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Quarterly Research Performance Progress

Report (Period Ending 9/30/2017)

Deepwater Methane Hydrate Characterization and Scientific Assessment

Project Period (10/1/2016-9/30/2020)

Submitted by:

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A handwritten signature in black ink, reading 'Peter B. Flemings', is written over a horizontal line.

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1 ACCOMPLISHMENTS

1.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?

The goals of this project are to plan and execute a state-of-the-art field program in the Gulf of Mexico to characterize methane hydrates. The project team will acquire conventional core, pressure core, and downhole logs, and perform in situ testing and measure physical properties in methane hydrate reservoirs in the Gulf of Mexico (GOM) to meet this goal.

Project Milestones are listed in the tables below.

Table 1: Previous Project Phase Milestones (Phase 1)

Milestone Description	Planned Completion	Actual Completion	Verification Method	Comments
M1A: Project Management Plan	3/2/2015 (BP1)	03/18/2015	Project Mgmt. Plan	--
M1B: Project Kick-off Meeting	1/14/2015 (BP1, Q2)	12/11/2014	Presentation	--
M1C: Site Location and Ranking Report	9/30/2015 (BP1, Q3)	09/30/2015	Phase 1 Report	--
M1D: Preliminary Field Program Operational Plan Report	9/30/2015 (BP1, Q3)	09/30/2015	Phase 1 Report	--
M1E: Updated CPP Proposal Submitted	5/1/2015 (BP1, Q3)	10/1/2015	Phase 1 Report	--
M1F: Demonstration of a viable PCS Tool	9/30/2015 (BP1, Q4)	09/30/2015	Phase 1 Report	--
M1G: Document results of BP1/Phase 1 Activities	12/29/2015 (BP2, Q1)	1/12/2016	Phase 1 Report	--

Table 2: Current Project Phase Milestones (Phase 2)

Milestone Description	Planned Completion	Actual Completion	Verification Method	Comments
M2A: Complete Updated CPP Proposal Submitted	11/2/2015 (BP2, Q1)	Nov 2015 (BP2, Q1)	Quarterly Report	Presented in Y2Q1 report
M2B: Scheduling of Hydrate Drilling Leg by IODP	5/18/2016 (BP2, Q3)	May 2017 (BP2, Q7)	Report status immediately to DOE PM	Expedition 386 scheduled for 2020
M2C: Demonstration of a viable PCS tool for hydrate drilling through completion of land-based testing	12/21/2015 (BP2, Q5)	Dec 2015 (BP2, Q5)	PCTB Land Test Report, in Quarterly Report	Presented in Y2Q1 report
M2D: Demonstration of a viable PCS tool for hydrate drilling through completion of a deep water marine field test	1/2/2017 (BP2, Q6)	May 2017 (BP2, Q7)	UT-GOM2-1 Expedition Summary, in Quarterly Report	Presented in Y3Q7 report
M2E: Complete Refined Field Program Operation Plan	9/26/2017 (BP2, Q8)	--	Phase 2 Report	In progress
M2F: Document results of BP2/Phase 2 Activities	12/29/2017 (BP3, Q1)	--	Phase 2 Report	In progress

Table 3: Future Project Phase Milestones (Phases 3A, 3B)

Milestone Description	Planned Completion	Actual Completion	Verification Method	Comments
M3A: Field Program Operational Plan report	12/18/2018 (BP3A, Q5)	--	Quarterly Report	--
M3B: Completion of Field Program Permit	12/9/2018 (BP3A, Q5)	--	Quarterly Report	--
M3C: Completion of Hazards Analysis	10/9/2018 (BP3A, Q5)	--	Field Program Haz. Report, in Quarterly Report	--
M3D: Demonstration of a viable PCS tool for hydrate drilling through completion of field operations	4/4/2019 (BP3A, Q7)	--	Quarterly Report	--
M3E: Complete IODP Preliminary Expedition Report	6/27/2019 (BP3A, Q7)	--	Send directly to DOE PM	--
M3F: Complete Project Sample and Data Distribution Plan	8/8/2019 (BP3A, Q8)	--	Send directly to DOE PM	--
M3G: Initiate Expedition Scientific Results Volume	4/3/2020 (BP3B, Q3)	--	Send directly to DOE PM	--
M3H: Complete IODP Proceedings Expedition Volume	8/24/2020 (BP3B, Q4)	--	Send directly to DOE PM	--

We are currently revising the schedule for future project phases in concert with the Budget Period 2/Budget Period 3 transition which will occur January 15, 2018. The Project Phase Milestones will be adjusted accordingly in the next Quarterly Report (BP2 Q9).

