

Oil & Natural Gas Technology

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Quarterly Research Performance Progress Report (Period ending 3/31/2013)

A new approach to understanding the occurrence and volume of natural gas hydrate in the northern Gulf of Mexico using petroleum industry well logs

10/1/2012-9/30/2015

Submitted by:
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Office of Fossil Energy

EXECUTIVE SUMMARY

The main objective of the project is to significantly increase our understanding of the occurrence, volume and fine scale distribution of natural gas hydrate in the northern Gulf of Mexico using petroleum industry and Gulf of Mexico Gas Hydrate Joint Industry Project (JIP) well logs.

In the first quarter (October 1, 2012-December 13, 2012), the initial steps were to establish an estimate for the base of gas hydrate stability zone (GHSZ) for each industry well in the Gulf of Mexico and begin ordering industry well data. For the modeling side of the project, student Brian Tost completed a formation model for JIP2 wells in Alaminos Canyon, Gulf of Mexico. Ann Cook and Barbara Anderson began constructing formation models for the sand reservoir in Green Canyon, Gulf of Mexico.

In the second quarter (January 1, 2013-March 31, 2013) well orders were completed for each block in the Gulf of Mexico, by Cook, Urmi Majumdar (PhD student), Abby Crock (undergraduate hourly) and Samyria Ismail (undergraduate hourly). Eleven total DVDs were ordered from the Bureau of Safety and Environment Enforcement (BSEE). Student Brian Tost defended his master's thesis on the JIP Alaminos Canyon wells. We are currently editing his thesis to send to the Journal of Geophysical Research. Undergraduate senior Abby Crock completed her thesis on Alaminos Canyon industry wells in Block 857.

PROGRESS, RESULTS AND DISCUSSION

See Table 1 for Project Timeline on each task and subtask.

Task 1.0 – Project Management Plan

During October and November, the Cook worked with Skip Pratt to develop the PMP for the project. It was completed on November 27, 2012.

Cook participated in a project kickoff conference call with DOE on November 7, 2012.

Task 2.0: Evaluation of gas hydrate occurrence in petroleum industry well logs

Subtask 2.1: Calculate the depth of the GHSZ depth in the Gulf of Mexico using ArcGIS.

Gas hydrate stability zone models for the Gulf of Mexico were received from Matt Frye, BOEM. These models contain minimum, mean and maximum estimates as well as breakdowns from P10-P90. The Frye models were assessed and by Cook and students, and compared to a blanket GIS calculation based only on bathymetric depth. We decided Frye models were likely more accurate, and decided to use the P90 gas hydrate stability zone depth as a cutoff for the log order. Thus, wells that contains only logs depths deeper than P90 will not be ordered.

Students Tost and Ismail worked on outputting spreadsheet data from the GIS to make the industry well log orders. Some GIS issues, including missing wells, were encountered and hopefully fixed.

The first well data order from BSEE was on December 7, 2012 and ordering continued through the end of Q2. Two undergraduate students, Crock and Ismail, PhD student Majumdar, and Cook ordered well data and compiled spreadsheets on each well (Subtask 2.2). In total, 11 DVDs were ordered full of logging data from the Gulf of Mexico. This task was completed at the end of Q2.

Subtask 2.2: Well log evaluation and database development.

Spreadsheets were developed for each block in the Gulf of Mexico for wells drilled in water column greater than 1400 ft. Orders were then compiled on the BSEE website using their well query system. Each well was queried using the API number. The BSEE seafloor depth at each well was crosschecked with GIS bathymetry data to make sure hydrate stability zone calculations were reasonably valid. Well logs that were above the P90 cutoff were ordered in each well, including (but not limited to) gamma ray, resistivity, velocity, density, neutron porosity and caliper. Most frequently, wells only contained resistivity and gamma ray logs. Additionally, we will not know how shallow some of the logs were recorded until the log data is analyzed. Typically the top of logged interval is only reported for the top of any log and typically does not represent the top of logged interval for all logs.

Task 3.0: Modeling of resistivity measurements from JIP Leg 2

Subtask 3.1: Develop true resistivity models for sand reservoirs for JIP Leg 2 Holes

A resistivity model that incorporates the measured resistivity and the seismic trace in for JIP2 Holes AC-21A and AC-21B has been developed by Tost and Cook.

