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Quarterly Research Performance Progress Report (Period Ending 6/31/2017) Deepwater Methane Hydrate Characterization and Scientific Assessment

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

Submitted by:

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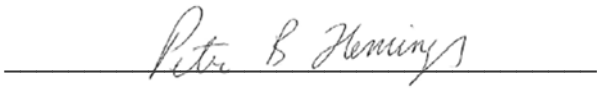

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Office of Fossil Energy

DISCLAIMER

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, Y7)	Quarterly Report	Presented in this report (Appendix A.)
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 (BP3A, 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	--

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

Objectives and Achievements

Objective 1: Assemble teams according to project needs.

- No new hires this period

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

- Managed current tasks (see details in document below).
- Monitored costs.
- Initiated Phase 2 / Budget Period 2 transition discussions and planning of future project phases with DOE.
- Held meetings for development of CPP-887 expedition plan with DOE, TAMU, and Geotek.
- Discussed possibility of no-cost extension to 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.

Objective 3: Communicate with project team and sponsors.

- Organized regular team meetings.
- Managed SharePoint sites, email lists, and archive/website.
- Held face-to-face meetings with DOE, USGS, and Geotek at shore-based operations site in Houma, LA immediately following Marine Test.

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 negotiations on SOW and budget for Oregon State University and University of Washington.

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: Complete)

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 2017	Scheduling of Hydrate Drilling Leg by IODP (JR Facility Board Meeting)
Spring 2019/2020	CPP-887 / IODP Expedition 386

Tasks Accomplished

- Strengthened our analysis of proposed drilling locations both for the Marine Test and for the CPP Proposal.
  Site Safety Presentation: UT and OSU met weekly by teleconference and improved communication over site analysis.
- IODP Environmental Protection and Safety Panel: UT and the Advisory Team presented at an IODP EPSP on May 3, 2017. The meeting was attended by members of UT, Columbia University, Ohio State, BOEM, and USGS. As a result, JOIDES Resolution Facilities Board recommended CPP-887 for scheduling; IODP Expedition 386 scheduled January 15 through March 15, 2020.

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

(Status: Complete)

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
  - GOM2 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: Complete)
  - All modifications to the PCTB were completed and vetted prior to, and in preparation for the Marine Test.

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

(Status: Complete - Marine Field Test completed May 1 through May 25, 2017; Marine Test dockside core processing and gas analytics completed May 26 through June 3, 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.
- Subtask 8.1: Review and Complete NEPA Requirements
  - Completed NEPA EQ (DOE Questionnaire).
- Subtask 8.2: Marine Field Test Detailed Drilling/Logging/Coring/Sampling Operational Plan
  - Held HAZID (Hazard Identification Study) & DWOP (Drill Well on Paper) Workshop
  - Held weekly and ad hoc planning teleconferences to discuss detailed well design, deck layout, and logistics planning.
  - Reviewed winch & cable options for running & pulling coring tools. Purchased a fit-of-purpose cable to run on a rental wireline unit.
  - Further evaluated options for wireline access through the top drive.
  - Finalized detailed logistics planning for the mobilization & demobilization.
  - Finalized mud programs and plug and abandonment programs for 2 locations.
  - Refined wireline logging program.
  - Refined detailed coring program.

    - Refined plan for surveying borehole.
    - Refined shipboard and science-based program.
- Subtask 8.3: Marine Field Test Documentation and Permitting
    - Submitted BOEM-0327 'Application for Permit to Conduct Scientific Research on the OCS', Drilling Plan, and Environmental Report.
    - Submitted BSEE–0123 "Application for Permit to Drill", Drilling Prognosis, and Well Program.
    - Completed Louisiana CZM documentation.
    - Completed EPA Region 6 NDPES notice of intent and acquired Gulf Cost General Permit.
- Subtask 8.4: Marine Field Test of Pressure Coring System
    - Coordinated and executed the testing of the PCTB and PCATs in two offshore wells within known gas hydrates occurrences, in accordance with Subtask 8.2. A summary of the Marine Test activities is provided as an appendix to this report (Appendix A.)

Activity this Period

- Subtask 8.5: Marine Field Test Report (*Status: On Schedule)*
    - A first draft of the Marine Test Report was generated by the UT-GOM2-1 Science Party on the rig.
    - A Sharepoint site was created to function as a repository for the Marine Test field data. All data logs from the Marine Test were uploaded to the site and the UT-GOM2-1 Science Party was granted access.
    - The UT-GOM2-1 Science Party continues to refine the Marine Test Report, which is on schedule for completion by the end of September, 2017.

TASK 9.0 - Pressure Core Transport, Storage, and Manipulation

(Status: Complete)

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: Complete)
    - Pressure Cores were successfully transported over US land by Geotek using Geotek Overpacks. Twenty-one Pressure Cores were delivered to UT in three shipments.

- Subtask 9.3: Storage of Hydrate Pressure Cores (Status: Complete)
    - UT successfully stored 21 pressure cores at UT in the refrigerated Pressure Core Center (Figure 9.3.1). The cores are in storage chambers acquired from Geotek. The pressure of the chambers is maintained by a pressure maintenance and relief safety system. The cores are being maintained at 3480 psi.

Figure 9.3.1: Photo of the 21 cores being stored at UT under pressure and refrigeration.

- Subtask 9.4: Refrigerated Container for Storage of Hydrate Pressure Cores (Status: Complete)
    - The remaining items to be corrected with the cold container that has been built and installed inside the Jackson School building, were resolved. The walk-in container is capable of storing, moving, and monitoring the pressure cores.

- Subtask 9.5 – 9.7: Hydrate Core Manipulator and Cutter Tool (Status: Complete)
    - A smaller version (length-wise) of the Geotek PCATS.
    - A leak in the main ball-valve was discovered during testing and the ball valve-seal needs to be replaced.

- Subtask 9.6 Hydrate Core Effective Stress Chamber (Status: Complete)
    - Chamber couples with the Manipulator and Cutting Tool to receive samples.
    - The chamber is capable of measuring effective stress, permeability, and extracting liquids for pore fluid analysis.
    - The need for a ball valve in the top section of the ALTS was identified and will be added.

- Subtask 9.7 Hydrate Core Depressurization Chamber (Status: Complete)
    - The chamber includes a high pressure gas manifold and gas sampling equipment
    - This equipment was assembled and tested with no issues identified.

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 first round of sample and data requests were received by UT. The technical advisory council met to review the requests provide guidance on the analysis proposed by each group. There were no objections to the initial round of requests but requests need to be revised based on the actual core samples and data recovered. Requestors were asked to join the UT-GOM2 Science Party assuming they could fulfill obligations to the study of those samples including obligations for reporting and publication. After the expedition depressurized (conventionalized) core samples were distributed according to the quality of the depressurized core and consistent with the core requests reviewed by the council. As discussed all pressure core was transported to UT pending further discussion with the council on how it will be distributed from there. A detailed core recovery report (Appendix B.) was distributed to the UT-GOM2-1 Science Party and these results were reported to the greater hydrate community at ICGH. Requesters are expected to refine their pressure core and additional depressurized core requests based on the report. All expedition scientists have been asked to submit their updates or new requests to UT by the end of July, 2017.

- 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.

  The following samples were distributed for on-shore analysis:
    - Interstitial waters at the University of Washington
    - Microbiology at ExxonMobil and Oregon State University
    - Whole core-logging using gamma scanner, x-ray computed tomography (for bulk density and internal structure), visual core description (sediment type, sedimentary structure, color, etc.), Photographs of split core, porosimetry, SEM, and XRD at Ohio State University.
    - Smear slide and coarse fraction petrography, CHNS elemental analysis, laser diffraction grain size distribution, and biostratigraphy at the University of New Hampshire
    - Grain size analysis (hydrometer method) and grain density at the University of Texas.

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.

PCATS water, and drilling fluid samples were also distributed to the University of Washington. Headspace gas samples were distributed to Ohio State University.

- Subtask 10.2: Pressure Core Analysis (Status: On Schedule)
  All pressure core acquired from the Marine Test was analyzed in PCATS and divided according to the sampling plan for long term storage at UT, quantitative degassing, and rapid degassing. PCATS analysis included full scan p-wave, gamma density, and 3D tomography. Details of the results can be found in the core recovery report (Appendix B).

  In addition quantitative degassing of core sections containing individual and multiple lithofacies was completed on-board and at the dock to determine hydrate saturation.

  Gas samples were analyzed on board and at the dock for oxygen, nitrogen, methane, ethane, propane, butane, isobutane, isopentane, and pentane content. Gas samples from the quantitative degassing efforts were also distributed for concentration of C1 to C20 gaseous alkanes, concentration of C2 and C3 alkene gases, $\delta^{13}C$ and δD of methane, $\delta^{13}C$ of ethane, concentration of CO_2, and concentration of noble gases (He, Ne, Ar, Kr, Xe) to Ohio State University. Samples were collected for analysis of the methane “clumped” isotopologue $^{13}CH_3D$ at Cal Tech.

  Material depressurized from the quantitative degassing studies underwent grain size analysis at the dock.

  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, and NETL.

- 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 (Field Program / Research Expedition)

(Status: On Schedule)

Activity this period

- Held kickoff web conference on June 27 with Texas A&M University and Advisory Team regarding scheduling of the JOIDES Resolution and expedition requirements. Attendees included IODP, DOE, LDEO, Geotek, and USGS.
- Began review of Marine Test outcomes and initiated deliberation the expedition drilling / logging / coring / sampling operation plan with the project Advisory team

TASK 12.0 - Field Program / Research Expedition Vessel Access

(Status: Complete)

Activity this period

- UT and the Hydrates Project Advisory Team presented for the IODP EPSP final review on May 3, 2017. The meeting was attended by members of UT, Columbia University, Ohio State, BOEM, and USGS.
- The IDOP review panel recommended CPP-887 for scheduling to the JOIDES Resolution Facilities Board.
- The JOIDES Resolution Facilities Board approved CPP-887 and scheduled Expedition 386 for January 15 – March 15, 2020.
- Began developing specifications for additional scientific and engineering applications for the CPP. Examples include 1) pressure coring; 2) pressure core analysis; 3) ROV capability; 4) complex wireline logging capability.

Decision Point 3: Budget Period Continuation

Activity this period

- Discussed with DOE Project Managers the current project status and the potential need for a no-cost budget period extension. A no-cost budget period extension will be pursued extending Phase 2/Budget Period 2 from September 30, 2017 to January 15, 2017.
- During monthly sponsor meetings held with DOE and the Advisory Team, UT proposed a revised project schedule, extending Phase 3a/Budget Period 3a and Phase 3b/Budget Period 3b into two distinct two-year phases (Phase 3/Budget Period 3 and Phase 4/Budget Period 4).

Future – Phase 3a/Budget Period 3a and Phase 3b/Budget Period 3b

Nothing to report this period.

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)

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 preparation for Budget Period 2 continuation/transition;
- Engaging stakeholders and subcontractors to, in consultation with the project Advisory Board, develop refined costs and detailed scopes of work for Phase 3/Budget Period 3 and Phase 4/Budget Period 4

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

Task complete; no activities planned.

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

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

UT has assembled a PCTB Assessment Team and has begun to assess the performance of the pressure coring system throughout the duration of the Marine Test. The purpose of the team is to conduct a detailed review of the pressure core tool performance including:

- Changes made in the tool at each step during the expedition
- Analysis of when the ball valve sealed for each deployment
- Determination of if and when boost pressure was applied
- Identify cores that did not remain in the hydrate stability zone during recovery

The PCTB Assessment Team will also infer a path forward with additional tool testing and modification as needed.

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 the Field Program / Research Expedition.

UT and the project Advisory Board will continue to review results from the Marine Test and refining the expedition drilling / logging / coring / sampling operation plan.

Task 12.0: Field Program / Research Expedition Vessel Access

Task complete; no activities planned.

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

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)

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 (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., 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-GOM^2 Project Website: https://ig.utexas.edu/energy/genesis-of-methane-hydrate-in-coarse-grained-systems/

- UT-GOM^2-1 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 project with many moving pieces. Our largest current challenges are:
    - We have completed the Marine Test field program (Task 8) and are now reviewing final expedition costs, resolving contract disputes, and assessing performance of the pressure core system.
    - We are beginning to plan our science program with Texas A&M, the operator of the JOIDES Resolution.
    - UT is currently pursuing a no-cost extension to the current budget phase (BP2) to allow us complete the final review of Marine Test Costs, complete a final review of the pressure coring system, incorporate experience from the Marine test into planning of the research expedition, and to allow for a more complete evaluation of cost schedules for future budget periods.

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

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		
Non-Federal Share	$ 525,849	$ 1,607,053	$ 576,503	$ 2,183,556	$ 1,456,361	$ 3,639,917		
Total Incurred Cost	$ 2,252,638	$ 6,706,492	$ 2,382,855	$ 9,089,347	$ 7,451,697	$ 16,541,044		
Variance								
Federal Share	$ 629,867	$ (116,636)	$ (8,403,569)	$ (8,520,205)	$ 4,993,414	$ (3,526,791)		
Non-Federal Share	$ (322,721)	$ (1,128,600)	$ (272,066)	$ (1,400,666)	$ 607,792	$ (792,874)		
Total Variance	$ 307,147	$ (1,245,236)	$ (8,675,635)	$ (9,920,871)	$ 5,601,206	$ (4,319,665)		

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

Quarterly Research Performance Progress Report

Appendix A

UT-GOM2-1 Expedition Summary

Appendix A

JULY 31, 2017

UT-GOM2-1 EXPEDITION SUMMARY

Deepwater Marine Test

Submitted by:
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1.0 Expedition Summary

From May 2 to May 22, 2017, the UT-GOM2-1 Hydrate Pressure Coring Expedition drilled two wells in Green Canyon Block 955 in the deepwater Gulf of Mexico. 21 10' pressure cores were taken in and near the coarse-grained methane hydrate reservoir. In the first well (UT-GOM2-1-H002), 1 of the 8 cores were recovered under pressure and there was 34% recovery. In the second well (UT-GOM2-1-H005), 12 of the 13 cores were recovered under pressure and there was 72% recovery. These pressure cores were imaged and logged under pressure. Samples were degassed both shipboard and dockside to interpret hydrate concentration. In addition, microbiological and porewater analyses were taken from the depressurized samples. 21 3 ft pressure cores were returned to the University of Texas for storage, distribution, and further analysis. The log and core data will provide a foundation for scientific exploration by the greater hydrate research community.

1.1. Background and Objectives

1.1.1. Expedition Background

This deep stratigraphic test well drilling project is part of the Deepwater Methane Hydrate Characterization & Scientific Assessment project DE-FE0023919, funded by the Department of Energy and advised by the United States Geological Survey (USGS) and the Bureau of Ocean Energy Management (BOEM). This test was designed to evaluate the ability of the DOE pressure-coring tool (PCTB) to effectively and consistently capture, collect, and recover hydrate-bearing sand sediment pressure core, under hydrate-stable conditions, to the drilling vessel deck. This test was also designed to demonstrate the ability to perform preliminary characterization of pressure cores and transfer the cores to pressurized storage devices in a manner that will enable the cores to be stored and analyzed onshore after the conclusion of the deep stratigraphic tests. The successful transportation of pressure core samples have demonstrated the capability of the UT Pressure Core Center (PCC) to receive, store, and analyze pressure core and provide opportunity for scientific exploration by UT and the greater hydrate community through access to the PCC and/or through recovered cores.

1.1.2. Expedition Objectives

The primary objective of UT-GOM2-1 was to demonstrate the engineering capability of the pressure-coring-tool-with-ball (the PCTB) to effectively and consistently capture, collect, and recover hydrate-bearing sand sediment pressure core. The PCTB has a "Cutting Shoe" (PCTB-CS) and a "Face-Bit" (PCTB-FB) configuration. We previously tested the PCTB-FB on land in lithologies not typical of hydrate-bearing systems in 2015; however, it has not been used for hydrate pressure coring. The PCTB arose from tools described as the Hybrid-PCS and was initially deployed with the cutting-shoe configuration in the Nankai Trough (Yamamoto et al., 2012) and versions of this tool were subsequently deployed in the South China Sea (Yang et al., 2015, Yang et al., 2017), the Japan Sea (Matsumoto et al., 2017), and offshore India (Kumar et al., 2016). A primary goal of the expedition was to test the PCTB-FB and the PCTB-CS in preparation for more extensive expeditions in the Gulf of Mexico.

UT-GOM2-1 was primarily an engineering test. However, the underlying goal of this effort is to increase our understanding of the production potential of hydrate-bearing sands. Logging while drilling has documented the occurrence and estimated the concentration of hydrate-bearing sands in the Gulf of Mexico. However, to understand the production potential, we need to recover cores and perform petrophysical analysis of these cores. Key questions range from understanding the compressibility and permeability of both the reservoir and its bounding units to understanding the concentration and chemistry of the hydrate and the pore waters (Boswell and Collett, 2016). Drilling studies have only recently begun to focus on hydrate bearing reservoirs in sands to address these issues. Examples include efforts in offshore japan (Ito et al., 2015) (Yamamoto, 2015) and offshore India (Kumar et al., 2016).

To achieve these scientific objectives, UT-GOM2-1 planned to demonstrate the ability to (1) log and image pressure cores, (2) subsample pressure cores and store subsamples in pressure vessels, and (3) obtain geochemical and petrophysical data from pressure cores. In addition, we planned to demonstrate our ability to transport these cores to store them at the University of Texas Austin. The depressurized and pressurized cores and logging data will provide opportunity for scientific exploration by the greater hydrate research community. The specific steps to achieve these goals included the following.

1. Drill two vertical wells in approximately 6670’ (2033 m) of water in the offshore Gulf of Mexico in Green Canyon Block 955 within 200’ of the previously drilled 955-H well.
2. Drill two vertical wells and take ten, 10’ (~3.0 m) long, pressure cores in each well (20 total cores) using the face-bit configuration of the PCTB in one well and the cutting-shoe configuration of the PCTB in the other well.
3. Wireline log the PCTB-CS hole.
4. Use the Pressure Core Analysis and Transfer System (PCATS) from Geotek Limited to characterize cores and transfer the samples to pressurized storage devices while on the drilling vessel or on land.
5. Use PCATS to perform:
    - 2D, 100 um resolution, X-ray imaging under pressure
    - P-wave Velocity and bulk density logging under pressure
    - Perform controlled degassing experiments
    - Subsample cores and store them in pressure chambers to shore-based laboratories
    - Pull, cut and transport PCs from the PCTB autoclaves into temporary storage chambers, degassing chambers, or storage chambers for shipping
    - Collect released gas and liquid during quantitative degassing (2 manifolds)

6. Transport and store up to twenty 3.3 to 3.9 ft (1.0 to 1.2 m) in length and 2.0 inches (5.08 cm) in diameter subsamples of pressure cores by road transport to the UT Pressure Core Center (PCC) for storage, further analysis, and distribution.
7. Transport depressurized pressure cores from the rig to the dock and then to Ohio State University.

1.2. UT-GOM2-1 Expedition: Pre-Drill Operational Planning

1.2.1. Project Development and Structure

In spring 2014, the U. S. Department of Energy Office of Fossil Energy National Energy Technology Laboratory released funding opportunity announcement Funding Opportunity Number: DE-FOA-0001023, which included a targeted Technical Topic Area requesting applications to investigate the occurrence and nature of methane hydrates on the U.S. Outer Continental Shelf to better characterize naturally-occurring gas hydrate deposits via multi-site deepwater marine drilling, logging, and/or sampling program. The University of Texas, in combination with partners from Ohio State University, Columbia University, and the Consortium for Ocean Leadership responded to this Funding Opportunity Announcement. The UT application was selected for funding and a Cooperative Agreement project was initiated in October of 2014. The project is titled "DE-FE0023919: Deepwater Methane Hydrate Characterization and Scientific Assessment. A three-phase, 6 year, program was designed that would include: Phase 1: technology development and testing, planning for an offshore engineering test of the technology, and planning for a 2nd offshore drilling, logging and coring expedition; Phase 2: execution of the offshore engineering test, associated science, and further planning for the 2nd expedition; and Phase 3: planning and execution of the 2nd expedition.

This report describes the planning, execution, and results of the offshore Marine Test entitled 'Expedition UT-GOM2-1." This was completed during Phase 2 of the project. UT-GOM2-1 targeted coarse-grained sands in Green Canyon Block 955 in the H-well of the Chevron Joint Industry Project in 2009.

1.2.2. GC955 Site Characterization and Selection

Geologic Conditions

Green Canyon 955 (GC 955) is located 232 kilometers south of Port Fourchon, Louisiana, USA, at the base of the Sigsbee Escarpment in the northern Gulf of Mexico abyssal plain, in approximately 2 km water depth (Figure 1.). Nearby, Green Knoll shows the expression of salt rising to the seafloor. GC 955 is at the mouth of Green Canyon, where sediment transported across the continental shelf and slope enters the abyssal plain (Figure 1.). Due to the rapid change in slope at the base of the Sigsbee escarpment, extensive turbidite and mass transport deposits are common in and near GC 955. Mass wasting is common, and the seafloor itself is scarred recent sediment transport. Most submarine landslides at and near the Mad Dog and Atlantis oil fields (14 and 25 miles to the NE, respectfully) occurred more than 8,000 years ago; however, the most recent slide was dated at 2,970 years ago (Young et al., 2003).

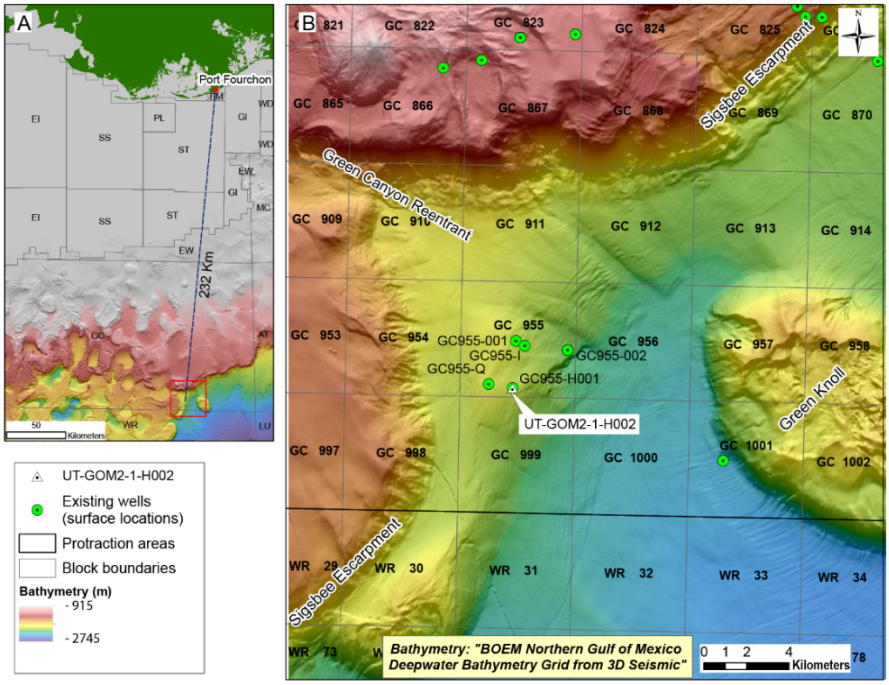

Figure 1.2.1. (A) GC-955 is located 232 km south-south-west of Port Fourchon, LA. At the foot of the Sigsbee Escarpment. (B) The UT-GOM2-1 Expedition drilled 2 wells at Green Canyon 955 within 30 meters of the previously drilled GC955-H001 well. The seafloor at GC 955 records a local topographic high. GC Block 955 is at the toe of the Sigsbee Escarpment adjacent to the Green Canyon reentrant. Bathymetry data from the BOEM Northern Gulf Of Mexico Deepwater Bathymetry Grid.

The Green Canyon 955 region has been a focus area for the study of methane hydrates since it was first described by McConnell (2000) and Heggland (2004). These studies described geophysical indications for gas sourcing, gas migration pathways into the shallow sediments afforded by extensive faulting, and the presence of thick sand reservoirs associated with a large and persistent Pleistocene channel-levee complex (McConnell et al., 2010). McConnell et al. (2010) review the G-955 location and summarize the geophysical and geological evidence for methane hydrate at this location. They describe the presence of a strong positive 'leading-peak' reflection within structural crests.

Based on these positive indicators for the presence of methane hydrates, the Chevron Joint Industry Project II (JIP II), drilled the H, I, and Q wells at GC 955 (Figure 1.) using Logging While Drilling (LWD) technology. The presence of hydrate was confirmed at each location. A range of publications describe the operations (Collett et al., 2009), the geological context (Boswell et al., 2012a, Boswell et al., 2012b, McConnell et al., 2010) and the specific logging results (Cook et al., 2012, Collett et al., 2012).

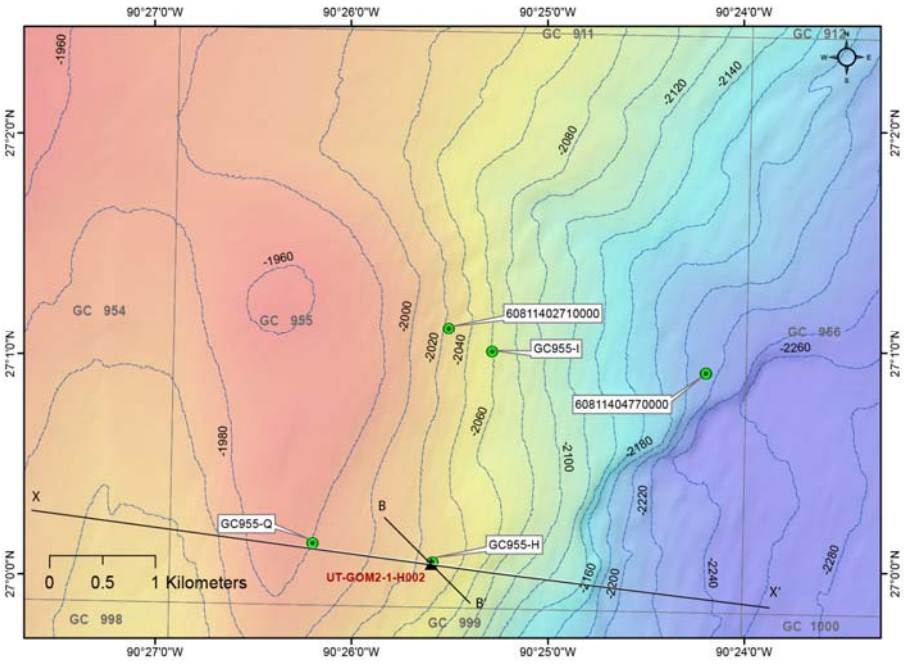

Figure 1.2.2. Bathymetry over Green Canyon Block 955. The Gas Hydrates JIP Leg II LWD program drilled the H, I, and Q wells in 2009. Two industry wells are located by their API #: the 60811402710000 well was drilled in 1999, and the 60811404770000 well (and its sidetrack) was drilled in 2006-2007. During Expedition UT-GOM2, UT-GOM2-1-H002 and UT-GOM2-1-H005 wells were drilled adjacent to the H well (red and blue circles). Bathymetry data from the BOEM Northern Gulf Of Mexico Deepwater Bathymetry Grid.

The methane hydrates inferred to be present at Block GC-955 overlie a salt-cored anticline that is seaward of the Sigsbee Escarpment. The anticline is cut by numerous that generally do not reach the seafloor (Figure 1.2.3). Some faults extend to the underlying salt. Bright amplitudes are present at the crest of the anticline. Muted imaging beneath these amplitudes may record the presence of gas.

We mapped seven seismic horizons across this structure: Horizon 100 through Horizon 600 and the seafloor (Figure 1.2.3, Figure 1.2.4). Horizon 100 and Horizon 300 bound a stacked channel-levee complex oriented NNW to SSE that is just to the east of the anticline (Figure 1.2.3). The GC 955-H well, lies on the western levee of this channel system (Figure 1.2.3). There is a strong peak-over-trough amplitude present (Figure 1.2.4). In the GC-955 H well (Figure 1.2.5, Figure 1.2.6), the peak correlates to the top of a high resistivity and high velocity section that is interpreted to record a sand-rich reservoir with methane hydrate in the pore space.

At the GC-955 H well, the section is mud-prone to a depth of 1270' feet below seafloor (fbsf). A 330 foot thick sand or silt-rich interval lies between 1270 and 1600 fbsf (Figure 1.2.5) based on the interpretation of the gamma ray, caliper, and resistivity data (Figure 1.2.5, Figure 1.2.6). The upper 50 feet of this interval may become more mud prone upward because the gamma ray values increase upward as the borehole washout decreases. Within this 330' sand-rich interval, there are three zones of high resistivity and high velocity where hydrate is interpreted to be present (green in 'Lithologic Units'). The uppermost zone is 86 feet thick. Where hydrate is not present in this sand-rich interval, significant borehole washout is present as is indicated from the enlarged borehole (caliper) and low density values. Based on the review of the 2012 LWD data (Boswell et al., 2012a, Boswell et al., 2012b, Collett et al.,

2012), we interpret the entire 330’ sand-rich interval is composed of interbedded sand and mud; the gas hydrate most likely occurs as pore-fill within thin-bedded sands within this sequence (Figure 1.2.6).

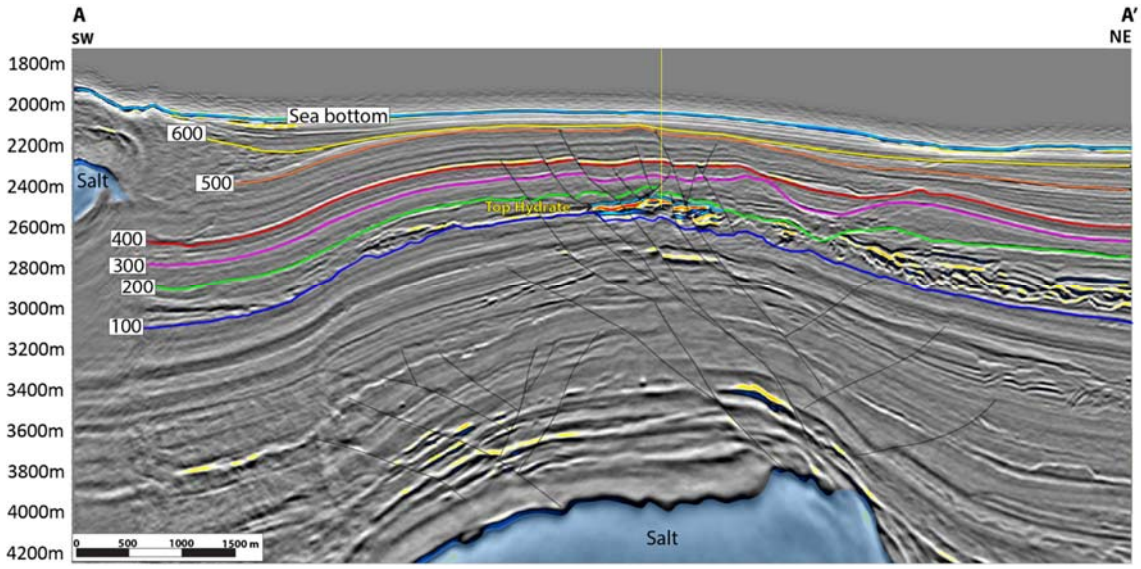

Figure 1.2.3. Interpreted seismic cross sections of the GC 955 area. *Images courtesy of WesternGeco (Flemings et al., 2017).*

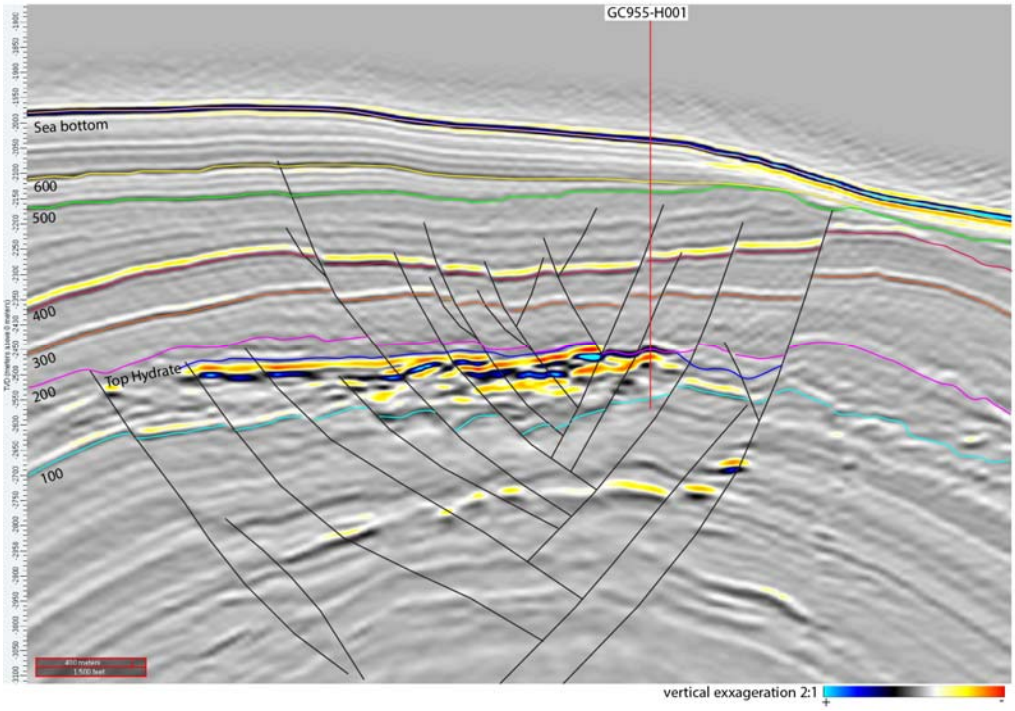

Figure 1.2.4. Expanded view of the GC955 H well location. *Images courtesy of WesternGeco (Flemings et al., 2017).*

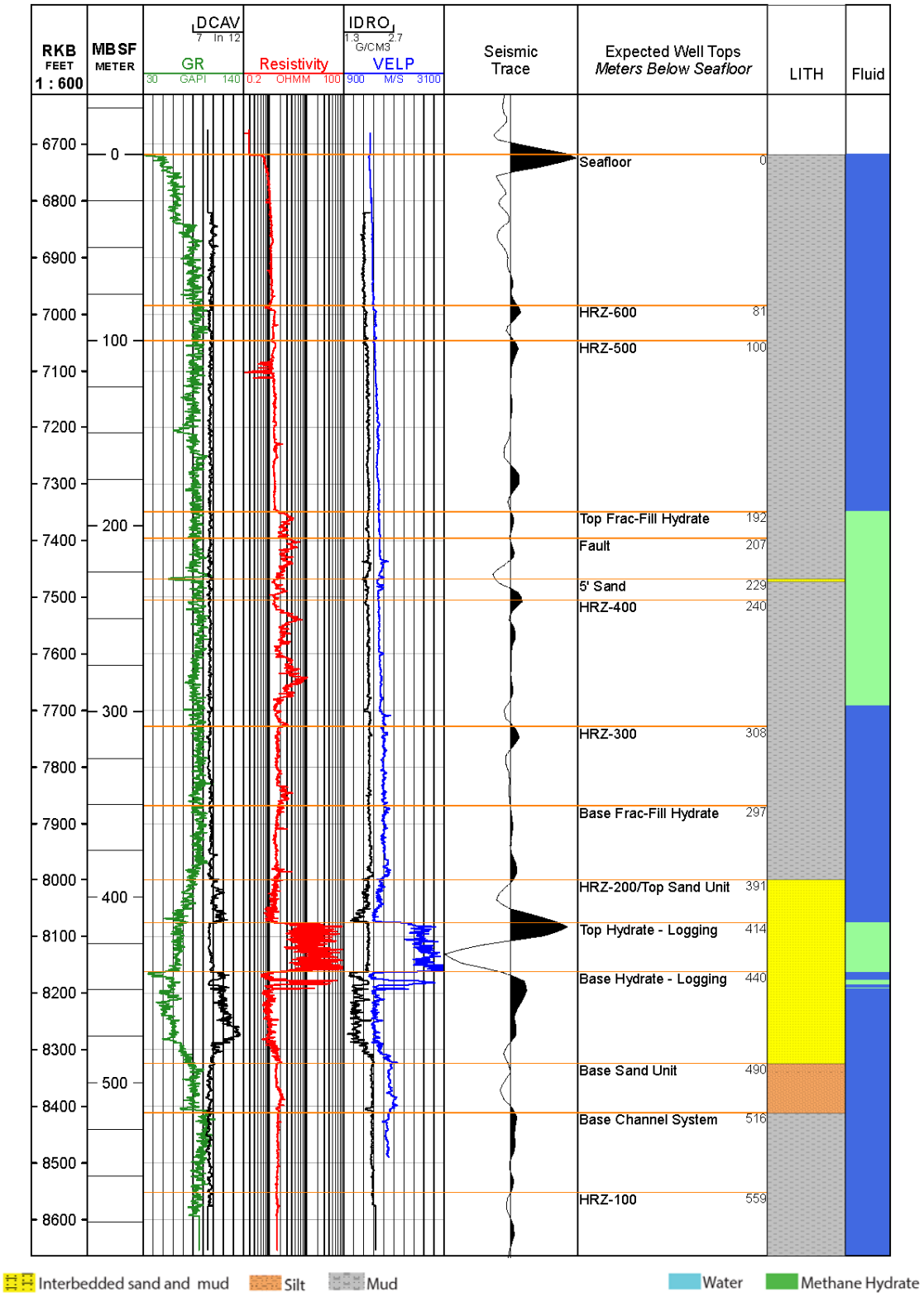

Figure 1.2.5. Well Log of the GC955-H well.