1.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

Previous - Phase 1 / Budget Period 1

Table 4: Tasks completed under Phase1/BP1

Task	Status	Quarterly Report with Task Information
Task 2.0 Site Analysis and Selection	Complete	Y1Q1, Y1Q2, Y1Q3, Y1Q4
Task 3.0 Develop Pre-Expedition Drilling/Logging/Coring/Sampling Operational Plan	Complete	Y1Q3, Y1Q4
Task 4.0 Complete and Update IODP CPP Proposal	Complete	Y1Q2, Y1Q3, Y1Q4
Task 5.0 Pressure Coring and Core Analysis System Modification and Testing	Complete	Y1Q2, Y1Q3, Y1Q4

Current - Phase 2 / Budget Period 2

TASK 1.0 - Project Management and Planning

Status: Ongoing

Activity this Period

Objective 1: Assemble teams according to project needs.

- Recruited for new postdoctoral research fellow
 - Conducted interviews
 - Made offers
 - Hired new postdoctoral researcher

Objective 2: Coordinate the overall scientific progress, administration and finances of the project.

- Managed current tasks (see details in document below).
- Monitored costs.
- Held regular meetings with DOE to deliberate Phase 2 / Budget Period 2 transition and future project phases.
- Submitted a formal request to DOE and was subsequently granted a no-cost extension of Budget Period 2 through January 15, 2017. This will allow UT to complete the following:
 - Perform final review of costs from the 2017 Marine Test;
 - Complete a review of the pressuring coring tool system performance and prepare a plan for improvement;
 - Assess experience from the Marine Test and incorporate them into planning of future project phases;
 - Allow time for more complete evaluation of costs schedules for future budget periods.
- Engaged stakeholders and subcontractors to begin development of refined costs and detailed scopes of work for future phases/budget periods of the project, in consultation with the project Advisory Board.
- Held weekly web conferences with DOE to plan for Budget Period 2 continuation/transition.
- Developed refined scopes of work and cost estimates in preparation for Budget Period 2 transition/continuation.

Objective 3: Communicate with project team and sponsors.

- Defined members and objectives of Pressure Coring Tool Development Team, and organized meetings for further testing and development of the pressure coring tool prior to the CPP-887 Expedition.
- Defined members and objectives of CPP-887 Operational Planning Team, and organized meetings for development of CPP-887 expedition plan with DOE, TAMU, USGS, and Geotek.
- Managed SharePoint sites, email lists, and archive/website.
- Organized face-to-face meeting with UT and TAMU in College Station, TX to discuss and plan permitting of CPP-887 expedition.

Objective 4: Coordinate and supervise all subcontractors and service agreements to realize deliverables and milestones according to the work plan.

- Actively managed subcontractors and service agreements.
- Completed no-cost extension for Oregon State University through January 15, 2017.
- Requested, received, and reviewed proposals and cost estimates from subcontractors for future project phases.

Objective 5: Compare identified risks with project risks to ensure all risks are identified and monitored. Communicate risks and possible outcomes to project team and stakeholders.

- Actively monitored project risks and as needed reported to project team and stakeholders.

TASK 6.0 - Technical and Operational Support of Complimentary Project Proposal (CPP)

Status: Ongoing

Table 5: Timing of Complimentary Project Proposal submission

Apr 1, 2015:	First Submittal of CPP
May 1, 2015:	Upload data to IODP SSDB
Oct 1, 2015:	Revised Submittal of CPP
Jan 8, 2016:	Upload data to IODP SSDB
Jan 12-14, 2016:	SEP Review Meeting
Apr 1, 2016:	CPP Addendum Submittal
May 2, 2016:	Upload data to IODP SSDB
May 15, 2016:	Proponent Response Letter Submitted
Jun 21-23, 2016:	SEP Review Meeting
June 2016	Safety Review Report Submitted
July 2016	Safety Presentation PowerPoint
July 11 – 13, 2016	Environmental Protection and Safety Panel (EPSP) Meeting
March 2, 2017	Submit CPP Addendum2
March 10, 2017	Upload Revised Site Survey Data
April 2017	Submit EPSP Safety Review Report V2
May 3, 2017	EPSP Safety Review Presentation V2
May 24, 2017	Scheduling of CPP-887 Hydrate Drilling Leg by JR Facility Board
Jan-March 2020	CPP-887 / IODP Expedition 386

Activity this Period

- Prepared revised scope of work and budget for the future phases of the project, including a refined operational plan for the Field Program / Research Expedition.

