NATIONAL ENERGY TECHNOLOGY LABORATORY

OIL & GAS

DOE Award No.: DE-FE0023919

Quarterly Research Performance Progress Report (Period Ending 12/31/2016) Deepwater Methane Hydrate Characterization and Scientific Assessment

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

Submitted by:

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Office of Fossil Energy

1. ACCOMPLISHMENTS:

A. 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.

Previous Phase Milestones

Milestone Description	Status
M1A: Project Management Plan	Complete: 03/18/2015
M1B: Project Kick-off Meeting	Complete: 12/11/2014
M1C: Site Location and Ranking Report	Complete: 9/30/2015
M1D: Preliminary Field Program Operational Plan Report	Complete: 9/30/2015
M1E: Updated CPP Proposal Submitted	Complete: 10/1/2015
M1F: Demonstration of a viable PCS Tool	Complete: 9/30/2015

Table 1: Milestones BP1

Current Phase Milestones

Milestone Description	Status	Verification Method	Comments
M1G: Document results of BP1/Phase 1 Activities	Complete: Jan 2016 (BP2 Q2)	Phase 1 Report	Submitted
M2A: Complete Updated CPP Proposal Submitted	Complete: Nov 2015 (BP3, Q1)	Quarterly Report	Update given in Y2Q1 report
M2B: Scheduling of Hydrate Drilling Leg by IODP	Expected date: May 2017 (BP2, Q7)	report status immediately to DOE PM	
M2C: Demonstration of a viable PCS tool for hydrate drilling through completion of land-based testing	Complete: Dec 2015 (BP2, Q5)	PCTB Land Test Report, in Quarterly Report	Update given in Y2Q1 report
M2D: Demonstration of a viable PCS tool for hydrate drilling through completion of a deepwater marine field test	Expected date: May 2017 (BP2, Y2)	Marine Field Test Report, in Quarterly Report	
M2E: Complete Refined Field Program Operation Plan	Expected date: Sept 2017 (BP2, Q8)	Quarterly Report	

Table 2: Milestones BP2

Future Phase Milestones

Milestone Description	Planned Completion	Verification Method
M2F: Document results of BP2/Phase 2 Activities	12/29/2017 (BP3A, Q1)	Phase 2 Report
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 Hazards 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

Table 3: Milestones BP3A, and BP3B

B. What was accomplished under these goals?

PREVIOUS – BUDGET PERIOD 1:

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 - BUDGET PERIOD 2:

Task 1.0 Project Management and Planning (*Status: On Schedule)*

Activity this period:

Objectives and Achievements
Objective 1: Assemble teams according to project needs.

- Recruited for postdoctoral position, research associate, and mapping technician
    - Conducted interviews
    - Made offers
    - On boarded contract mapping technician

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

- Managed current tasks see details in document below
- Monitored costs reported status and changes to DOE project manager

Objective 3: Communicate with project team and sponsors

- Organized regular team meetings
- Held face-to-face meeting with Geotek in Austin
- Managed SharePoint sites, email list, and archive/website

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.
- Still in negotiations on SOW and budget for University of New Hampshire subcontract.

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: On Schedule)*

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
Feb 2017	Submit Addendum V2
Feb 2017	Upload Revised Data
April 2017	EPSP Safety Review Report V2
May 2017	EPSP Safety Review Presentation V2
May 2017:	Scheduling of Hydrate Drilling Leg by IODP (JR Facility Board Meeting)
Spring 2019:	IODP Expedition

Table 4: Timing of Complimentary Project Proposal submission

Activity this period:

1. ***Strengthened Geology and Geophysics (G&G) Analysis:***
    a. UT focused on strengthening its ability to perform geological and geophysical analysis in order to meet the planning needs for both the Marine Test and for the CPP Proposal.
    b. UT hired a Postdoctoral scientist with industry experience to work on the G&G.
    c. UT hired a stratigraphic and shallow hazards specialist to assist with the geological analysis.
    d. UT visited with Western Geco and purchased seismic data over GC 955 (the region where we will perform our Marine Test). The new seismic data greatly improve the quality of seismic data and allows us to make well plans.
    e. UT visited with both BP and Shell to discuss the Mad Dog and the Orca region, respectively. Insights from these visits were applied in our mapping analysis.