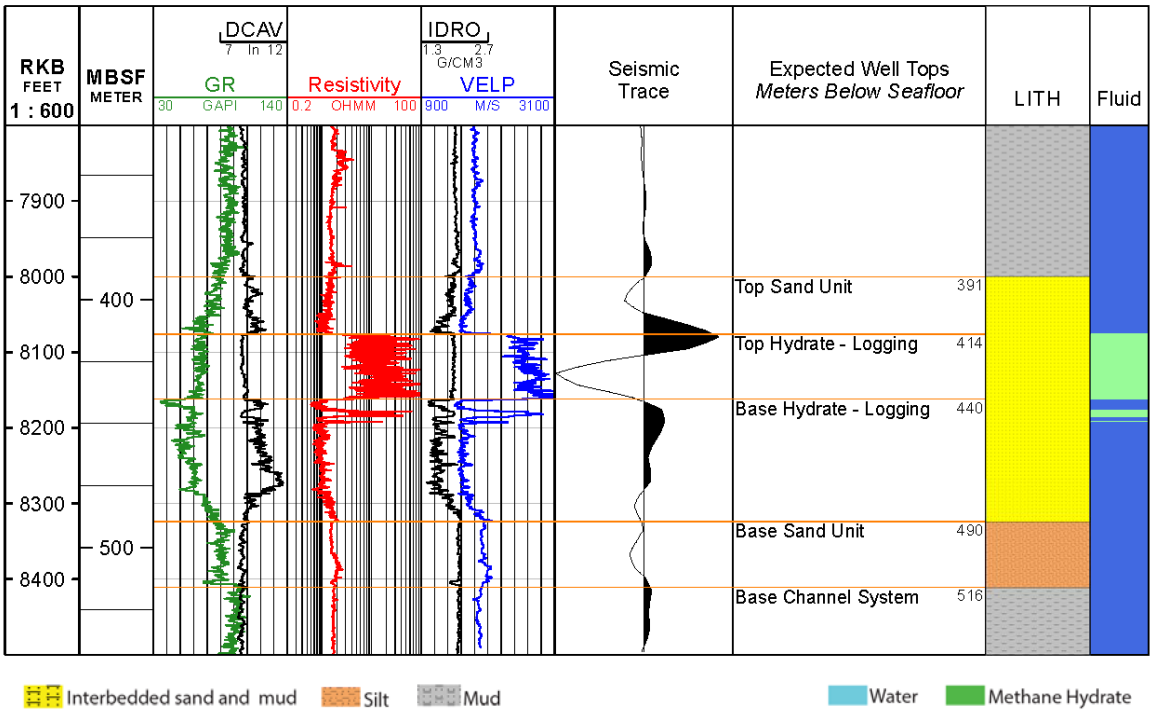

Figure 1.2.6. Expanded view of the hydrate-bearing section in the GC955H well from Logging While Drilling (LWD) data. Zones of high resistivity and high velocity within areas of low gamma ray are interpreted to be hydrate-bearing sands (delineated with green on the far right). The abrupt changes in the resistivity in this interval are interpreted to record interbedded sands and muds. The GC955H well results have been discussed in detail previously (Collett et al., 2010, Boswell et al., 2012a, Collett et al., 2012) RKB: Depth below rig floor.

Event	Measured Depth (MD)	Depth below Sea Level	Depth Below Seafloor	SRD	Lithologic Unit
unit	fbrf	fbsl	fbsf	SRD	
Sea floor	6,719	6,667	-	6,669	
HRZ-600	6,977	6,925	258	6,927	
HRZ-500	7,057	7,005	338	7,007	
Top Fracture Filling Hydrates	7,329	7,277	610	7,279	
Fault	7,469	7,417	750	7,419	1
5' thick sand	7,471	7,419	752	7,421	
HRZ-400	7,505	7,453	786	7,455	
Base Fracture Filling Hydrates	7,681	7,629	962	7,631	
HRZ-300	7,737	7,685	1,018	7,687	
HRZ- 200 / Top Sand - rich section	8,009	7,957	1,290	7,959	
Top Massive Sand	8,033	7,981	1,314	7,983	
Top Hydrate - Predicted	8,077	8,025	1,358	8,027	
Top Hydrate - Seismic Peak	8,082	8,030	1,363	8,032	2
Base of Hydrate - Predicted	8,163	8,111	1,444	8,113	
Base of Sand Unit	8,311	8,259	1,592	8,261	
Base of Channel System	8,402	8,350	1,683	8,352	
HRZ-100	8,551	8,499	1,832	8,501	3

Table 1.2.1. Mapped horizons at GC955-H002 well. SRD is the seismic reflection depth.

Geothermal Gradient

No direct temperature measurements exist at GC-955 to determine the temperature gradient. Therefore, we applied a theoretical approach, based on the thermodynamic properties of gas hydrate. The water depth is 2047 meters at GC-955. The base of gas hydrate stability zone was interpreted from 2- and 3-D seismic data to lie at approximately 2486 meters (2501 m rkb) below sea level (mbsl) or 439 meters below sea floor (mbsf).

We estimate the three-phase equilibrium curve for pure methane hydrates employing the model developed by (Flemings and Liu, 2007). The three-phase equilibrium condition is obtained from the intersection of two pressure-temperature-salinity dependent methane solubility curves: 1) methane solubility in water when methane hydrate and water phases are in equilibrium, described by the model of (Henry et al., 1999); and 2) methane solubility in water when methane gas and water phases are in equilibrium, described by the model of (Duan et al., 1992). We assume seawater salinity (3.5 wt.%) and hydrostatic pressure. At the depth of BSR (439 mbsf), the water pressure is 25.09 MPa. We assume a bottom water temperature 4.2 °C (NODC, 2013). The temperature should be 20.4 °C to achieve three-phase conditions at the observed BSR. With these conditions, the geothermal gradient equals 36.9 °C/km (Figure 1.2.7).

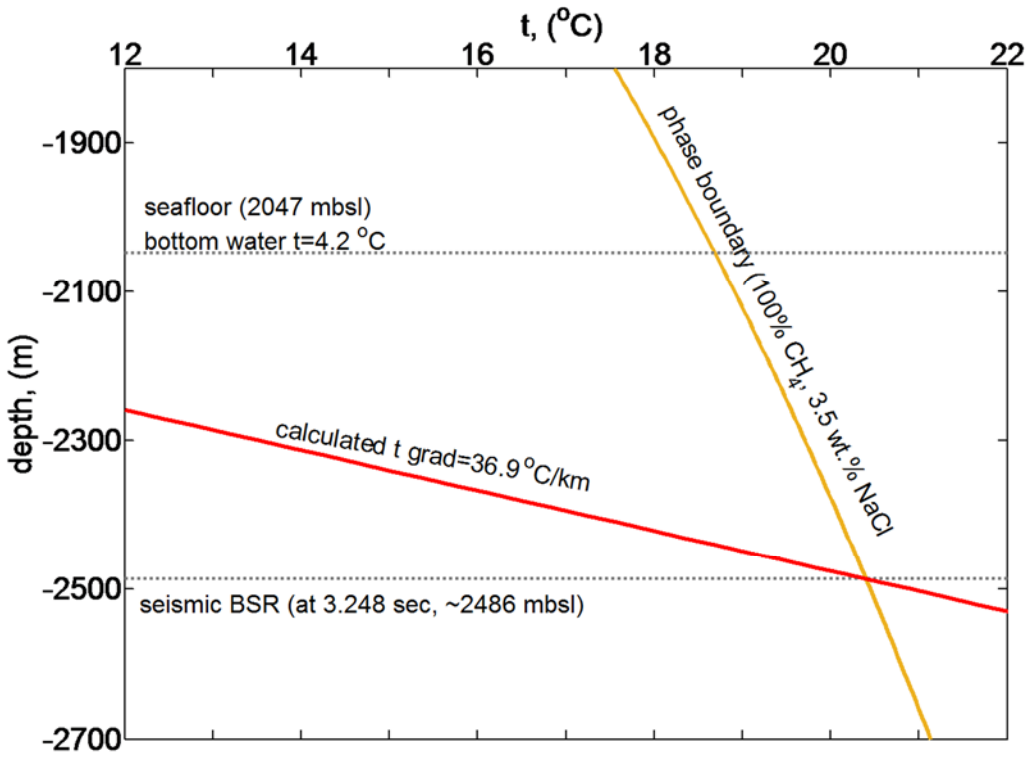

Figure 1.2.7. Temperature-depth diagram, showing gas hydrate phase boundary within the study area. Seismic BSR was used as a reference for GHSZ lower boundary in temperature gradient calculation experiment.

Gas Hazards

GC 955 has a high concentration of shallow gassy sediments over the faulted structure, especially in the southwestern quadrant of the block. The upward migration of the gas is interpreted to be hindered by gas hydrate formation at and above the base of the gas hydrate stability zone. Seismic data suggest that free gas is present in the GC-955 structure beneath the hydrate layer in some areas. Seismic and well data record the presence of only hydrate at GC955-H001.

Based on offset observations, there is a low risk for gas flow due to dissociation of hydrate cuttings within the hydrate bearing interval (1,363-1,449 fbsf). Beneath the hydrate zone, there is a low risk for gas flow due to the presence of free gas. Although penetration of a permeable gas-rich zone beneath the hydrate could result in a continuous gas flow if not hydrostatically controlled, free gas is not expected at the GC955-H002 location.

The GC955-H001 well was drilled and completed without any significant problems and without any special measures other than the precautionary use of drilling fluid for wellbore stability (Collett et al., 2009). However, high amplitudes and particularly the strong positive reflector that is regionally present, may record the base of a gas cap beneath the hydrate in some locations. In the GC 955-Q well, a gas bubble was observed at 1,516 fbsf during a connection. The well was displaced to 13 ppg mud and observed for an hour with no flow. While pulling the string out of the hole, a small, continous flow was observed. It has been theorized that the flow was possibly due to borehole swabbing while pulling out of the hole or that the use of heavy mud may have fractured sedients at the bottom of the hole into a fee-gas zone below the gas-bearing hydrate zone (Collett et al., 2010). The well was ultimately plugged with a 16 ppg cement.

The lessons learned from drilling the Q well include the following. It is important to follow good drilling practices to prevent swabbing or fracturing the formation. To minimize the likelihood for swabbing; maintain the mud properties throughout the drilling to minimize bit & BHA balling. Circulate a minimum of bottoms up to provide a clean annulus prior to starting out of the hole. Perform an extended flow check. When pulling out of the hole, keep the drill string full of weighted mud to maintain the drill pipe to annulus U-tube effect. Pull the drill string at a slow rate and monitor for evidence of overpull or changes in string weight. If swabbing is suspected, run the drill string back to bottom and the circulate the well at least a hole volume and observe for flow. If flow persists after circulating, pump kill mud in increasingly heavier weights to control the well. To avoid fracturing the formation, increase the kill mud weight in no-more-than 0.5 ppg stages and perform flow checks in between each stage. The maximum kill mud weight should not exceed fracture gradient.

Observations made during the JIP drilling indicate that when drilling highly concentrated gas hydrate sections, they will by nature release an amount of hydrate and gas as the formation is cut. The size and intensity of the cut-gas release can be controlled to some extent by reducing the rate of penetration, but gas should be expected in the annular fluid; much as it is when drilling through other gas-ladened formations.

Shallow Water Flow

There are only two sand-prone zones: 1) a 5' sand at 750 fbsf (brine) and the target Unit 2 sand (hydrate). The risk for SWF was assessed as 'Low' in these two intervals and negligible risk for the remainder of the section. There was no evidence of any shallow water flow in the GC955-H well (Collett et al., 2009). Elsewhere in the block, a water flow was observed at the GC955-I well after the drill string was pulled out of the hole from well total depth of 9,027 fbrf with 10.5 ppg mud in the hole. A cement plug was placed in the well.

Human Obstructions

The nearest existing wells are three wells that were drilled at this location during the 2009 Gas Hydrates JIP Leg II LWD program (GC955 -I, -Q, and -H) and two industry wells (OSC-G 20114 #1 and OCS-G 20114 #2). No other man-made features or other potentially hazardous seafloor conditions are identified in the vicinity of the proposed well site. However, there may be uncharted obstructions present that are not detectable within the resolution of the conventional 3-D data set. An ROV will be used to inspect the seafloor at the proposed well site immediately before spud-in to confirm that there are no seafloor obstructions.

Pore Pressure/ Fracture Gradient

Based on seismic interpretation and offset well information from GC955H-001, formations penetrated at the proposed location are expected to be normally pressured. There is a possible gas cap beneath the hydrate in the region (although not identified at the H002 location), the pressure associated with the gas cap is illustrated with the red line in the figure below.

The well will be drilled riserless without casing. We illustrate a 0.5 PPG drilling margin at the base of the well which declines to zero at the mudline where all the stresses converge. Near the mudline, the drilling margin must converge to less than 0.5 ppg. This is the reason why industry routinely drills this section riserless, as we will do in this well. At the reservoir level (Figure 1.2.8) there is a 0.9 PPG drilling margin between the maximum expected pore pressure and the fracture gradient.

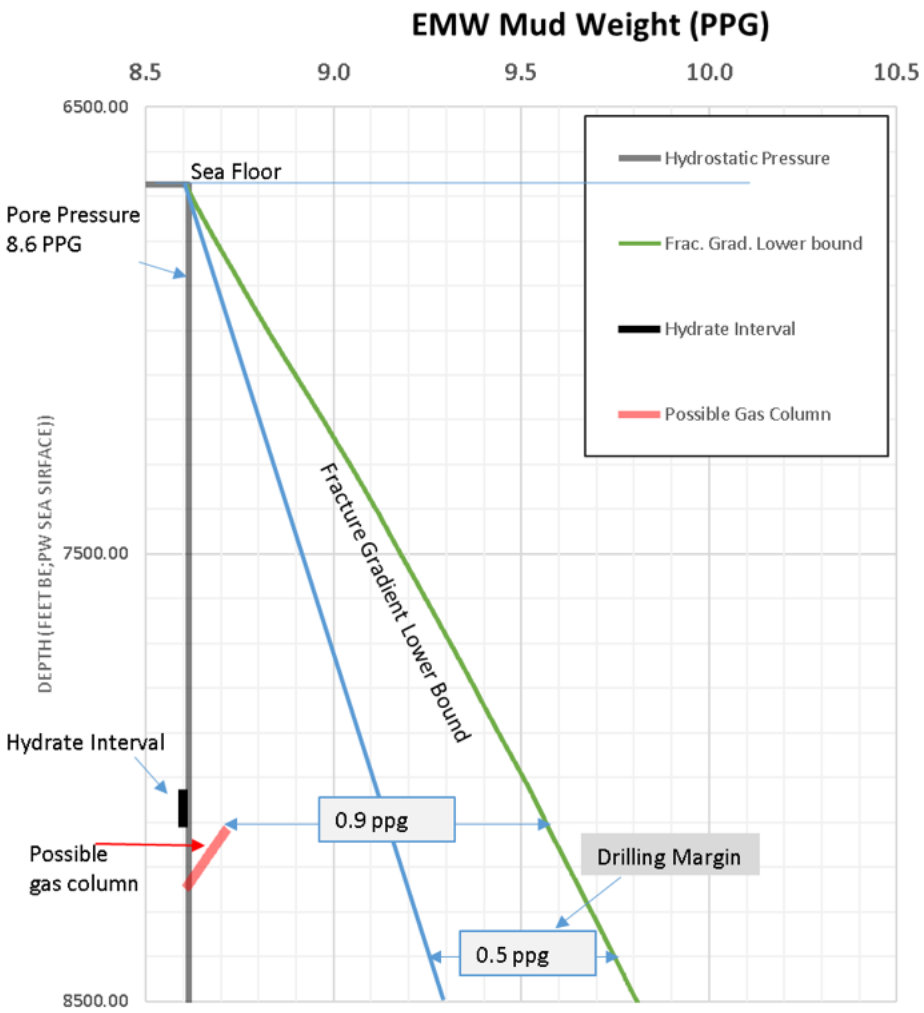

Figure 1.2.8. *Site UT-GOM2-01 pore pressure plot and fracture gradient prediction.*

1.2.3. Drilling Platform Review and Selection

Vessel Selection - Bidding & Evaluation Process

A high-level statement-of-requirements was developed and requests for proposals were sent to prospective vessel contractors. In December 2015, returned proposals were pre-screened to ensure offered vessel was capable of meeting equipment requirements. A number of follow-up clarification meetings were held, as well as requests made for additional information. The details of the proposals and each vessel's capability were documented in a summary spreadsheet for ease of comparison. Each vessel and company capability was evaluated vs. project requirements. A scorecard was developed; weighted to reflect perceived importance of individual items on overall success of the project. The scorecard included a combination of rig equipment capability and soft issues such as coring/drilling experience; plans for management of subcontractors, logistics, and mobilization; cost; risk exposure; vessel availability within the operating window; and client space. Each proposal was evaluated and

scored by a panel consisting of geological, operational, and management expertise. In April 2016; after scoring and discussion, the vessel selection was unanimously agreed by the panel.

Vessel contracting strategy

Due to the complexities of setting-up and managing University contracts, the vessel contractor was asked to contract and to manage logistical support and all third-party contractors (excluding coring) as part of the vessel contract. Environmental compliance oversite was managed by the third-party drilling fluid provider. Third-party services ultimately provided for the Marine Test and sub-contracted by the vessel contractor included: mud, cement, slickline, electric-line logging, gyro survey tools, drill pipe rental, PE certification of the P&A design, drilling-parameter recorder system, enhanced communication system, ROVs, installation of grating for single-elevation work surfaces, and full logistical support (helicopters, crew boat, and supply boats).

Contracting of a US-flagged intervention vessel which routinely operates in deepwater Gulf of Mexico, simplified project planning and execution for the University. The University was able to take advantage of procedures, systems, and third-party alliances already established and provided by the contractor. Most notable, was the ability for the University to operate under the vessel contractor's Safety and Environmental Management System (SEMS). Additionally, requirements for vessels operating in the Gulf of Mexico had already been addressed by the contractor and thus, not a work front to be managed by the University (i.e. USGC Certificate of Inspection, Certificate of Class, vessel Oil Spill Response Plan, US Certificate of Financial Responsibility, vessel NPDES permit, etc).

1.2.4. Liability Obligations

Regulatory Liability

To assure that the University was able to meet the financial obligations to cover the liabilities outlined by the federal regulations (Title 30 CFR 250, 251, 550, and 551), the University was required to qualify as an operator in the Gulf of Mexico. Because of the uniqueness of being a public academic institution, the University had to work closely with the BOEM - Adjudication Section to modify the established qualification process. Ultimately, the following documents were provided for review:

1. Certificate of Formation – Letter stating that the University is a public entity created under Texas Constitution of 1876 and an excerpt from the Texas Higher Education Coordinating Board - "Education Code Title 3 - Higher Education, Subtitle C - The University of Texas System, Chapter 65 - Administration of the University of Texas System, Subchapter A - General Provisions, Subchapter B – Administrative Provisions, and Subchapter C - Powers and Duties of Board" which includes discussion of the powers related to the issuance of bonds and notes.
2. Resolution Certification - Certificate issued by a member of the Board of Regents of The University of Texas that the University is authorized to hold mineral leases, permits and rights-of-way on the Outer Continental Shelf.
3. Incumbency Certification – Authority from the Board of Regents that the named delegate is empowered to bind the University and enter into contracts and other documents, including those related to Federal lands or minerals, use of land for research, permits, rights-of-use-and-easement, financial assurance, bonds, and applications.

On 3/21/2017, the University was recognized as qualified to bid & acquire leases at a BOEM lease sale, to receive and hold leases (including record title interest or operating rights) as a leasee, to be designated operator of a lease or portion of a lease, and to receive and hold pipeline rights-of-way and rights-of-use and easement on the OCS. The qualification was applicable to the entire OCS.

Determination of Liability, Indemnification, and Insurance – Between Contracted Parties

During contract negotiations, the determination and acceptance of various liabilities was risk-based and project specific. A full understanding of the well control aspects of the formations to be penetrated and methane-hydrate behavior, as well as a recognition of which party controlled various aspects of the activity, drove the mutual agreement of liability between primary parties.

A knock-for-knock indemnification was agreed to the extent authorized by the constitution and laws of the state of Texas.

Each party carried Insurance to cover agreed liability and associated financial responsibility. The primary parties named each other as 'additional insureds' where appropriate. The University carried the following additional insurance during project execution: Maritime Employers' Liability Insurance, Control of Well, Commercial General Liability, Excess Liability, and Lost-in-Hole Downhole Equipment Coverage.

1.3. UT-GOM2-1 Expedition: Operational Overview

Expedition UT-GOM2-01 is divided into four phases: (1) Planning; (2) Mobilization; (3) Execution; (4) Demobilization; and (5) Shore-Based Science (Tables 1.3.1 and 1.3.2).

Date	Activity	Planning	Mobilization	Execution	Demobilization	Dockside Analysis
10/15/2016	Kick-off Contractor Meeting					
4/15/2017	Mobilization					
5/11/2017	Execution					
5/23/2017	Begin Demobilization					
5/24/2017	Scientists leave vessel					
5/26/2017	establish shore-based Lab, Port Fourchon					
6/3/2017	Complete Dockside Analysis					

Table 1.3.1. Phases of Planning and Execution for UT-GOM2-01 Expedition.

Planning accelerated with the kick-off contractor meeting in October-2016. This is, perhaps, the first time that an Academic Institution has acted as an Operator for drilling deepwater wells. Preparing for this endeavor included a myriad of tasks including the following: (1) performing basic geology and geophysics studies to optimize drilling location; (2) contracting a drilling vessel; (3) establishing appropriate project insurance; (4) developing a safe drilling program and a plug and abandonment program; (5) Applying for permits to meet regulatory requirements. These operator responsibilities were in addition to the tasks that are more common to a university including the development of a detailed scientific program. This planning phase lasted, in some cases, until after the drilling vessel had sailed. For example, official permission to drill the UT-GOM2-01 wells was not received until 06-May-2017, after the *D/V Q4000* was already on location at GC-955.

The drilling vessel, Helix's *D/V Q4000* was selected for the program. The Q4000 was in dry-dock in Brownsville, Texas prior to the project. Mobilization included delivery of equipment to Port Fourchon for delivery by boat and delivery to Brownsville to onboard equipment directly. Mobilization began with the first movement of equipment on 25-April-2017. Operations in Brownsville included boarding Geotek equipment, the sand-line, Geotek personnel, and part of the science team. The Q4000 sailed from Brownsville on 01-May-2017. Mobilization continued after the *D/V Q-4000* left dock in Brownsville. It included bringing the service vans online, making up the BHA, and flow testing of the PCTB within the water column prior to the spudding.

Project execution formally began on 11-May-2017 with the spudding of the UT-GOM2-01 H002 well (HOO2). The execution phase lasted only 12 days during which the UT-GOM2-01 H002 and UT-GOM2-01 H005 wells were drilled. When the BHA was pulled from the hole on 12-May-2017, demobilization began. Scientists were offloaded by helicopter to Houma, Louisiana. The pressure cores were transported by boat to Port Fourchon, LA. Other activities included cleaning the mud pits on the ship, and ultimately cleaning the tanks on the mud boat.

Synchronous with demobilization was a 'dock-side' core analysis phase. In our planning phase, it was determined that there would not be enough time to process cores taken during the latter half of the execution phase while on the vessel. To properly analyze the core, Geotek's PCATS and UT's sampling lab were re-established on shore at the InterMoor dockyard in Port Fourchon, LA.

The *UT-GOM2 Post-Drill Operation Report and Daily Log (executed activities, drilling and coring statistics, and an event drilling-log)* can be found in Appendix A of this report, which includes a listing of completed operational activities during UT-GOM2 and a daily log of the major project activities.

UT DOE GOM^2 PCTB Marine Test Hole H002 Planned v. Actual Timeline

Revision: 0 Date: 11 July 2017

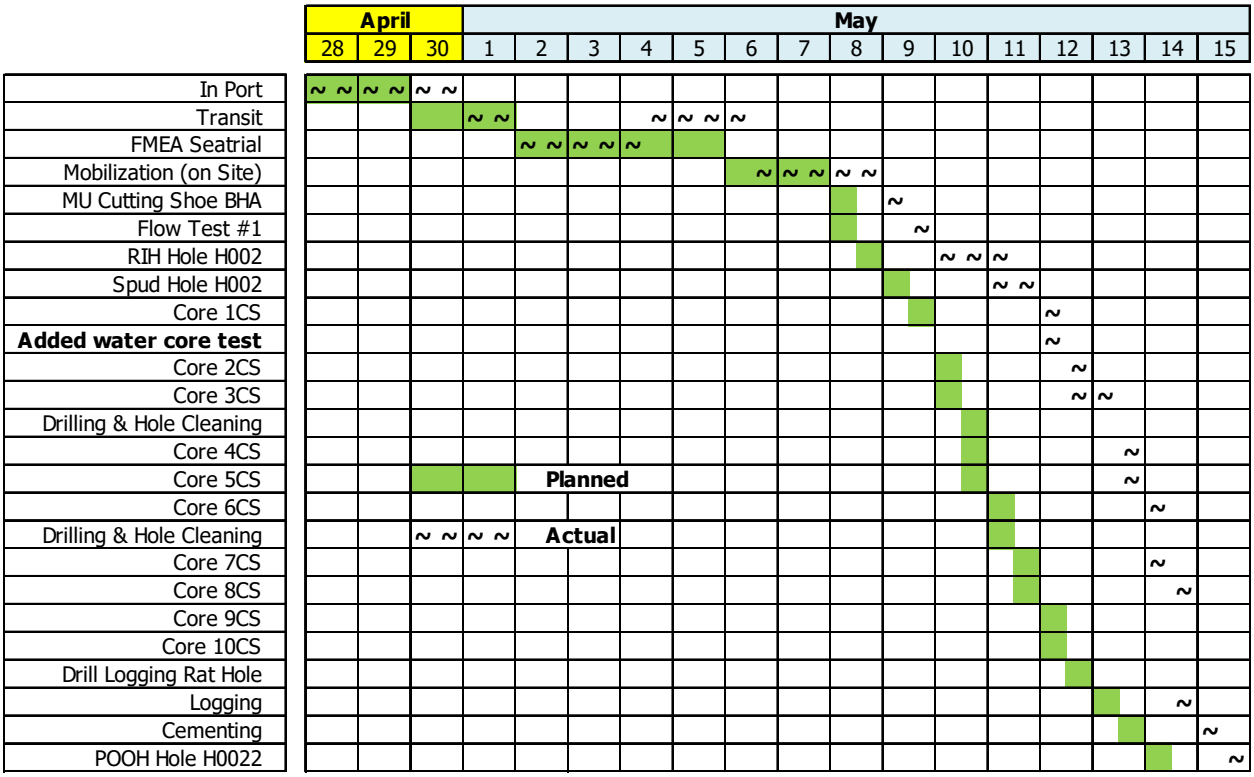

Table 1.3.2. Operational flow chart showing the planned and actual UT-GOM2-01 drilling and coring operations for H002.

UT DOE GOM^2 PCTB Marine Test Hole H005 Planned v. Actual Timeline

Revision: 0 Date: 11 July 2017

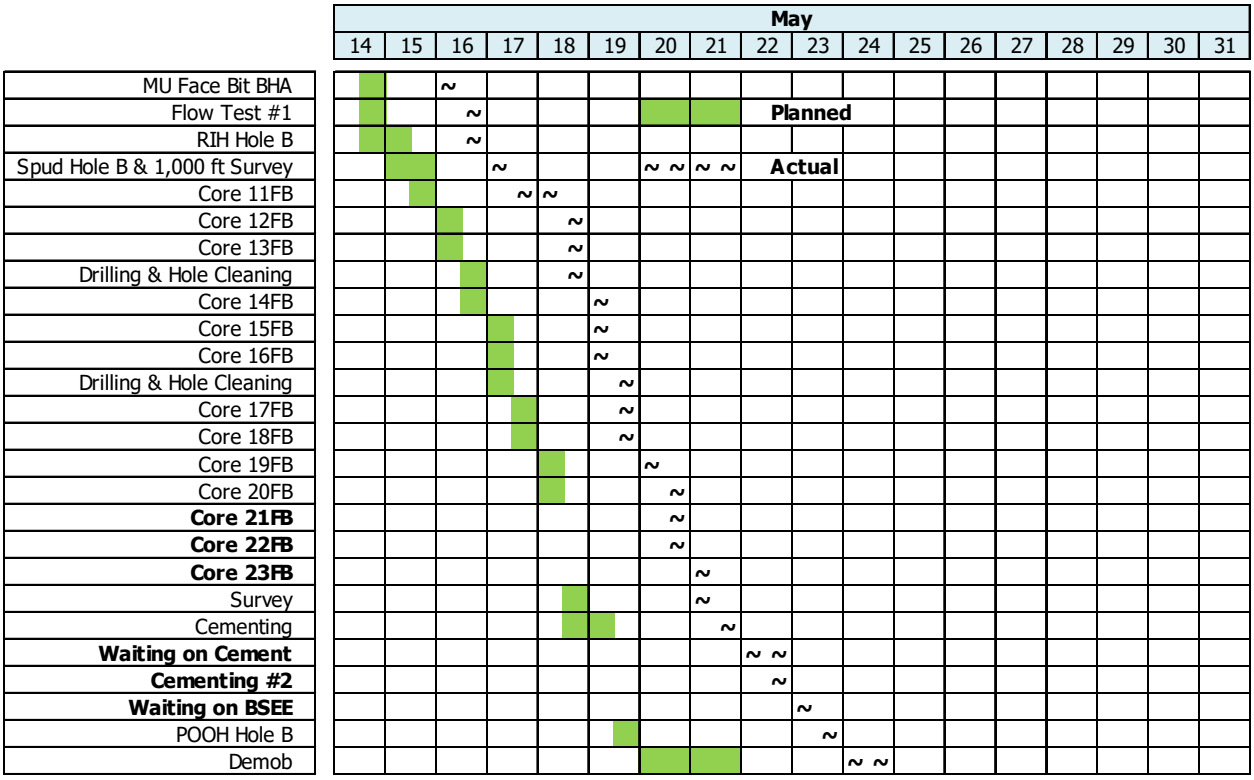

Table 1.3.3. Operational flow chart showing the planned and actual UT-GOM2-01 drilling and coring operations for H005.

1.3.1. Mobilization

Before mobilization the DOE Pressure Coring Tool w/Ball Valve (PCTB) underwent testing and modification. Ownership of the PCTB was transferred from DOE to the University of Texas Austin. UT Austin then contracted with Aumann Engineering to test and modify this tool to prepare it for use in the offshore. Over two years, UT worked with Aumann Engineering (in 2016, Aumann Engineering was purchased by Geotek Limited and it is now termed Geotek Coring, USA) to perform and test engineering modifications. Throughout this phase, two configurations of the tool were developed: the face bit configuration and the cutting shoe configuration. The cutting show configuration is compatible with other IODP coring tools. However the face-bit configuration was thought to have the potential to be more successful for coring sandy reservoirs. New parts for the tool were machined and the configurations were successfully tested at Geotek Coring in Salt Lake City and at Schlumberger's Cameron testing facility. After field testing at Cameron, minor modifications to the tool were made to implement a flow diverter to reduce the pressure on the coring liner during coring and minimize the possibility of casing collapse. It was intended to test this capability on a vessel of opportunity prior to Expedition UT-GOM2-1. However, further testing was not accomplished.

Extensive planning for core acquisition, core analysis, and sample transport was also conduct during this time. Invitations were sent out to members of the science team and a first pass look at sample and data requests from the members of the greater hydrate community was used in the identification and gathering of supplies to support the science goals beyond the test of the coring tools.

Mobilization, not including Helix subcontractor mobilization, was worked by UT with Geotek Ltd., Geotek Coring, Prolog, and Tiger Rentals. Five service vans/containers and three baskets of heavy equipment were delivered to Keppel AmFELS, Brownsville for loading onto the D/V Q-4000. Geotek containers purposefully arrived several days ahead of transfer to the rig in order to set up test equipment after the trip overseas. Mobilization of equipment began in the US with the first movement of equipment on 25-April-2017. The D/V Q-4000 set sail from Brownsville on 01-May-2017.

During transit to the drill site, Geotek brought the service vans online connecting them to air, water, and power. Make up the BHA and flow testing of the PCTB within the water column prior to the spudding was completed.

A final container, specially modified for mud lab operations on the rig, was delivered to InterMoor Port Fourchon. This container along with other Helix sub-contractor supplies were then transferred by supply ship to the D/V Q-4000 at the drill site.

Mobilization of personnel also occurred in two waves. About half of the members of the University group including all of the members from Geotek completed final boarding of the *D/V Q-4000* on April 30. The remainder of the personnel including members of the science and videography teams boarded the Q-4000 by helicopter from Houma, LA on 09-May-2017.

Several crew changes occurred during operations, one by personnel boat from Brownsville and rest by Helicopter from Houma, LA.

During drilling and coring operations supply boats brought additional needed equipment and consumables including a second delivery of mud.

1.3.2. Hole H002 and Hole H005 Locations

When the Q4000 arrived at location, the ROV's were deployed and the JIP Leg II GC-955 H001 well location was identified. The H001 well was well preserved 8 years after it had been originally drilled (Figure 1.3.1). The position of the H001 was identified through the WinFrog system on the ship by locating the position of the ROV while sitting over the H001 position. The 'as found' position of the H001 well was not exactly the 'published' position of the H001 well (Table 1.3.4, Figure 1.3.2). We interpret this difference is due to the limited accuracy of the positioning system, which was estimated to be 14 m. The H002 and H005 were located relative to the discovered location of the H001 well.

