting of the Executive Council at Penn State on September 9th, 2004, and 3) the GSTC participated in the Society of Petroleum Engineers (SPE) Eastern Regional Meeting, held in Charleston West Virginia September 16th and 17th, 2004.

At the proposal selection meeting in Morgantown, WV, six projects were selected for funding. However, two projects selected by the EC were subsequently withdrawn and contracts for the research were not formalized. The first project was "Smart Gas: Using Chemicals to Improve Gas Deliverability" with Correlations Company. The problem

with this project was the fact that Correlations Company could not come up with the required 40% cost match. The second unsuccessful project was “New and Improved Deliverability Enhancement Methodology for Gas Storage Wells” with Kinder-Morgan. In their original proposal, Kinder-Morgan requested \$120,108 in funding from the GSTC. The Executive Council selected the project, but was only willing to fund the project at the amount of \$60,000. Kinder-Morgan did not feel that this was adequate funding for the proposed project and withdrew their proposal. As of September 30, 2004 three contracts were executed, with the remaining one still in negotiation. The fully executed contracts were: “Real-time Wellbore Integrity Modeling” from Colorado School of Mines, “Renovations of Produced Waters from Underground Natural Gas Storage Facilities: A Feasibility Study Using Hybrid Constructed Wetland Technology,” from Clemson University, and “Gas Storage Deliverability Enhancement and Maintenance: An Intelligent Portfolio Management Approach,” West Virginia University. The remaining project that is currently under negotiation is: “Compact Separators for Gas Storage Field Applications,” Colorado Engineering Experiment Station.

On September 9th 2004, a meeting of the Executive Council was held at the University Park Campus of Penn State. The purpose of this meeting was to address issues dealing with the constitution, web-page and plans for the RFP for the next funding cycle. The meeting agenda is in Appendix 1. The format of the meeting was a conference call because many of the Executive Council members were unable to attend in person. Those in attendance were: Robert Watson, David Johnson, Daniel Driscoll, Christina Sames, Sue Lavan, Ray Harris, and Natalie Novak. Those that were able to participate via speaker phone were: Larry Kennedy, Jim Philo, Karen Benson, Steve Bergin, and Steve Foh. And those whom were unable to attend in person or by phone were: Larry Chorn, Andrew Theodos, Charles Chabannes, and John Leeson. The meeting minutes are in Appendix 2. A summary of the items discussed at the meeting will be briefly discussed below.

The first item discussed was the wording of the RFP given that some proposal submitters misinterpreted the requirement for the submission of a public abstract. In certain instances, these organizations were of the opinion that the information contained in the abstract was proprietary. Consequently, permission to publish the abstract was

withheld. It was decided to make the language of the next RFP more explicit so that this issue would not reappear next year. Moreover, it was noted that any proposal that was received by the GSTC without a public abstract, or release to publish the accompanying public abstract, would not be considered for funding by the consortium.

The next topic discussed was the future modifications to the GSTC web site. It was decided that three layers of access to the web site would be created. First, was a full public access layer with general information about the GSTC and instructions on how to become a member. It was also decided that this layer would also contain a directory where articles or other information related to hydrocarbon storage could be posted. Second, a GSTC members only layer where project results and other relevant information could be posted. And third, an Executive Council only layer, where information such as the full project proposals would be posted and could be shared among executive council members.

Several other topics were discussed and clarified. It was decided that during the EC proposal selection meeting, that any EC member with a “conflict of interest” concerning the proposal being considered, must leave the room and avoid any discussion of the project until the voting is complete. Also it was decided that all non-voting Executive Council members are to be included in all Executive Council communications, and that access to full proposals would be made available. Other topics discussed were: EC communication response time, the need for official EC meeting minutes, EC decisions being final, new proposal evaluation forms, Ad-hoc groups, 40% cost share requirement, members being limited to two persons attending meetings, and GSTC constitutional amendments. It was decided that the next RFP release date would be October 1, 2004 with a proposal due date of January 15, 2005. It has since been decided that because the selected date of January 15 falls on a Saturday, that the proposal due date will be changed to Monday, January 17, 2005. The next Consortium proposal selection meeting will be held February 2nd and 3rd, 2005 in Houston, Texas.

In order to promote the activities of the GSTC and recruit more members, we participated in the Society of Petroleum Engineers (SPE) Eastern Regional Meeting in Charleston, West Virginia September 16th and 17th, 2004. A booth was manned jointly with the Stripper Well Consortium (SWC). Both of these DOE sponsored consortia are

managed by Penn State. Member registration forms and informational handouts were made available to those in attendance.