2. ***Geology and Geophysics (G&G) Analysis at CPP Locations::***
    a. Orca Location: OSU assembled and presented analysis of all of the industry wells in the Orca Basin dataset. OSU worked with BOEM to help select better sites for the Orca Basin. OSU worked with UT to help identify channel systems in the Orca Basin area. UT and OSU held weekly meetings to mature prospects at Orca, Terrebonne and Mad Dog.
    b. Terrebonne: UT and OSU worked to finalize drill sites. Detailed work was expended in moving well locations to account for shallow hazards. Columbia processed USGS 2D seismic lines near Terrebonne sites and prepared for initial seismic inversion.

c. Mad Dog: UT worked to analyze possible hydrate targets across the Mad Dog region. UT re-located its drill sites in order to avoid shallow hazards.
d. Site Safety Presentation: UT and OSU met weekly by teleconference and improved communication over site analysis.

3. EPSP Facilities Board review

a. UT received a letter from Anthony Koppers (Chair of the Joides Resolution Facilities Board) that informed UT that the Safety Review held in July 2017 was not a sufficient review. UT and the Facilities Board devised the following approach to have a review that would allow the drilling when the Joides Resolution (the research drilling vessel) will most likely be in the Gulf. The schedule is as follows.
    i. **March 2 (*UT goal Feb*):** Submittal of Addendum (Add2) for Proposal 877-CPP2, provide updates on the relocated sites for the TBONE and ORCAB basins
    ii. **March 10 (*UT goal Feb*):** Deadline to upload new data for relocated sites (SSDB)
    iii. **March 10-April**: New data will have Quality Assurance / be Quality Controlled by the Science Support Office (SSO)
    iv. **April 6:** Submittal of Safety Review Report to the SSO for EPSP
    v. **May 2-3:** EPSP meeting in College Station, Texas
    vi. **May 16-17:** JRFB meeting. Decision on scheduling of 877-CPP2
b. EPSP Walk Through Workshop Planned
    i. We will hold a workshop in Austin, TX on January 19 & 20, 2017 to review the geology and geophysics of well locations proposed for 1) the upcoming Marine Test (Sigsbee, GC 955) and 2) the envisioned IODP Expedition (IODP Proposal 887-CPP2) (Terrebone-WR 313, Orca, and Mad Dog).

Task 7.0: Continued Pressure Coring and Core Analysis System Modifications and Testing (*Status: On Schedule)*

Completed Tasks:

Subtask 7.1: Review and Complete NEPA Requirements (PCTB Land Test): Submitted and received approval for PCTB Land Test NEPA Requirements Y2Q1

Subtask 7.2: Pressure Coring Tool with Ball (PCTB) Land Test: *Y2Q1 report (Flemings, 2016a)*

Subtask 7.3: PCTB Land Test Report: GOM^2 PRESSURE CORING TOOL WITH BALL VALVE (PCTB) LAND TEST INITIAL REPORT in Y2 Q1 report (Flemings, 2016a)

Appendix A: GEOTEK CORING, HYBRID PRESSURE CORING TOOL WITH BALL VALVE (PCTB) 2015 LAND TEST PROGRAM in Y2 Q2 report (Flemings, 2016b)

Activity this period:

Subtask 7.4: PCTB Tool Modification, *Status: On Schedule*

All modifications to the PCTB have been completed and fully vetted in preparation for the marine test.

The activity during this period focused on preparations for the marine test.

- A list of all parts and equipment required for the marine test was generated and purchase orders have been issued for their procurement.

- Collaboration with the Helix Energy Solutions (the vessel operator) and Geotek Coring continues so as to ensure the rig is properly configured for the marine test.

- Wireline specifications have been defined and an appropriate wireline identified for use during the marine test.