Figure 1.3.1. *The H001 hole, drilled in 2009 during the Chevron JIP was found at the start of the UT-GOM2-01 Expedition. The hole is in remarkably good condition given that it was drilled 8 years before this photograph was taken.*

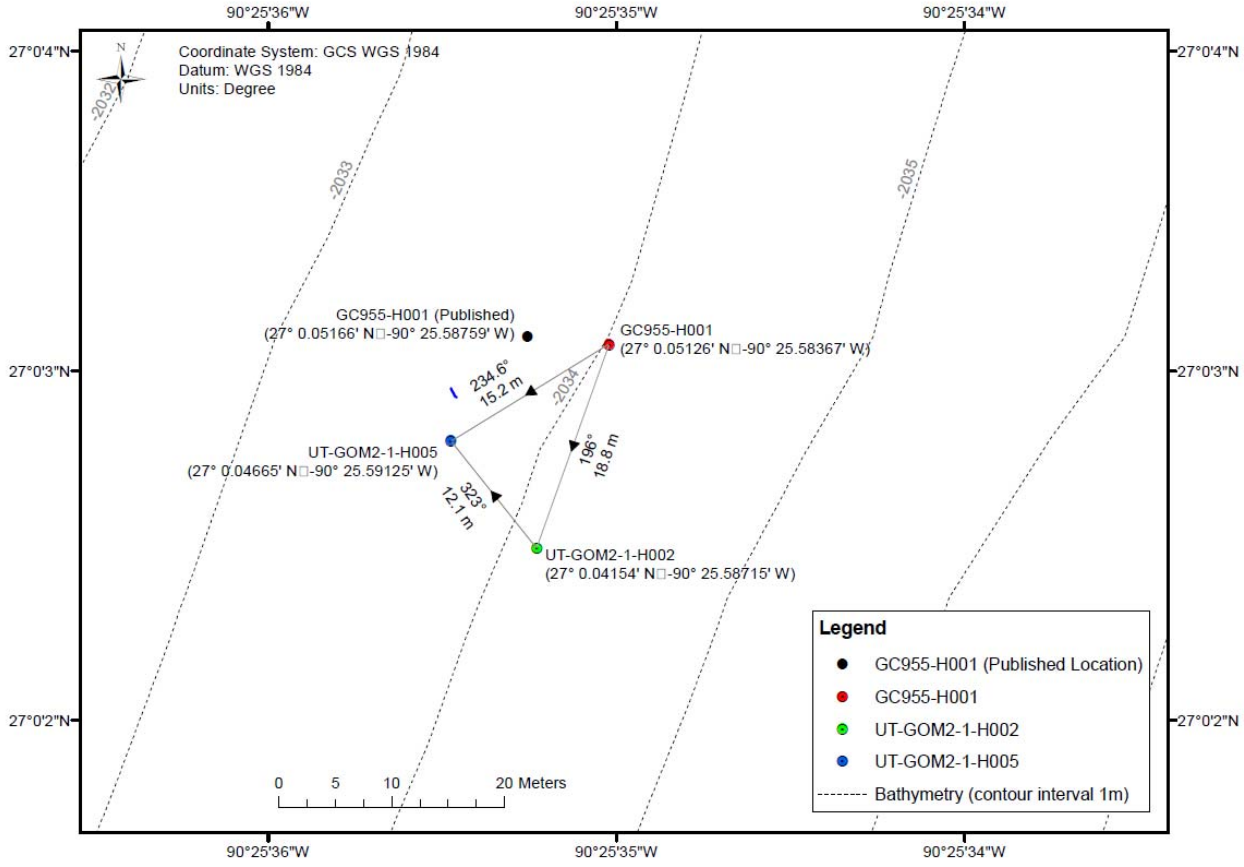

Figure 1.3.2. The locations, distances, and azimuths between the GC955-H001 well as located by BOEM ('published location'), the position of GC955-H001 as found in Expedition UT-GOM2-1, and the GC955-H002 well.

Name	Latitude WGS84 (decimal min.)	Longitude WGS84 (decimal min.)
UT-GOM2-1-H005	**27° 0.04665' N**	**-90° 25.59125' W**
UT-GOM2-1-H002	**27° 0.04154' N**	**-90° 25.58715' W**
GC955-H001-as found	**27° 0.05126' N**	**-90° 25.58367' W**
GC955-H001-published	**27° 0.05166' N**	**-90° 25.58759' W**

Table 1.3.4. Location information for 2 UT wells (H002 and H005). The H001 well is shown 'as found' in UT GOM2-01 and as published previously by BOEM.

	Seafloor KB	*Water Depth (ft)*	*Water Depth (m)*
H001	6,718	6,667	2,032.1
H002	6718	6666	2,031.8
H005	6719	6667	2,032.1

Table 1.3.5. Depth of seafloor for three GC-955 site H wells.

The seafloor depth at UT-GOM2-1-H002 and H005 was determined through observation of the ROV as to when the BHA tagged seafloor with a drill pipe measured depth of 6719 ft. Spud Hole UT-GOM2-1-H005 at 6666.0 ft (6718.0 ft RKB). The H001 well tag depth was estimated from the depth on the LWD log where there was a shift in the Ring Resistivity recording the seafloor.

Calculated top of the hydrate interval for H001, H002, and H005 wells.

Well	FBRF (ft)	TVDSS (ft)	FBSF (ft)	SRD (ft)
H001	8076	8025	1358	8030
H002	8074	8022	1358	8027
H005	8075	8023	1356	8028

Note: 1. FBRF = feet below rig floor, TVDSS = true vertical depth subsea, FBSF = feet below seafloor, SRD = seismic reference depth.

Table 1.3.6. Estimated depth to the top of the hydrate-bearing interval.

The depth of the top of the hydrate-bearing interval was estimated from the seismic data given the known seafloor depth (

Calculated top of the hydrate interval for H001, H002, and H005 wells.

Well	FBRF (ft)	TVDSS (ft)	FBSF (ft)	SRD (ft)
H001	8076	8025	1358	8030
H002	8074	8022	1358	8027
H005	8075	8023	1356	8028

Note: 1. FBRF = feet below rig floor, TVDSS = true vertical depth subsea, FBSF = feet below seafloor, SRD = seismic reference depth.

Table 1.3.6). We mapped the peak seismic reflection at the top of the hydrate-bearing interval to the H002 and H005 well locations. Ultimately, because these wells were drilled so close to each other we found the H002 well would come in 2 feet shallower and the H005 would come in 1 foot below the H001 depth relative to seafloor.

1.3.3. Hole H002 and Hole H005 Coring Operations and Recovery

Two wells were drilled in Green Canyon Block 955: Holes UT-GOM2-1-H002 and -H005. Both wells were adjacent to the previously drilled well GC-955H. One 1.4 m (4.6 ft) of pressure core (Core H002-4CS) was recovered within the hydrate stability zone at HoleH002. 16.1 m (69.9') of pressure core where the material has stayed within the hydrate stability zone are available and in storage vessels from Hole H005

(Cores H005-9FB, -1FB, -6FB, -9FB and -12FB have been excluded). In addition, 4.2 m of pressurized core from H005 that likely temporarily left hydrate stability during recovery and processing are available. All but one of the cores are from the hydrate reservoir. Little core was acquired from the material that bounds the reservoir and none of this material was recovered pressurized; it is unclear whether Core H005-13FB penetrates material below the hydrate reservoir. We interpret that the material above and below the reservoir are so poorly consolidated that they could not be readily recovered during coring.

Hole UT-GOM2-1-H002

Figure 1.3.3 shows the coring intervals and core recovered from UT-GOM2-1-H002 compared to the GC-955H well log data. Overall, only one core from H002 was recovered at pressure. Seven cores were recovered at atmospheric pressure after the coring tool ball value failed to close properly before the core was pulled out of the hydrate stability zone. These cores were sampled for interstitial water, microbiology, physical property, and head space gas samples with additional core sections remaining. A single pressure core, H002-04CS, was recovered at pressure and was cut into two sections for degassing and one section in a storage chamber transported to the UT Pressure Core Center.

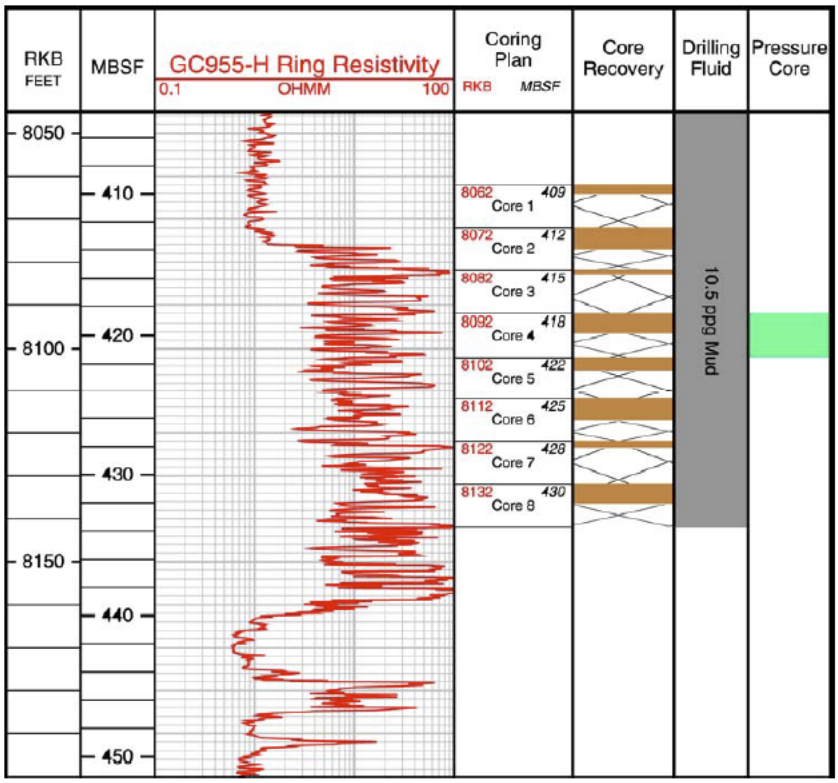

Figure 1.3.3. Cores plan and core recovered from H-002 compared to the GC-955H well log data.

Hole UT-GOM2-1-H005

Figure 1.3.4 and Figure 1.3.5 shows the core plan and core recovered from UT-GOM2-1-H005 compared to the GC-955H well log data. 11 cores (Cores H005-1FB to -8FB, H005-10FB to -11FB, and H005-13FB) were recovered at pressure and without leaving the methane hydrate stability zone. One core, H005-9FB, was recovered at pressure but left the hydrate stability zone and began to dissociate, creating voids filled with gas. One core, H005-12FB, was recovered at atmospheric pressure after the coring tool ball value failed to close properly.

Cores H005-1FB and -6FB, while recovered within the hydrate stability field, lost pressure temporarily during cutting due to seal problems in PCATS. Thus, Cores H005-1FB, -6FB, and -9FB are likely altered due to some hydrate dissociation.

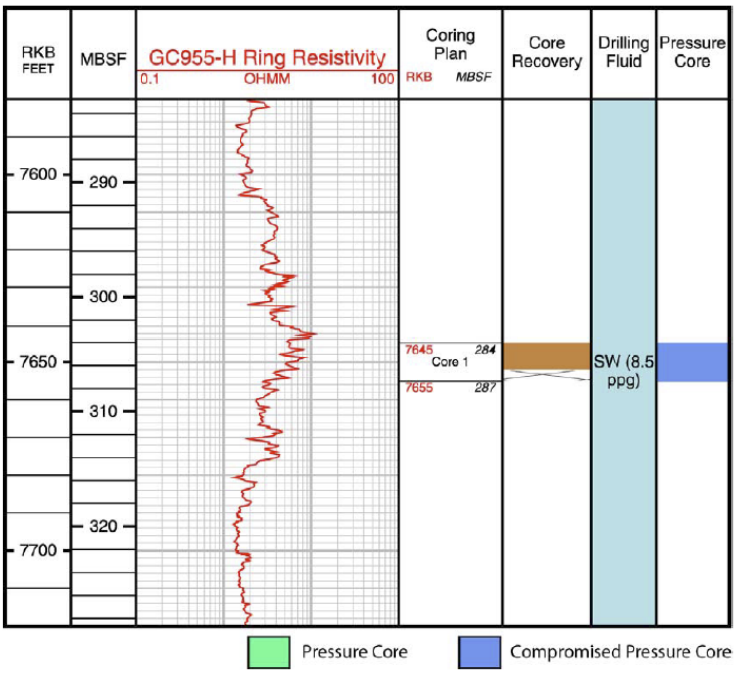

Figure 1.3.4. Log of the UT-GOM2-1-H005 well showing the position of Core #1. The ring resistivity log for the GC955-H well is shown in the center. The percent recovery is indicated by the brown box.

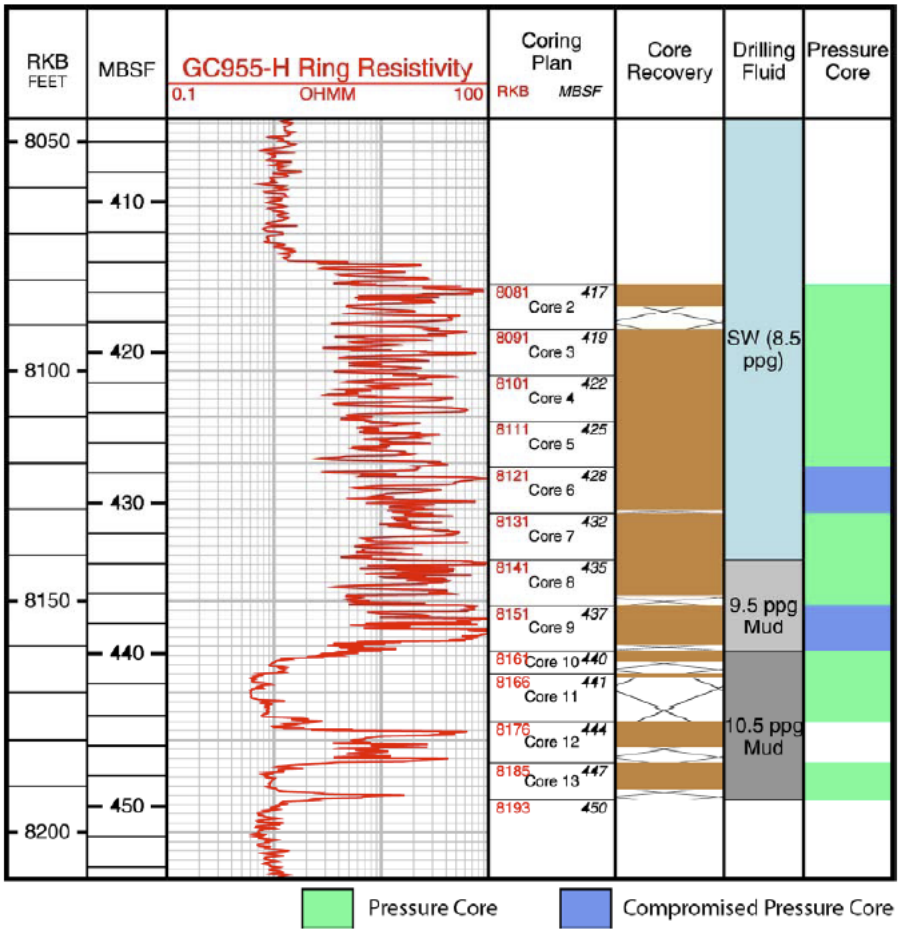

Figure 1.3.5. Log of the UT-GOM2-1-H005 well showing the position of Cores FB2-FB13. The ring resistivity log for the GC955-H well is shown in the center. The recovery is indicated by the brown box. Cores 2-7 were drilled with seawater, cores 8-9 were drilled with 9.5 ppg mud, and cores 10-13 were drilled with 10.5 ppg mud.

1.3.4. Demobilization

Demobilization occurred in phases. First, demobilization occurred from the ship while simultaneously establishing analysis capabilities at Port Fourchon, La. Then the Port Fourchon facilities where demobilized at the completion of shore-based activities.

After drilling and coring operations were completed on 23-May-2017, container baskets were repacked with heavy service items and supplied pack in service vans and containers for transport. Service vans decommissioned and prepped for transport using special protocols to ensure that the acquired depressurized and pressure cores were kept cold. Power was disconnected on the D/V Q-4000 in a specific order and the power outage minimized before the vans were reconnected on the supply boat. All containers, vans, and baskets were transported in a single supply boat, modified to provide power to

the vans, to InterMoor Port Fourchon were the second mobilization, or recommissioning of the core analysis equipment began.

All members of the University group were transported off the D/V Q-4000 by helicopter to Houma, LA. Members of the group participating in the dock-side core analysis operation left Houma for Port-Fourchon were several new members of the science party joined them there.

From the supply vessel, Geotek and UT containers were unloaded as using a special protocol to ensure the depressurized and pressure cores were kept cold. Air compressors, generators, and fuel bowsers were brought in while InterMoor provided water hook-up. The service vans and containers were arranged to minimize/optimize movement of the long pressure cores. The service vans were connected to air, power, and water and the equipment retested before core analysis and cutting was restarted.

During operations at InterMoor; as enough sections of pressure core headed to UT were identified, cut and placed in UT storage chambers; pressure cores were being transported over land to the UT Pressure Core Center. Three trips were made in all with a Geotek specially designed, Department of Transportation approved, overpack system inside a reefer van. Also during operations at InterMoor the PCTB service was clean and all parts prepped for long-term storage at UT.

Once operations were complete at InterMoor all depressurized core, gas samples, and water samples were packed and shipped using dry ice and other methods as necessary to preserve them. The remaining supplies were then pack in service vans and containers depending on their final destination. All equipment and service vans were decommissioned and picked up for transport over land and sea and all rented equipment was picked up and returned.

The PCTB service van and the three baskets of heavy parts were brought to UT for long-term storage. The baskets were unloaded and returned to Tiger Rentals. The Geotek service vans arrived back in the UK. The Mud Lab was returned to Prolog. All pressure cores arrived at UT and are currently being stored under a high pressure maintenance and relief system in a room controlled to 4°C and all depressurized core, gas, and water samples arrived at their intended destinations.

1.4. UT-GOM2-1 Expedition: Scientific Results

1.4.1. Lithostratigraphy and Physical Properties:

Three lithofacies were identified using PCATS P-wave velocity, gamma density, and 2D X-ray data and confirmed by grain size measurements. Lithofacies I was only recovered in Core H005-1FB and is characterized by high density (2-2.1 g/cc) and low P-wave velocity (~1500-1700 m/s). Lithofacies II and III are interbedded in the hydrate-bearing interval (Figure 1.4.1). Lithofacies II is composed of low density (1.7 to 1.9 g/cc) and high velocity (3000-3250 m/s) beds. Ripple lamination and/or cross-bedding was observed in X-ray images (Figure 1.4.2). Lithofacies II contains the most continuous un-deformed samples. Lithofacies 3 is composed of high density (~1.9-2.1g/cc) and low velocity (~1700 m/s) beds. In X-ray images, it is generally more deformed than Lithofacies I.

Core H005-1FB contains Lithofacies I, while cores H002-4CS, H005-2FB to -11FB, and H005- 13FB contain both Lithofacies 2 and 3. Preliminary grain size analyses indicate distinct differences between each

lithofacies (Figure 1.4.3). Lithofacies I is the finest, composed of silty clay and is from the unit well above the hydrate reservoir. Lithofacies II is coarsest and is composed of sandy silt; Lithofacies III is composed of clayey silt.

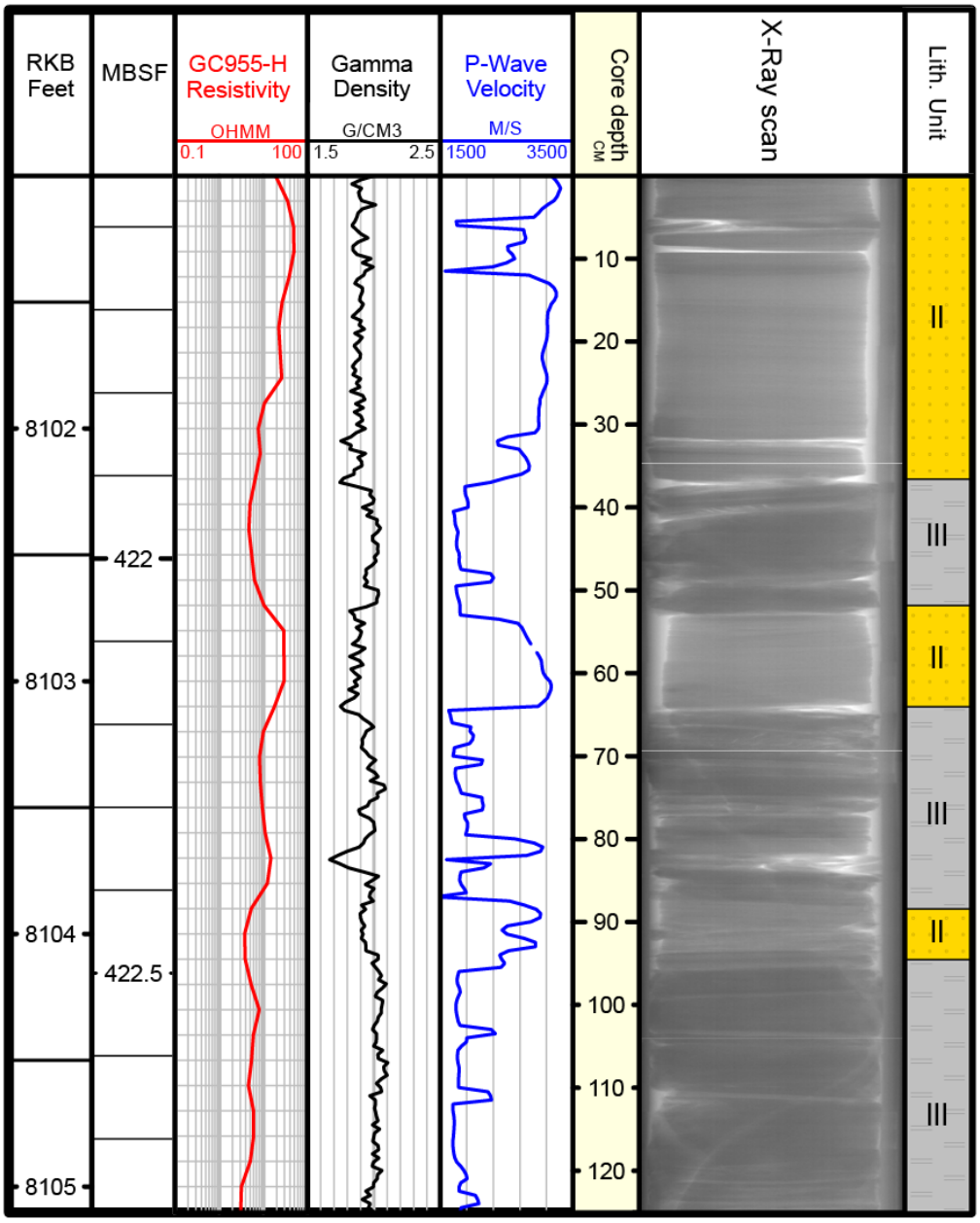

Figure 1.4.1. Example of interbedded Lithofacies II and III from Core UT-GOM2-1-H005-4FB. The data shown here are downhole ring resistivity from GC955-H with the gamma density, P-wave velocity, and 2D X-ray scan from core H005-4FB. Interpreted lithofacies on the right. Lighter intervals in the X-ray correspond to lower density and higher P-wave velocity.

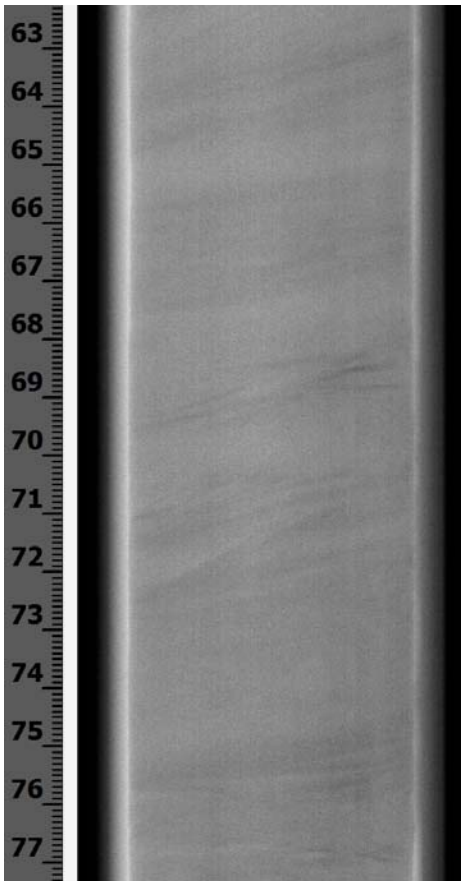

Figure 1.4.2. An example of trough cross-laminations in Lithofacies II from core UT-GOM2-1-H005-2FB-2.

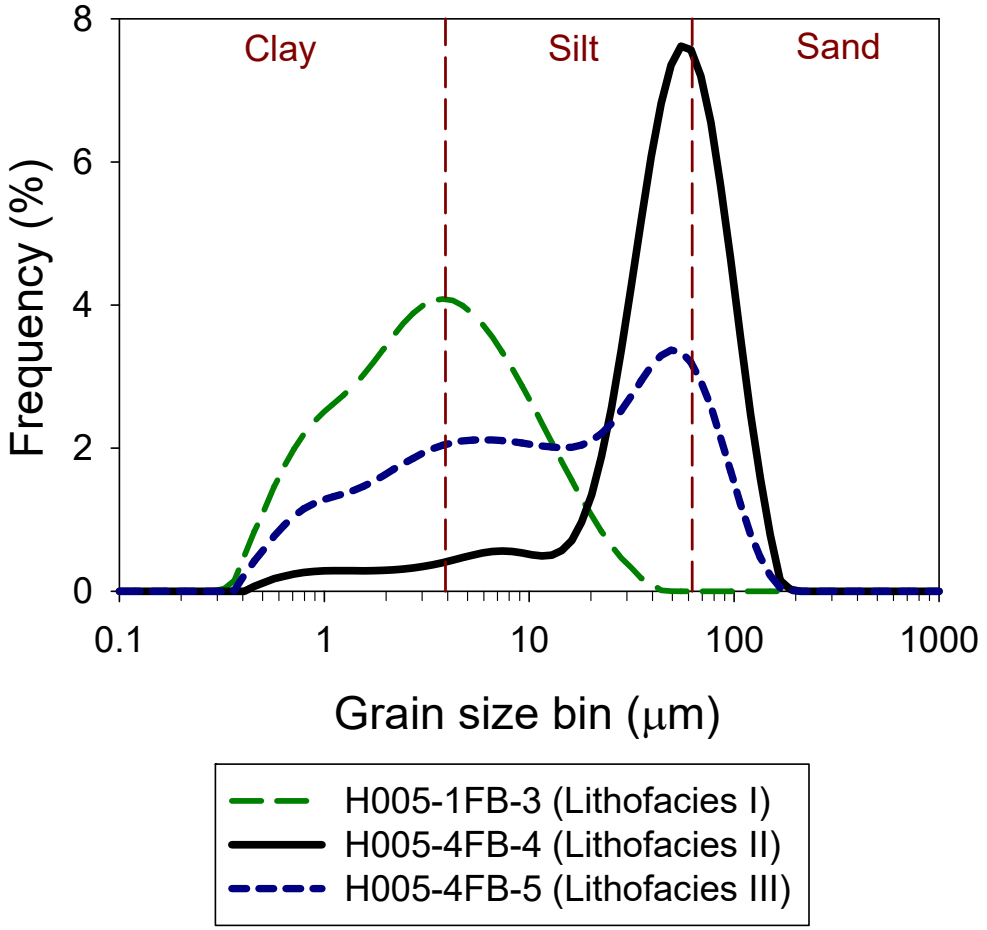

Figure 1.4.3. Grain size distributions analyzed with laser particle size analysis with examples from each lithofacies. Lithofacies I is finest followed by Lithofacies III and Lithofacies II.

1.4.2. Quantitative Degassing

Quantitative degassing experiments were performed separately on Lithofacies I, II, and III. The total amount of gas and liquid released was recorded and the pressure continuously monitored. Between 0.3 and 123 L of gas was recovered during individual degassing experiments (Figure 1.4.4). Gas samples were analyzed periodically in each experiment and were composed of primarily methane with an average of 94 ppm ethane and detectable, but not quantifiable propane. Hydrate saturations were calculated from the methane content, an assumption of 40% porosity, and an assumption that a core volume that fills the internal diameter of the core liner. Lithofacies I contains very low to no hydrate saturation (<3%), Lithofacies II contains very high hydrate saturation (66-87%), and Lithofacies III contains moderately low hydrate saturation (~18-30%). Other degassing experiments contained multiple facies (within cores UT-GOM2-1-H005-7FB, and -10FB) or uncertain facies (cores UT-GOM2-1-H005-9FB and -11FB). These mixed or uncertain facies sections exhibit a wide range of hydrate saturations (0.8-77%).

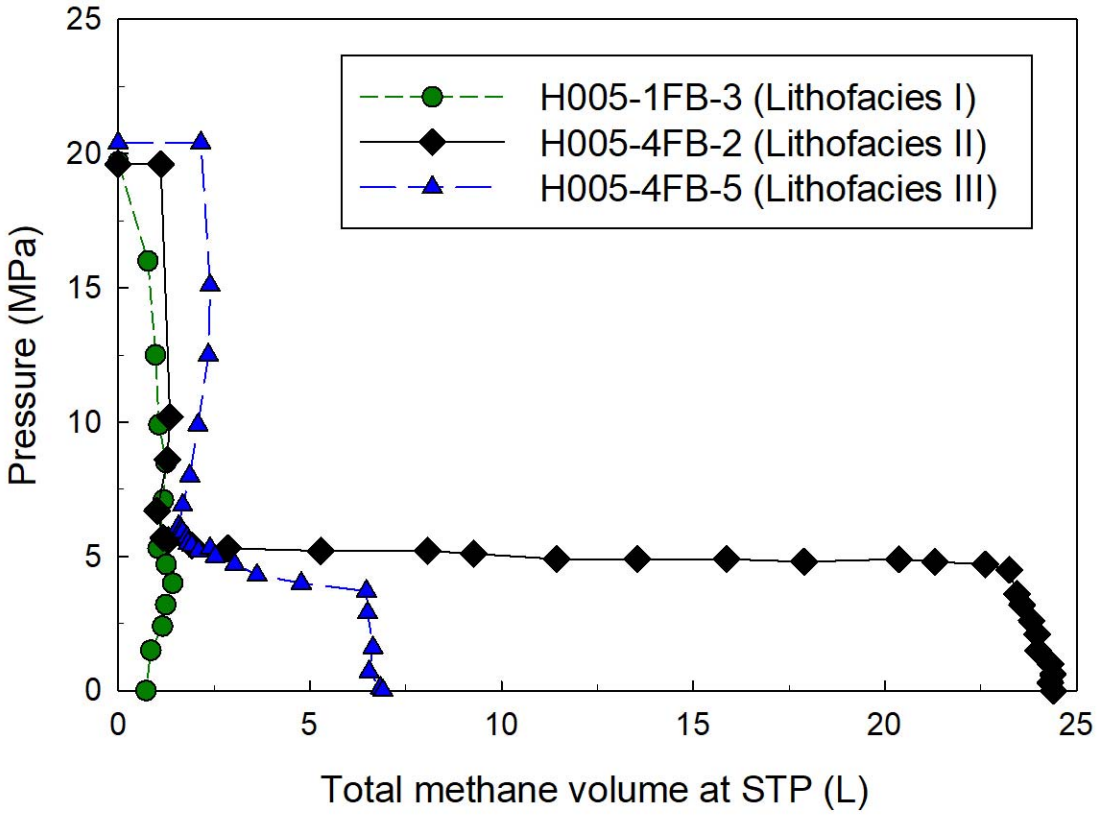

Figure 1.4.4. Example of methane volume versus pressure from three quantitative degassing experiments, each representing Lithofacies I, II, and III. Lithofacies II generally produced the most gas, followed by Lithofacies III, and the least in Lithofacies I.

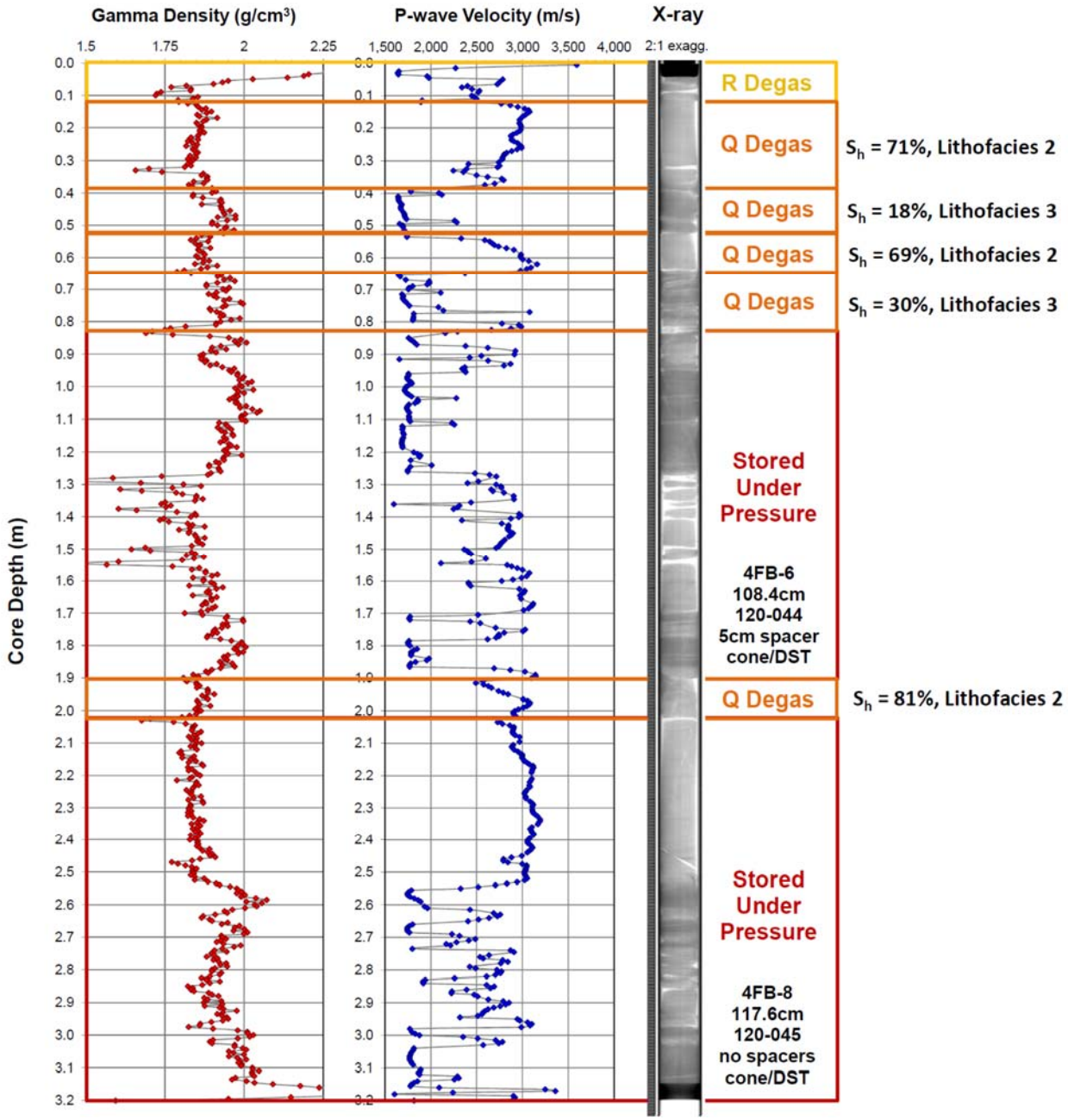

Figure 1.4.5. PCATS results with lithofacies-specific hydrate saturation (S_h) for core UT-GOM2-1-4FB.

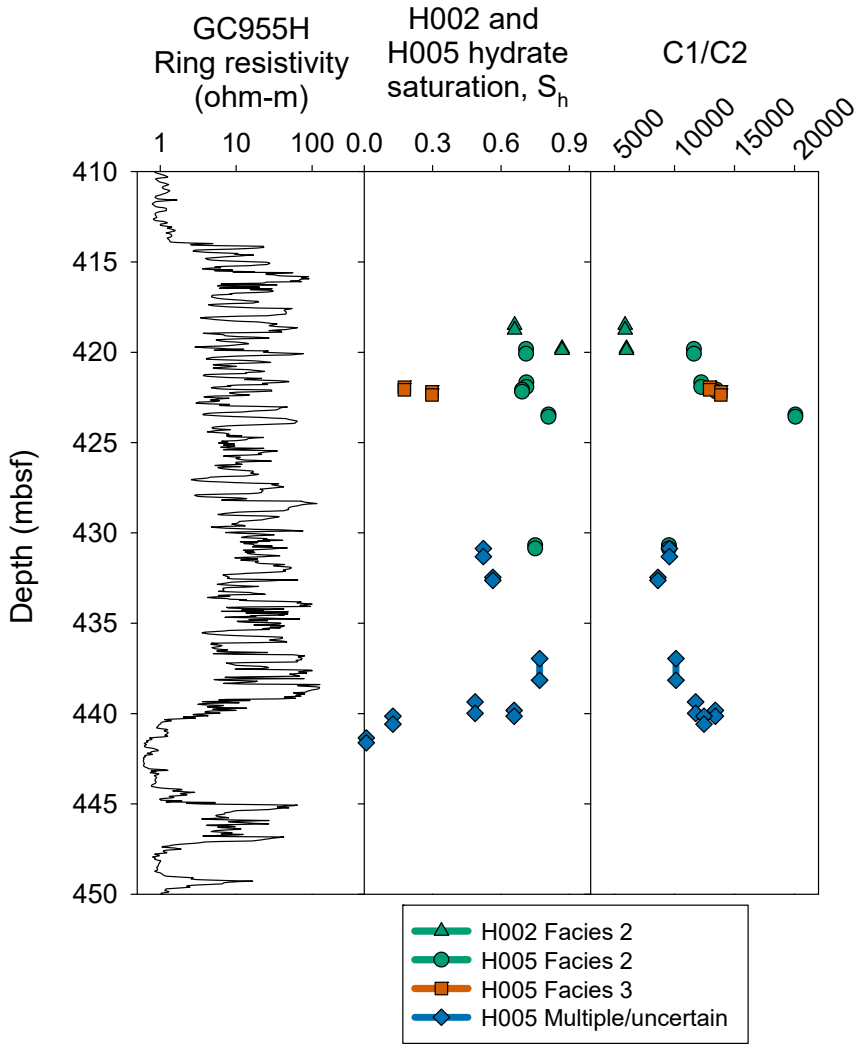

Figure 1.4.6. Down core variation in methane hydrate saturation (Sh) and the methane:ethane ratio (C1/C2) from Holes UT-GOM2-1-H002 and –H005 along with the ring resistivity data from GC955H.