- Held in-person and web conference meetings with IODP/Texas A&M to discuss the decision of which institution will hold the status of “Operator” for the Research Expedition, and the associated implications of regulatory and permitting burden.

TASK 7.0 – Cont’d Pressure Coring and Core Analysis System Modifications & Testing

Status: Complete

Completed Subtasks

- Subtask 7.1: Review and Complete NEPA Requirements (PCTB Land Test)
- Subtask 7.2: Pressure Coring Tool with Ball (PCTB) Land Test
- Subtask 7.3: PCTB Land Test Report
- Subtask 7.4: PCTB Tool Modification

TASK 8.0 - Pressure Coring Tool with Ball (PCTB) Marine Field Test

Status: In Progress (The Marine Field Test offshore expedition was completed in May 2017; Marine Test dockside core processing and gas analytics were completed May-June, 2017)

Completed Subtasks

- Decision Point 2: Marine Field Test Stage Gate
- Subtask 8.1: Review and Complete NEPA Requirements
- Subtask 8.2: Marine Field Test Detailed Drilling/Logging/Coring/Sampling Operational Plan
- Subtask 8.3: Marine Field Test Documentation and Permitting
- Subtask 8.4: Marine Field Test of Pressure Coring System

Activity this Period

- Subtask 8.5: Marine Field Test Report (*Status: On Schedule*)
 - The UT-GOM2-1 Science Party continues to refine the Marine Test Report

TASK 9.0 - Pressure Core Transport, Storage, and Manipulation

Status: Ongoing

Completed Subtasks

- Subtask 9.1: Review and Complete NEPA Requirements (Core Storage and Manipulation)
- Subtask 9.2: Hydrate Core Transport
- Subtask 9.3: Storage of Hydrate Pressure Cores
- Subtask 9.4: Refrigerated Container for Storage of Hydrate Pressure Cores
- Subtask 9.5: Hydrate Core Manipulator and Cutter Tool
- Subtask 9.6 Hydrate Core Effective Stress Chamber
- Subtask 9.7 Hydrate Core Depressurization Chamber

TASK 10.0 - Pressure Core Analysis

Status: On Schedule

A process for receiving sample requests, approving requests, and distributing core was finalized and approved by the GOM2 technical advisory council. A form by which members of the greater hydrate community could request samples and data from the Marine Test was distributed. The second round of sample and data requests, including updated requests as requested by the council, were received by UT. The technical advisory council met to review the requests provide guidance on the analysis proposed by each group.

- Subtask 10.1: Routine Core Analysis (Status: On Schedule)

Depressurized core from the Marine Test was divided, stored, and shipped according to sample handling protocols established for mud lab operations on the rig and at the dock. Initial results from the analysis will be included in the Expedition Report. Additional work is still on-going.

We were unable to distribute depressurized core for geotechnical analysis and the full suite of physical properties analysis due to the nature of the core recovered. It might be possible to complete geotechnical analysis on depressurized cores from very slow depressurization and/or slow depressurization with confining pressure.

- Subtask 10.2: Pressure Core Analysis (Status: On Schedule)

After initial pressure core analysis during the expedition as described in the last report, twenty-one pressure cores came to the University of Texas for further distribution at a later time. Samples are expected to be distributed to the University of Texas, USGS Woods Hole, Georgia Tech, NETL, and AIST.

Protocols for Pressure Core cutting and analysis are being tested at UT using synthetic cores made from concrete. Once the protocols have been fully tested, UT will be testing using one of the pressure cores compromised during retrieval and analysis using the expedition, Core UT-GOM2-1-H005-6FB-2.