An initial model for JIP2 Hole GC-955H was completed in December 2012. Anderson and Cook are collaborating to produce more accurate models. These models are on track for completion at the end of Q4.

Subtask 3.2: Determine hydrate saturation using best-fit ANISBED models.

This task is on track to begin in Q3.

Task 4.0: Determining volume of methane in gas hydrate in the northern Gulf of Mexico

This task and associated subtasks are on track to begin in Phase II.

Task 5.0: Publication, presentation and dissemination of results.

A publication is being prepared on the resistivity anomaly in Alaminos Canyon for the *Journal of Geophysical Research* with authors Brian Tost and Ann Cook. Tost and Cook will present their findings at the Unconventional Resources Technology Conference in Denver Colorado in August 2013.

	Phase 1								Phase 2			
	Year 1				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Task 1	[Tan bar spanning all 12 quarters]											
Task 2	[Tan bar spanning Year 1 and Year 2]											
Subtask 2.1	[Green bar with black dot in Q2]											
Subtask 2.2		[Green bar with black dot in Q2 of Year 2]										
Task 3	[Tan bar spanning Year 1 and Year 2]											
Subtask 3.1	[Green bar with black dot in Q4 of Year 1]											
Subtask 3.2			[Green bar with black dot in Q3 of Year 2]									
Task 4					[Tan bar spanning Year 2 and Year 3]							
Subtask 4.1									[Green bar with black dot in Q2 of Year 3]			
Subtask 4.2					[Green bar]							
Subtask 4.3					[Green bar with black dot in Q4 of Year 3]							
Task 5					[Tan bar spanning Year 2 and Year 3]							

Table 1. Project timeline by task (tan bars) and subtask (green bars). Total project time is 2, 18 month-long phases (3 years). Subtask 2.1 has been completed and the first milestone was met. Milestones are indicated by a black dot.

PARTICIPANTS

Name: Ann Cook

Project Role: PI

Contribution: Managing student time, developing models for JIP wells, ordering well data

Person Months: .5

Name: Brian Tost

Project Role: Graduate student

Contribution: Alaminos Canyon formation models, preparing paper for publication

Funding Support: NSF fellowship

Person Months: 1.5

Name: Urmi Majumdar

Project Roll: Graduate student

Contribution: ordering well data, familiarizing self with project and past literature on the Gulf of Mexico gas hydrates

Person Months: 1.5

Matt Frye of BSEE has also been involved with the project by supplying his GIS calculations of the gas hydrate stability zone.

COSTS

During Q2 charges to the project include graduate student tuition, undergraduate hourly pay, and DVD ordering. A few things were ordered during this period that have not yet been reflected on financial statements, including a computer for Majumdar, some undergraduate hourly pay and most of the DVD orders.