1.4.3. Geochemistry and Microbiology

Ten whole round core samples were collected for porewater chemistry and microbiological analyses. The pore water samples will be measured for salinity, major and minor ions, and dissolved organic carbon. The microbial community will be characterized via RNA and DNA analyses. Drilling fluid and PCATS water samples were collected to characterize potential contamination. PCATS fluid was spiked with 10 ppm Cs to trace contamination from samples processed in PCATS and stored in storage vessels.

1.4.4. Wireline logging

Hole UT-GOM2-H002 was logged from 7680 to 8057 ft RKB. Gamma ray and resistivity logs were generated for the logged interval. A potential bridge in the hole prevented logging below 8057 ft RKB to characterize the hydrate reservoir.

1.5. UT-GOM2-1 Expedition: Reporting

1.5.1. Shipboard Contractor and Scientific Daily Reports

Daily shipboard contractor reporting during UT-GOM2-1 consisted of (1) Helix Drilling Reports, (2) Q4000 Bridge Reports – including POB report, (3) Weatherford Drilling/Coring Performance Reports, (4) Geotek Coring Reports, (5) Swaco Daily Drilling Fluids Report, (6) Schlumberger Services Completions (cementing) Report, (7) Schlumberger Wireline Services Daily Report, and the (8) UT Daily Operational and Science Reports.

1.5.2. UT-GOM2-1 Expedition Report

UT-GOM2-1 participants are preparing an expedition report that will be completed by Sept. 2017. The will report on all aspects of UT-GOM2-1 and will make available all data acquired and analyzed during the expedition. At the beginning of UT-GOM2-1, reporting duties were assigned to the individual laboratory group leaders. These duties included the drafting of their lab group's initial findings into a report for the each of the holes drilled during the expedition. Drafts also included figures and tables representing the data generated during the shipboard core analysis process. These reports are being revised and edited currently.

1.5.3. Other Project Reporting Plans and Requirements

This preliminary expedition summary will be included in an extended expedition summary report including details on pressure coring, physical properties, quantitative degassing, lithostratigraphy, geochemistry and wireline logging for each of the two holes. In addition we anticipate that additional findings will be published together in a special journal report at the end of the expedition moratorium period, 31-October 2018.

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UT-GOM2-1 EXPEDITION SUMMARY

Deepwater Marine Test

Appendix A: Post-drill Operation Report and Daily Log

UT/DOE GOM^2 Marine Test Daily Log

Revision: 0 Date: 6 June 2017

Date	Time	Activity Description	Daily Log
20-Apr-17		UT representative arrives at Keppel AmFELS Shipyard in Brownsville, TX.	Shipyard work continued on the vessel (Q4000) in dry dock. Tom Pettigrew (Pettigrew Engineering/UT), Quentin Huggett (Geotek), Sally Huggett (Geotek, not sailing), Mike Mimitz (Geotek), Allan Bakken (Geotek), and Matt Selman (Geotek) arrived at the Kepple AmFELS shipyard in Brownsville, Texas. A shipyard briefing was given and then identification and gangway passes were issued. Vish Subramani (Helix) escorted the group to the Q4000 where a shipboard safety briefing was given as well as a tour of the vessel. Positions for the Geotek PCATS containers were laid out on deck. Electrical and air connections were located. Water connections are yet to be defined. Required lengths of utility hoses and cables was measured. The rig floor was inspected as well as the mouse hole locations, tuggers, etc. While sitting on the dock, the PCTB service van was opened and inspected, all was found to be as shipped. The DNV frame was located in another part of the shipyard and requested to be moved dockside.
21-Apr-17		Q4000 in dry dock, shipyard work continues.	Shipyard work continued on the vessel in dry dock. No shipments were received.
22-Apr-17		PCATS, PCTB, BHA components arrive dockside in Brownsville, TX	Shipyard work continued on the vessel in dry dock. All of the Geotek Pressure Core Analysis and Transfer System (PCATS) containers and all three lifting baskets, one from Austin and two from Houston arrived and were offloaded from their trucks to dockside. Helix requested a change in the PCATS container layout on deck. Geotek personnel boarded the Q4000 to confer on the changes.
23-Apr-17		Chillers, cold shuck arrive dockside in Brownsville, TX, chillers installed in DNV frame.	Shipyard work continued on the vessel in dry dock. Lifting basket contents were inventoried and required tubulars and subs were present. The chillers arrived late afternoon and were offload from the truck dockside.
24-Apr-17		Q4000 moved out of dry dock and tied up dockside.	Shipyard work continued on the vessel in dry dock. The chillers were installed in the DNV frame. Nitrogen bottles were secured in a rack. The revised deck layout for the PCATS containers was approved by both Helix and Geotek. At 0930 hrs. the dry dock began flooding in preparations for moving the Q4000 alongside the dock. The Q4000 was tied up dockside at 1700 hrs.
25-Apr-17		Q4000 shipyard work continues.	Shipyard work continued on the vessel dock side. Loading of the Geotek and UT equipment was discussed with Rig Superintendent.
26-Apr-17		Q4000 shipyard work continues.	Shipyard work continued on the vessel dock side.
27-Apr-17		Q4000 shipyard work continues.	Shipyard work continued on the vessel dock side. All Geotek personnel completed the SafeGulf course. Peter Polito (University of Texas at Austin (UT)), Steve Phillips (UT), Kevin Meazell (UT), and Tiannong Dong (UT) arrived.
28-Apr-17		Q4000 shipyard work continues.	Shipyard work continued on the vessel dock side. Additional UT personnel that arrived Thursday were given the shipyard safety briefing and issued identification and gangway passes. Peter Flemings (UT) arrived.
29-Apr-17		UT personnel board Q4000.	Shipyard work continued on the vessel dock side. Peter Flemings was given the shipyard safety briefing and issued identification and a gangway pass. All Geotek PCATS containers were loaded on board and positioned on deck. The lifting baskets from Houston were unloaded dockside and the contents loaded onboard the Q4000. All UT personnel move on board the Q4000 at 1600 hrs. and given the shipboard safety briefing.
30-Apr-17		Geotek personnel board Q4000.	UT and Geotek staff boarded the Q4000. All Geotek containers were loaded onto the vessel. Phone and internet connected to company man and the 3rd party offices. Representatives from UT, Geotek, Helix, Schlumberger, and Weatherford met to discuss the status/plans for rig floor and container operations going forward. These plans include utility connections to Geotek containers, grating installation, Schlumberger wireline rig up through the top drive, Weatherford instrumentation, and mouse-hole installation/modification. The current priority is for Helix to finish loading and load-testing before the above operations can continue.

UT/DOE GOM^2 Marine Test Daily Log

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Date	Time	Activity Description	Daily Log
1-May-17	0750	Begin transit to FMEA site.	At 0750hr the Q4000 left the dock at Brownsville, TX and was guided by the harbor pilot through the channel towards South Padre Island. At 1020hr the vessel entered the Gulf of Mexico, and continued offshore at 1105hr after the pilot disembarked. At 1300hr conducted fire drill. Geotek Coring gained access to clean freshwater for their core lab containers. Helix began required vessel sea trials by 2200hr.
	2200	Arrive FMEA site.	
2-May-17		Conduct sea trials, FMEA.	Helix continued to conduct required vessel sea trials. Geotek-Coring continued to prepare core lab containers (PCATS) for operations.
		Assemble and test PCATS.	
3-May-17		Conduct sea trials, FMEA.	Helix continued to conduct required vessel sea trials. Geotek-Coring continued to prepare core lab containers (PCATS) for operations.
		Assemble and test PCATS.	
4-May-17	1800	1 nmi off FMEA site, begin transit and lump sum mobilization.	Helix completed a crew change through the morning and afternoon with three helicopter flights. After transfers were complete, the Q4000 was de-ballasted and began to transit towards GC955. Helix began installing the grating around Geotek-Coring (PCATS) containers. Geotek-Coring continued to prepare core lab containers (PCATS) for operations.
		Rig Movement Notification submitted.	
		Geotek continued to organize and inventory their equipment.	
5-May-17		Underway for H002 site.	The Q4000 continued transit towards GC955 throughout the day. Grating was installed around Geotek Coring (PCATS) containers. UT, Helix, Geotek-Coring and all third parties participated in a pre-spud meeting to discuss the expedition objectives and the operational plan. Schlumberger and Helix worked on rigging up the wireline equipment through the top drive.
		Pre-spud meeting held.	
		Grating installed around Geotek's containers.	
		Geotek continuing to set up their equipment.	
		Rig up wireline equipment to/through top drive.	
6-May-17	1600	1 nmi off operations site.	The Q4000 arrived within 1 nmi of location of the GC955-H001 well at 1600hr after a 307 nmi transit. Schlumberger and Helix complete the rigging up the wireline equipment through the top drive. Geotek-Coring continued to prepare Geotek Coring (PCATS) containers and PCTB pressure core systems. The ROV was launched at 2040he to deploy four Compact transponders and survey the site area. The GC955-H001 well was found at 2247hr at a location of 27° 00.05126' N, 090° 25.58367' W in a WGS84 coordinate system. The borehole well head at the seafloor was intact and in good condition.
		Geotek continued to prepare their equipment.	
		Launch ROV, deploy transponders, conduct as-found survey.	
		Locate Hole H001 at 27° 00.05126' N, 090° 25.58367' W (WGS84).	
7-May-17	0230	M/V HOS Crockett arrived on site with equipment and mud from Fourchon, LA, begin offload.	Helix conducted a partial crew change via three helicopter flights. The supply boat *M/V HOS Crockett* was offloaded over most of the day; drilling mud, gel, and the mud lab were brought on board. The as-found ROV survey of the seafloor was completed. Geotek-Coring conducted trial PCTB core system runs in the Geotek Coring (PCATS) labs. Helix worked on installing the HVAC system for the mud pumps. Weatherford installed a new interface and software to monitor and record drilling and coring parameters.
		Crew change occurred via three helicopter flights.	
		Mud lab offloaded.	
		Completed as-found survey with the ROV.	
		Weatherford installed interface and software to record drilling parameters.	
8-May-17	1227	The M/V HOS Crockett departed.	Conducted fire/abandon ship drill at 0819hr. The supply boat M/V HOS Crockett materials transfer was completed and departed at 1227hr. The UT mud lab was placed into location on the deck of the Q4000 and hooked up to utilities. Helix finished installing the duct work for the mud pumps. Made up ~2300 ft of drill pipe between 1400-1930hr and then between 1940-2200hr pulled up and laid down pipe in doubles. Starting at 2015hr, Weatherford software began logging top drive data; allowing for the recording of all drilling parameters, except the stroke counter on the mud pumps. Helix performed pressure testing of the upper and lower IBOP valves and the wireline night cap starting at 2315hr.
		Spot mud lab, connect utilities.	
	1400-2200	Make up ~2300 ft of drill pipe and lay out in doubles.	
	2315	Begin pressure testing upper and lower IBOP valves and wireline night cap.	

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Date	Time	Activity Description	Daily Log
9-May-17	0800	Complete pressure testing upper and lower IBOP valves and wireline night cap.	Conducted a series of three Shallow Flow Tests of the PCTB-CS pressure core system with the BHA hanging just below the sea surface. Preliminary analysis of data from Geotek instrumented core liner shows only small pressure differentials across the core liner during each of the three Shallow Flow Tests of the PCTB-CS. The instrumented core liner upon visual inspection did not exhibit any damage or deformation. The PCTB-CS Surface Pump Test revealed a potential problem associated with the use of the shipboard Hex mud pumps in that the pumps could not effectively work below a flow rate of about 125 GPM. It has been shown in the past that high mudflow rates, exceeding about 30 GPM, can cause severe borehole washouts and adversely affect core recovery. A decision was made to also test the use of the Schlumberger cement pumps to determine if lower mud pump rates could be established and maintained. As shown above, the cement pumps used during Surface Pump Test 3 was able to establish and maintain low flow rates in the range of 21-40 GPM. The current operational plan has been modified to include the use of the onboard cement pumps during planned pressure coring operations. There were three helicopter flights for crew change, and the remainder of the UT Science Party arrived at 1445hr and went through the safety orientation.
	0800	MU PCTB-CS OCBA for flow test.	
	1145	UT personnel board via helicopter from Houma, LA.	
	1230-1300	Space out with PCTB and instrumented core barrel	
	1621-1646 hr	Surface Pump Test 1 PCTB-CS	
	1653-1710 hr	Surface Pump Test 2 PCTB-CS	
	1953-2022 hr	Surface Pump Test 3 (cement pump) PCTB-CS	
	2130-2400	Space out cementing liner, center bit and PCTB-CS.	
10-May-17	0000-0215	MU PCTB-CS BHA.	Made-up and ran to the seafloor the BHA with drill collars and pipe reaching near the seafloor (6716 ft MD) at 2110hr and the Geotek instrumented core barrel was deployed in preparation for conducting a series of seafloor level flow tests. The first attempted Deep Flow Test was not completed because of an electrical problem associated with one of the ship's mud pumps. However, two additional seafloor pump tests were completed without any concerns. The flow tests also allowed for the analysis of the performance of all three pump units on the platform (i.e., Hex Pumps 1 and 2; and the Schlumberger cement pump). Analysis of data obtained from both the sea surface and seafloor flow tests documented only small pressure differentials across the core liner for all of the completed tests. In addition, the instrumented core liner was not damaged during any of the completed pump test. Modifications to the drilling fluid flow paths through the PCTB-CS appear to have significantly reduced the internal pressure conditions that have in the past resulted in the collapse of core liners within the PCTB-CS system. The pump tests also represented an excellent opportunity for Geotek-Coring and the Q4000 rig crew to become more familiar with operations and handling of the PCTB-CS pressure core system as deployed on this expedition.
	0215-1630	RIH w/ bit on drill pipe.	
	1630-1930	Change bails on TDS, stage PCTB-CS, RU wireline.	
	1930-2110	RIH w/ instrumented core barrel.	
	2110-2230	Seafloor Pump Test X PCTB-CS (incomplete test)	
		Using Hex Pump 2 switched to Hex Pump 1 (circulating seawater)	
	2230-2315	Seafloor Pump Test 1 PCTB-CS	
	2315-2400	Seafloor Pump Test 2 (cement pump) PCTB-CS	
	0912-1647	USCG inspection.	
11-May-17	0000-0100	Complete Seafloor Pump Test 2 (cement pump) PCTB-CS	At 0830hr spudded Hole UT-GOM2-1-H002 at 6667.0 ft (6719.0 ft RKB) and advanced hole to a depth of 8032.0 ft RKB (1313.0 fbsf) by midnight without any significant problems. Geotek-Coring completed preparations for coring operations and developed plans for simulated core runs to be conducted before reaching core point as planned for the morning of 12-May-17. The UT Scientific Party refined and finalized the Hole UT-GOM2-1-H002 core plan. The UT Scientific Party also continued to develop the core handling and processing plan. Based on (1) lateral correlation with seismic data from Hole GC955-H as drilled under the Gulf of Mexico Gas Hydrate Joint Industry Project Leg II (GOM JIP Leg II) in 2009 to the Hole UT-GOM2-1-H002 and (2) the seafloor depth at UT-GOM2-1-H002, the first pressure core point (Core UT-GOM2-1-H002-01) was set at 8062.0 ft RKB (1343.0 fbsf).
	0100-0500	POOH w/ instrumented core barrel.	
		RIH w/ center bit.	
	0500-0530	Test wireline night cap on TDS to 5000 psi	
	0530-0600	Held Spud meeting with all personnel involved	
	0600-0830	RIH w/ bit.	
	0630-0730	Move rig over H002 location.	
	0730-0830	Tag mudline at 6719.0 ft.	
	0830-2300	Spud Hole H002.	
		Drill 6719.0 ft to 8032.0 ft.	
	0856-1215	BSEE inspection (Inspectors Campo, Boudreaux, Fry, Shedd)	
	2300-2400	Circulate hole clean with 8.6 ppg mud	

UT/DOE GOM^2 Marine Test Daily Log

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Date	Time	Activity Description	Daily Log
12-May-17	0000-0030	Fill hole w/ 10.5 ppg WBM.	Performed a series of three simulated coring drill downs with the bit just off the bottom of the hole. Hole UT-GOM2-1-H002 was advanced from 8062 ft MD to 8092 ft MD with 3 PCTB-CS pressure cores (Core UT-GOM2-1-H002-01-CS, Core UT-GOM2-1-H002-02-CS, and Core UT-GOM2-1-H002-02-CS). **Conducted core run: Core UT-GOM2-1-H002-01CS.** Core barrel recovered on deck with ball valve closed but with little to no pressure in the autoclave. Core UT-GOM2-1-H002-01CS, which was the first core acquired during this expedition, recovered 2.3 ft (69 cm) of core in poor condition and failed to retain pressure. The deployment, cutting, and recovery of the core appeared to be conducted without any problems. We did not see any trouble with the latching of the tool or it's deployment in the pipe. But it took more than 6,000 lbs of pull to unlatch the tool from the BHA. The cutting of the core on bottom also appeared to be good with somewhat variable penetration rates and weight on bit. Upon recovery, the ball valve was closed but the pressure boost appeared not to have pressurized the autoclave below the new flow diverter set above the upper autoclave seal (poly-pak seals). Two additional PCTB-CS operational tests were conducted in the open drill pipe (while not in contact with the sediment) that appeared to confirm that there was some form of pressure block in the tool. **Conducted core run: Core UT-GOM2-1-H002-02CS.** When the tool was recovered on deck the ball valve was not closed; core liner visible through ball valve (no pressure). Core did not retract into the autoclave. The upper threaded connection of the liner to the top of the core plug was broken and the core catcher was damage indicating that the core likely jammed, which caused core milling and the breaking of the liner. It also took about a 6000 lb pull to unlatch the inner core barrel from with the BHA during the recovery of the core. A total of 5.3 ft (162 cm) of sediment was recovered. **Conducted core run: Core UT-GOM2-1-H002-03CS.** Upon recovery this core failed to hold pressure; however, it did return core to the surface. This failure of the core system to retain pressure was attributed to the fact that the retrieval of the inner core-barrel required a special procedure to release it form the latches in the BHA. We did not see any trouble with the deployment and latching of the tool before coring. The actual core cut event appeared to be good with somewhat variable penetration rates and weight on bit. However, at the end of the test the inner core-barrel was stuck in the BHA. The rig crew and Geotek staff core team managers worked with the Schlumberger wireline engineer for nearly four hours to unlatch the core barrel from the BHA. Eventually, the decision was made to use a special emergency release procedure that was successful but also prevents the ball-valve on the tool from closing. A total of 1.1 ft (33 cm) was recovered. The 'conventionalized' core material from each core was transferred to the UT mud lab whole rounds were subsampled and preserved for shore-based geochemistry, microbiology, and physical properties. Head space gas samples were sampled for shore-based analyses.
	0030-0230	Performed coring simulations drilling down: 8032 ft - 8042 ft, 8042 ft - 8052 ft, 8052 ft - 8062 ft.	
	0230-0330	Circulate hole clean.	
	0330-0730	POOH w/ center bit.	
		RIH w/ PCTB-CS.	
	0730-0900	Core H002-01, F/ 8062 ft T/ 8072 ft.	
	0900-0930	POOH w/ PCTB-CS (recovered 2.3 ft, 0 psi).	
	0930-1010	RIH w/ PCTB-CS for water core test 1.	
		POOH PCTB-CS (0 psi, boost failed).	
	1010-1230	RIH w/ PCTB-CS for water core test 2.	
		POOH w/ PCTB-CS (0 psi, boost failed).	
	1230-1830	RIH w/ PCTB-CS.	
		Circulate hole clean.	
	1830-1900	Core H002-02, F/ 8072 ft T/ 8082 ft.	
	1900-1945	POOH w/ PCTB-CS (recovered 5.3 ft, 0 psi) (liner did not retract preventing ball valve from closing.	
	1945-2230	RIH w/ PCTB-CS.	
		Circulate hole clean.	
	2230-2330	Core H002-03, F/ 8082 ft T/ 8092 ft.	
	2330-2400	RIH w/ pulling tool.	

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13-May-17	0000-0400	PCTB-CS would not unlatch from the BHA.	Hole UT-GOM2-1-H002 was advanced from 8092 ft MD to 8112 ft MD with 2 PCTB-CS pressure cores (Core UT-GOM2-1-H002-04CS and Core UT-GOM2-1-H002-05CS). **Conducted core run: Core UT-GOM2-1-H002-04CS.** Core UT-GOM2-1-H002-04CS was recovered on deck with ball valve closed and at an internal autoclave pressure of 3372 psi, which was the first core acquired during this expedition at pressure. The deployment and recovery of the PCTB-CS core barrel was conducted without any problems. The cutting of the core at the bottom of the hole also appeared to be good with almost constant core penetration rates and weight on bit. Upon recovery, the PCTB-CS core barrel was placed in the vertical ice-shuck on the rig floor. The internal pressure of the PCTB-CS autoclave when received in the Geotek Coring Service Van measured 3372 psi, which is slightly less than the expected hydrostatic pressure at the depth of the cored reservoir section at this site. In the PCATS lab, an X-ray scan of the PCTB-CS autoclave revealed 4.6 ft (140 cm) section of sediment core and 4.0 ft (123 cm) sediment fill above the core rabbit, which indicates that formation sediment had been fluidized during coring and flowed up into the core liner through the small ports in the rabbit. **Conducted core run: Core UT-GOM2-1-H002-05CS.** For Core UT-GOM2-1-H002-05, the ball-valve failed to close or hold pressure; however, it did return core to the surface. For Core UT-GOM2-1-H002-05CS the tool was recovered to the rig floor with the ball-valve closed but not sealed. Silt and sand was found packed between the ball valve and seal; and the seal appeared to be damaged. We also had significant trouble unlatching this tool from the BHA during recovery, which may also have been caused by the impact of silt/sand on the operation of the latch system within the PCTB-CS BHA. Core UT-GOM2-1-H002-05CS did recover 3.1 ft (94 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab.
		POOH w/ pulling tool, RIH w/ emergency pulling tool.	
	0345	POOH w/ PCTB-CS (recovered 1.1 ft, 0 psi).	
	0400-0630	RIH w/ PCTB-CS.	
	0630-0900	Running tool shear released PCTB.	
		POOH w/ running tool, RIH w/ emergency pulling tool.	
		POOH w/ PCTB-CS.	
	0900-1300	RIH w/ PCTB-CS.	
	1300-1330	Core H002-04, F/ 8092 ft T/ 8102 ft. MD: Recovered 4.6 ft, 3372 psi	
	1330-1530	POOH w/ PCTB-CS (recovered 4.6 ft, 3372 psi)	
	1530-1930	RIH w/ PCTB-CS.	
	1930-2000	Core H002-05, F/ 8102 ft T/ 8112 ft. MD: Recovered 3.1 ft, 0 psi	
	2000-2400	POOH w/ PCTB-CS (recovered 3.1 ft, 0 psi)	
	0540-1130	M/V Mr Steven arrive/departed location.	
14-May-17	0000-0200	RIH w/ PCTB-CS.	Hole UT-GOM2-1-H002 was advanced from 8112 ft RKB to 8142 ft RKB with 3 PCTB-CS pressure cores (Core UT-GOM2-1-H002-06CS, Core UT-GOM2-1-H002-07CS, Core UT-GOM2-1-H002-08CS). All three of the recovered PCTB-CS cores failed to hold pressure. **Conducted core run: Core UT-GOM2-1-H002-06CS**. For Core UT-GOM2-1-H002-06CS, the ball-valve closed, seal at top end of autoclave plug failed; however, it did return core to the surface. For Core UT-GOM2-1-H002-06 the tool was recovered to the rig floor with the ball-valve partially closed (not sealed). Silt and sand was found packed between the ball valve and seal. Core UT-GOM2-1-H002-06 recovered 5.2 ft (158 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab. **Conducted core run: Core UT-GOM2-1-H002-07CS.** For Core UT-GOM2-1-H002-07CS, the ball-valve failed to close or hold pressure (displaced BV seal); however, it did return core to the surface. For Core UT-GOM2-1-H002-07 the tool was recovered to the rig floor with the ball-valve partially closed (not sealed). Silt and sand was found
	0200-0230	Core H002-06, F/ 8112 ft T/ 8122 ft. MD: Recovered 5.2 ft, 0 psi	
	0230-0315	POOH w/ PCTB-CS (recovered 5.2 ft, 0 psi).	
	0315-0730	RIH w/ PCTB-CS.	
	0730-0830	Core H002-07, F/ 8122 ft T/ 8132 ft. MD: Recovered 1.5 ft, 0	
	0830-0920	POOH w/ PCTB-CS (recovered 1.5 ft, 0 psi).	
	0920-1330	RIH w/ PCTB-CS.	
	1330-1400	Core H002-08, F/ 8132 ft T/ 8142 ft.	
	1400-1530	POOH w/ PCTB-CS (recovered 4.6 ft, 0 psi) (ball valve did not actuate).	
	1530-1630	Decision made to TD Hole H002 at 8142 ft.	
		Pumped 280 bbls of 10.5 ppg to sweep hole clean.	
	1630-1730	Rig up logging sheaves.	
	1730-1830	POOH w/ bit F/ 8142 ft T/ 7680 ft.	
	1830-2040	RU logging wireline through travel block and TDS	
		MU logging wireline packoff in TD	
		Terminate logging wireline cable head	
		MU logging tool string.	

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	2040-2400	RIH w/ EDTC-HRLA-GPIT (logging tool string includes Induction Inclinometer).	packed between the ball valve and seal. In addition, sediment was also found above the core rabbit in the PCTB-CS autoclave, indicating that formation sediment had been fluidized during coring and flowed up into the core liner through the small ports in the rabbit. Core UT-GOM2-1-H002-07 did recover 1.5 ft (46 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab. **Conducted core run: Core UT-GOM2-1-H002-08CS.** For Core UT-GOM2-1-H002-08CS, the ball-valve failed to actuate or hold pressure. The ball-valve release sleeve (collett) failed by sliding over stop position, which resulted in the failure of the ball-valve to actuate. Core UT-GOM2-1-H002-08 did recover 4.6 ft (140 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab. Hole UT-GOM2-1-H002 reached a TD of 8142 ft RKB (1423 fbsf) at 1630 hr with the recovery of Core UT-GOM2-1-H002-08, after which the hole was swept with 280 bbls of 10.5 ppg water-based mud in preparation for downhole wireline logging. The wireline logging tool string (including EDTC-HRLA-GPIT) was lowered to bottom of the hole, and two up hole log runs from 8045 ft RKB to 7680 ft RKB (Main Pass and Repeat Pass) were acquired without any problems. Because of borehole blockages, the wireline logging tool string could not pass below 8045 ft RKB and the BHA had been set back to a depth of 7680 ft RKB. **Wireline Logs: EDTC-HRLA-GPIT F/7680 ft RKB T/8045 ft RKB (Main Pass)**
		Unable to pass 8045 ft.	
		Log up F/ 8045 ft T/ 7680 ft.	
		RIH w/ EDTC-HRLA-GPIT F/ 7680 ft T/ 8045 ft.	
		Log up F/ 8045 ft T/ 7680 ft.	
		Continue up hole log run to obtain seafloor log depth at 6704 ft.	
		POOH w/ logging tool string.	
15-May-17	0000-0130	Continue POOH w/ logging tool string.	Logging program in Hole UT-GOM2-1-H002 was completed with the acquisition of a main pass and repeat pass surveys (EDTC-HRLA-GPIT) over the depth interval from 7680 ft RKB to 8045 ft RKB. Hole UT-GOM2-1-H002 was abandoned with the emplacement of a 500 ft cement plug that was set above the hydrate interval to avoid any potential problem associated with hydrate dissociation that may be caused by the heat generated by cement hydration. The last half of the day dealt with preparations to move onto the location of Hole UT-GOM2-1-H005. Prepared and set cement plug in Hole UT-GOM2-1-H002 from a depth of 7900 ft RKB to 7400 ft RKB. Recovered PCTB-CS BHA to the ship and prepared to run the PCTB-FB version of the PCTB pressure core system.
		RD logging tools, wireline, and wireline sheaves	
	0130-0430	RIH w/ bit F/ 7680 ft T/ 8142 ft.	
		Spot 25 bbls 11.5 ppg Gel pad mud.	
		POOH w/ bit BHA F/ 8142 ft T/ 7900 ft.	
		Pump 200 bbls of 10.5 ppg WBM.	
		Drop cementing liner.	
	0430-1230	Pump 17 bbls gel spacer.	
		Drop Nerf ball, pump 3 bbls of 10.5 ppg spacer.	
		Pump 77 bbls 16.4 ppg cement.	
		Pump 17 bbls of gel spacer.	
		Displace drill string w/ 171 bbls of seawater.	
		POOH w/ bit F/ 7900 ft T/ 6611 ft.	
		Flush drill string w/ 350 bbls seawater and 2 nerf balls.	
		POOH w/ cementing liner.	
		Flush DS w/ 245 bbls of seawater.	
	1230-1825	POOH w/ bit	
		LO BHA (5 drill collars, 2 stabilizers, bit sub, bit) inspect for residual cement.	
	1825-2400	MU face bit OCBA.	
		Space out center bit, PCTB-FB, cementing liner.	
	2132	M/V Gerry Bordelon on location.	

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16-May-17	0000-0330	Complete space out center bit, PCTB-FB, cementing liner.	Conducted three full function (water) tool tests of the PCTB-FB in the drill pipe as it was being deployed in preparation for drilling the next test hole in the project (Hole UT-GOM2-1-H005). To further test the engineering capability of the "face-bit" version of the PCTB pressure-coring tool, it was tested in three successive tests in which the configuration of the tool was not changed between each tests and the coring and core handling procedures were conducted in a similar fashion in each test. The tools as tested were all the face-bit cutting version of the PCTB, which is also known as the PCTB-FB. In each case the "flow diverter" in the pressure core barrel was sealed with an O-ring. These tests were all full function tests in that the PCTB-FB inner barrel was lowered into drill pipe on a slick line wire, (2) the PCTB-FB inner barrel was locked into the BHA, (3) the wireline "running in" tool was used to deploy the PCTB-FB inner barrel and the wireline "pulling" tool was used to recover the PCTB-FB inner barrel to the deck of the ship. Under normal operations, the pulling tool is deployed and latches into the PCTB-FB inner barrel in the BHA and when pulled by the slick line the ball-valve at the bottom of the PCTB-FB inner barrel closes, the upper valve on the tool closes, the entire inner core barrel unlatches from the BHA, and the onboard pressure boost system activates to maintain internal tool pressures during recovery.
	0210	Begin transferring 881 bbls 16.0 ppg WBM from M/V Gerry Bordelon.	
	0719	M/V Gerry Bordelon depart location.	
	0330-0800	MU PCTB-FB BHA	
		RIH w/ bit T/ 1090 ft.	
	0800-1000	RIH w/ PCTB-FB for water core test 3.	
		Circulate seawater at 2 bpm using Hex Pump 2	
		POOH w/ PCTB-FB.	
	1000-1200	RIH w/PCTB-FB for water core test 4.	
		Circulate seawater at 2 bpm using Hex Pump 2	
		POOH w/ PCTB-FB.	
	1200-1630	RIH w/ PCTB-FB for water core test 5.	
		Circulate seawater at 1.75 bpm using Hex Pump 2	
		POOH w/ PCTB-FB.	
	1630-1800	RIH w/ center bit.	
	1800-2400	RIH w/ bit F/ 1090 ft T/ 6700 (18 ft above sea floor).	
		Backload equipment to M/V Gerry Bordelon.	
17-May-17	0000-0124	Move rig over Hole H002.	Re-entered Hole UT-GOM2-1-H002 to tag and test cement plug, tagged top of cement plug at 6839 ft RKB. Set down 11000lbs on top of cement plug. D/S Q4000 was moved over proposed location of Hole UT-GOM2-1-H005. Hole UT-GOM2-1-H005 was spud at 6666.0 ft (6718.0 ft RKB) at 0230hr and advanced to the first core point at 7645 ft RKB. Acquired pressure core from a known fracture dominated hydrate-bearing section that overlies the hydrate-bearing sand-rich reservoir section that is the primary coring target at the Green Canyon 955 test site. **Conducted core run: Core UT-GOM2-1-H005-01FB.** The core throw for the 01 core was 10ft, but from drilling performance data it appeared that the core only cut about 5-6 ft of formation. On recovery, the ball valve was closed and the autoclave was conditioned in the cold shuck for 20 minutes before a pressure of 4115 psi was measured in the service van, indicating that the pressure boost had been retained. The autoclave was moved to PCATS for core handling and processing. The target depth for Core UT-GOM2-1-H005-01 was specifically selected to test the impact of mud-rich sediments on the PCTB-FB core system. A total of 7.1 ft (217 cm) of sediment was recovered.
		Reenter Hole H002.	
		RIH w/ bit, tag top of cement at 6839 ft, apply 11,000 lb WOB.	
		POOH w/ bit F/ 6839 ft T/ 6690 ft.	
		Weekly activity report end submitted.	
	0124-0230	Move rig over proposed Hole H005 location.	
		RIH w/ bit, tag mudline at 6718.0 ft.	
	0230-1330	Spud Hole H005.	
		Drill to 7654 ft.	
	1330-2230	POOH w/ center bit.	
		RIH w/ PCTB-FB.	
		PCTB-FB failed to land in BHA.	
		POOH w/PCTB-FB.	
		RIH w/ PCTB-FB.	
	2230-2330	Core H005-01, F/ 7645 ft T/ 7655 ft.	
		POOH w/ PCTB-FB (recovered 7.1 ft, 4115 psi).	
	2330-2400	RIH w/ center bit.	