- Subtask 10.3: Hydrate Core-Log-Seismic Synthesis (*Status: Future Task*)

We were unable to capture well logging data from the hydrate-bearing reservoir in H002 as planned.

TASK 11.0 - Update Pre-Expedition Drilling / Logging / Coring / Sampling Operational Plan (Research Expedition)

Status: On Schedule

Activity this period

- Initiated weekly Operations Team meetings to provide guidance and consensus on refinement of research Expedition Operational Plan.
- Initiated weekly PCTB Development team meetings to review performance of PCTB during Marine Test and provide guidance and consensus on the need for future tool programs.
- Engaged subcontractors with requests to develop revised scopes of work for the Research Expedition based on UT's refined Operational Plan and feedback from the Project Advisory Team.

TASK 12.0 - Field Program / Research Expedition Vessel Access

Status: Complete

In Y3, Q7 UT and the Hydrates Project Advisory Team presented for the IODP EPSP final review. This meeting was attended by members of UT, Columbia University, Ohio State University, BOEM, and USGS. The IODP review panel recommended CPP-887 for scheduling to the JOIDES Resolution Facilities Board. JOIDES Resolution Facilities Board approved CPP-887 and scheduled Expedition 386 for January – March 15, 2020. Having acquired access to the Research Expedition vessel, this task is now completed. Ongoing tasks associated with planning the Research Expedition fall under Task 6.0 (Technical and Operational Support of Complimentary Project Proposal) or Task 11.0 (Update Pre-Expedition Drilling/Logging/Coring/Sampling Operational Plan).

Decision Point 3: Budget Period Continuation

Activity this period

- A no-cost budget period extension was granted extending Phase 2/Budget Period 2 from September 30, 2017 to January 15, 2017.
- As noted in activities reported in Tasks 1, 6, and 11 above, UT has been working hard to prepare for the Budget Period transition/continuation. This has included the following:
 - Holding Operational Planning Team meetings to refine the Operational Plan for the Research Expedition;
 - Holding PCTB Development Team meetings to inform development of future tasks;
 - Engaging subcontractors and vendors with requests for refined scopes work and costs;
 - Discussing proposed revisions to project plan and associated costs with DOE on a weekly basis; and
 - Preparing the required documentation for the Budget Period transition/continuation.

1.3 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

TASK 1.0: Project Management and Planning (continued from prior phase)

UT will continue to execute the project in accordance with the approved PMP, manage and control project activities in accordance with their established processes and procedures to ensure subtasks and tasks are completed within schedule and budget constraints defined by the PMP.

Key project management and planning goals for the next quarter include:

- Complete revised proposal and costs for Budget Period 2 continuation/transition.
- Submit final budget period transition documents to DOE.

TASK 6.0: Technical and Operational Support of Complimentary Project Proposal (CPP)

UT will continue to engage IODP/Texas A&M on critical decision point of who (UT or Texas A&M) will function as the “licensed operator” during the Research Expedition, and move forward with permitting preparations based on this decision. UT will also engage subcontractors on initiation of project tasks to be started in Q1 of the next project phase, beginning January 16, 2018.

Task 7.0: Continued Pressure Coring and Core Analysis System Modifications and Testing

UT has assembled a PCTB Development Team and has held meetings to assess the performance of the pressure coring system during the Marine Test. The PCTB Development Team has determined that additional tool testing and modifications are required prior to the Research Expedition, and has developed a plan for testing, analysis, and modifications, which will be proposed as a future project task.

Task 8.0: Pressure Coring Tool with Ball (PCTB) Marine Field Test

UT will complete the Marine Test Report also known as the UT-GOM2-1 Expedition Summary.

Task 10.0 Pressure Core Analysis

UT will continue analyzing routine (depressurized) core. Refine the pressure core distribution plan and continue pressure core analysis.

Mini-PCATS operation will begin for core sections to be analyzed at the UT pressure core center or transported to collaborating institutions. Gas analysis will continue and gas samples will be sent for clumped isotope analysis at Caltech.

Task 11.0: Update Pre - Expedition Drilling / Logging / Coring / Sampling Operational Plan (Field Program / Research Expedition)

UT will continue to hold planning meetings with Texas A&M University and the project advisory board to plan and refined the Field Program / Research Expedition.