- Collaboration with Schlumberger Wireline Services, Geotek Coring and Lamont Doherty Earth Observatory continues so as to ensure proper deployment of logging tools during the marine test.

- Collaboration with MI Swaco and Helix Energy Solutions continues so as to ensure adequate proper drilling mud is available during the marine test as well as mud mixing services.

- Collaboration with Schlumberger Well Services and Helix Energy Solutions continues so as to ensure adequate proper cement is available during the marine test as well as cementing services.

- A mobilization and demobilization plan has been drafted and continues to be refined.

Task 8.0: Pressure Coring Tool with Ball (PCTB) Marine Field Test (*Status: On Schedule)*

Target Marine Test Dates: March 1 – May 2017

Completed Tasks

Decision Point 2: Marine Field Test Stage Gate: Submitted necessary documents to meet requirements of stage gate. This authorization was granted based on documentation received to support the Marine Field Test to be conducted under Task 8.4.

Activity this period:

Subtask 8.1: Review and Complete NEPA Requirements (*Status: On Schedule)*
Completed preparation of NEPA EQ (DOE Questionnaire). Preliminary preview by BOEM complete.

Subtask 8.2: Marine Field Test Detailed Drilling/Logging/Coring/Sampling Operational Plan *(Status: On schedule)*

1. Held reviews of the Marine Test well program with Helix and subcontractors on 10/14/2016 & 10/27/2016.
2. Held weekly and ad hoc planning teleconferences to discuss detailed well design, deck layout, and logistics planning.
3. Reviewed winch & cable options for running & pulling coring tools. Agreed to purchase a fit-of-purpose cable to run on a rental wireline unit.
4. Evaluated options for wireline access through the top drive.
5. Commenced design of BHA cement-protection liner, cold shuck hang-off adapter, and mousehole adapter.
6. Commenced detailed logistics planning for the mobilization & demobilization.
7. Finalized surface locations for four proposed locations.
8. Confirmed that proposed well location GC955H-002 would be the first well drilled and would be wireline-logged over the cored interval.
9. Developed wireline logging program.
10. Developed detailed coring program.
11. Developed plan for taking inclination and azimuth surveys in both wells.
12. Continue to revise mud and cement programs.
13. Commenced modeling of the blowout scenario and development of detailed well control contingency plan.
14. Commenced sourcing freezer and work space options for storing cores for microbiology studies.

Subtask 8.3: Marine Field Test Documentation and Permitting (*Status: Delayed)*

1. Continued preparation of BOEM-0327 ‘Application for Permit to Conduct Scientific Research on the OCS’, Drilling Plan, and Environmental Report.

2. Continued preparation of BSEE–0123 “Application for Permit to Drill”, Drilling Prognosis, and Well Program.
3. Continued preparation of Exploration Plan and Louisiana CZM documentation.
4. Working with BOEM and BSEE to determine process for permit application submission. Process for university-operated deep stratigraphic tests not clear-cut with new regulations.
5. Agreed to request two waivers in the APD. The first is to permanently abandon the wells without setting a cement plug unless flow was encountered. If flow is encountered, a waiver to place cement above hydrate zone to avoid potential destabilization. The second waiver is to take the inclination & azimuth surveys at the conclusion of deep start test instead of every 1000 feet during drilling/coring.

Subtask 8.4: Marine Field Test of Pressure Coring System (*Status: On schedule)*

1. Executed contract with Helix on 11/30/2016.
2. Continued risk evaluation and determination of insurance requirements by UT Office of Risk Management and insurance brokers.
3. Working with UT Legal, Office of Risk Management & Business Contracts to include “hold-harmless’ clauses in contracts with subcontracting universities and with UT-subcontractors.
4. No changes to rig schedule. Project still on the Q-4000 rig schedule after completion of an ABS inspection in Brownsville, Texas.

Subtask 8.5: Marine Field Test Report (*Status: Future Task)*

A preliminary structure of the Marine Test Report was constructed.