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18-May-17	0000-0625	Drill F/ 7655 ft T/ 8081 ft, w/ seawater and Hi vis sweeps every 2 doubles.	Continued drilling Hole UT-GOM2-1-H005 from 7655 ft RKB to 8081 ft RKB the depth of the next core point in the hole. Acquired and logged in PCATS Core UT-GOM2-1-H005-02FB and Core UT-GOM2-1-H005-03FB. These scans indicated high P-wave velocities consistent with hydrate at high-saturations.
	0625-1130	POOH w/ center bit.	
	1130-1200	RIH w/ PCTB-FB.	
	1200-1240	Core H005-02, F/ 8081 ft T/ 8091 ft.	
		POOH w/ PCTB-FB (recovered 4.9 ft, 2834 psi).	C**onducted core run: Core UT-GOM2-1-H005-02FB.** Successful coring run with clean pick up from BHA. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 45 mins before a pressure of 2834 psi was measured in the service van, indicating that there was a very slight leak which was located around the ball valve. The autoclave pressure was increased to 4000 psi before being transferred to PCATS. A total of 4.9 ft (150 cm) of sediment was recovered.
	1240-1545	RIH w/ PCTB-FB.	
		Tag fill at 8086 ft.	
		POOH w/ PCTB-FB.	
	1545-1700	Pump 25 bbls gel sweep followed by 280 bbls seawater.	
	1700-1930	RIH with core barrel.	
	1930-2120	Core H005-03, F/ 8091 ft T/ 8101 ft.	
		POOH w/ PCTB-FB (recovered 10 ft, 1780 psi).	**Conducted core run: Core UT-GOM2-1-H005-03FB.** Another good coring run with clean pick up from BHA. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 45 mins before a pressure of 1780 psi was measured in the service van indicating that there might be a slow leak. The autoclave was transferred to PCATS where pressure was increased to 4000 psi before core handling and processing. DST record showed that autoclave had fully sealed during recovery. A total of 10.0 ft (304 cm) of sediment was recovered.
	2120-2230	Circulated 25 bbls gel sweep followed by 128 bbls seawater.	
	2230-2400	Prepare to take core UT-GOM2-1-H005-04	

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19-May-17	0000-0130	RIH w/ PCTB-FB.	Advanced Hole UT-GOM2-1-H005 from 8101 ft RKB to 8151 ft RKB with the acquisition of five pressure cores.
	0130-0330	Core H005-04, F/ 8101 ft T/ 8111 ft.	
		POOH w/ PCTB-FB (recovered 10.5 ft, 3477 psi).	
	0330-0400	Gel sweep followed by seawater.	**Conducted core run: Core UT-GOM2-1-H005-04FB.** On recovery the ball valve was closed and the autoclave was left in the cold shuck for 43 mins before a pressure of 3477 psi was measured in the service van indicating that the autoclave had sealed at in situ pressures. The autoclave was transferred to PCATS for core handling and processing. DST record showed that autoclave had fully sealed as it was lifted from the BHA. Core recovery 10.5 ft (321 cm) as measured by X-ray image in PCATS.
	0400-0630	RIH w/ PCTB-FB.	
	0630-0800	Core H005-05, F/ 8111 ft T/ 8121 ft.	
		POOH w/ PCTB-FB (recovered 9.7 ft, 3242 psi).	
	0800-0900	Gel sweep followed by seawater	
	0900-1100	RIH w/ PCTB-FB.	
	1100-1230	Core H005-06, F/ 8121 ft T/ 8131 ft.	
		POOH w/ PCTB-FB (recovered 9.4 ft, 3250 psi).	**Conducted core run: Core UT-GOM2-1-H005-05FB.** On recovery the ball valve was closed and the autoclave was left in the cold shuck for 35 mins before a pressure of 3242 psi was measured in the service van indicating that the autoclave had sealed around the in situ pressure. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 9.7 ft (296 cm) as measured by X-ray image in PCATS.
	1230-1300	Gel sweep followed by seawater	
	1300-1500	RIH w/ PCTB-FB.	
	1500-1700	Core H005-07, F/ 8131 ft T/ 8141 ft.	
		POOH w/ PCTB-FB (recovered 10.5 ft, 3164 psi).	
	1700-1830	Displaced hole w/ 9.5 ppg WBM, begin pump and dump w/ 9.5 ppg WBM.	
	1830-2000	RIH w/ PCTB-FB.	
	2000-2400	Core H005-08, F/ 8141 ft T/ 8151 ft.	**Conducted core run: Core UT-GOM2-1-H005-06FB.** Good coring run with clean pick up from BHA and a sea floor 'cooling stop' for 15 mins. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 35 mins before a pressure of 3250 psi was measured in the service van indicating that the autoclave had sealed around the in situ pressure. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 9.4 ft (286 cm) as measured by X-ray image in PCATS.
		POOH w/ PCTB-FB (recovered 8.2 ft, 3016 psi).	**Conducted core run: Core UT-GOM2-1-H005-07FB.** Good coring run with clean pick up from BHA and a sea floor 'cooling stop' for 15 mins. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 46 mins before a pressure of 3164 psi was measured in the service van indicating that the autoclave had sealed around the in situ pressure. The set pressure for this deployment was made at 3000 psi and consequently there was no boost. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 10.5 ft (321 cm) as measured by X-ray image in PCATS.
			Conducted core run: Core UT-GOM2-1-H005-08FB. Switched from drilling with seawater to drilling with 9.5 lb/gal mud. Good coring run but the pick up from BHA took multiple efforts before it cane free. The tool was stopped at the sea floor (cooling stop) for 15 mins. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 77 mins before a pressure of 3016 psi was measured in the service van indicating that the autoclave had sealed around the set pressure indicating that the accumulator boost may have assisted sealing the autoclave. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 8.2 ft (250 cm) as measured by X-ray image in PCATS.

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Date	Time	Activity Description	Daily Log
20-May-17	0000-0230	Re-headed slick line.	Advanced Hole UT-GOM2-1-H005 from 8151 ft RKB to 8185 ft RKB with the acquisition of four pressure cores. **Conducted core run: Core UT-GOM2-1-H005-09FB.** Good coring run with a clean pick-up from the BHA with a 15 minutes autoclave cooling stop at the sea bed to experiment with further cooling of the autoclave. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 55 minutes before a pressure of only 746 psi was measured in the service van. On this occasion the set pressure was 4015 psi and hence the boost did not function as expected and there was no accumulator function. The pressure was pumped up to 3250 psi before being transferred to PCATS. The DST recordings showed that autoclave did not seal until it close at the surface and was probably aided by at least partial dissociation of gas hydrates. Core recovery was 8.9 ft (270 cm) as measured by the X-ray image in PCATS (includes a number of voids). **Conducted core run: Core UT-GOM2-1-H005-10FB.** During the coring the cement pumps (mud pumps) stopped temporarily (~30 sec). At approximately 5 ft into formation bit reached very high torque (as much as 30 klbs) and released, causing the drill string to spin in reverse momentarily. Coring was discontinued immediately at this point. On recovery, the ball valve was closed but there was an indication there may be a slight leak (which proved to be wrong) and hence the tool was moved quickly out of the cold shuck to the service van where the pressure was found to be 3255 psi. It was then placed in the cold bath before being transferred to PCATS. A total of 1.4 ft (44 cm) of sediment was recovered. **Conducted core run: Core UT-GOM2-1-H005-11FB.** After the difficulties experienced during the last coring run, the main objective of Core UT-GOM2-1-H005-11FB was to advance through what is interpreted on the logs as a water bearing zone before another short gas hydrate interval beneath it. Consequently the pump rates were increased significantly at the expense of the core quality to ensure that a clean hole was developed for the next core (Core UT-GOM2-1-H005-12FB) which is back in a gas hydrate interval. The tool was deployed in the BHA before a core was cut using the 10.5 lb/gal mud. After picking up from BHA and retrieving to the rig floor the ball valve was closed and the autoclave was left in the cold shuck for 45 minutes before a pressure of 3002 psi was measured in the service van. The autoclave was placed in the cold bath while PCATS was being prepared. A total of 0.9 ft (26 cm) of sediment was recovered. **Conducted core run: Core UT-GOM2-1-H005-12FB.** The tool was deployed in the BHA before a core was cut using the 10.5 lb/gal mud. Weight and torque came on bit 1 ft early (above core point) hence the run was stopped after a 9 ft advance. Generally a good coring run with clean a pick up from BHA, however on recovery the ball valve was only half closed trapping sediment in the ball follower and hence having zero pressure. Core barrel was over-filled, with rabbit against top plug and core material across the ball valve. Recovery was 5.4 ft (165 cm).
		RIH w/ PCTB-FB.	
	0230-0630	Core H005-09, F/ 8151 ft T/ 8161 ft.	
		POOH w/ PCTB-FB (recovered 8.9 ft, 746 psi).	
		Fill/sweep hole with 10.5 ppg mud, begin pump and dump w/ 10.5 ppg WBM.	
	0630-1030	RIH w/ PCTB-FB.	
		Failed to latch in BHA.	
		POOH w/ PCTB-FB, remove broken latch pin.	
		RIH w/ PCTB-FB.	
	1030-1200	Core H005-010, F/ 8161 ft T/ 8166 ft.	
		POOH w/ PCTB-FB (recovered 1.4 ft, 3255 psi).	
		Sweep hole with 10.5 ppg mud.	
	1501-1811	M/V Mr Steven arrive/departed location.	
	1200-1600	RIH w/ PCTB-FB.	
	1600-1730	Core H005-011, F/ 8166 ft T/ 8176 ft.	
		POOH w/ PCTB-FB (recovered 0.9 ft, 3002 psi).	
		Sweep hole with 10.5 ppg WBM.	
	1730-2000	RIH w/ PCTB-FB.	
	2000-2400	Core H005-012, F/ 8176 ft T/ 8185 ft (partial core to accommodate for fill).	
		POOH w/ PCTB-FB (recovered 5.4 ft, 0 psi).	
		Sweep hole with 10.5 ppg WBM.	

UT/DOE GOM^2 Marine Test Daily Log

Revision: 0 Date: 6 June 2017

Date	Time	Activity Description	Daily Log
21-May-17	0000-0030	RIH w/ PCTB-FB.	Advanced Hole UT-GOM2-1-H005 to the total depth of the hole at 8193 ft with the acquisition of pressure core Core UT-GOM2-1-H005-13-FB. **Conducted core run: Core UT-GOM2-1-H005-13FB.** Before the deployment of the PCTB-FB inner core barrel, a 3/8 inch hole was drilled in the middle barrel and the set boost pressure was raised above the in situ pressure to ~4000 psi. This modification was designed to test whether the additional flow path would help create a boost pressure. Good coring run with a clean pick-up from the BHA with a 15 minutes autoclave cooling stop at the sea bed to experiment with further cooling of the autoclave. After picking up from BHA and retrieving to the rig floor the ball valve was closed and an autoclave pressure of 2806 psi was measured in the service van. The autoclave was placed in the cold bath while PCATS was being prepared. Core recovery was 5.8 ft (175 cm) as measured by the X-ray image in PCATS. Conduct two up hole directional gyroscopic surveys from the 8100 ft RKB to the seafloor. **Wireline Log: Gyroscopic directional survey F/8100 ft RKB T/surface (Run-1)** **Wireline Log: Gyroscopic directional survey F/8100 ft RKB T/surface (Run-2)** Hole UT-GOM2-1-H005 was abandoned with the emplacement of a 500 ft cement plug that was set above the hydrate interval to avoid any potential problem associated with hydrate dissociation. Prepared and set cement plug in Hole UT-GOM2-1-H005 from a depth of 7900 ft RKB to 7400 ft RKB.
	0030-0230	Core H005-013FB, F/ 8185 ft T/ 8193 ft (partial core to accommodate for fill).	
		POOH w/ PCTB-FB (recovered 5.8 ft, 2806 psi).	
	0230-0800	RIH w/ gyroscopic survey tool.	
		Conduct up hole survey F/ 8100 ft T/ seafloor.	
		POOH w/ gyroscopic survey tool.	
		Review data, determine 2nd run required.	
		RIH w/ gyroscopic survey tool.	
		Conduct up hole survey F/8100 ft T/ seafloor.	
		POOH w/ gyroscopic survey tool.	
	0800-0930	Spot 28 bbls 11.5 ppg high-viscosity pad mud in bottom of hole.	
		POOH w/ bit T/ 7900 ft.	
	0930-1230	Pump 17 bbls of 10.5 ppg gel spacer.	
		BO cement head and load nerf ball.	
		Pump 3 bbl of 10.5 ppg spacer.	
		Pump 54.7 bbls of 16.4 ppg cement.	
		Pump 6.7 bbl of 10.5 ppg gel spacer.	
		Displace drill string with 180.7 bbls of seawater.	
	1230-1830	POOH w/ bit F/ 7900 ft T/ 6600 ft.	
		Flush drill string w/ 350 bbls of seawater and 2 nerf balls.	
		Waiting on cement.	
	1830-2230	RIH w/ bit T/ 7621 ft, unable to tag cement.	
	2230-2400	POOH w/ bit T/ 6800 ft.	
		Waiting on cement	
		Rig Movement Notification submitted.	
22-May-17	0000-0900	POOH w/ bit T/ 6600 ft (above mudline).	Re-entered Hole UT-GOM2-1-H005 to tag and test cement plug, tagged top of cement plug at 7691 ft RKB. Set down 15000lbs on top of cement plug. Began to backload project equipment to the supply vessel *HOS Red Rock.* Decision was made to set additional cement on top of existing cement plug in Hole UT-GOM2-1-H005; with BHA at 1691 ft RKB, pumped 58 bbls cement slurry and bbls tail spacer.
		Waiting on cement	
		Flush DP with 250 bbls of seawater.	
	0900-1100	RIH w/ bit, tag top of cement at 7691 ft, apply 15,000 lbs WOB.	
	1004	M/V Red Rock on location.	
	1100-1200	POOH w/ bit T/ 7172 ft.	
	1200-1230	POOH w/ bit T/ 6868 ft.	
	1230-1330	Circulate 300 bbls 10.5 ppg WBM.	
	1330-1600	Backload project equipment to HOS Red Rock	
	1600-1730	RIH w/ bit T/ 7691 ft, tag cement, POOH to 7686 ft.	
	1730-2130	Backload project equipment to HOS Red Rock	
	2130-2400	Pump 96 bbls of 10.5 ppg WBM.	
		Pump 17 bbls of 10.5 ppg spacer.	
		Drop Nerf ball, pump 3 bbls of 10.5 ppg spacer.	
		Pump 58 bbls 16.4 ppg cement.	
		Pump 17 bbls 10.5 ppg spacer.	

UT/DOE GOM^2 Marine Test Daily Log

Revision: 0 Date: 6 June 2017

Date	Time	Activity Description	Daily Log
23-May-17	0000-0100	Continue pumping spacer.	Demobilization operations continued throughout the day with the transferee of equipment to the supply vessel *HOS Red Rock.* Borehole cementing operations in Hole UT-GOM2-1-H005 was completed and the drill string was recovered and laid down as singles.
	0100-0345	POOH w/ bit to 5976 ft.	
		Flush drill string w/ 400 bbls seawater.	
	0345-1140	RIH w/ bit to 6674 ft.	
		Waiting on approval from BSEE to abandoned hole w/o tagging cement.	
		Transfer 340 bbls of 16.0 ppg WBM to M/V Red Rock.	
		Backload equipment to M/V Red Rock.	
		Receive approval from BSEE.	
	1200-1300	POOH w/ bit to 6100 ft laying down singles.	
	1300-1330	WOW (lightning in area).	
	1330-2400	POOH to BHA laying down singles.	
		Break down BHA.	
		Conduct as-left site survey w/ ROV.	
24-May-17	0000-1200	Continue breaking down BHA.	Demobilization operations continued throughout the day with the transfer of equipment to the supply vessel HOS Red Rock, which departed location 2337hr. The drill string was recovered and laid down as singles. Geotek personnel and UT representative depart rig via helicopter. Q4000 Rig moved 1 nmi off location by midnight, end of lump sum demobilization.
		Backload BHA and DP.	
	0730	UT personnel depart rig via helicopter.	
	1200-2200	Backload project equipment.	
		Recover transponders.	
	1330	Geotek personnel and UT representative depart rig via helicopter.	
	2200-2400	Rig 1 nmi off location, end of lump sum demobilization.	
	2337	M/V HOS Red Rock departed location.	
25-May-17	0000-1230	M/V HOS Red Rock transiting from GG955 to Port of Fourchon, LA.	In the last 24 hours, completed UT-GOM2-1 demobilization operations with the arrival and offloading of the *M/V HOS Red Rock* in the Port of Fourchon, LA (InterMoor facilities). The pressure core storage van was offloaded by 1500 hr. From power disconnect to power hook up the transfer of the pressure core sample van took only 15 minutes. Also today, the UT and Geotek technical team meant to review and finalize the pressure core-cut, sampling, and degassing plans to be conducted at the PCATS/UT labs in Fourchon.
	1230-1300	M/V HOS Red Rock arrives InterMoor dock/facilities.	
	1300-1500	Offload project equipment.	
		PCATS system transfer, with pressure cores.	
		UT core processing lab transfer.	
	1500-2400	Setup PCATS and UT core labs.	
		Weekly activity report submitted.	
26-May-17	0000-1100	Setup PCATS and UT core labs.	Setup of Geotek and UT labs at InterMoor were completed. UT continued to work on the expedition report, planning degassing activities, and preparing to ship geochemistry and microbiology samples. Geotek began PCATS scanning and cutting of Core UT-GOM2-1-H005-10FB.
	1100-2400	PCATS operation.	
27-May-17	0000-2400	PCATS and degassing operations.	Geotek worked on scanning and cutting of Cores UT-GOM2-1-H005-11FB and 04FB. Geotek/UT began quantitative degassing of two sections from Core UT-GOM2-1-H005-10FB.
	1000	Delivery of over pack container.	
28-May-17	0000-2400	PCATS and degassing operations	Geotek worked on scanning and cutting of Core UT-GOM2-1-H005-4FB and Core UT-GOM2-1-H005-5FB. Geotek worked on preparing the overpack unit for the first shipment of 1.2 m storage vessels to UT. UT finished quantitative degassing of two sections from Core UT-GOM2-1-H005-10FB and began quantitative degassing of 5 sections from Core UT-GOM2-1-H005-4FB, and completed one of these sections. Gases were sampled for post-cruise analysis and the remaining sediment after degassing was processed through the mud lab.
29-May-17	0000-2400	PCATS and degassing operations	Geotek worked on scanning and cutting of Core Core UT-GOM2-1-H005-5FB. It was determined that seals need to be purchased and replaced in PCATS and PCATS operation was paused. Geotek worked on preparing the overpack unit for the first of three shipments of storage vessels to Austin. The truck arrived and began transport with an expected arrival the next day 30 May 2017. UT finished quantitative degassing of two sections from Core UT-GOM2-1-H005-4FB and continued degassing two additional sections. Gases were sampled for post-cruise analysis and remaining sediment after degassing was processed through the mud lab.
	0000-1100	Preparation of over pack for shipping	
	1115	Over pack departure	
	1115-2400	PCATS and degassing operations	
30-May-17			
31-May-17		H002 and H005 end of operations reports submitted.	

Quarterly Research Performance Progress Report

Appendix B

UT-GOM2-1 Core Recovery Report

DOE Award No.: DE-FE-0028967

UT-GOM2-1 Core Recovery Report

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1. EXECUTIVE SUMMARY:

This report briefly describes the quantity and quality of the pressurized and depressurized core recovered from the UT-GOM2-1 Hydrate Pressure Coring Expedition of May 2017. Cores were taken in two holes in GC-955: the H-002 and the H-005. We compare the core recovery to the Logging While Drilling data acquired in the Chevron JIP II Expedition in 2009. Figures of PCATS gamma density, P-wave velocity, and X-ray imaging, are provided for all cores recovered under pressure. A summary of the core sections brought back to UT under pressure are provided. Information about the depressurized core material and other samples already distributed for geochemistry, microbiology, additional physical properties, and conventional core analysis is also provided. We observe two distinct lithofacies within the hydrate-bearing interval based on density, P-wave, and hydrate saturation.

2. CORE RECOVERED FROM UT-GOM2-1-H002 and -H005:

Two wells were drilled in Green Canyon Block 955: Holes UT-GOM2-1-H002 and -H005. Both wells were adjacent to the previously drilled well GC-955H. One 1.4 m (4.6 ft) of pressure core (Core H002-4CS) was recovered within the hydrate stability zone at HoleH002. 16.1 m (69.9') of pressure core where the material has stayed within the hydrate stability zone are available and in storage vessels from Hole H005 (Cores H005-9FB, -1FB, -6FB, -9FB and -12FB have been excluded). In addition, 4.2 m of pressurized core from H005 that likely temporarily left hydrate stability during recovery and processing are available. All but one of the cores are from the hydrate reservoir. Little core was acquired from the material that bounds the reservoir and none of this material was recovered pressurized; it is unclear whether Core H005-13FB penetrates material below the hydrate reservoir. We interpret that the material above and below the reservoir are so poorly consolidated that they could not be readily recovered during coring.

Three lithofacies have been identified. Lithofacies 1 was only recovered in Core H005-1FB and is characterized by high density (2-2.1 g/cc) and low P-wave velocity (~1500-1700 m/s). Lithofacies 2 and 3 are interbedded in the hydrate-bearing interval. Lithofacies 2 is composed of low density (1.7 to 1.9 g/cc) and high velocity (3000-3250 m/s) beds. Ripple lamination and/or cross-bedding was observed in X-ray images. It contains the most continuous un-deformed samples. Lithofacies 3 is composed of high density (~1.9-2.1g/cc) and low velocity (~1700 m/s) beds. In X-ray images it generally is more deformed than Lithofacies 1.

Core H005-1FB contains Lithofacies 1, while cores H002-4CS, H005-2FB to -11FB, and H005-13FB contain both Lithofacies 2 and 3. Quantitative degassing experiments were performed separately on Lithofacies 1, 2, and 3. Lithofacies 1 contains very low to no hydrate saturation (<1%), Lithofacies 2 contains very high hydrate saturation (60-90%), and Lithofacies 3 contains moderately low hydrate saturation (~20%).

A. UT-GOM2-1-H002

Figure 1 shows the core plan and core recovered from UT-GOM2-1-H002 compared to the GC-955H well log data. Overall, only one core from H002 was recovered at pressure and without leaving the methane hydrate stability zone. Seven cores were recovered at

atmospheric pressure after the coring tool ball value failed to close properly before the core was pulled out of the hydrate stability zone. These cores were sampled for interstitial water, microbiology, physical property, and head space gas samples with additional core sections remaining. A single pressure core, H002-04CS, was recovered at pressure and was cut into two sections for degassing and one section in a storage chamber transported to the UT Pressure Core Center.

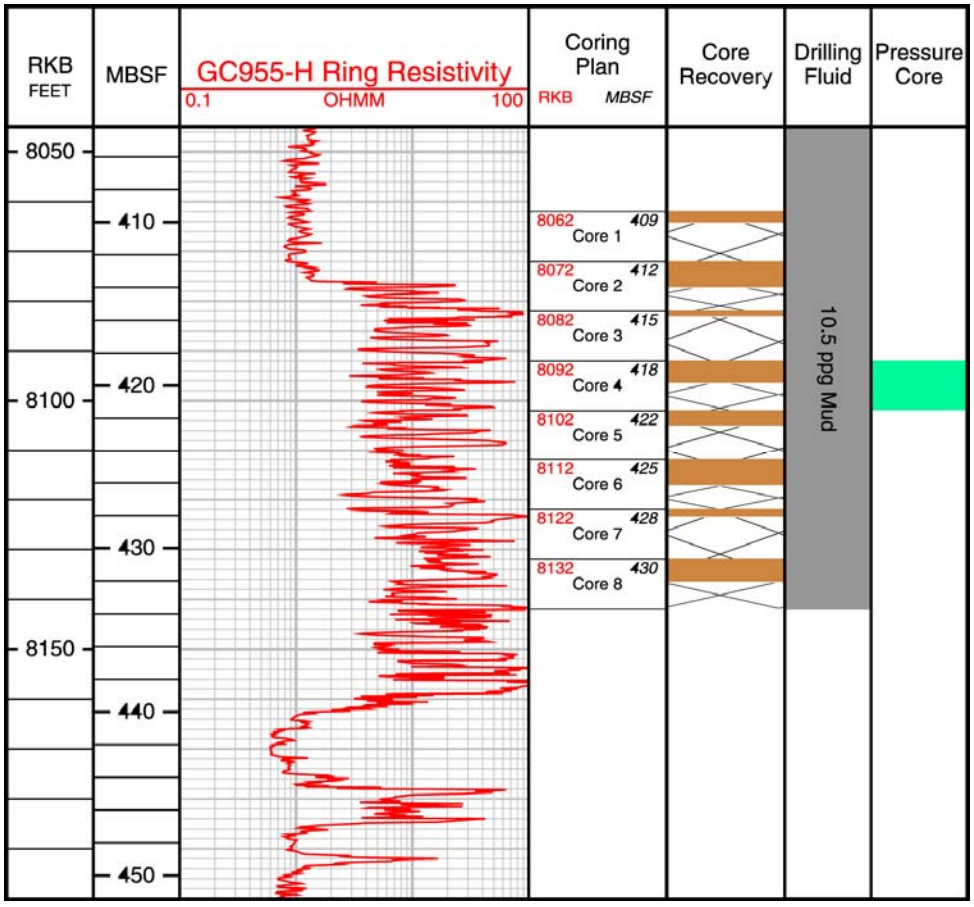


Figure 1. Cores plan and core recovered from H-002 compared to the GC-955H well log data

Table 1: Core and coring interval is displayed along with the actual core recovery value. The UT-GOM2-1-H002 yielded a 34% core recovery.

Core	Interval (ft RKB)	Interval (mbsf)	Recovery (ft)	Recovery (m)	Pressure (psi)	% Recovery	Core quality
UT-GOM2-1-H002-1CS	8062 - 8072	409.3 – 412.4	2.3	0.70	0	23	Non-pressurized
UT-GOM2-1-H002-2CS	8072 - 8082	412.4 – 415.4	5.3	1.62	0	53	Non-pressurized
UT-GOM2-1-H002-3CS	8082 - 8092	415.4 – 418.5	1.1	0.34	0	11	Non-pressurized
UT-GOM2-1-H002-4CS	8092 - 8102	418.5 – 421.5	4.5	1.37	3372	45	Pressurized
UT-GOM2-1-H002-5CS	8102 - 8112	421.5 – 424.6	3.1	0.94	0	31	Non-pressurized
UT-GOM2-1-H002-6CS	8112 - 8122	424.6 – 427.6	5.2	1.58	0	52	Non-pressurized
UT-GOM2-1-H002-7CS	8122 - 8132	427.6 – 430.1	1.5	0.46	0	15	Non-pressurized
UT-GOM2-1-H002-8CS	8132 - 8142	430.1 – 433.0	4.6	1.40	0	46	Non-pressurized

Totals			27.5	8.38		34	

B. UT-GOM2-1-H005

Figure 2 and 3 shows the core plan and core recovered from UT-GOM2-1-H005 compared to the GC-955H well log data. Overall 11 cores (Cores H005-1FB to -8FB, H005-10FB to -11FB, and H005-13FB) were recovered at pressure and without leaving the methane hydrate stability zone. One core, H005-9FB, was recovered at pressure but left the hydrate stability zone and began to dissociate, creating voids filled with gas. One core, H005-12FB, was recovered at atmospheric pressure after the coring tool ball value failed to close properly.. Cores H005-1FB and -6FB, while recovered within the hydrate stability field, lost pressure temporarily during cutting due to seal problems in PCATS. Thus, Cores H005-1FB, -6FB, and -9FB are likely altered due to some hydrate dissociation.

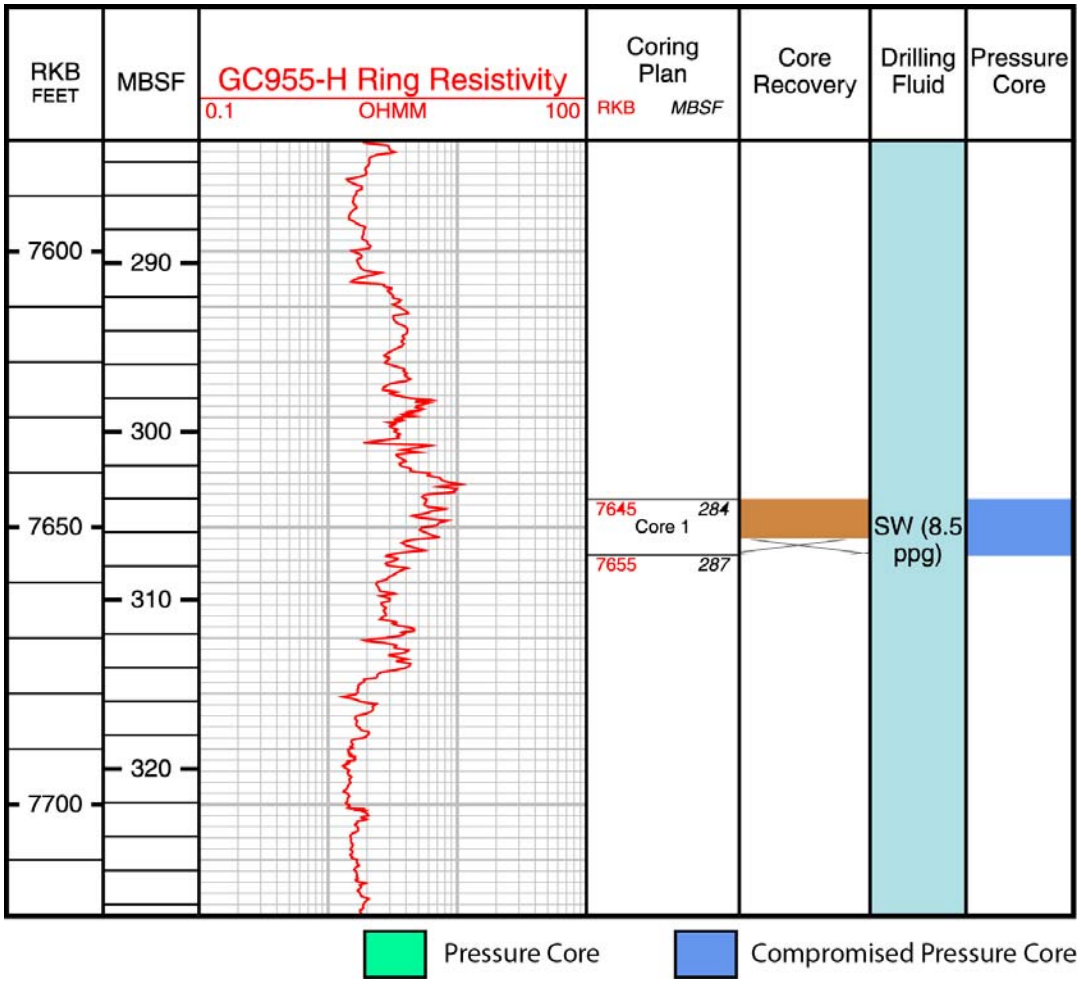


Figure 2. Log of the UT-GOM2-1-H005 well showing the position of Core #1. The ring resistivity log for the GC955-H well is shown in the center. The percent recovery is indicated by the brown box.

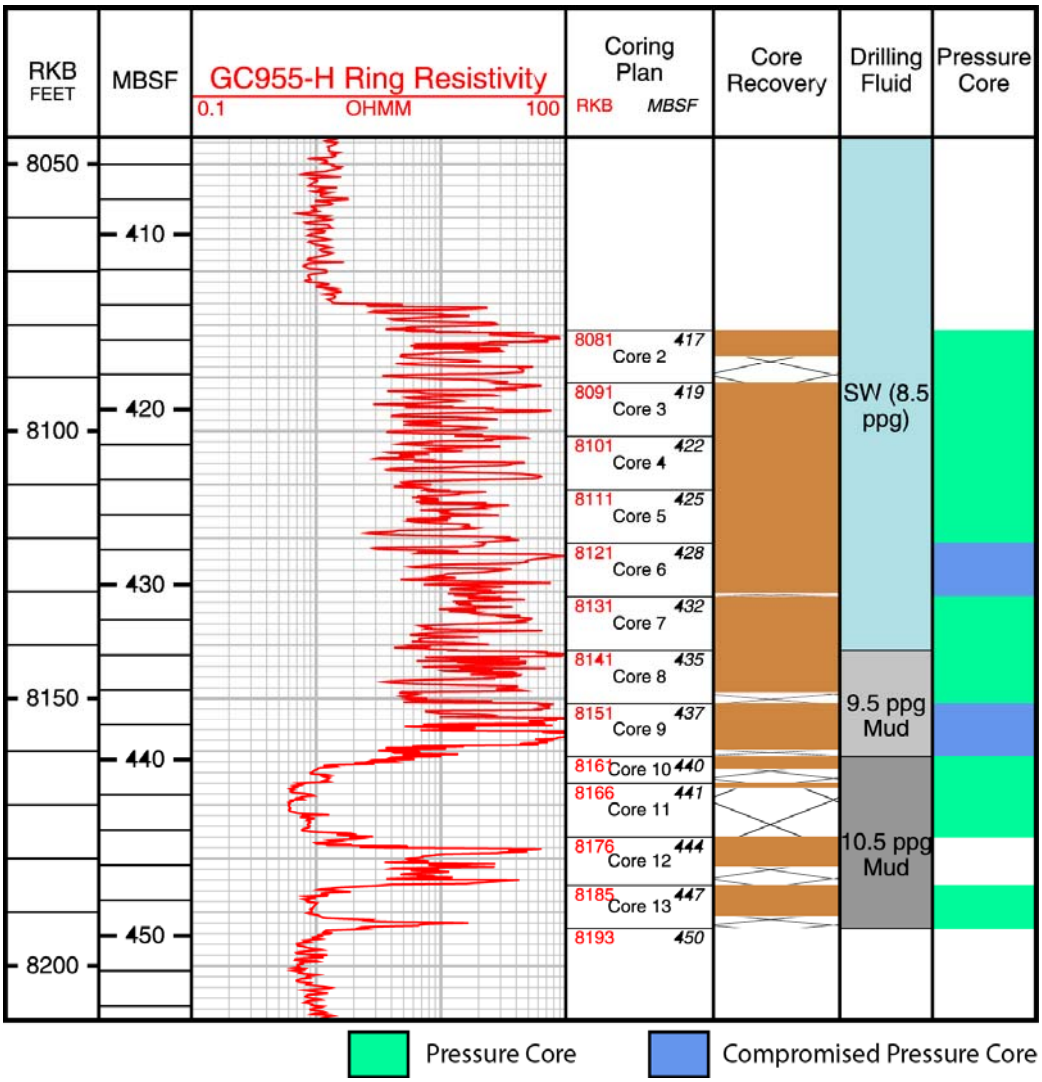


Figure 3. Log of the UT-GOM2-1-H005 well showing the position of Cores FB2-#13. The ring resistivity log for the GC955-H well is shown in the center. The recovery is indicated by the brown box. Cores 2-7 were drilled with seawater, cores 8-9 were drilled with 9.5 ppg mud, and cores 10-13 were drilled with 10.5 ppg mud.

Table 2: Core and coring interval is displayed along with the actual core recovery value for UT-GOM2-1-H005.

Core	Interval (ft RKB)	Interval (mbsf)	Recovery (ft)	Recovery (m)	Pressure (psi)	% Recovery	Core quality
UT-GOM2-1-H005-1FB	7645 - 7655	284.0 – 287.0	7.1	2.17	4115	71	Pressurized, but compromised
UT-GOM2-1-H005-2FB	8081 - 8091	417.0 – 419.0	4.9	1.50	2834	49	Pressurized
UT-GOM2-1-H005-3FB	8091 - 8101	419.0 – 421.5	10.0	3.04	1780	100	Pressurized
UT-GOM2-1-H005-4FB	8101 - 8111	421.5 – 424.6	10.5	3.21	3477	105	Pressurized
UT-GOM2-1-H005-5FB	8111 - 8121	424.6 – 427.6	9.7	2.96	3241	97	Pressurized
UT-GOM2-1-H005-6FB	8121 - 8131	427.6 – 432.2	9.4	2.86	3250	94	Pressurized, but compromised
UT-GOM2-1-H005-7FB	8131 - 8141	432.2 – 435.0	10.5	3.21	3164	105	Pressurized
UT-GOM2-1-H005-8FB	8141 – 8151	435.0 – 436.8	8.2	2.50	3015	82	Pressurized
UT-GOM2-1-H005-9FB	8151 - 8161	436.8 – 439.8	8.9	2.70	746	89	Pressurized, but compromised
UT-GOM2-1-H005-10FB	8161 – 8166	439.8 – 441.4	2.4	0.72	3255	47	Pressurized
UT-GOM2-1-H005-11FB	8166 – 8176	441.1 – 444.0	0.9	0.27	3001	9	Pressurized
UT-GOM2-1-H005-12FB	8176 – 8185	444.0 – 447.1	5.7	1.75	0	64	Non-pressurized
UT-GOM2-1-H005-13FB	8185 - 8193	447.1 – 449.6	5.8	1.76	2806	72	Pressurized

Totals			94.0	28.7			

3. INITIAL CORE ANALYSIS AND FIRST DISTRIBUTION:

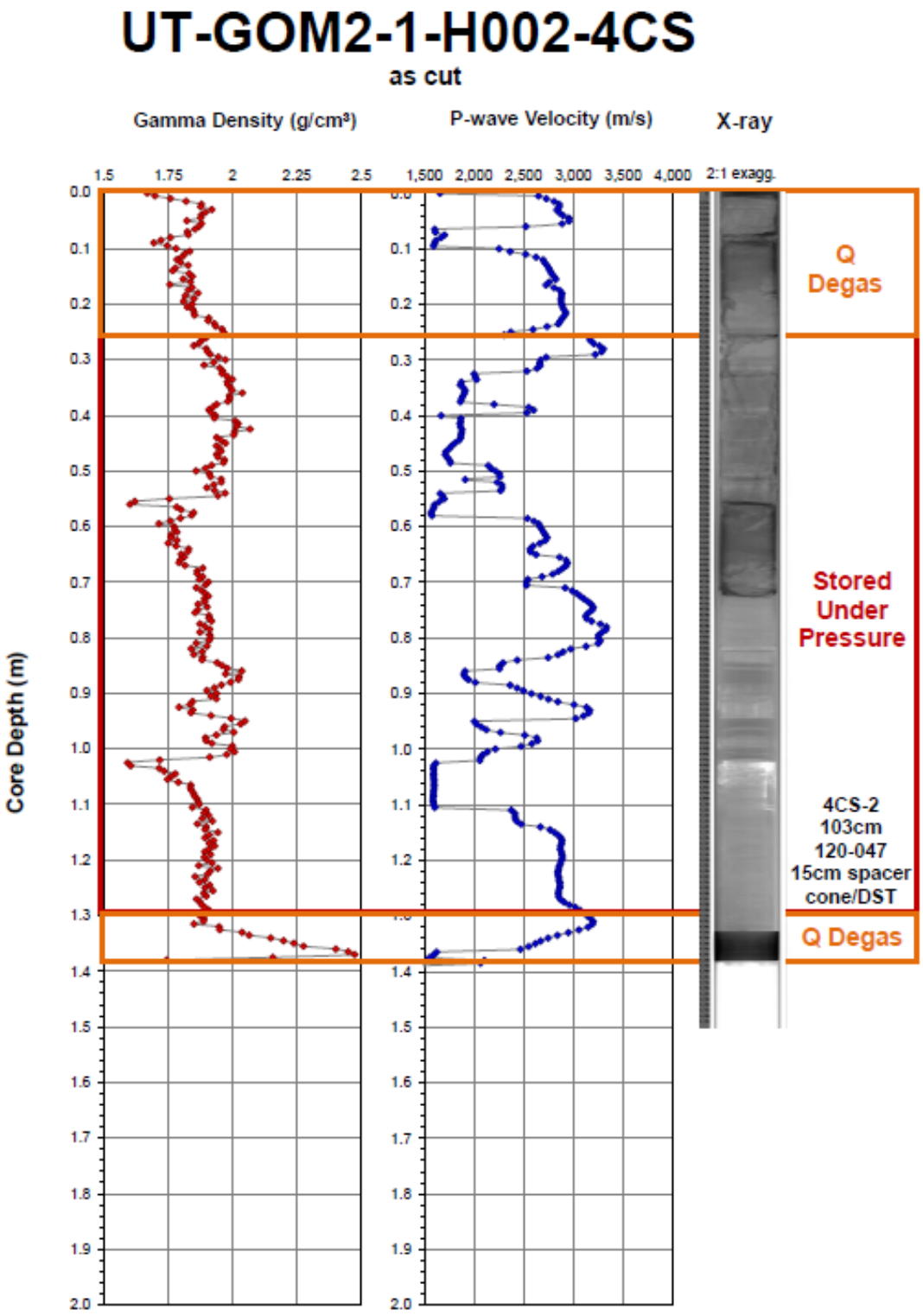


Figure 4. UT-GOM2-1-H002-4CS. Curated Length does not match recovery due to curated voids.