Task 12.0: Field Program / Research Expedition Vessel Access

Research Expedition vessel access has been acquired. IODP has scheduled CPP-887 (Expedition 386) to occur between January and March 2020.

2 PRODUCTS

2.1 PUBLICATIONS, CONFERENCE PAPERS, AND PRESENTATIONS

- Cook, A.E., & Sawyer, D., 2015, Methane migration in the Terrebonne Basin gas hydrate system, Gulf of Mexico, presented at 2015, Fall Meeting, AGU, San Francisco, CA, 14-18 Dec.
- Cook, A.E., & Sawyer, D., 2015, The mud-sand crossover on marine seismic data: *Geophysics*, v. 80, no. 6, p. A109-A114, 10.1190/geo2015-0291.1.
- Cook, A.E., and Waite, 2016, Archie's saturation exponent for natural gas hydrate in coarse-grained reservoir, presented at 2016 Gordon Research Conference from Feb28 to Mar04 in Galveston, TX, United States.
- Cook, A.E., Hillman, J., & Sawyer, D., 2015, Gas migration in the Terrebonne Basin gas hydrate system, Abstract OS23D-05 presented at 2015, Fall Meeting, AGU, San Francisco, CA, 14-18 Dec.
- Cook, A.E., Hillman, J., Sawyer, D., Treiber, K., Yang, C., Frye, M., Shedd, W., Palmes, 2016, Prospecting for Natural Gas Hydrate in the Orca & Choctaw Basins in the Northern Gulf of Mexico, poster at 2016 Fall Meeting, AGU, San Francisco, CA, 12-16 Dec.
- Fortin, W., 2016, Properties from Seismic Data, IODP planning workshop, Southern Methodist University, Dallas, Texas, April 11, 2017.
- Fortin, W., Goldberg, D.S., Holbrook, W.S., and Küçük, H.M., 2016, Velocity analysis of gas hydrate systems using prestack waveform inversion, Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28 - March 4, 2016.
- Fortin, W., Goldberg, D.S., Küçük, H.M., 2016, Methane Hydrate Concentrations at GC955 and WR313 Drilling Sites in the Gulf of Mexico Determined from Seismic Prestack Waveform Inversion, *EOS Trans. AGU*, Fall Meeting, Session 13837: Experiments, Modeling and Field Studies on Gas Hydrate Formation, San Francisco, CA Dec 12---16, 2016.
- Darnell, K., Flemings, P.B., DiCarlo, D.A., 2016, Nitrogen-assisted Three-phase Equilibrium in Hydrate Systems Composed of Water, Methane, Carbon Dioxide, and Nitrogen, Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec. (scheduled)
- Goldberg, D., H.M. Küçük, S. Haines, G. Guerin, 2016. Reprocessing of high resolution multichannel seismic data in the Gulf of Mexico: implications for BSR character in the Walker Ridge and Green Canyon areas, Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28 - March 4, 2016.
- Hillman, J., Cook, A. & Sawyer, D., 2016, Mapping and characterizing bottom-simulating reflectors in 2D and 3D seismic data to investigate connections to lithology and frequency dependence, presented at 2016 Gordon Research Conference from Feb28 to Mar04 in Galveston, TX, United States.
- Hillman, J, Cook, A.E., Sawyer, D., Küçük, H.M., and Goldberg, D.S., 2016. The character and amplitude of bottom-simulating reflectors in marine seismic data, *Earth & Plan Sci Lett.*, doi:<http://dx.doi.org/10.1016/j.epsl.2016.10.058>
- Hillman, J.I.T., Cook, A.E., Daigle, H., Nole, M., Malinverno, A., Meazell, K. and Flemings, P.B, 2017. Gas hydrate reservoirs and gas migration mechanisms in the Terrebonne Basin, Gulf of Mexico. Marine and Petroleum Geology. doi:10.1016/j.marpetgeo.2017.07.029*