CONCLUSIONS

In order to address the gas storage needs of the natural gas industry, an industry-driven consortium has been created – the Gas Storage Technology Consortium (GSTC). The objective of the GSTC is to provide a means to accomplish industry-driven research and development designed to enhance operational flexibility and deliverability of the Nation's gas storage system, and to provide a cost effective, safe, and reliable supply of natural gas to meet domestic demand. To accomplish this objective, the project is divided into three phases that are managed and directed by the GSTC Coordinator. Base funding for the consortium is provided by the U.S. Department of Energy (DOE). In addition, funding has been received from the Gas Research Institute (GRI).

The first phase of the consortium, Phase 1-A, was initiated on September 30, 2003, and was completed on March 31, 2004. Phase 1-A of the project included the creation of the GSTC structure, development and refinement of the constitution (by-laws), and election of the nine member Executive Council.

The project is currently in the second phase, (Phase 1-B) which began on April 1, 2004. The current reporting period is from July 1, 2004 thru September 30, 2004. During this time period there were three main activities. First were the ongoing negotiations of the four sub-awards that were to culminate with signed contracts in place. Second, an Executive Council meeting was held at Penn State September 9, 2004. And third, the GSTC participated in the SPE Eastern Regional Meeting in Charleston, West Virginia, on September 16th and 17th.

The next consortium meeting is scheduled for February 2-3, 2005 at the Wyndham Hotel, Houston Texas. This meeting will serve as both a technology transfer session and a meeting where the next round of projects are selected for funding. The RFP due date for this round of funding has been set for January 17, 2004. Subsequent reports will deal with these activities.

REFERENCES

1. "Technical Progress Report for the Gas Storage Technology Consortium: 3rd Quarterly Report for the Period 4/1/2004 – 6/30/2004", Watson, R.W., July, 2004.

APPENDIX 1: GSTC EC Meeting Agenda, September 9, 2004



GSTC EC Meeting
Thursday, September 9, 2004
104 Hosler Building
The Pennsylvania State University, University Park, PA
12:00-Noon
Agenda

- EC Communications
- GSTC Communications
- GSTC Accounting
- EC Meeting Minutes/Procedures
- Ad-hoc Groups
- RFP & Constitution amendments

Appendix 2: September 9, 2004 E.C. Meeting Minutes



To: GSTC Executive Council

From: Dr. Robert Watson, Director

Re: GSTC Executive Council Meeting, September 9, 2004

Date: September 21, 2004

Meeting held September 9, 2004 at Penn State

The Executive Council meeting began at 12:13 PM.

Attendees:

In-Person

Robert Watson

David Johnson

Daniel Driscoll

Christina Sames

Sue Lavan

Ray Harris

Natalie Novak

Phone:

Larry Kennedy

Jim Philo

Karen Benson

Steve Bergin

Steve Foh

Unable to attend in person or by phone:

Larry Chorn

Andrew Theodos

Charles Chabannes

John Leeson

Items discussed at the meeting are addressed in this memo.

1) Proposal Abstract:

- a. RFP Interpretation: Some proposal submitters did not interpret the RFP correctly, specifically the area of a Public Abstract. The Public Abstract must be addressed in the RFP checklist and it must be clearly stated that if the proposal is not complete, according to the RFP checklist, the proposal will not be accepted. Christina Sames provided draft language for modification of the RFP to emphasize the importance of filing a complete proposal in accordance with the RFP checklist.**
- b. The “Consortia Office” will receive the proposal and verify that the contents are complete according to the RFP checklist. This will occur at the same time for all proposals, after the RFP deadline. If all of the information is not included, the proposal will be rejected.**
- c. Once the proposals have been received by Penn State, opened, and it has been determined that all items on the checklist have been met: Abstracts will be posted (within five business days) to the website for the EC and GSTC members to view (in the Members-only area), but not the public. Full proposals will only be available to the Executive Council, including non-voting members (in the EC-only area). After the proposal selection meeting, selected proposal abstracts will be posted to the website with full public access. This will occur within five business days following the proposal selection meeting. Penn State will not wait until after the contracts are in place to make the abstracts of selected projects available to the public. If a project is to be funded with modifications to the original scope or proposal, only the approved name of the project will be listed on the public portion of the website with a footnote or other clear demarcation that indicates a modified version of the abstract will be subsequently posted.**

2) GSTC website:

- a. Discussion revolved around putting links to other organizations on the GSTC website. Links to organizations such as: DOE, PRCI, DOE’s Stripper Well Consortium, and also to GSTC member companies websites. Sue Lavan will look into the legal issues of this from Penn State’s perspective. If there are no legal issues, the EC believes that it is appropriate for links to non-profit R&D organizations and/or member companies to be placed on the GSTC website after they are approved by a majority vote of the EC.**