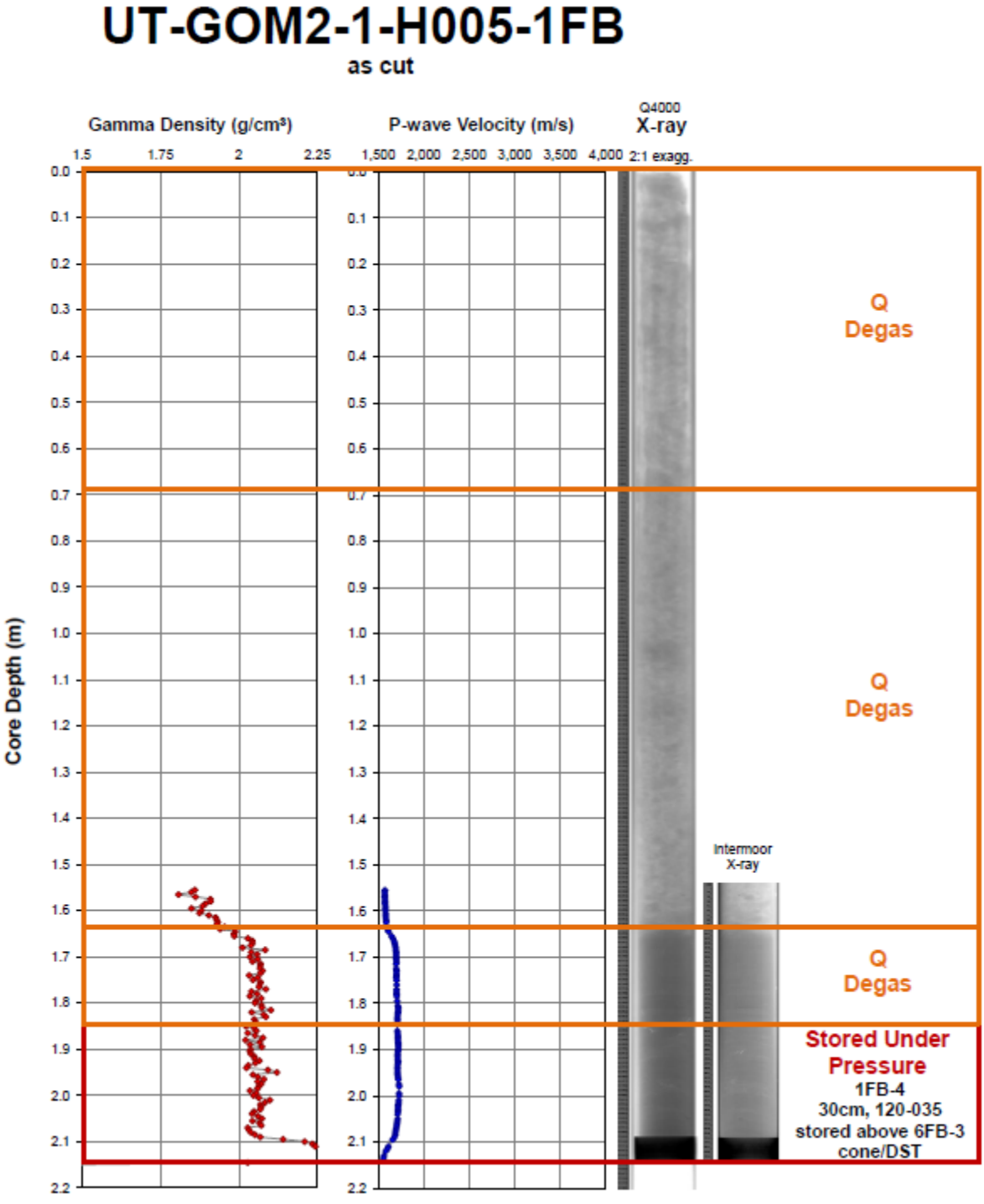


Figure 5. UT-GOM2-1-H005-1FB

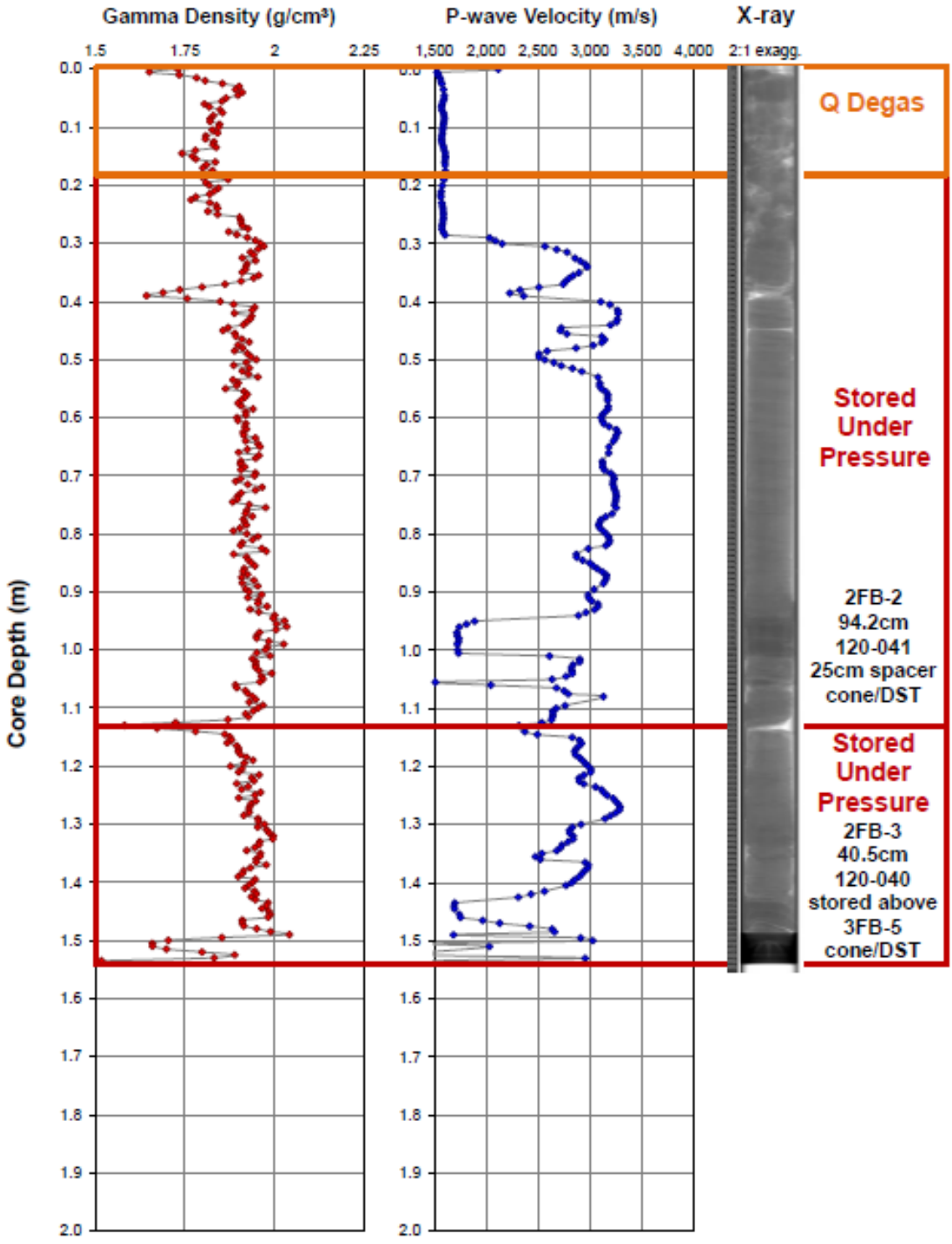


Figure 6. UT-GOM2-1-H005-2FB

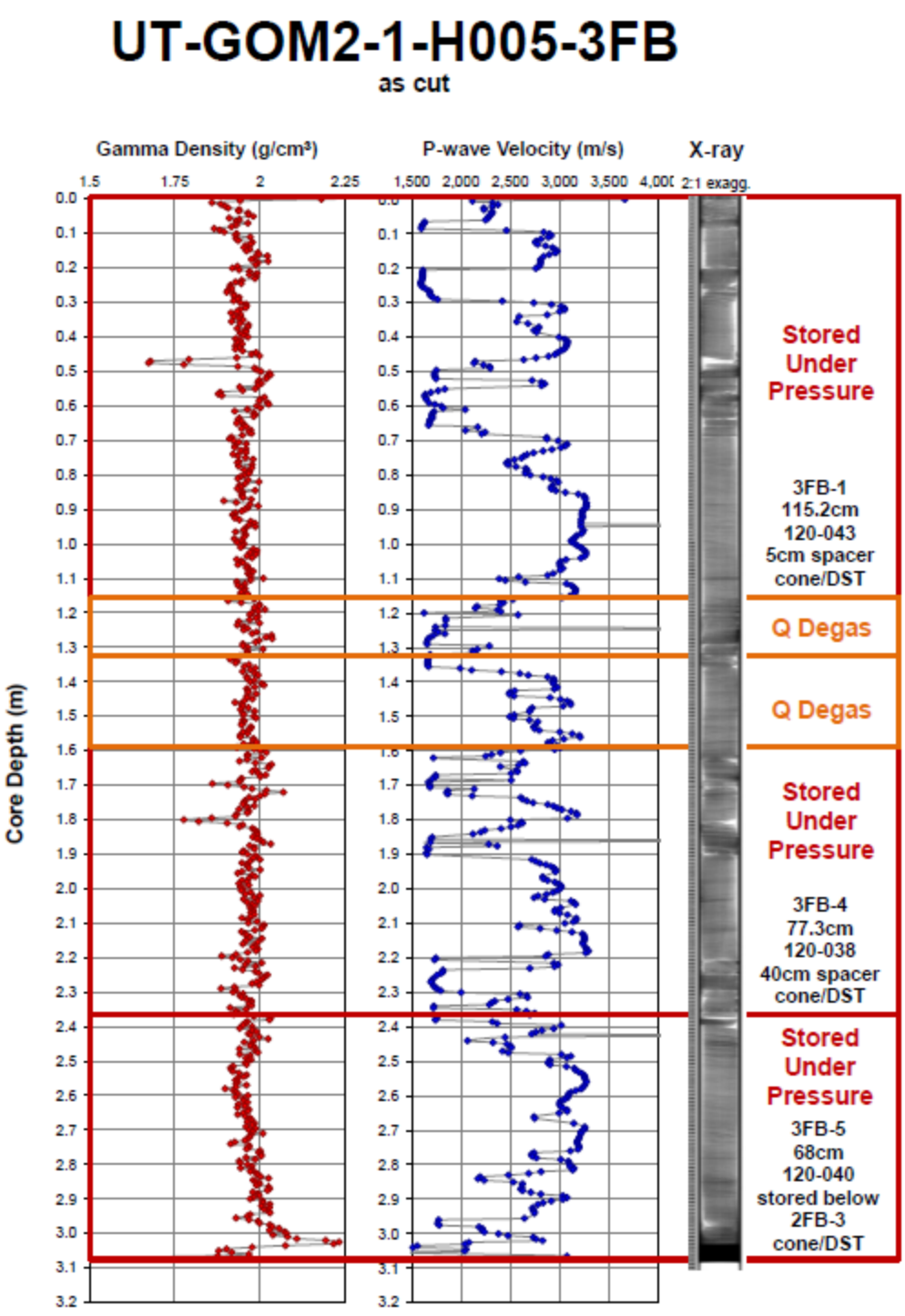


Figure 7. UT-GOM2-1-H005-3FB

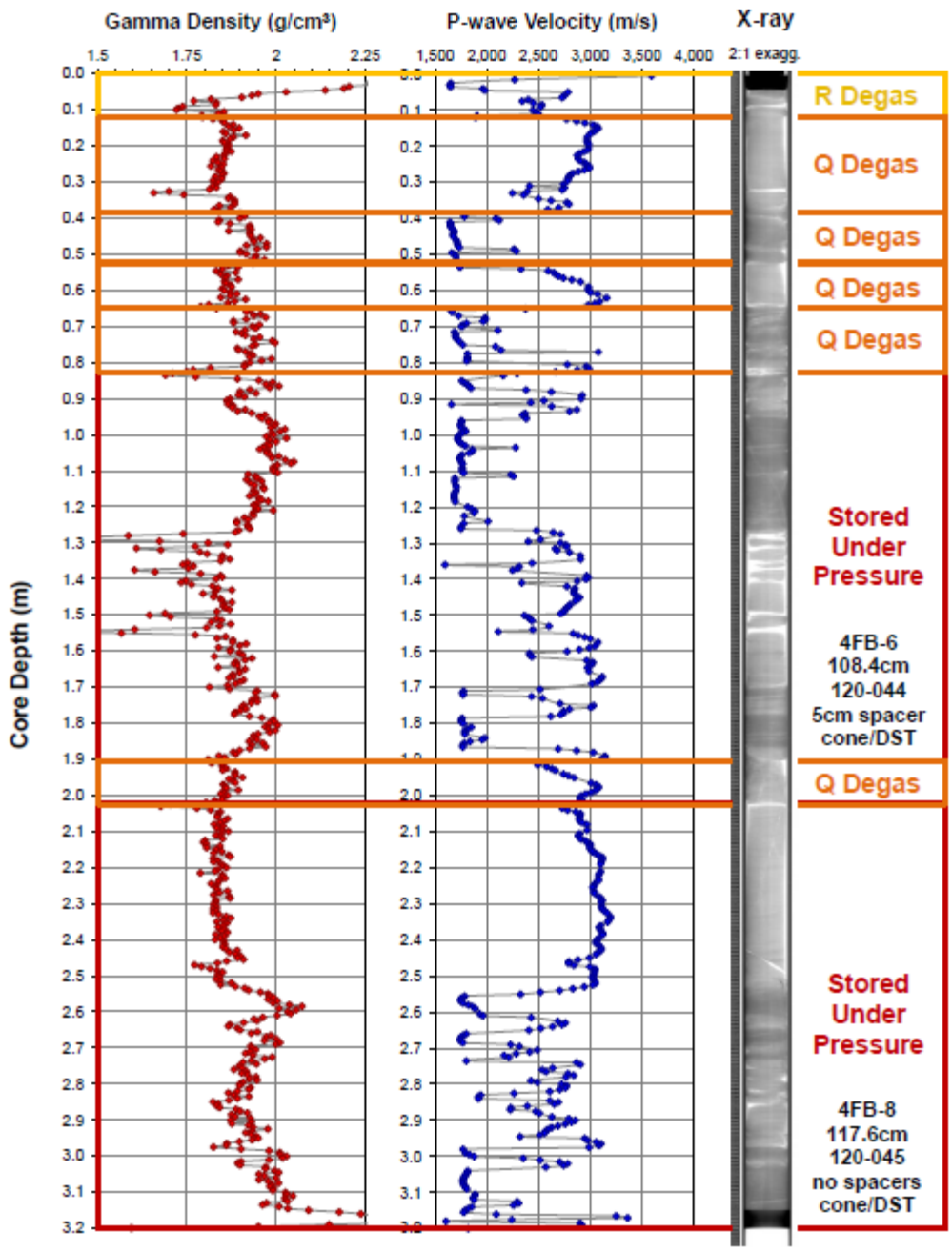


Figure 8. UT-GOM2-1-H005-4FB

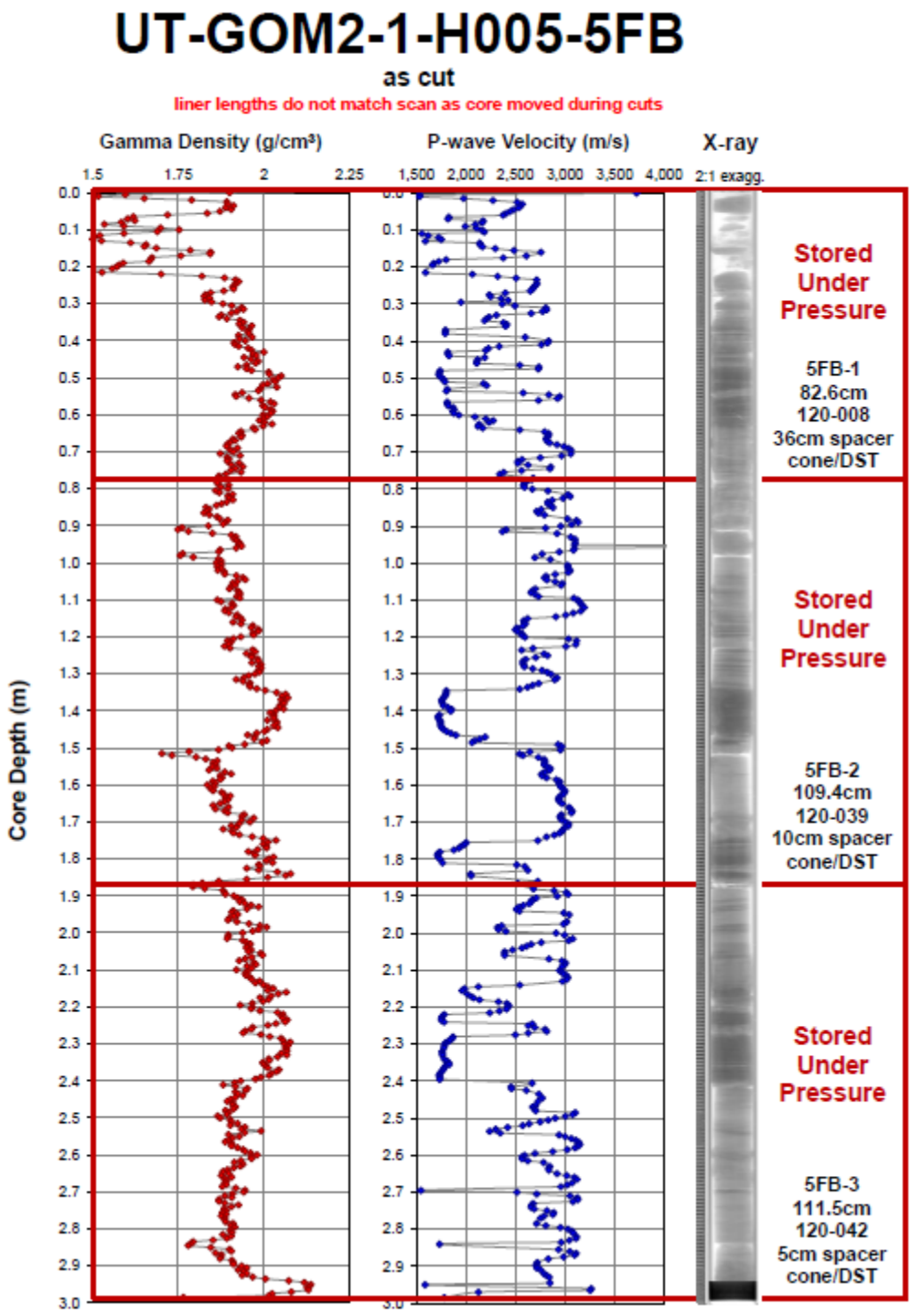


Figure 9. UT-GOM2-1-H005-5FB

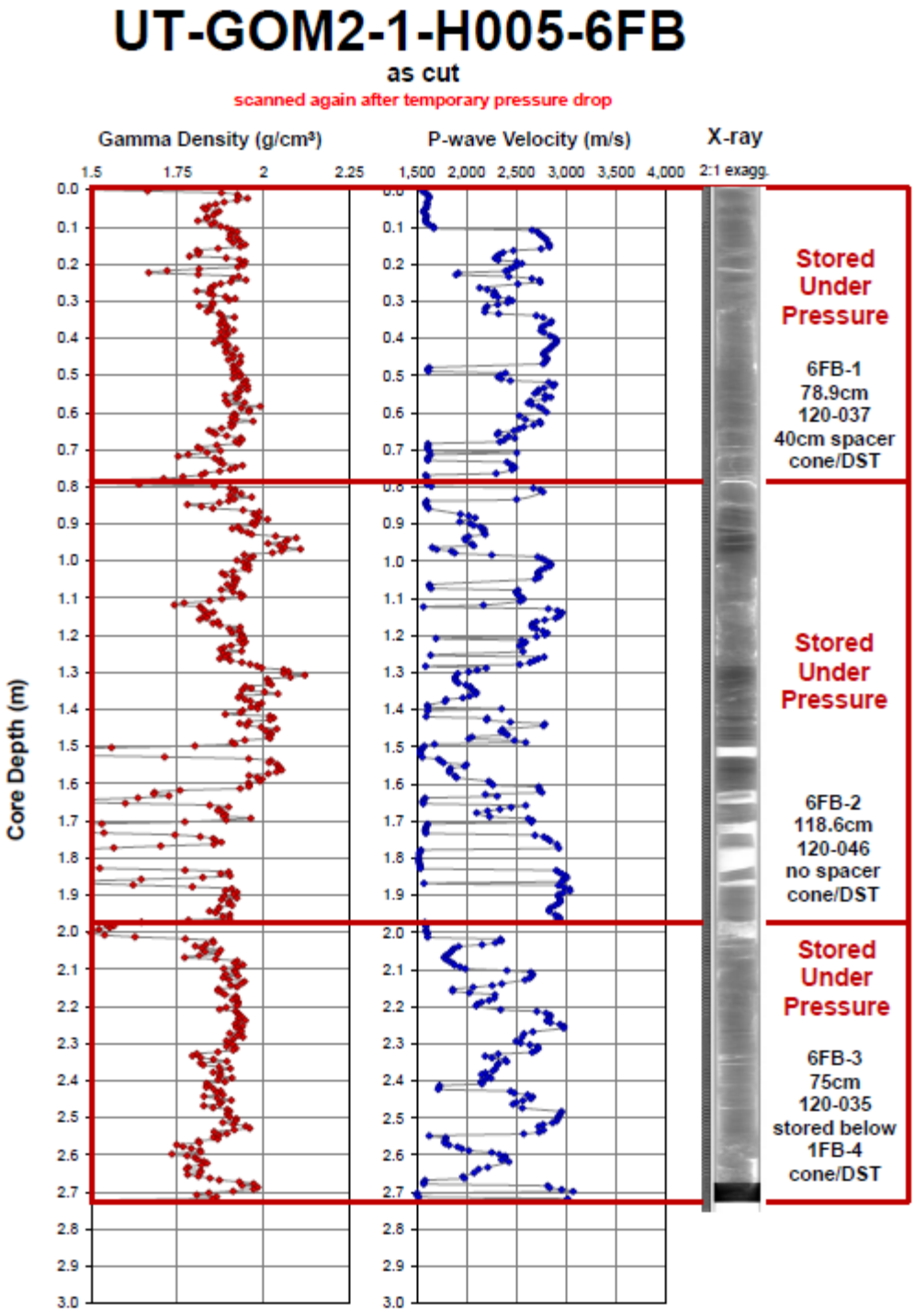


Figure 10. UT-GOM2-1-H005-6FB

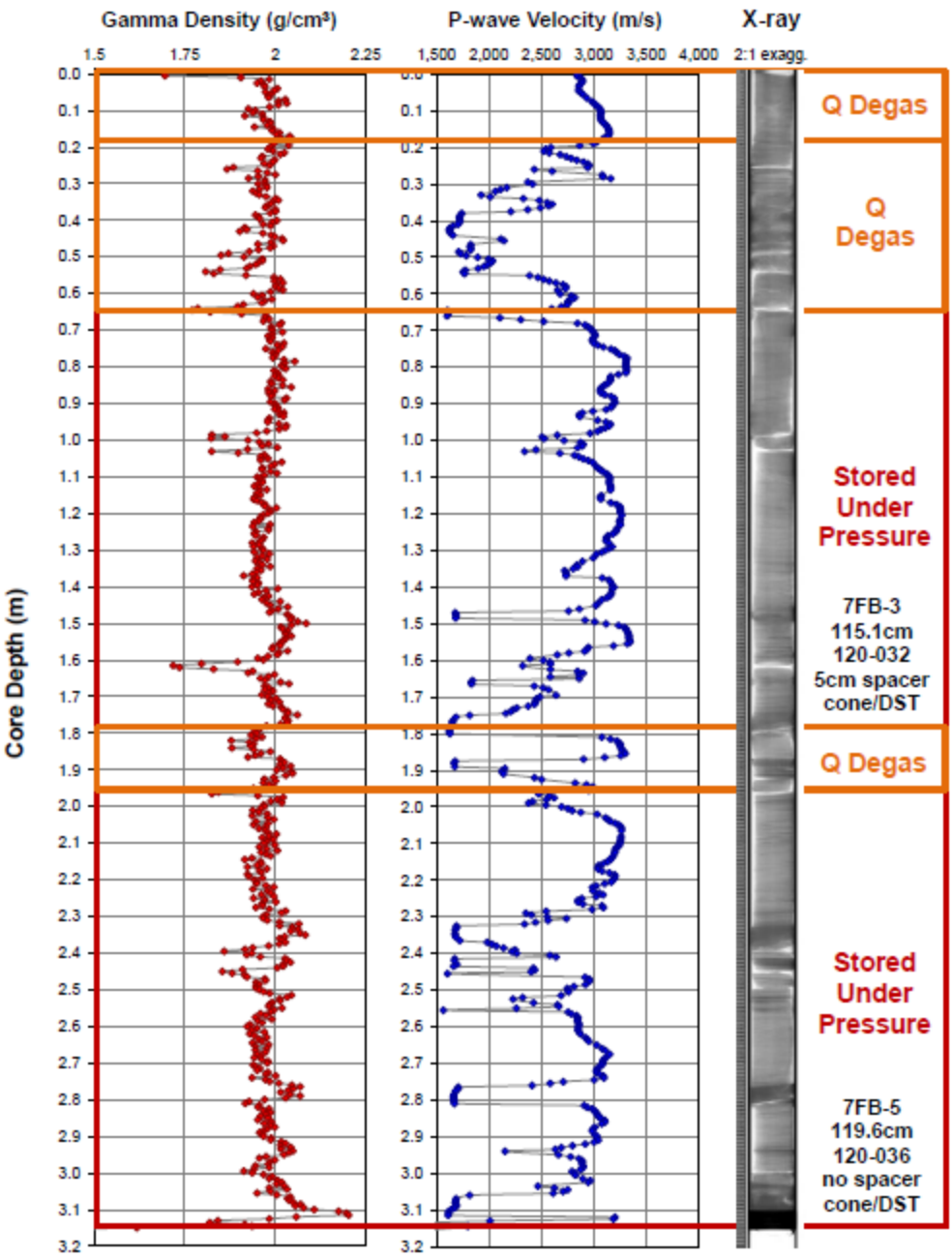


Figure 11. UT-GOM2-1-H005-7FB

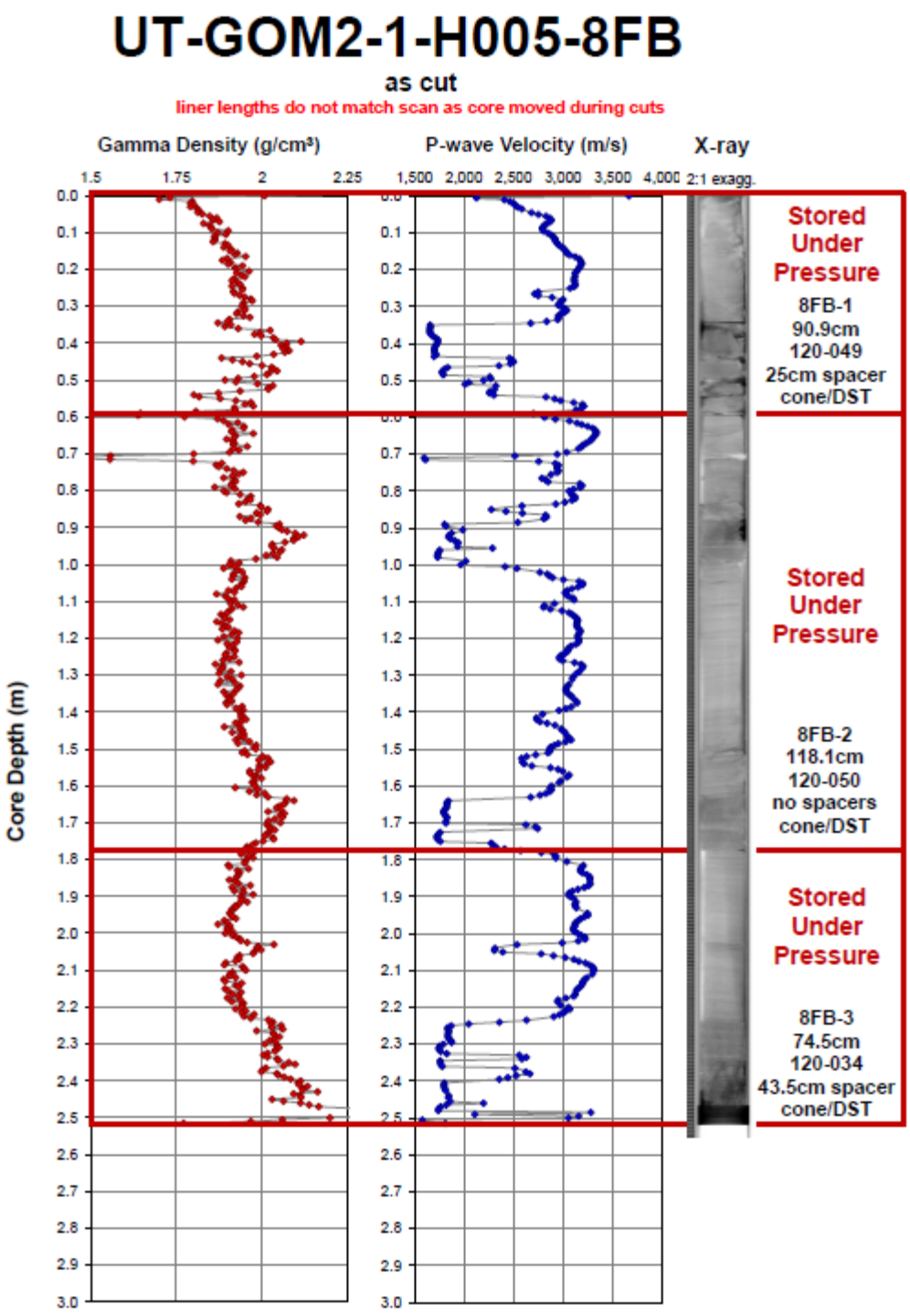


Figure 12. UT-GOM2-1-H005-8FB

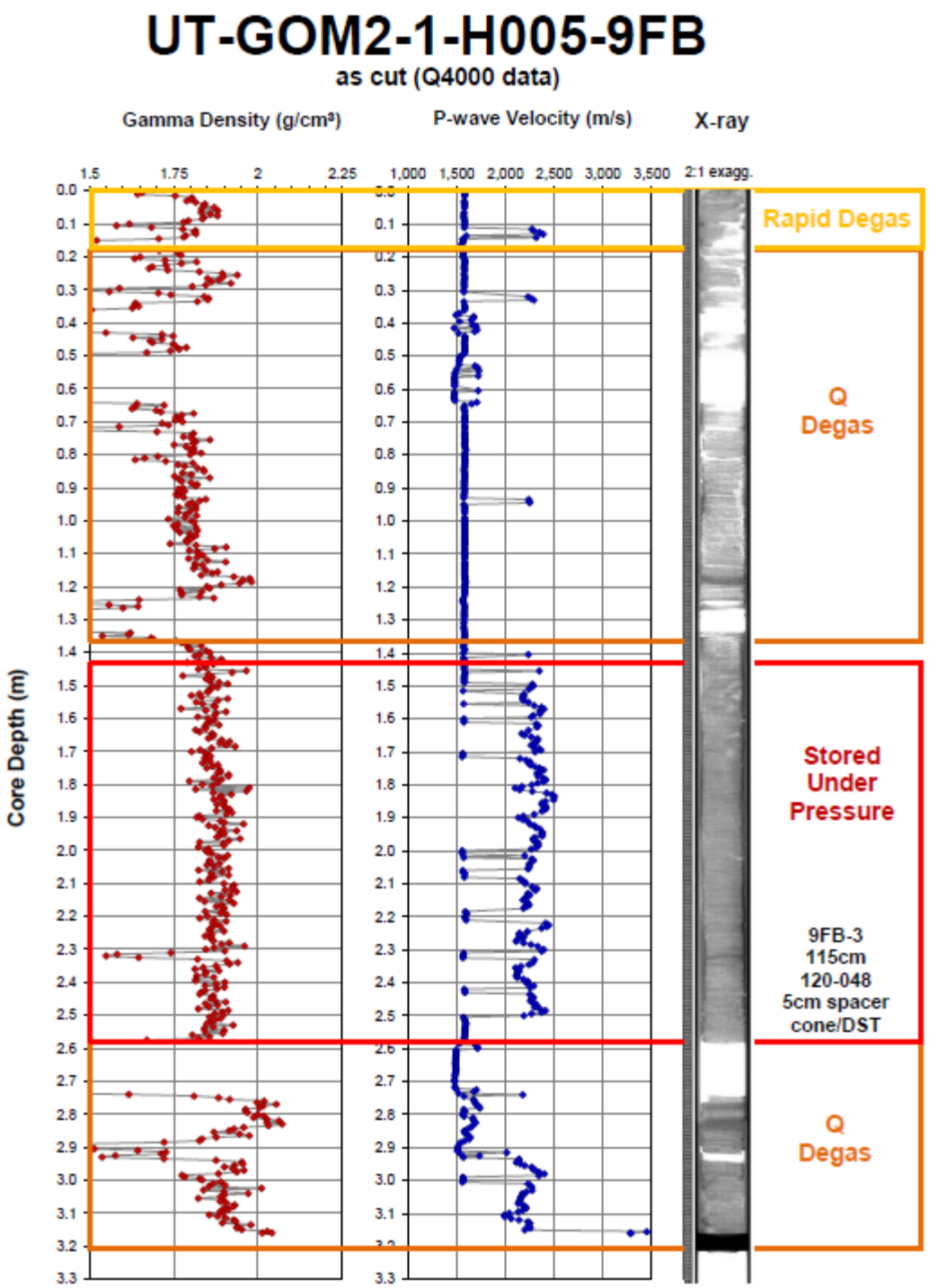


Figure 13. UT-GOM2-1-H005-9FB. Core experience excursion outside of the hydrate stability zone. Curated Length does not match recovery due to curated voids.