- Küçük, H.M., Goldberg, D.S, Haines, S., Dondurur, D., Guerin, G., and Çifçi, G., 2016. Acoustic investigation of shallow gas and gas hydrates: comparison between the Black Sea and Gulf of Mexico, Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28 - March 4, 2016.
- Majumdar, U., Cook, A. E., Shedd, W., and Frye, M., 2016, The connection between natural gas hydrate and bottom-simulating reflectors: Geophysical Research Letters, DOI: 10.1002/2016GL069443
- Malinverno, A., 2015. Monte Carlo inversion applied to reaction-transport modeling of methane hydrate in continental margin sediments, Fall AGU Meeting, San Francisco, Calif., Abstract OS23B-2003.
- Malinverno, A., 2016. Modeling gas hydrate formation from microbial methane in the Terrebonne basin, Walker Ridge, Gulf of Mexico, Gordon Research Conference on Natural Gas Hydrate Systems, Galveston, TX, Feb 28 - March 4, 2016.
- Meazell, K., Flemings, P.B., 2016, Heat Flux and Fluid Flow in the Terrebonne Basin, Northern Gulf of Mexico, Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec. (scheduled)
- Meazell, K., & Flemings, P.B., 2016, New insights into hydrate-bearing clastic sediments in the Terrebonne basin, northern Gulf of Mexico. Gordon Research Conference on Natural Gas Hydrate Systems.
- Meazell, K., & Flemings, P.B., 2016, The depositional evolution of the Terrebonne basin, northern Gulf of Mexico. 5th Annual Jackson School Research Symposium.
- Meazell, K., 2015, Methane hydrate-bearing sediments in the Terrebonne basin, northern Gulf of Mexico, Abstract OS23B-2012 presented at 2015 Fall Meeting, AGU, San Francisco, CA. 14-18 Dec.
- Phillips, S.C., Borgfeldt, T., You, K., Meyer, D., and Flemings, P., 2016, Dissociation of laboratory-synthesized methane hydrate by depressurization. Poster presented at 2016 Gordon Research Conference and Gordon Research Seminar on Natural Gas Hydrates. Poster presented at 2016 Gordon Research Conference from Feb28 to Mar04 in Galveston, TX, United States.
- Phillips, S.C., *You, K., Borgfeldt, T., *Meyer, D.W., *Dong, T., Flemings, P.B., 2016, Dissociation of Laboratory-Synthesized Methane Hydrate in Coarse-Grained Sediments by Slow Depressurization, Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec. (scheduled)
- Phillips, S.C., You, K., Flemings, P.B., Meyer, D.W., and Dong, T., under review. Dissociation of Laboratory-Synthesized Methane Hydrate in Coarse-Grained Sediments By Slow Depressurization. Marine And Petroleum Geology
- Treiber, K, Sawyer, D., & Cook, A., 2016, Geophysical interpretation of gas hydrates in Green Canyon Block 955, northern Gulf of Mexico, USA. Poster presented, poster presented at 2016 Gordon Research Conference from Feb28 to Mar04 in Galveston, TX, United States.
- Worman, S. and, Flemings, P.B., 2016, Genesis of Methane Hydrate in Coarse-Grained Systems: Northern Gulf of Mexico Slope (GOM²). Poster presented at UT GeoFluids Consortia Meeting from March 2nd- March 4th in Austin, TX, United States.
- Yang, C., Cook, A., & Sawyer, D., 2016, Geophysical interpretation of the gas hydrate reservoir system at the Perdido Site, northern Gulf of Mexico, presented at 2016 Gordon Research Conference from Feb28 to Mar04 in Galveston, TX, United States

- You, K.Y., DiCarlo, D. & Flemings, P.B., 2015, Quantifying methane hydrate formation in gas-rich environments using the method of characteristics. Abstract OS23B-2005 presented at 2015, Fall Meeting, AGU, San Francisco, CA, 14-18 Dec.
- You, K., Flemings, P.B., 2016, Methane Hydrate Formation in Thick Sand Reservoirs: Long-range Gas Transport or Short-range Methane Diffusion?, Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec. (scheduled)
- You, K., and Flemings, P. B., 2017, Methane Hydrate Formation In Thick Sand Reservoirs: 1. Short-Range Methane Diffusion, Marine and Petroleum Geology.
- You, K.Y., Flemings, P.B., & DiCarlo, D., 2015, Quantifying methane hydrate formation in gas-rich environments using the method of characteristics. Poster presented at 2016 Gordon Research Conference and Gordon Research Seminar on Natural Gas Hydrates. Poster presented at 2016 Gordon Research Conference from Feb28 to Mar04 in Galveston, TX, United States.