- b. **Three layers of access will be created on the website: Public, members only, EC only.**
- c. **Create a “publications” area on the website in the public area to post articles or other information related to hydrocarbon storage that the GSTC Director believes to be of interest to the Consortium and/or the general public. Project results will be posed to a separate area from the public access “publications” area in the “members only” area of the website.**
- d. **Abstracts for projects selected for funding will be posted to the public area of the website within five business days of the selection meeting.**
- e. **Sue Lavan will pull together information from the Office of Sponsored Programs (OSP) Database and compile an update of the subaward status for each of the proposals selected. Dave Johnson will then have this information posted to the GSTC website in the EC council only section.**

3) Conflict of interest:

- a. **During an Executive Council proposal selection meeting: Any EC member with a “conflict of interest” concerning the proposal being considered, MUST leave the room and avoid any discussion of the project until the voting is complete. This person would not be able to vote on that particular proposal. If it is the GSTC Director that has a conflict of interest and has to leave the room, the DOE representative will preside over the meeting.**

4) Non-Voting EC members:

- a. **Non-voting Executive Council members will be included in all Executive Council communications, including access to the full proposals when they come in following a RFP.**

5) EC communication response time:

- a. **When a decision needs to be made or a response received from the EC, a minimum of 5 working days must be allowed for a response. If the communication was sent via e-mail, and no response has been received after 5 working days, an attempt by phone to reach the non-responsive EC member(s) will be made.**

6) EC meeting minutes:

- a. **“Official” meeting minutes will be taken at all EC meetings. These minutes will then be reviewed by the EC. The EC will have 5 working days to respond. EC will suggest changes in**

WORD using “track changes” feature, and return the file to Penn State via e-mail. The suggested changes will be incorporated into these minutes and will be resubmitted to the EC for final approval. The approved minutes will then be posted to the GSTC website in the members section.

7) EC Decisions:

- a. Decisions made at EC meetings are FINAL. The project based on a specific budget and scope of work agreed upon by a majority of the voting EC members will be offered for award, and once agreed upon will not be changed. If the EC desires to alter the original proposal, clearly defined contingencies may be identified to assist the Director in seeking a modified budget or scope from the proposing consortium member (respondent). If the respondent does not agree to the changes in scope or budget approved by the EC or can not reach agreement within the previously established contingency path, the project will be dropped. Bottom line: there will be a FINAL agreement that will be documented in the meeting minutes.**

8) Proposal Evaluation Forms:

- a. The EC decided to continue with the practice of handing out evaluation forms for the GSTC members to use in evaluating the proposals as presented at the GSTC meetings. The evaluation forms will be collected and tabulated by Penn State for the EC’s consideration during their proposal funding deliberations. Bob Watson, Karen Benson and Jim Philo will work together to develop an evaluation form for approval by the EC. Steve Foh will e-mail them some forms that his organization has used for this purpose.**

- b. Evaluation forms are not the only consideration for the funding decision. A primary purpose of the EC meeting after proposals have been presented to the membership is to discuss the proposals and hear all views. The evaluation form is just a tool , and the results from the evaluation forms are not binding on the EC. If the funding outcome differs from the evaluation form outcome, then the differences will be**

documented. No information about EC deliberations will be disclosed other than what is posted on the website. One of the duties of the GSTC Director is to act as a representative of the EC in dealing with challenges to the decisions of the EC.

9) Ad-hoc groups:

- a. Once contracts are finally executed, how do we gain additional members to ad-hoc groups? The Ad-hoc Chairman contacts people to serve on the group and is responsible for the selection of the group. The PI will agree to the members selected. Parties with conflicts of interest can not serve on ad-hoc committees. Chairmen of Ad-hoc committees are selected by the EC according to the Constitution.

10) Cost Share:

- a. A minimum of 40% cost share must be present for a proposal to be considered.

11) Member details:

- a. Penn State will revise the meeting registration form to reflect that only 2 persons can attend meetings from any one member company. Proposals are limited to primary membership, not subsidiary, unless the subsidiary also joins the GSTC.

12) Future dates:

- a. Next RFP release date will be October 1, 2004
- b. Proposal due date Jan 15, 2005
- c. Next Consortia meeting is February 2 and 3, 2005 in Houston, Texas.

13) Constitutional Amendments

Bob Watson and Sue Lavan will work on the language to be approved by the EC to amend the Constitution as follows:

- a. The DOE representative will preside over meetings at any time the Director is unable.
- b. A minimum of 45-day notice of regular meetings will be given to members via e-mail.
- c. Parent, Affiliate, and Subsidiary company membership designations and requirements will be defined.

14) GSTC Accounting

- a. **Bob Watson will develop, provide, and maintain a spreadsheet accounting of consortium funds posted in the in the EC only area of the website.**