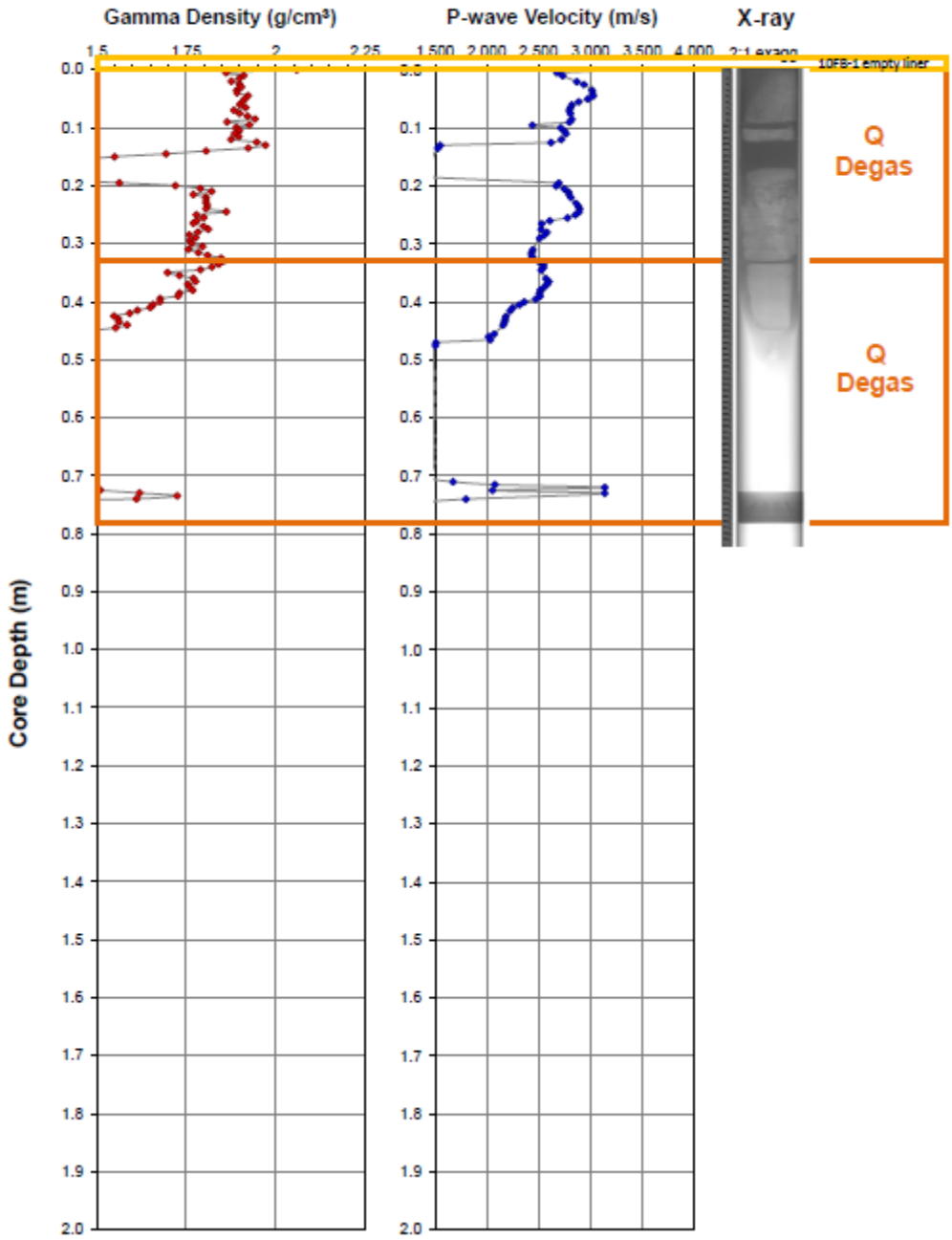


Figure 14. UT-GOM2-1-H005-10FB

UT-GOM2-1-H005-11FB

as cut

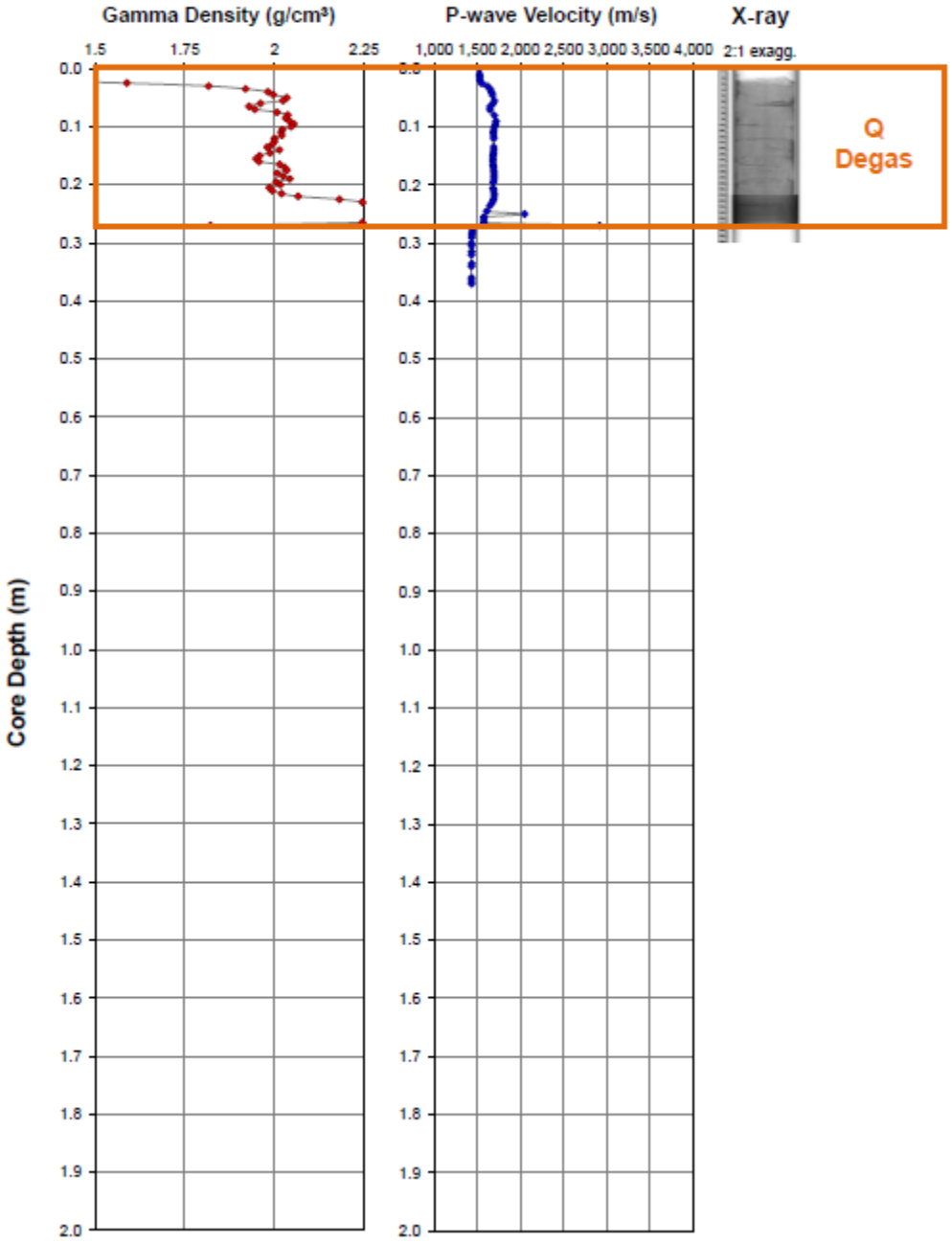


Figure 15. UT-GOM2-1-H005-11FB

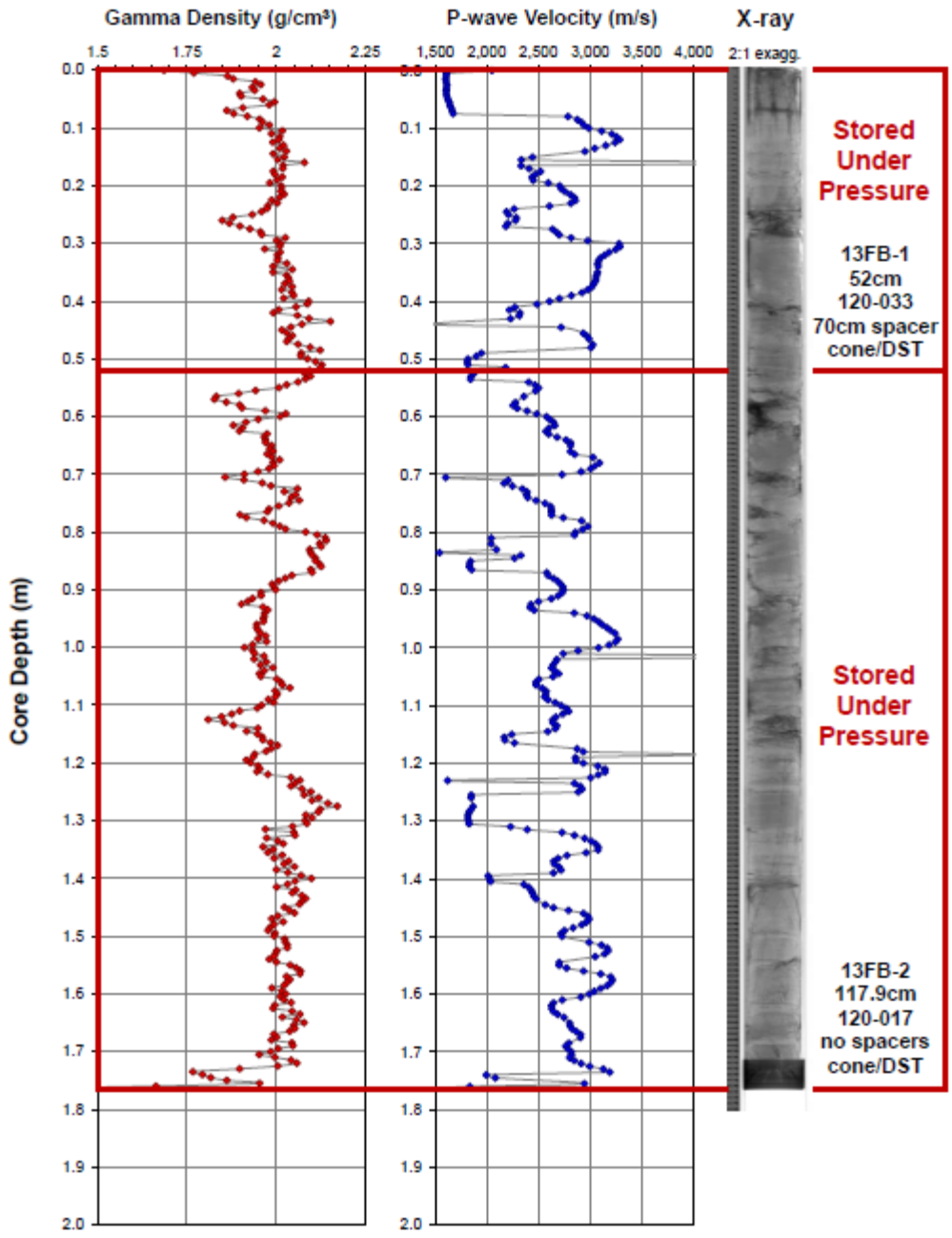


Figure 16. UT-GOM2-1-H005-13FB

4. SUMMARY OF PRESSURE CORE RECOVERED

Table 3. Summary of pressure cores brought back to UT

Pressure core chamber	Pressure core	Depth from core top (cm)	Length (cm)	Description / comments
120-047	H002-4CS-2	26.8-129.5	103.0	Degassing of adjacent sections 4CS-1 and 4CS-3. 15 cm spacer and DST.
120-035	H005-1FB-4	184-214	30.0	Degassing of sections 1FB-1, 1FB-2, and 1FB-3. Stored above 6FB-3 with DST. Sample may have hydrate stability field during core processing.
120-041	H005-2FB-2	18-112.2	94.2	Degassing of adjacent section 2FB-1. Stored 25 cm spacer and DST.
120-040	H005-2FB-3	112.2-152.7	40.5	Degassing of section 2FB-1. Stored above 3FB-5 with cone and DST.
120-043	H005-3FB-1	0-115.2	115.2	Degassing of sections 3FB-2 and 3FB-3. 5 cm spacer and DST
120-038	H005-3FB-4	159.2-236.5	77.3	Degassing of sections cut 3FB-2 and 3FB-3. Stored with 40 cm spacer and DST
120-040	H005-3FB-5	236.5-304.5	68.0	Degassing Data collected from cut 3FB-2 and 3FB-3. Stored below 2FB-3 with cone and DST.
120-044	H005-4FB-6	82.5-190.9	108.4	Degassing Data collected from cut 4FB-2, 4B-3, 4FB-4, 4FB-5 and 4FB-7. 5 cm spacer and DST.
120-045	H005-4FB-8	202.9-320.5	117.6	Degassing Data collected from cut 4FB-7 above. No spacer. With cone and DST.
120-008	H005-5FB-1	0-82.6*	82.6	No degassing data from this core. 36 cm spacer and DST.
120-039	H005-5FB-2	82.6-192*	109.4	No degassing data from this core. 10 cm spacer and DST.
120-042	H005-5FB-3	192-303.5*	111.5	No degassing data from this core. 5 cm spacer and DST.
120-037	H005-6FB-1	0-78.9	78.9	No degassing data from this core. 40 cm spacer and DST. Sample may have left hydrate stability field during core processing.
120-046	H005-6FB-2	78.9-197.5	118.6	No degassing data from this core. No spacer. DST. Sample may have hydrate stability field during core processing.
120-035	H005-6FB-3	197.5-272.5	75	No degassing data from this core. Stored below H005-1FB-2. DST. Sample may have hydrate stability field during core processing.
120-032	H005-7FB-3	63.1-178.2	115.1	Degassing Data collected from cut 7FB-1, 7FB-2, and 7FB-4 above and below. 5 cm spacer and DST.
120-036	H005-7FB-5	194.8-314.4	119.6	Degassing Data collected from cut 7FB-4 above. No spacer. DST.
120-049	H005-8FB-1	0-90.9*	90.9	There was some sediment above top of core. No degassing data from this core. 25 cm spacer and DST.

120-050	H005-8FB-2	90.9-209*	118.1	No degassing data from this core. No spacer. DST.
120-034	H005-8FB-3	209-283.5*	74.5	No degassing data from this core. 43.5 cm spacer and DST.
120-048	H005-9FB-3	143-258	115	Degassing Data collected from cut 9FB-2 and 7FB-4 above and below. 5 cm spacer and DST. Sample left methane hydrate stability field during core recovery.
120-033	H005-13FB-1	0-52	52	No degassing data from this core. 70 cm spacer and DST.
120-017	H005-13FB-2	52-169.9	117.9	No degassing data from this core. No spacer. DST.

* Liner lengths do not match scan as core moved during cuts

5. SUMMARY OF DEPRESSURIZED CORE RECOVERED:

Table 4. Depressurized material and other samples already distributed for geochemistry, microbiology, physical properties, and conventional core analysis

Core Section or Sample Type	Depth (cm)	Length (cm)	Description / Comments
H002-1CS-1	0-79	79	Interstitial water, microbiology, physical property, and head space gas samples collected.
H002-2CS-1	0-45	45	
H002-2CS-2	45-125	80	Interstitial water, microbiology, physical property, and head space gas samples collected.
H002-2CS-3	125-225	100	
H002-2CS-4	225-322	97	Physical property, and head space gas samples collected.
H002-2CS-CC	322-327	5	
H002-3CS-1	0-33	33	Physical property sample collected.
H002-3CS-CC	33-48	15	
H002-5CS-1	0-100	100	Physical property, and head space gas samples collected.
H002-6CS-1	0-19	19	
H002-6CS-2	19-119	100	
H002-6CS-3	119-219	100	
H002-6CS-4	219-319	100	Interstitial water, microbiology, physical property, and head space gas samples collected
H002-6CS-5	319-343	24	Physical property, and head space gas samples collected.
H002-7CS-1	0-72	72	

H002-8CS-1	0-57	57	Interstitial water, microbiology, physical property, and head space gas samples collected.
H002-8CS-2	57-157	100	
H002-8CS-3	157-235	78	
H002-8CS-4	235-315	80	Interstitial water, microbiology, physical property, and head space gas samples collected.
H002-8CS-5	315-352	37	
H005-12FB-1	0-12	12	
H005-12FB-2	12-76	64	Interstitial water, microbiology, physical property, and head space gas samples collected
H005-12FB-3	76-175	99	Interstitial water, microbiology, physical property, and head space gas samples collected

* Section lengths do not represent core sediment recovery to the presence of voids.

Quarterly Research Performance Progress Report

Appendix C

UT-GOM2-1 Daily Reports

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 30 April 2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 30 April 2017
Brownsville, TX at the dock in the Keppel Amfels shipyard.

3. DESCRIPTION OF OPERATIONS:

UT and Geotek have boarded the Q4000. All Geotek containers have been loaded onto the vessel. Phone and internet have been connected to company man and the 3rd party offices. Representatives from UT, Geotek, Helix, Schlumberger, and Weatherford met to discuss the status/plans for rig floor and container operations going forward. These plans include utility connections to Geotek containers, grating installation, Schlumberger wireline rig up through the top drive, Weatherford instrumentation, and mouse-hole installation/modification. The current priority is for Helix to finish loading and load-testing before the above operations can continue.

4. OPERATIONAL PLAN (Next 24 Hours):

We are scheduled to depart from Brownsville tomorrow morning, May 1, at 0700. The plans discussed above will continue during the transit to GC 955.

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
LWD Totals: NA
Wireline Totals: NA

6. CORE DATA:

Hole: NA
PCTB Coring (pressure coring) Totals: NA

7. Science Activities

NA

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 01 May 2017, 0000-2400 hr

2. LOCATION:

0000 – 0750 hr, 01 May 2017
Brownsville, TX
0750 – 2200 hr, 01 May 2017
Transit
2200 – 2400
Stationary offshore

3. DESCRIPTION OF OPERATIONS:

At 0750 hr the *Q4000* left the dock and was guided by the harbor pilot through the channel towards South Padre Island. At 1020 hr the vessel entered the Gulf of Mexico, and continued offshore at 1105 after the pilot disembarked. At 1300 there was a fire drill. Geotek gained access to clean freshwater for their containers. Most activities are paused until Helix finishes sea trials for the vessel.

4. OPERATIONAL PLAN (Next 24 Hours):

The *Q4000* will stop and ballast late today and then Helix will perform sea trials of various vessel functions starting this evening, and should be complete by Wednesday. The transit to Green Canyon 955 will continue after the tests.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities:

Reviewed drilling program and coring plan.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 02 May 2017, 0000-2400 hr

2. LOCATION:

0000-2400 hr, 02 May 2017
26.1025° N, 96.05967° W
Approximately 60 nmi offshore South Padre Island, TX

3. DESCRIPTION OF OPERATIONS:

The Q4000 has remained stationary offshore while conducting a variety of tests. Geotek worked on organizing their containers and are awaiting electrical connections.

4. OPERATIONAL PLAN (Next 24 Hours):

Helix will continue their FMEA sea trials.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

The science party has been reviewing the drilling and coring plan.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 03 May 2017, 0000-2400hr

2. LOCATION:

0000 -2400 hr, 03 May 2017
26.1025° N, 96.05967° W
Approximately 60 nmi east of South Padre Island, TX

3. DESCRIPTION OF OPERATIONS:

The *Q4000* remained stationary and Helix completed FMEA tests. Geotek gained electrical power to their equipment and started one their chilling units.

4. OPERATIONAL PLAN (Next 24 Hours):

After a crew change in the morning of 04 May 2017, the *Q4000* will de-ballast and begin transit to GC955. Forecasted strong winds may cause delays.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

The science party has been reviewing the drilling and coring plan.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 04 May 2017, 0000-2400hr

2. LOCATION:

0000 – 1800 hr, 04 May 2017
26.1025° N, 96.05967° W
Approximately 60 nmi east of South Padre Island, TX
1800 – 2400 hr, 05 May 2017
Transit towards GC995

3. DESCRIPTION OF OPERATIONS:

Helix completed a crew change through the morning and afternoon with three helicopter flights. After transfers were complete, the *Q4000* was de-ballasted and began to transit towards GC955. Helix began installing the grating around Geotek's containers. Geotek continued to organize and inventory their equipment.

4. OPERATIONAL PLAN (Next 24 Hours):

The *Q4000* will continue its transit to the northeast with an expected arrival at GC955 late on 06 May 2017.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

The science party has been reviewing the drilling, coring and sampling plan.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 05 May 2017, 0000-2400 hr

2. LOCATION:
0000 – 2400 hr, 05 May 2017

3. DESCRIPTION OF OPERATIONS:
The *Q4000* continued transit towards GC955 throughout the day. Grating is installed around Geotek's containers and they are continuing to set up their equipment. UT, Helix, Geotek and all third parties had a pre-spud meeting to discuss the expedition objectives and the operational plan. Schlumberger and Helix worked on rigging up the wireline equipment to the top drive.

4. OPERATIONAL PLAN (Next 24 Hours):
The *Q4000* is expected to arrive at GC955 at 1530 on 06 May 2017. The supply boat is ready and will arrive on Saturday.

5. DOWNHOLE LOGGING OPERATIONS:
NA

6. CORE DATA:
NA

7. Science Activities
The science party continued to review and refine the drilling and coring plan.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 06 May 2017, 0000-2400hr

2. LOCATION:

0000 – 1640 hr, 06 May 2017
Transit to GC955
1640 hr – 2400 hr
On site at GC955-H002

3. DESCRIPTION OF OPERATIONS:

The Q4000 arrived 1 nmi from GC955-H002 at 1600 hr after a 307 nmi transit. The wireline equipment is now rigged up to the top drive. Geotek continued to prepare their equipment. The ROV was launched at 2040 to deploy four Compatt transponders and survey the site area. The H001 well was found at 2247 hr at a location of 27° 00.05126' N, 090° 25.58367' W in a WGS84 coordinate system. The condition of the top of the borehole is intact.

4. OPERATIONAL PLAN (Next 24 Hours):

The supply boat is scheduled to arrive early 07 May 2017 and will be offloaded much of the day. Drilling mud will be offloaded and mixed. On-site mobilization will continue in preparation for the flow test. UT will work to unpack and organize the mud lab.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

The science party continued to work on resolving the coring points and sampling protocols.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 07 May 2017, 0000-2400hr

2. LOCATION:

0000 - 2400 hr, 07 May 2017
GC955H

3. DESCRIPTION OF OPERATIONS:

A partial crew change occurred via three helicopter flights. The supply boat was offloaded over most of the day; drilling mud, gel, and the mud lab were brought on board. The as-found survey with the ROV was completed. Geotek did a trial run of attaching an autoclave to PCATS. Helix increased the voltage at Geotek's containers to 204 V. Helix worked on installing the HVAC system for the mud pumps. Weatherford installed a new interface and software to record active signals during drilling.

4. OPERATIONAL PLAN (Next 24 Hours):

Potable water and fuel will be transferred to the *Q4000*. Helix will make up doubles in drill pipe. The flow test is planned to occur sometime on 08 May 2017.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

The science party worked to finalize the location of the H002 well based on the 'as found' location of the H001 borehole. The final location of the H002 well was selected to be: 27° 0.0460' N 90° 25.5930 W in the WGS84 coordinate system. This is 59 ft SSW from the existent H001 borehole. The Science Party worked on planning the expedition report.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 08 May 2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 08 May 2017
Green Canyon 955
UT-GOM2-1-H002

3. DESCRIPTION OF OPERATIONS:

There was a fire/abandon ship drill at 0819 hr. The supply boat transfer was completed and the boat departed at 1227 hr. The mud lab was placed into location and hooked up to utilities. Helix finished installing the duct work for the mud pumps. Helix made up ~2300 ft of drill pipe between 1400-1930 hr and then between1940-2200 hr brought up and laid down pipe in doubles. Starting at 2015 hr, Weatherford software began logging top drive data; they now can record all drilling parameters, except the stroke counter on the mud pumps. Helix performed pressure testing of the upper and lower IBOP valves and the wireline night cap starting at 2315 hr.

4. OPERATIONAL PLAN (Next 24 Hours):

The BHA will be picked up in the morning of 09 May 2017 to begin PCTB flow testing. Geotek will install the cold shuck and chillers. There will be three to four helicopter flights tomorrow for additional crew change and the arrival of the remainder of the science party.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

The science party continued to refine coring points. Geotek trained UT personnel in quantitative degassing. UT worked on setting up the mud lab for sampling.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 09 May 2017, 0000-2400hr

2. LOCATION:

0000 -2400 hr, 09 May 2017
UT-GOM2-1-H002

3. DESCRIPTION OF OPERATIONS:

0200	Pressure test of wireline night cap
0310	Pressure test of lower IBOP
0545	Pressure test of upper IBOP
0930 hr	BHA picked up in preparation of the flow test.
1230-1300	Space out with PCTB and instrumented core barrel

1621-1646 hr
Surface Pump Test 1 PCTB-CS
Bit just above sea surface below ship
0-140 SPM; 0-28 GPM
33-1450 psi standpipe pressure (Weatherford)

1653-1710 hr
Surface Pump Test 2 PCTB-CS
Bit just above sea surface below ship
0-140 SPM; 0-28 GPM
19-1824 psi standpipe pressure (Weatherford)

1953-2022 hr
Surface Pump Test 3 (cement pump) PCTB-CS
Bit just above sea surface below ship
0.5-8.0 barrels per minute (BPM); 21-40 GPM
80-1055 psi standpipe pressure (Weatherford need to confirm source)

2130 hr	Space out of cementing core barrel in outer core barrel
2205	Space out of center bit in outer core barrel

There were three helicopter flights for crew change, and the remainder of the science party arrived at 1445 and went through the safety orientation.

4. OPERATIONAL PLAN (Next 24 Hours):

Trip pipe to the seafloor (~10 hrs). Run a pump test just above the seafloor. Spud hole near the end of 10 May 2017.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

Preliminary analysis of data from Geotek instrumented core liner shows only small pressure differentials across the core liner during each of the three Surface Pump Test of the PCTB-CS as conducted on 09-May-17. The instrumented core liner upon visual inspection did not exhibit any damage or deformation.

The science party met to discuss the plan for the expedition report and began working on report chapters. The official hole names for this expedition are UT-GOM2-1-H002 and UT-GOM2-1-H005.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 10-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 10-May-2017
Green Canyon 955
UT-GOM2-1-H002

3. DESCRIPTION OF OPERATIONS:

0000-0015 JSA in support of BHA MU
0015-0215 Continue to MU BHA (PCTB-CS) with drill collars
BHA: 203.12ft drifted BHA W/ 4.105" drift
0215-1200 MU in RIH BHA (PCTB-CS) and DP, fill with seawater
1200-1630 Continue to RIH BHA (PCTB-CS) F/ 4929ft T/ 6550ft
Drifted each joint W/ 4.125" drift.
1630-1700 JSA/TBT in support of PCTB-CS pump test
Vessel off lump sum mobilization
1700-1930 Change bails on TDS, stage PCTB-CS, RU wireline
1930-2110 MU and RIH instrumented core barrel F/surface T/6545ft and POOH
2110-2230 RIH instrumented core barrel F/surface T/6200ft
Seafloor Pump Test X PCTB-CS (incomplete test)
Bit just above sea surfloor
Using Hex Pump 2 switched to Hex Pump 1 (circulating seawater)
Hex Pump 2: 30 SPM; 150 GPM; 32 psi (Weatherford)
Hex Pump 1: 30 SPM; 150 GPM; 18 psi (Weatherford)
2230-2235 Shutdown Hex Pump 1 because of electrical problem
2235-2315 **Seafloor Pump Test 1 PCTB-CS**
Bit just above seafloor
Using Hex Pump 2 (circulating seawater)
0-140 SPM; 0-700 GPM
16-1922 psi standpipe pressure (Weatherford)
2315-2400 **Seafloor Pump Test 2 (cement pump) PCTB-CS**
Bit just above seafloor
0.5-7.0 barrels per minute (BPM); 21-40 GPM
1.0-239 psi standpipe pressure (Schlumberger gauge)

4. OPERATIONAL PLAN (Next 24 Hours):

Update: Spudded hole UT-GOM2-1-H002 at 08:53 on 11-May-2017. Tagged seafloor, drill pipe measured depth 6719 ft. Coordinates: Lat: 27° 00.04548', Long: -90° 25.59312' (WGS 84).

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

The PCTB-CS pressure core BHA reached near the seafloor (6716 MD) at 2110hr and the Geotek instrumented core barrel was deployed in preparation for conducting a series of seafloor level pump tests. The first attempted seafloor pump test was not completed because of an electrical problem associated with one of the ship's mud pumps. However, two additional seafloor pump tests were completed without any concerns. The pump tests also allowed for the analysis of the performance of all three pump units on the platform (i.e., Hex Pumps 1 and 2; and the Schlumberger cement pump). Analysis of data obtained from both the sea surface and seafloor pump test documented only small pressure differentials across the core liner for all of the completed tests. In addition, the instrumented core liner was not damaged during any of the completed pump test. Modifications to the drilling fluid flow paths through the PCTB-CS appear to have significantly reduced the internal pressure conditions that have in the past resulted in the collapse of core liners within the PCTB-CS system. The pump tests also represented an excellent opportunity for Geotek and the Q4000 rig crew to become familiar with operations and handling of the PCTB-CS pressure core system as deployed on this expedition.

The Science Party continued to work on core handling and sample plans in preparation for the spuding of the UT-GOM2-1-H002 hole now scheduled for early on 11-May-17. In addition, Geotek technical staff and UT scientists have reviewed and further refined the planned pressure core degassing experimental protocols that will be used to conduct new "slow degassing protocols".

Confirmed following shipboard conversions (Geotek, UT, etc.):
-Mud pumps 5.04 US Gallons per stroke, will use 5.0 GPM/stroke in calculations
-US barrels to US gallons (1bbl = 42 gallons)

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 11-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 11-May-2017
Green Canyon 955
Hole UT-GOM2-1-H002
Lat: 27° 00.04548', Long: -90° 25.59312' (WGS 84)
Water depth: 6667.0 ft (6719.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0100	Complete the PCTB-CS Seafloor Pump Test 2 from 10-May-2017
	Flow test Hex Pump 1 (unable to maintain pump rate)
0100-0500	Prepare to spud Hole UT-GOM2-1-H002
	POOH instrumented core barrel F/6454 T/surface
	JSAs to deal with PCTB-CS and wireline systems
	MU and RIH PCTB-CS center bit barrel
	MU wireline night cap to TDS
0500-0530	Test wireline night cap on TDS to 5000 psi
0530-0600	Held Spud meeting with all personnel involved
0600-0630	RIH DP F/6550ft T/6709ft
0630-0730	*D/S Q4000* DP moved over proposed drill site
0730-0830	RIH and tagged mudline at 6719.0 ft RKB
	Pull clear of mudline a reset data loggers
0830-1200	Spud Hole UT-GOM2-1-H002 at 6667.0 ft (6719.0 ft RKB).
	Advance hole to 6992.0 ft RKB (273.0 fbsf)
	BSEE inspection (Inspectors Campo, Boudreaux, Fry, Shedd
1200-2300	Advance hole to 8032.0 ft RKB (1313.0 fbsf)
2300-2400	Circulate hole clean with 8.6 ppg mud

4. OPERATIONAL PLAN (Next 24 Hours):

Continue to advance Hole UT-GOM2-1-H002 to planned first core point at 8062.0 ft RKB (1343.0 fbsf), deploy and conduct continuous pressure coring with the PCTB-CS system.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

NA

7. Science Activities

In the last 24 hours, spudded and advanced Hole UT-GOM2-1-H002 to a depth of 8032.0 ft RKB (1313.0 fbsf) by midnight without any significant problems. Geotek completed preparations for coring operations and developed plans for simulated core runs to be conducted before reaching core point as planned for the morning of 12-May-17. The UT Scientific Party refined and finalized the Hole UT-GOM2-1-H002 core plan and continued to work on the "Methods Section" writing assignments in support of the expedition initial results volume. The UT Scientific Party also continued to develop the core handling and processing plan. Based on 1) lateral correlation with seismic data from Hole GC955-H as drilled under the Gulf of Mexico Gas Hydrate Joint Industry Project Leg II (GOM JIP Leg II) in 2009 to the Hole UT-GOM2-1-H002 and 2) the seafloor depth at UT-GOM2-1-H002, the first pressure core point (Core UT-GOM2-1-H002-01) was set at 8062.0 ft RKB (1343.0 fbsf). Posted below is the finalized core plan for Hole UT-GOM2-1-H002.

GC955 H002 Coring Plan	
Water Depth (tvdss)	6667
Rig Floor elevation above sl. (ft)	52
mud line depth RKB	6719
Hydrate Top (fbsf)	1358
Hydrate top (RKB)	8077
Hydrate Bottom (fbsf)	1444
core length (ft)	10
wash interval (ft)	10

Core #	Top (fbsf)	Bottom (fbsf)	Top (RKB)	Bottom (RKB)
1	1343	1353	8062	8072
2 (hydrate top in middle)	1353	1363	8072	8082
3	1363	1373	8082	8092
4	1373	1383	8092	8102
5	1383	1393	8102	8112
6	1393	1403	8112	8122
Drill/Wash	1403	1429	8122	8148
7	1429	1439	8148	8158
8 (hydrate base in middle)	1439	1449	8158	8168
9	1449	1459	8168	8178
10	1459	1469	8178	8188
Drill/Wash	1469	1719	8188	8438

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 12-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 12-May-2017
Green Canyon 955
Hole UT-GOM2-1-H002
Lat: 27° 00.04548', Long: -90° 25.59312' (WGS 84)
Water depth: 6667.0 ft (6719.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0030	At Hole UT-GOM2-1-H002
	Continue to circulate hole clean and fill with F/8.6 ppg T/10.5 ppg mud
0030-0230	Performed coring simulations drilling down:
	F/ 8032 ft MD T/ 8042 ft MD
	F/ 8042 ft MD T/ 8052 ft MD
	F/ 8052 ft MD T/ 8062 ft MD
0230-0330	Circulate hole clean and fill with 10.5 ppg mud
0330-0730	Prepare to acquire Core UT-GOM2-1-H002-01
	JSA to review wireline operations
	Transfer PCTB-CS tools to rig floor
	Recover PCTB-CS center bit
	RU and RIH PCTB-CS F/Surface T/8062 ft RKB
	Circulate hole clean and fill with 10.5 ppg mud
0730-0900	**Core UT-GOM2-1-H002-01, F/8062 T/8072 ft MD: Recovered 2.26 ft, 0 psi**
0900-0930	Recover PCTB-CS inner core barrel
	Upon recovery stab into vertical cold shuck
	Upon inspection of core barrel discovered sample was not pressurized
	Pressure boost failed to fully-charge the PCTB-CS autoclave
0930-1010	**Conduct PCTB-CS BHA Water Test 1**
	Standard PCTB-CS configuration (with polypack seals)
	RIH F/ Surface T/ 8072 ft RKB, lock tool into BHA
	POOH PCTB-CS with standard pulling tool
	Upon inspection (0 psi) pressure boost failed
	Pressure boost failed to charge PCTB-CS autoclave
1010-1230	**Conduct PCTB-CS BHA Water Test 2**
	Upper seal changed to a 0-ring to allow limited fluid transfer
	RIH F/ Surface T/ 8072 ft RKB, lock tool into BHA
	POOH PCTB-CS with standard pulling tool
	Upon inspection (0 psi) pressure boost failed
	Pressure boost failed to charge PCTB-CS autoclave

1230-1830 Prepare to acquire Core UT-GOM2-1-H002-02
JSA to review wireline operations
PU and RIH PCTB-CS F/Surface T/8072 ft RKB
Circulate hole clean and fill with 10.5 ppg mud
1830-1900 **Core UT-GOM2-1-H002-02, F/8072 T/8082 ft MD: Recovered 5.33 ft, 0 psi**
1900-1945 Recover PCTB-CS inner core barrel
Upon inspection the core did not retract and the ball valve did not close
1945-2230 Prepare to acquire Core UT-GOM2-1-H002-03
PU and RIH PCTB-CS F/Surface T/8082 ft RKB
Circulate hole clean and fill with 10.5 ppg mud
2230-2330 **Core UT-GOM2-1-H002-03, F/8082 T/8092 ft MD: Recovered 1.08 ft, 0 psi**
2330-2400 Recover PCTB-CS inner core barrel
Note from 13-May-2017 UT-GOM2-1 Daily Operational and Science Report: The PCTB-CS inner core barrel would not unlatch from the coring BHA using the standard recovery tool. After several hours of attempting to free the tool, the Geotek emergency release tool was used to successfully release the inner core barrel; however, the normal functioning of this tool will not activate the ball valve or other tool functions resulting in the depressurization of the core.