2.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

- UT-GOM² Project Website: <https://ig.utexas.edu/energy/genesis-of-methane-hydrate-in-coarse-grained-systems/>
- UT-GOM²-1 Expedition Website: <https://ig.utexas.edu/energy/genesis-of-methane-hydrate-in-coarse-grained-systems/expedition-ut-gom2-1/>
- Project SharePoint: <https://sps.austin.utexas.edu/sites/GEOMech/doehd/teams/>

2.3 TECHNOLOGIES OR TECHNIQUES

Nothing to report.

2.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Nothing to report.

3 CHANGES/PROBLEMS

3.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Nothing to report.

3.2 ACTUAL OR ANTICIPATED PROBLEMS OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

This is a challenging and complex project with many moving pieces. Our largest current challenges are:

- Planning the science and operational program with Texas A&M University, the operator of the JOIDES Resolution drillship.
- Reviewing costs and developing a revised scope of work and proposal for the future phases of the project.

3.3 CHANGES THAT HAVE A SIGNIFICANT IMPACT ON EXPENDITURES

Nothing to report.

3.4 CHANGE OF PRIMARY PERFORMANCE SITE LOCATION FROM THAT ORIGINALLY PROPOSED

Nothing to report.

4 SPECIAL REPORTING REQUIREMENTS

4.1 CURRENT: PHASE 2 / Budget Period 2

- Task 1: Revised Project Management Plan (Status: Complete)
- Subtask 7.3 – PCTB Land Test Report (Status: Complete)
- Subtask 8.5 – Pressure Core Marine Field Test Report (Status: On Schedule)
- Task 11 – Refined Field Program Operational Plan Report (Status: On schedule)

4.2 FUTURE – Phase 3 / Budget Period 3

Phase 3A

- A Phase 3A Report encompassing the refined Operational Plan, pressure coring team report, and permitting report
- Task 14 - Field Program Operational Plan report
- Task 15 – Field Program Hazards Report

Phase 3B

- Task 16 – IODP Preliminary Expedition Report
- Task 18 – Project Sample and Data Distribution Plan
- Task 18 – IODP Proceedings Expedition Volume
- Task 18 – Expedition Scientific Results Volume

We are currently revising the schedule for future project phases in concert with the Budget Period 2/Budget Period 3 transition which will occur January 15, 2018. The Project Phase tasks will be adjusted accordingly in the next Quarterly Report (BP2 Q9).

5 BUDGETARY INFORMATION

Budget Period 2 cost summary is outlined below. Note: Y2 in the table is Y3 of the overall project including BP1.