Task 9.0: Pressure Core Transport, Storage, and Manipulation (*Status: On Schedule)*

Completed Tasks:

Subtask 9.1: Review and Complete NEPA Requirements (Core Storage and Manipulation):
Submitted and received approval for NEPA Requirements Y2Q2.

Activity this period:

Subtask 9.2: Hydrate Core Transport (*Status: On schedule)*
Geotek has secured approval for the use of their Overpacks for methane Hydrate transportation with the DOT. Contract with Geotek is still in place for the transport of pressure cores over land.

Subtask 9.3: Storage of Hydrate Pressure Cores (*Status: Future Task)*
Nothing to report this period

Subtask 9.4: Refrigerated Container for Storage of Hydrate Pressure Cores (*Status: On Schedule)*

The container has been built, installed inside the Jackson School building, and hooked up. The walk-in container will be capable of storing, moving, and monitoring the pressure cores. Storage capability includes the ability to maintain conditions necessary to keep twenty 1.2 m pressure cores for the duration of the project.

Subtask 9.5 – 9.7: Hydrate Core Manipulator and Cutter Tool, Hydrate Core Effective Stress Chamber, Hydrate Core Depressurization Chamber (*Status: On Schedule)*

The Pressure Core Manipulator and Cutting Tool, Hydrate Core Effective Stress Chamber, and Depressurization Chamber are being assembled and tested.

1. Pressure Core Manipulator and Cutting Tool
    a. A smaller version (length-wise) of the Geotek PCATS.
2. Hydrate Core Effective Stress Chamber
    a. Chamber will couple with the Manipulator and Cutting Tool to receive samples.
    b. The chamber will be capable of measuring effective stress, permeability, and extracting liquids for pore fluid analysis.
3. Depressurization Chamber
    a. The chamber includes a high pressure gas manifold and gas sampling equipment

Task 10.0 Pressure Core Analysis (*Status: On Schedule)*

Continued planning for acquisition of pressure cores. Two documents one outlining the Pressure Core Analysis to be done on-board the Marine Test Rig (Marine Test Science On-Board Plan) and the other outlining the details of the Pressure and Routine Core analysis to be done on-shore (Marine Test Science On-Shore Plan) are being developed. Several versions have been released. A technical advisory council was established to provide guidance on the analysis and distribution of routine and pressure cores. A review meeting was conducted and the council provided inputs to these documents. Identification of the specific persons involved in filling the require science rolls on the rig have been delayed as well as announcing the method for requesting core samples to the greater hydrate community.

Subtask 10.1: Routine Core Analysis (*Status: Future Task)*
Nothing to report this period.

Subtask 10.2: Pressure Core Analysis (*Status: Future Task)*
The quality and amount of analysis that can be done on-board is highly dependent on the Marine Test Drilling and Coring timeline. Details of the dependency including the expected number of cores, prioritization of core experiments, and process for assigning cores to specific assignments can be found in the on-board document.

Subtask 10.3: Hydrate Core-Log-Seismic Synthesis (*Status: Future Task)*
Nothing to report this period.

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

Nothing to report this period.

Task 12.0: Field Program / Research Expedition Vessel Access (*Status: Future Task)*

Nothing to report this period.

Decision Point 3: Budget Period Continuation

Nothing to report this period.

FUTURE – BUDGET PERIOD 3A, & 3B: Not Started

C. 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)

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. A key goal of the next quarter is complete final preparations for the Marine Test.

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

During the next reporting period we will focus on both the February submissions to the EPSP and SEP (see section B). This will entail holding a workshop in Austin in February.

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

In the next reporting period we will complete all of the preparations of the Coring system assuming a target excursion readiness date of April 1, 2017 for Marine Field Test.

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

We will finalize the drilling plan for the Marine Test. We will finalize contracts, and complete permitting. We will prepare a Scientific Prospectus to describe the planned drilling program. We will finalize detailed planning documents for the Marine Tests. We will work with vendors and contractors to staff for Marine Test.

Task 9.0: Pressure Core Transport, Storage, and Manipulation

Being temperature and humidity control testing of the new storage container at UT Austin. Geotek will continue the assembly and test of the Pressure Core tools in the UK. We will send our lab manager to the UK for training.