Department: 06560		The Ohio State University - Office of Sponsored Programs			Project: 60036410	
Principal Investigator: Cook, Ann Elizabeth		Project Financial Summary			Award: GRT00028365	
Sponsored Program Officer: Scribner, Joseph Scott		For the Month Ending: MAR 31, 2013			Sponsor: US Department of Energy	
Facilities & Administration Rate: 52.50 %		Project Period: 10/01/2012 to 03/31/2014			Grant/Contract: DE-FE0009949	
Project/Award Title: New approach to understanding the occurrence and volume of natural gas hydrate in the northern Gulf of Mexico using petroleum industry well logs						
Sponsor						
Category	Budget	Expenses This Month	Expenses To Date	Commitments	Balance	
Salaries and Wages	52,030.00	1,892.92	5,743.56	9,136.10	37,150.34	
Fringe Benefits	5,888.00	189.29	574.35	913.61	4,400.04	
GA Tuition and Fees	23,256.00	0.00	5,852.00	14,700.00	2,704.00	
Total Personnel Costs	81,174.00	2,082.21	12,169.91	24,749.71	44,254.38	
Materials and Supplies	0.00	0.00	35.00	0.00	-35.00	
Domestic Travel	10,000.00	0.00	0.00	0.00	10,000.00	
Purchased Services	15,000.00	0.00	0.00	0.00	15,000.00	
Total Direct Costs	106,174.00	2,082.21	12,204.91	24,749.71	69,219.38	
Facilities and Administrative	43,532.00	1,093.16	3,335.30	5,276.10	34,920.60	
Total	149,706.00	3,175.37	15,540.21	30,025.81	104,139.98	
Cost Share						
Category	Budget	Expenses This Month	Expenses To Date	Commitments	Balance	
GA Tuition and Fees	0.00	0.00	8,656.00	0.00	-8,656.00	
Total Personnel Costs	0.00	0.00	8,656.00	0.00	-8,656.00	
Total Direct Costs	0.00	0.00	8,656.00	0.00	-8,656.00	
Total	0.00	0.00	8,656.00	0.00	-8,656.00	
Third Party						
Category	Budget	Expenses This Month	Expenses To Date	Commitments	Balance	
Other Direct Costs	22,500.00	0.00	0.00	0.00	22,500.00	
Purchased Services	52,000.00	0.00	0.00	0.00	52,000.00	
Total Direct Costs	74,500.00	0.00	0.00	0.00	74,500.00	
Total	74,500.00	0.00	0.00	0.00	74,500.00	

Table 2. Total costs through Q2.

Department: 06560		The Ohio State University - Office of Sponsored Programs			Project: 60036410	
Principal Investigator: Cook, Ann Elizabeth		Detail of Expenses			Award: GRT00028365	
Sponsored Program Officer: Scribner, Joseph Scott		For the Month Ending: MAR 31, 2013			Sponsor: US Department of Energy	
		Project Period: 10/01/2012 to 03/31/2014			Grant/Contract: DE-FE0009949	
Project/Award Title: New approach to understanding the occurrence and volume of natural gas hydrate in the northern Gulf of Mexico using petroleum industry well logs						
Account	Account Description				Sponsor Expense	
60092	Graduate Research Associate				1,827.22	
60131	Student (non-GA/non-FWSP)				65.70	
	Salaries and Wages				1,892.92	
60292	Bnft-Graduate Research Assoc				182.72	
60331	Bnft-Student (non-GA/non-FWSP)				6.57	
	Fringe Benefits				189.29	
	Total Personnel Costs				2,082.21	
	Total Direct Costs				2,082.21	
66701	Indirect Costs				1,093.16	
	Facilities and Administrative				1,093.16	
	Total F&A Costs				1,093.16	
	Total Project Costs This Month				3,175.37	

Table 3. Detail of expenses through Q2.

Department: 06560		The Ohio State University - Office of Sponsored Programs				Project: 60036410	
Principal Investigator: Cook, Ann Elizabeth		Detail of Payroll Expenses				Award: GRT00028365	
Sponsored Program Officer: Scribner, Joseph Scott		For the Month Ending: MAR 31, 2013				Sponsor: US Department of Energy	
		Project Period: 10/01/2012 to 03/31/2014				Grant/Contract: DE-FE0009949	
Project/Award Title: New approach to understanding the occurrence and volume of natural gas hydrate in the northern Gulf of Mexico using petroleum industry well logs							
Employee							Sponsor Expenses
Account	ID	Name	Journal ID	Journal Date	Pay Type	Description	This Month
60092	200299301	Majumdar, Umi		03/29/2013	HR Monthly	HR Payroll Expense	1,827.22
Total for Account							1,827.22
60131	200208533	Ismail, Samrya A		03/22/2013	HR Bi-Weekly	HR Payroll Expense	65.70
Total for Account							65.70
60292			BNRF700576	03/31/2013	Other	OSURF BENEFIT RATE 5	182.72
Total for Account							182.72
60331			BNRF500430	03/31/2013	Other	OSURF BENEFIT RATE 5	6.57
Total for Account							6.57
Total for Project							2,082.21

Table 3. Detail of payroll expenses through Q2.

CONCLUSION

Currently, all project tasks are on track. The well ordering required all six months due to a late start on the project, but was completed on time. There are no major changes from the PMP and no significant impact to report this early in the project.