Table 6: BP2 Cost Summary

Baseline Reporting Quarter	Budget Period 2							
	Y1Q1		Y1Q2		Y1Q3		Y1Q4	
	10/01/15-12/31/15		01/01/16-03/31/16		04/01/16-06/30/16		07/01/16-09/30/16	
	Y1Q1	Cumulative Total	Y1Q2	Cumulative Total	Y1Q3	Cumulative Total	Y1Q4	Cumulative Total
Baseline Cost Plan								
Federal Share	\$ 1,805,358	\$ 1,805,358	\$ 1,327,931	\$ 3,133,289	\$ 492,932	\$ 3,626,221	\$ 492,932	\$ 4,119,153
Non-Federal Share	\$ 471,771	\$ 471,771	\$ 471,771	\$ 943,542	\$ 471,771	\$ 1,415,313	\$ 471,771	\$ 1,887,084
Total Planned	\$ 2,277,129	\$ 2,277,129	\$ 1,799,702	\$ 4,076,831	\$ 964,703	\$ 5,041,534	\$ 964,703	\$ 6,006,237
Actual Incurred Cost								
Federal Share	\$ 788,040	\$ 788,040	\$ 802,088	\$ 1,590,128	\$ 862,023	\$ 2,452,151	\$ 920,499	\$ 3,372,650
Non-Federal Share	\$ 267,114	\$ 267,114	\$ 258,648	\$ 525,762	\$ 308,579	\$ 834,341	\$ 246,863	\$ 1,081,204
Total Incurred Cost	\$ 1,055,154	\$ 1,055,154	\$ 1,060,736	\$ 2,115,890	\$ 1,170,602	\$ 3,286,492	\$ 1,167,362	\$ 4,453,854
Variance								
Federal Share	\$ (1,017,318)	\$ (1,017,318)	\$ (525,843)	\$ (1,543,161)	\$ 369,091	\$ (1,174,070)	\$ 427,567	\$ (746,503)
Non-Federal Share	\$ (204,657)	\$ (204,657)	\$ (213,123)	\$ (417,780)	\$ (163,192)	\$ (580,972)	\$ (224,908)	\$ (805,880)
Total Variance	\$ (1,221,975)	\$ (1,221,975)	\$ (738,966)	\$ (1,960,941)	\$ 205,899	\$ (1,755,042)	\$ 202,659	\$ (1,552,383)
Baseline Reporting Quarter	Budget Period 2							
	Y2Q1		Y2Q2		Y2Q3		Y2Q4	
	10/01/16-12/31/16		01/01/17-03/31/17		04/01/17-06/30/17		07/01/17-09/30/17	
	Y2Q1	Cumulative Total	Y2Q2	Cumulative Total	Y2Q3	Cumulative Total	Y2Q4	Cumulative Total
Baseline Cost Plan								
Federal Share	\$ 1,096,922	\$ 5,216,075	\$ 10,209,921	\$ 15,425,996	\$ 1,001,922	\$ 16,427,918	\$ 1,001,922	\$ 17,429,840
Non-Federal Share	\$ 848,570	\$ 2,735,654	\$ 848,569	\$ 3,584,223	\$ 848,569	\$ 4,432,792	\$ 848,569	\$ 5,281,361
Total Planned	\$ 1,945,492	\$ 7,951,729	\$ 11,058,490	\$ 19,010,219	\$ 1,850,491	\$ 20,860,710	\$ 1,850,491	\$ 22,711,201
Actual Incurred Cost								
Federal Share	\$ 1,726,789	\$ 5,099,439	\$ 1,806,352	\$ 6,905,791	\$ 5,995,336	\$ 12,901,127	\$ 2,788,502	\$ 15,689,629
Non-Federal Share	\$ 525,849	\$ 1,607,053	\$ 576,503	\$ 2,183,556	\$ 1,456,361	\$ 3,639,917	\$ 1,070,171	\$ 4,710,088
Total Incurred Cost	\$ 2,252,638	\$ 6,706,492	\$ 2,382,855	\$ 9,089,347	\$ 7,451,697	\$ 16,541,044	\$ 3,858,672	\$ 20,399,717
Variance								
Federal Share	\$ 629,867	\$ (116,636)	\$ (8,403,569)	\$ (8,520,205)	\$ 4,993,414	\$ (3,526,791)	\$ 1,786,580	\$ (1,740,211)
Non-Federal Share	\$ (322,721)	\$ (1,128,600)	\$ (272,066)	\$ (1,400,666)	\$ 607,792	\$ (792,874)	\$ 221,602	\$ (571,273)
Total Variance	\$ 307,147	\$ (1,245,236)	\$ (8,675,635)	\$ (9,920,871)	\$ 5,601,206	\$ (4,319,665)	\$ 2,008,181	\$ (2,311,484)

6 REFERENCES

Flemings, P. B., 2016a, Y2Q1 Quarterly Research Performance Progress Report (Period ending 12/31/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

Flemings, P. B., 2016b, Y2Q2 Quarterly Research Performance Progress Report (Period ending 3/31/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

7 ACRONYMS

CPP	Complimentary Project Proposal
DOE	Department of Energy
EPSP	Environmental Protection and Safety Panel
IODP	International Ocean Discovery Program
LDEO	Lamont–Doherty Earth Observatory
LWD	Logging While Drilling
m	meter
MADOG	Mad Dog
NEPA	National Environmental Policy Act
OCB	Outer Core Barrel
OCBA	Outer Core Barrel Assembly
OSU	Ohio State University
PCATS	Pressure Core Analysis and Transfer System
PCTB	Pressure Coring Tool with Ball Valve
PRL	Proponent Response Letter
SEP	Science Evaluation Panel
SSDB	Site Survey Data Bank
TBONE	Terrebonne
TFA	Total Flow Area
UNH	University of New Hampshire
UT	The University of Texas

Table 7: Acronyms

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