Task 10.0 Pressure Core Analysis

Finalize planning for acquisition and analysis of pressure cores for the PCTB Marine Field Test using the On-Board and On-Shore Science Plan Documents. Identify specific persons to fill the required man-power on-board the Marine Test (the Science team). Announce the method for requesting Marine Test samples to the Hydrate community.

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

No work planned for the next reporting period.

Task 12.0: Field Program / Research Expedition Vessel Access (*Status: Future Task)*

No work planned for the next reporting period.

2. PRODUCTS:

A. 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., 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

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., Borgfedlt, 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)

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 (GOM^2). 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.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.

B. Website(s) or other Internet site(s)

Project Website: http://www.ig.utexas.edu/gom2/

Project SharePoint: https://sps.austin.utexas.edu/sites/GEOMech/doehd/teams/

C. Technologies or techniques

Nothing to Report.

D. Inventions, patent applications, and/or licenses

Nothing to Report.

E. Other products

Flemings, P. B., 2014, Y1Q1 Quarterly Research Performance Progress Report (Period ending 12/31/2014), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

Flemings, P. B., 2015, Y1Q2 Quarterly Research Performance Progress Report (Period ending 3/31/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

Flemings, P. B., 2015, Y1Q3 Quarterly Research Performance Progress Report (Period ending 6/30/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

Flemings, P. B., 2015, Y1Q4 Quarterly Research Performance Progress Report (Period ending 9/30/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

Flemings, P. B., 2015, Phase 1 Report (Period ending 9/30/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

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

Flemings, P. B., 2016, Y2Q3 Quarterly Research Performance Progress Report (Period ending 6/30/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

Flemings, P. B., 2016, Y2Q4 Quarterly Research Performance Progress Report (Period ending 9/30/2015), Deepwater Methane Hydrate Characterization and Scientific Assessment, DOE Award No.: DE-FE0023919.

3. CHANGES/PROBLEMS:

A. Changes in approach and reasons for change

1. UT hired a consultant to assist with prospect maturation. The requirements for permitting for the Marine Test (Task 8) and the CPP Proposal (Task 6) required significantly more effort than originally envisioned.

B. Actual or anticipated problems or delays and actions or plans to resolve them

1. This is a challenging project with many moving pieces. Our largest current challenges are:
    a. Complete the permitting of the well with the federal government. We are working directly with BOEM to achieve this and we are making progress.

b. Complete Bonding and Insurance
    i. UT is focused on completing these negotiations.

C. Changes that have a significant impact on expenditures

1. Detailed planning revealed significant costs not originally accounted for to complete the planned Marine Test:
    a. Well completions (plug and abandon) requirements are significantly more involved than originally envisioned because the regulations have changed. This affects total rig time and contractor fees.
    b. It will be extremely challenging to process all the core and appropriately analyze it while on the drilling platform.
    c. Insurance and Bonding costs are significantly higher than originally planned.
2. A detailed cost analysis was performed and presented to DOE and our technical advisory team. Plans are underway to propose a modification to the costs to meet the project objectives.

D. Change of primary performance site location from that originally proposed

Nothing to Report.

4. SPECIAL REPORTING REQUIREMENTS:

A. CURRENT - BP2 / Phase 2

Task 1 – Revised Project Management Plan (Complete)

Subtask 7.03 – PCTB Land Test Report (Complete)

Subtask 8.05 – Pressure Core Marine Field Test Report

Task 11 – Refined Field Program Operational Plan Report

B. FUTURE - BP 3 / Phase 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

5. BUDGETARY INFORMATION:

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

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						
Non-Federal Share	$ 525,849	$ 1,607,053						
Total Incurred Cost	$ 2,252,638	$ 7,533,999						
Variance								
Federal Share	$ 629,867	$ (116,636)						
Non-Federal Share	$ (322,721)	$ (1,128,600)						
Total Variance	$ 307,147	$ (1,245,236)						

Table 5

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

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