4. OPERATIONAL PLAN (Next 24 Hours):

Continue to advance Hole UT-GOM2-1-H002 with continuous pressure coring with the PCTB-CS system.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

PCTB-CS Coring (pressure coring) Totals: 3 core, 30.0 ft cored; 8.67 ft recovery

Core UT-GOM2-1-H002-01
F/8062 T/8072 ft MD: Recovered 2.26 ft, 0 psi
Performed coring operations F/ 8062 ft T/ 8072'
Drilling/Coring Parameters : 50 RPM w/ 3.5 K torque and cement unit circulating 10.5 ppg WBM at 125 gpm and standpipe pressure of 15 psi, ROP 5-15 ft/hr, WOB 2-6 tons, With polypack diverter seal.
Core start time 0745 hr; Core end time 0840 hr; Core on deck at 0917 hr.
Core barrel recovered on deck with ball valve closed but with little to no pressure in the autoclave. Core UT-GOM2-1-H002-01, which was the first core acquired during this expedition, recovered 2.26 ft of core in poor condition and failed to retain pressure. The deployment, cutting, and recovery of the core appeared to be conducted without any problems. We did not see any trouble with the latching of the tool or it's deployment in the pipe. But it took more than 6,000 lbs of pull to unlatch the tool from the BHA. The cutting of the core on bottom also appeared to be good with somewhat variable penetration rates and weight on bit. Upon recovery, the ball valve was closed but the pressure boost appeared not to have pressurized the autoclave below the new flow diverter set above the upper autoclave seal (polypack seals). It was speculated that the interaction of the new upper seal and flow diverter

had created a pressure seal (hydraulic lock) that did not allow the pressure charging of the autoclave. Two additional PCTB-CS operational tests were conducted in the open drillpipe (while not in contact with the sediment) that appeared to confirm that there was some form of pressure block in the tool. It is also important to add that the spring type core catcher was damaged upon recovery, showing evidence of inverted and twisted fingers.

Core UT-GOM2-1-H002-02
F/8072 T/8082 ft MD: Recovered 5.33 ft, 0 psi
Drilling/Coring Parameters : 60 RPM w/ 3.5 K torque and cement unit circulating 10.5 ppg WBM at 125 gpm and standpipe pressure of 15 psi, ROP 20-90 ft/hr, WOB 1-20 tons, With O-ring diverter seal.
Core start time 1840 hr; Core end time 1857 hr; Core on deck at 2430 hr.
Tool recovered on deck. Ball valve not closed; core liner visible through ball valve (no pressure). Core did not retract into the autoclave. The upper threaded connection of the liner to the top of the core plug was broken and the core catcher was damage indicating that the core likely jammed, which caused core milling and the breaking of the liner. It also took about a 6000 lb pull to unlatch the inner core barrel from with the BHA during the recovery of the core. We have concluded that the main factor affecting/limiting our core recovery, core quality and sometime creating tool damage (preventing recovery under pressure) is 'formation jamming'. This happens when the formation is forced up inside the cutting shoe, without the core having been correctly cut and the cuttings removed. This can happen as a result of ship's movement indicated by the rapid and significant changes to the weight on bit (WOB).

Core UT-GOM2-1-H002-03
F/8082 T/8092 ft MD: Recovered 1.08 ft, 0 psi
Drilling/Coring Parameters : 60 RPM w/ 3.5 K torque and cement unit circulating 10.5 ppg WBM at 125 gpm and standpipe pressure of 15 psi, ROP 7-24 ft/hr, WOB 5-15 tons, With O-ring diverter seal.
Core start time 2225 hr; Core end time 2315 hr; Core on deck at 0245 hr (13-May-17).
Core UT-GOM2-1-H002-03 failed to hold pressure; however, it did return core to the surface. This failure of the core system to retain pressure was attributed to the fact that the retrieval of the inner core-barrel required a special procedure to release it form the latches in the BHA. We did not see any trouble with the deployment and latching of the tool before coring. The actual core cut event appeared to be good with somewhat variable penetration rates and weight on bit. However, at the end of the test the inner core-barrel was stuck in the BHA. The rig crew and Geotek staff core team managers worked with the Schlumberger wireline engineer for nearly four hours to unlatch the core barrel from the BHA. Eventually, the decision was made to use a special emergency release procedure that was successful but also presents the ball-valve on the tool from closing.

7. Science Activities

The ‘conventionalized’ core material from each core was transferred to the UT mud lab whole rounds were subsampled and preserved for shore-based geochemistry, microbiology, and physical properties. Head space gas samples were sampled for shore-based analyses. A total of 2.65 ft was sampled as whole rounds and the remaining 6.02 ft was archived for shore-based splitting and description. Based on a quick description of core ends, the primary lithology in the recovered cores ranges from sandy silt with clay to silty sand with clay. A sample of drilling fluid was sampled and preserved to characterize potential contamination.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 13-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 13-May-2017
Green Canyon 955
Hole UT-GOM2-1-H002
Lat: 27° 00.04548', Long: -90° 25.59312' (WGS 84)
Water depth: 6667.0 ft (6719.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0400	At Hole UT-GOM2-1-H002
	Core UT-GOM2-1-H002-03 core barrel would not unlatch from the BHA
	Pumped numerous mud sweeps and worked SLB slickline to free tool
	Deployed Geotech Coring -- Emergency Recovery Tool
	0345 unlatch and recovered tool to the surface via SLB slickline
0400-0630	Prepare to acquire Core UT-GOM2-1-H002-04
	Assemble new core barrel
	JSA to review coring and wireline operations
	RU and RIH PCTB-CS F/Surface T/8135 ft RKB
0630-0900	SLB slickline dropped core barrel off wireline
	Work and pull core barrel with Geotech Coring -- Emergency Recovery Tool
	POOH PCTB-CS F/8092 ft RKB T/Surface
0900-1300	Prepare to acquire Core UT-GOM2-1-H002-04
	Assemble new core barrel
	RU and RIH PCTB-CS F/Surface T/8092 ft RKB
1300-1330	**Core UT-GOM2-1-H002-04, F/8092 ft T/8102 ft MD: Recovered 4.6 ft, 3372 psi**
1330-1530	Recover PCTB-CS inner core barrel
	Upon recovery stabbed into vertical cold shuck
	Upon inspection of core barrel was confirmed to be pressurized
1530-1930	Prepare to acquire Core UT-GOM2-1-H002-05
	Rebuild upper and lower section of PCTB-CS
	RU and RIH PCTB-CS F/Surface T/8102 ft RKB
1930-2000	**Core UT-GOM2-1-H002-05, F/8102 ft T/8112 ft MD: Recovered 3.1 ft, 0 psi**
2000-2400	Recover PCTB-CS inner core barrel
	Difficulty unlatching PCTB-CS outer barrel
	Work and pull core barrel with SLB slickline
	Upon inspection of core barrel it was confirmed not to be pressurized

4. OPERATIONAL PLAN (Next 24 Hours):

Continue to advance Hole UT-GOM2-1-H002 with continuous pressure coring with the PCTB-CS system.

5. DOWNHOLE LOGGING OPERATIONS:

NA

6. CORE DATA:

PCTB-CS Coring (pressure coring) Totals: 2 core, 20.0 ft cored; 7.7 ft recovery

Core UT-GOM2-1-H002-04
F/8092 ft MD T/8102 ft MD: Recovered 4.6 ft, 3372 psi
Performed coring operations F/ 8092 ft MD T/ 8102 ft MD
Drilling/Coring Parameters: 60 RPM w/ 3-6 K torque and Hex Pump 2 circulating 10.5 ppg WBM at 280 gpm and standpipe pressure of 12 psi, ROP 20 ft/hr, WOB 2-6 tons, with no seals in the diverter.

Core UT-GOM2-1-H002-04 was recovered on deck with ball valve closed and at an internal autoclave pressure of 3372 psi, which was the first core acquired during this expedition at pressure. The deployment and recovery of the PCTB-CS core barrel was conducted without any problems. The cutting of the core at the bottom of the hole also appeared to be good with almost constant core penetration rates and weight on bit. Upon recovery, the PCTB-CS core barrel was placed in the vertical ice-shuck on the rig floor. The internal pressure of the PCTB-CS autoclave when received in the Geotech Coring Service Van measured 3372 psi, which is slightly less than the expected hydostatic pressure at the depth of the cored reservoir section at this site. In the PCATS lab, an X-ray scan of the PCTB-CS autoclave revealed 4.6 ft (140 cm) section of sediment core and 4.0 ft (123 cm) sediment fill above the core rabbit, which indicates that formation sediment had been fluidized during coring and flowed up into the core liner through the small ports in the rabbit. The Geotek PCATS X-ray image of the recovered core section, from below the core rabbit, measured a total thickness of 4.6 ft (140 cm) and the following characteristics with depth along the core: **00-53 cm** sheared and biscuited core section with an upward decreasing bulk denisty trend, with the upper 32.0 cm of this section characterized by peak P-wave velocites ranging from 2,500 to over 3,200 m/s indicating the pressence of a highly saturated gas hydrate-beaing sediments; **53-102 c**m is also characterized by an upward decreasing bulk density trend and several 10-25 cm thick intervals exhibiting velocities as high as 3,400 m/s also indicating the presence of gas hydrate ; **102-140 cm** is a third upward decreasing bulk density section with a relatively massively-bedded 23 cm thick high velocity likely hydrate bearing unit. The PCATS cut plan for this core is under review, but it is likely that most of this core will be preserved for post expedition analysis and some sections may be selected for quantitative degassing.

Core UT-GOM2-1-H002-05
F/8102 ft MD T/8112 ft MD: Recovered 3.1 ft, 0 psi
Performed coring operations F/8102 ft MD T/8112 ft MD
Drilling/Coring Parameters: 60 RPM w/ 4-8 K torque and Hex Pump 2 circulating 10.5 ppg WBM at 100-225 gpm and standpipe pressure of 12 psi, ROP 40-60 ft/hr, WOB 4-12 tons, with no seals in the diverter.
Core start time 1947 hr; Core end time 2000 hr; Core on deck at 2323 hr.

For Core UT-GOM2-1-H002-05, the ball-valve failed to close or hold pressure; however, it did return core to the surface. For Core UT-GOM2-1-H002-05 the tool was recovered to the rig floor with the ball-valve closed but not sealed. Silt and sand was found packed between the ball

valve and seal; and the seal appeared to be damaged. We also had significant trouble unlatching this tool from the BHA during recovery, which may also have been caused by the impact of silt/sand on the operation of the latch system within the PCTB-CS BHA. Core UT-GOM2-1-H002-05 did recover 3.1 ft (94 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab.

7. Science Activities

In the last 24 hours, Hole UT-GOM2-1-H002 was advanced from 8092 ft MD to 8112 ft MD with 2 PCTB-CS pressure cores (Core UT-GOM2-1-H002-04 and Core UT-GOM2-1-H002-05). Only Core UT-GOM2-1-H002-04 was recovered near its pre-set pressure, the other PCTB-CS failed to hold pressure. PCATS processing and scans yielded significant evidence (i.e., P-wave velocities) for the occurrence of gas hydrate at high concentrations in Core UT-GOM2-1-H002-04. The failure of Core UT-GOM2-1-H002-05 has been attributed to problems associated with sand and silt interfering with the operations of the ball-valve in the PCTB-CS core system.

The Core UT-GOM2-1-H002-05 ‘conventionalized’ core material was transferred to the UT mud lab and a whole round was subsampled and preserved for shore-based physical property measurements. A head space gas sample was also acquired for post expedition analysis. A total of 0.17 ft (5 cm) was sampled as whole rounds and the remaining 2.93 ft (89 cm) was archived for shore-based analysis. Based on a quick description of core ends, the primary lithology in this core is sandy silt at the bottom and silty sand at the top. A sample of drilling fluid and a sample of PCATS water were collected and preserved to characterize potential core contamination in support of the geochemistry and microbiological analyses.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 14-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 14-May-2017
Green Canyon 955
Hole UT-GOM2-1-H002
~~Lat: 27° 00.04548', Long: -90° 25.59312' (WGS 84)~~
Corrected Location: Lat: 27° 00.04154', Long: -90° 25.58715' (WGS 84)
Water depth: 6667.0 ft (6719.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0200	At Hole UT-GOM2-1-H002
	Prepare to acquire Core UT-GOM2-1-H002-06
	Rebuild upper and lower section of PCTB-CS
	RU and RIH PCTB-CS F/Surface T/8112 ft RKB
0200-0230	**Core UT-GOM2-1-H002-06, F/8112 ft T/8122 ft MD: Recovered 5.2 ft, 0 psi**
	Stop coring and monitor hole until returns stop
0230-0315	Recover PCTB-CS inner core barrel
	POOH PCTB-CS F/8122 ft RKB T/Surface
	Upon inspection of core barrel it was confirmed not to be pressurized
0315-0730	Prepare to acquire Core UT-GOM2-1-H002-07
	Rebuild upper and lower section of PCTB-CS
	RU and RIH PCTB-CS F/Surface T/8122 ft RKB
0730-0830	**Core UT-GOM2-1-H002-07, F/8122 ft T/8132 ft MD: Recovered 1.5 ft, 0 psi**
	Stop coring and monitor hole until returns stop
0830-0920	Recover PCTB-CS inner core barrel
	POOH PCTB-CS F/8132 ft RKB T/Surface
	Upon inspection of core barrel it was confirmed not to be pressurized
	Noted cut O-ring on ball valve of core barrel
0920-1330	Prepare to acquire Core UT-GOM2-1-H002-08
	Rebuild upper and lower section of PCTB-CS
	RU and RIH PCTB-CS F/Surface T/8132 ft RKB
1330-1400	**Core UT-GOM2-1-H002-08, F/8132 ft T/8142 ft MD: Recovered 4.6 ft, 0 psi**
	Stop coring and monitor hole until returns stop
1400-1530	Recover PCTB-CS inner core barrel
	POOH PCTB-CS F/8142 ft RKB T/Surface
	Upon inspection of core barrel it was confirmed not to be pressurized
	Noted ball-valve did not accurate
1530-1630	Hole UT-GOM2-1-H002 TD at 8142 ft RKB (1423 fbsf)
	Pumped 280 bbls of 10.5 ppg to sweep hole clean
1630-1730	Prepare for wireline logging operations
	JSA and TBT in support of logging program

	Install wireline logging sheaves
1730-1830	POOH BHA F/8142 ft RKB (1423 fbsf) T/7680 ft RKB (961 fbsf) at 5min/90ft
1830-2040	**Conduct wireline logging operations in UT-GOM2-1-H002**
	JSA and TBT in support of logging program
	Move logging tools from moonpool to rig floor
	RU logging wireline through travel block and TDS
	MU logging wireline packoff in TD
	Terminate logging wireline cable head
	MU logging tools and build logging string in DP
2040-2400	RIH with EDTC-HRLA-GPIT, DP set at 7680 ft RKB (961 fbsf)
	Logging tool string includes Induction Inclinometer
	WL tools unable to pass 8045 ft RKB (1326 fbsf)
	Obtain up hole log run from F/8045 ft RKB T/7680 ft RKB (Repeat Pass)
	RIH with EDTC-HRLA-GPIT F/7680 ft RKB T/8045 ft RKB
	Obtain up hole log run from F/8045 ft RKB T/7680 ft RKB (Main Pass)
	Continue up hole log run to obtain seafloor log depth at 6704 ft RKB.
	POOH logging tool string F/7680 ft RKB to T/5000 ft RKB

4. OPERATIONAL PLAN (Next 24 Hours):

Complete wireline logging program in Hole UT-GOM2-1-H002, set cement plug and abandon Hole UT-GOM2-1-H002, move to location of Hole UT-GOM2-1-H005, and MU BHA and RIH.

5. DOWNHOLE LOGGING OPERATIONS:

Wireline Logs: EDTC-HRLA-GPIT F/7680 ft RKB T/8045 ft RKB (Main Pass)
Wireline Logs: EDTC-HRLA-GPIT F/7680 ft RKB T/8045 ft RKB (Repeat Pass)

6. CORE DATA:

PCTB-CS Coring (pressure coring) Totals: 3 core, 30.0 ft cored; 11.3 ft recovery

Core UT-GOM2-1-H002-06
F/8112 ft T/8122 ft RKB: Recovered 5.2 ft, 0 psi
Performed coring operations F/8112 ft RKB T/8122 ft RKB
Drilling/Coring Parameters: 60 RPM w/2-5 Kflb torque and Hex Pump 2 circulating 10.5 ppg WBM at 100 gpm and standpipe pressure of 20 psi, ROP 20-50 ft/hr, WOB 6 tons, with no seals in the diverter.
Core start time 0155 hr; Core end time 0244 hr; Core on deck at 0355 hr.
For Core UT-GOM2-1-H002-06, the ball-valve closed, seal at top end of autoclave plug failed; however, it did return core to the surface. For Core UT-GOM2-1-H002-06 the tool was recovered to the rig floor with the ball-valve partially closed (not sealed). Silt and sand was found packed between the ball valve and seal. Core UT-GOM2-1-H002-06 recovered 5.2 ft (158 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab.

Core UT-GOM2-1-H002-07
F/8122 ft RKB T/8132 ft RKB: Recovered 1.5 ft, 0 psi
Performed coring operations F/8122 ft RKB T/8132 ft RKB
Drilling/Coring Parameters: 60 RPM w/3-4 Kflb torque and Hex Pump 2 circulating 10.5 ppg WBM at 50-100 gpm and standpipe pressure of 20 psi, ROP 10-25 ft/hr, WOB 5 tons, with no seals in the diverter
Core start time 0727 hr; Core end time 0815 hr; Core on deck at 0855 hr
For Core UT-GOM2-1-H002-07, the ball-valve failed to close or hold pressure (displaced BV seal); however, it did return core to the surface. For Core UT-GOM2-1-H002-07 the tool was recovered to the rig floor with the ball-valve partially closed (not sealed). Silt and sand was found packed between the ball valve and seal. In addition, sediment was also found above the core rabbit in the PCTB-CS autoclave, indicating that formation sediment had been fluidized during coring and flowed up into the core liner through the small ports in the rabbit. Core UT-GOM2-1-H002-07 did recover 1.5 ft (46 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab.

Core UT-GOM2-1-H002-08
F/8132 ft RKB T/8142 ft RKB: Recovered 4.6 ft, 0 psi
Performed coring operations F/8132 ft RKB T/8142 ft RKB
Drilling/Coring Parameters: 60 RPM w/2-4 Kflb torque and Cement Pump circulating 10.5 ppg WBM at 210 gpm and standpipe pressure of 20 psi, ROP 20 ft/hr, WOB 5-8 tons, with no seals in the diverter
Core start time 1310 hr; Core end time 1350 hr; Core on deck at 1440 hr
For Core UT-GOM2-1-H002-08, the ball-valve failed to actuate or hold pressure. The ball-valve release sleeve (collett) failed by sliding over stop position, which resulted in the failure of the ball-valve to actuate. Core UT-GOM2-1-H002-08 did recover 4.6 ft (140 cm) of non-pressurized core that was transferred and processed through the onboard UT core processing lab.

7. Science Activities

In the last 24 hours, Hole UT-GOM2-1-H002 was advanced from 8112 ft RKB to 8142 ft RKB with 3 PCTB-CS pressure cores (Core UT-GOM2-1-H002-06, Core UT-GOM2-1-H002-07, Core UT-GOM2-1-H002-08). All three of the recovered PCTB-CS cores failed to hold pressure. The failure of the first two core runs have been attributed to problems associated with sand and silt interfering with the operations of the ball-valve in the PCTB-CS core system that could be linked to an internal core tool flow problem that is being currently evaluated.

The ‘conventionalized’ core material from cores Core UT-GOM2-1-H002-06, Core UT-GOM2-1-H002-07, and Core UT-GOM2-1-H002-08 was transferred to the UT mud lab and whole rounds were subsampled and preserved for shore-based microbiological, geochemical, physical property measurements. Head space gas samples were also acquired for post expedition analysis. A total of 3.25 ft (99 cm) was sampled as whole rounds and the remaining 8.0 ft (244 cm) was archived for shore-based analysis. Based on a quick description of core ends, the primary lithology in these cores ranges from sandy silt to silty, fine sand. A sample of drilling fluid was collected and preserved to characterize potential

core contamination in support of the geochemistry and microbiological analyses. Geotek finished logging Core UT-GOM2-1-H002-04 in PCATS (139 cm) including full CT. Draft pressure core cutting plan provided to UT science team. In total, 27.5 ft of sediment was recovered from Hole UT-GOM2-1-H002 (34% recovery), with 4.5 ft under pressure.

Hole UT-GOM2-1-H002 reached a TD of 8142 ft RKB (1423 fbsf) at 1630 hr with the recovery of Core UT-GOM2-1-H002-08, after which the hole was swept with 280 bbls of 10.5 ppg water-based mud in preparation for downhole wireline logging. The wireline logging tool string (including EDTC-HRLA-GPIT) was lowered to bottom of the hole, and two up hole log runs from 8045 ft RKB to 7680 ft RKB (Main Pass and Repeat Pass) were acquired without any problems. Because of borehole blockages, the wireline logging tool string could not pass below 8045 ft RKB and the BHA had been set back to a depth of 7680 ft RKB.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 15-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 15-May-2017
Green Canyon 955
Hole UT-GOM2-1-H002
Corrected Location: Lat: 27° 00.04154', Long: -90° 25.58715' (WGS 84)
Water depth: 6667.0 ft (6719.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0130	At Hole UT-GOM2-1-H002
	Continue downhole logging operations
	POOH logging tool string F/5000 ft RKB to T/Surface ft RKB
	JSA for the personnel involved in wireline logging program
	RD logging tools, wireline, and wireline sheaves
0130-0430	Prepare to set cement plug in Hole UT-GOM2-1-H002
	RIH BHA F/7680 ft RKB T/8142 ft RKB (bottom of the hole)
	Spot 25 bbls of 11.5 ppg Gel pad followed by 200 bbls of 10.5 ppg WBM
	POOH BHA F/8142 ft RKB T/7900 ft RKB
	Deploy Geotek cement barrel, free-fall to BHA
	Build cement
0430-1230	JSA for the personnel involved in setting cement plug
	Cementer pumped 20 bbls gel spacer
	Cementer mixed and pumped 77 bbls 16.4 ppg cement
	Place 500 ft cement plug F/7400 ft RKB T/7900 ft RKB
	Cementer pumped 17 bbls of gel spacer
	Cementer pumped 171 bbls of seawater
	POOH BHA F/7900 ft RKB T/6611 ft RKB
	Flushed DS and cement barrel W/seawater
	Pumped 2 nerf balls and 350 bbls of seawater
	Recover Geotek cement barrel on slickline
	Flushed DS with 245 bbls of seawater
1230-1825	POOH BHA F/6611 ft RKB T/Surface
	BO BHA (5 drill collars, 2 stabilizers, bit sub, bit)
1825-2400	Prepare to run PCTB-FB pressure core BHA
	MU face bit and bit sub to outer core barrel
	MU landing saver sub, top sub, head sub
	Geotek performed space out on center bit core barrel
	Geotek performed space out core barrel in outer core barrel
	Geotek performed space out cementing barrel in outer core barrel

4. OPERATIONAL PLAN (Next 24 Hours):

Conduct series of full function (water) tool test of the PCTB-FB in DP. Move onto location of Hole UT-GOM2-1-H005, RIH, and spud hole.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data acquired over the last 24 hr.

6. CORE DATA:

No additional cores acquired over the last 24 hr.

7. Science Activities

In the last 24 hours, the downhole logging program in Hole UT-GOM2-1-H002 was completed with the acquisition of a main pass and repeat pass surveys (EDTC-HRLA-GPIT) over the depth interval from 7680 ft RKB to 8045 ft RKB. Hole UT-GOM2-1-H002 was abandoned with the emplacement of a 500 ft cement plug that was set above the hydrate interval to avoid any potential problem associated with hydrate dissociation that may be caused by the heat generated by cement hydration. The last half of the day dealt with preparations to move onto the location of Hole UT-GOM2-1-H005.

The technical objectives of the Hole UT-GOM2-1-H005 drilling and coring program include (1) demonstrate the engineering capability of the “face-bit” version of the PCTB pressure-coring tool to effectively and consistently capture, collect, and recover hydrate-bearing sand sediments, (2) test the coring efficiency of the cutting shoe BHA, and (3) obtain up to 13 pressure cores in the methane-hydrate-bearing sand and adjacent interfaces.

The pressurized core from Hole UT-GOM2-1-H002 (Core 4) and the conventionalized core material from other cores collected from Hole UT-GOM2-1-H002 continued to be processed through their respective labs on the ship. A cut plan for Hole UT-GOM2-1-H002 was finalized and two sections were selected for quantitative degassing, and one section transferred to a storage vessel for shipment to UT. Head space gas samples obtained from degassing experiments of subsamples from Core UT-GOM2-1-H002-04 have yielded significant volumes of mostly methane gas.

The drilling, wireline, and core pressure/temperature data were integrated for analyzing the performance of each pressure core run. The core pressure/temperature data indicate that several cores that failed to hold pressure experienced substantial cooling due to hydrate dissociation during retrieval.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 16-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 16-May-2017
Green Canyon 955
Hole UT-GOM2-1-H002
Corrected Location: Lat: 27° 00.04154', Long: -90° 25.58715' (WGS 84)
Water depth: 6667.0 ft (6719.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0330 At Hole UT-GOM2-1-H002
Continue operations in support of the "PCTB-FB BHA Water Test 3"
Geotek completed space out test of the PCTB-FB core system

0330-0800 JSA for the personnel involved deployment of BHA
MU PCTB-FB BHA
RIH PCTB-FB BHA F/surface T/1090 ft RKB
Fill DP with seawater every 10 connections

0800-1000 **Conduct PCTB-FB BHA Water Test 3**
JSA for the personnel involved with slick line and RU PCTB-FB
RU slick line in TDS
MU PCTB-FB core barrel (with O-ring seal in diverter)
RIH CTB-FB F/surface T/1038 ft RKB; POOH running tool
RIH slick line with CTB-FB pulling tool F/surface T/1038 ft RKB
Circulate seawater at 2 bpm using Hex Pump 2
Shutdown Hex Pump 2, latch pulling tool
POOH CTB-FB core barrel F/1038 ft RKB T/surface

1000-1200 **Conduct PCTB-FB BHA Water Test 4**
MU PCTB-FB core barrel (with O-ring seal in diverter)
RIH CTB-FB F/surface T/1040 ft RKB; POOH running tool
RIH slick line with CTB-FB pulling tool F/surface T/1038 ft RKB
Circulate seawater at 2 bpm using Hex Pump 2
Shutdown Hex Pump 2, latch pulling tool
POOH CTB-FB core barrel F/1038 ft RKB T/surface

1200-1630 **Conduct PCTB-FB BHA Water Test 5**
MU PCTB-FB core barrel (with O-ring seal in divereer)
RIH CTB-FB F/surface T/1035 ft RKB; POOH running tool
RIH slick line with CTB-FB pulling tool F/surface T/1035 ft RKB
Circulate seawater at 1.75 bpm using Hex Pump 2
Shutdown Hex Pump 2, latch pulling tool
POOH CTB-FB core barrel F/1035 ft RKB T/surface

1630-1800 MU PCTB-FB center bit assembly to slick line
RIH PCTB-FB center bit assembly F/surface T/1034 ft RKB

JSA for the personnel involved rigging down slick line
Rig down slick line

1800-2400 RIH CTB-FB BHA F/1090 ft RKB T/6700 (18 ft above sea floor)

4. OPERATIONAL PLAN (Next 24 Hours):

Re-enter Hole UT-GOM2-1-H002 with PCTB-FB BHA tag and test cement plug. Spud Hole UT-GOM2-1-H005 and advance to first core point at 7645 ft RKB.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data acquired over the last 24 hr.

6. CORE DATA:

No additional cores acquired over the last 24 hr. However, we conducted a series of full function (water) tool tests of the PCTB-FB in DP. The results of these tests have been described below in this report.

7. Science Activities

Operations and science activities over the last 24-hours focused mostly on reviewing the performance of the PCTB-CS core runs and the various tool "pump" and "water" tests that were conducted over the last six days of this field test. Also, a total of three full function (water) tool tests of the PCTB-FB were conducted today in the drill pipe as it was being deployed in preparation for drilling the next test hole in the project (Hole UT-GOM2-1-H005).

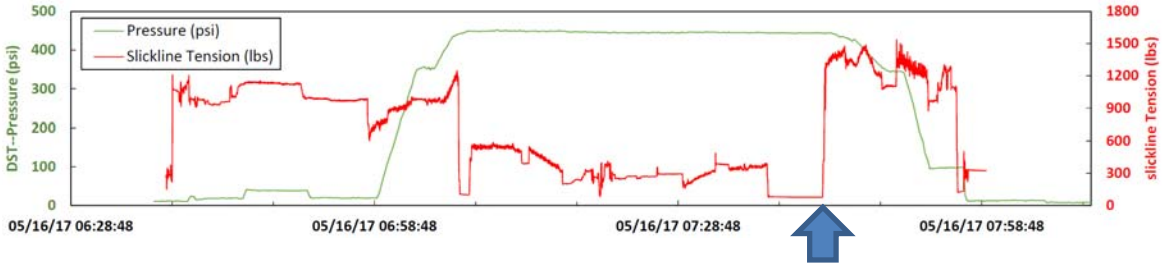
The Geotek and onboard UT-technical staff along with support from Weatherford, who are maintaining the systems that monitor shipboard drilling/coring parameters and performance, have been accessing, compiling, and analyzing the large number of drilling/coring data sets that have been generated during each tool test and core run over the last six days. These data include pressure and temperature data recorded in each core barrel when deployed in the borehole, data on the performance of the wireline system that deploys and recovers the pressure core barrels during each core run, information on drilling performance and drilling fluids (including drilling fluid pressures, temperature, bit penetration rates, weight on bit, drilling mud flow rates, rate of bit rotation, etc.) and many other important performance measurements.

To further test and demonstrate the engineering capability of the "face-bit" version of the PCTB pressure-coring tool, it was tested today in three successive tests in which the configuration of the tool was not changed between each tests and the coring and core handling procedures were conducted in a similar fashion in each test. The tools as tested were all the face-bit cutting version of the PCTB, which is also known as the PCTB-FB. In each case the "flow diverter" in the pressure core barrel was sealed with an O-ring. These tests were all full function tests in that the PCTB-FB inner barrel was lowered into drill pipe on a slick line wire, (2) the PCTB-FB inner barrel was locked into the BHA, (3) the wireline "running in" tool was used to deploy the PCTB-FB inner barrel and the wireline "pulling" tool was used to recover the PCTB-FB inner barrel to the deck of the ship. Under normal operations, the pulling tool is deployed and latches into the PCTB-FB inner barrel in the

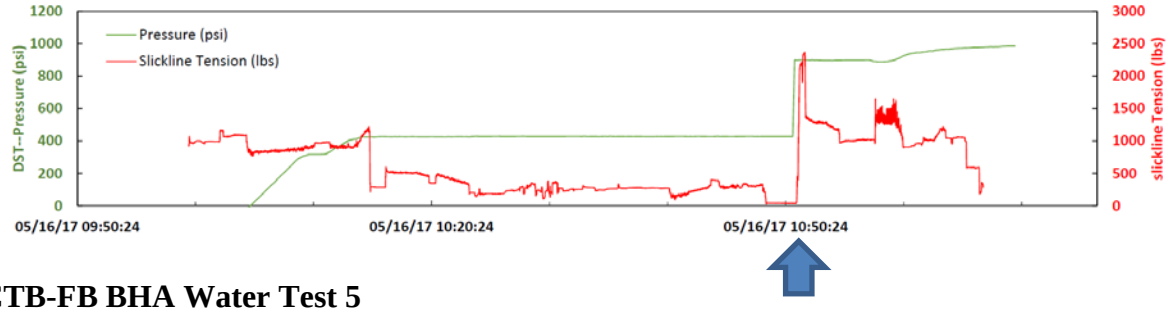
BHA and when pulled by the slick line the ball-valve at the bottom of the PCTB-FB inner barrel closes, the upper valve on the tool closes, the entire inner core barrel unlatches from the BHA, and the onboard pressure boost system activates to maintain internal tool pressures during recovery.

In the plots of the PCTB-FB BHA Water Test 4 and PCTB-FB BHA Water Test 5 we see good examples of the expected pressure boost as the PCTB-FB inner barrel is unlatched from the BHA; and the PCTB-FB was recovered sealed and at pressure for both of these tests (the large blue arrow in each plot marks the time the PCTB-FB inner barrel unlatches from the BHA). For Test 4 the autoclave pressure was measured at 1015 psi and for Test 5 the autoclave pressure was measured at 1113 psi. The PCTB-FB BHA Water Test 3, however, does not show the expected pressure boost and in this case the autoclave was not sealed.

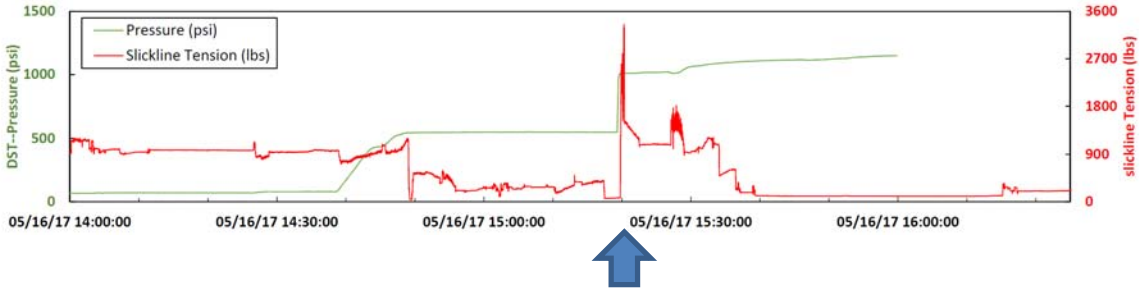
PCTB-FB BHA Water Test 3



PCTB-FB BHA Water Test 4



PCTB-FB BHA Water Test 5



The pressurized core from Hole UT-GOM2-1-H002 (Core 4) and the conventionalized core material from other cores collected from Hole UT-GOM2-1-H002 continued to be processed through their respective labs on the ship. Quantitative pressure core degassing experiments have continued on two sections from Core 4. Head space gas samples obtained from degassing experiments of subsamples from Core UT-GOM2-1-H002-04 have continued to yield significant volumes of mostly methane gas that suggest high methane hydrate saturation in this core. Additional gas samples have been collected for shore-based gas analyses.

Helix also conducted a large crew change today with a total of four helicopter flights. The UT led science team on the *D/V Q4000* also saw the departure of Yongkoo Seol, Gilles Guerin, Anton Caputo, and Robert Andrew Ott.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 17-May-2017, 0000-2400 hr

2. LOCATION:

0000 - 2400 hr, 17-May-2017
Green Canyon 955

Location from 0000 – 0338 hr
Hole UT-GOM2-1-H002
Corrected Location: Lat: 27° 00.04154', Long: -90° 25.58715' (WGS 84)
Water depth: 6667.0 ft (6719.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

Location from 0338 – 2400 hr
Hole UT-GOM2-1-H005
Corrected Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0124	At Hole UT-GOM2-1-H002
	Re-enter Hole UT-GOM2-1-H002 to tag and test cement plug
	Move *D/V Q4000* over Hole UT-GOM2-1-H002
	Stab drillstring into H002
	RIH F/6700 ft RKB and tag top of cement plug at 6839 ft RKB
	Set down 5000lbs on top of cement plug
	POOH F/6839 ft RKB T/6690 ft RKB
0124-0230	Prepare to spud Hole UT-GOM2-1-H005
	D/S Q4000 DP moved over proposed drill site, ROV used to position DS
	RIH and tagged mudline at 6718.0 ft RKB
	Pull clear of mudline a reset data loggers
	Held shallow gas well control drill
	Held spud meeting
0230-0338	Spud Hole UT-GOM2-1-H005 at 6666.0 ft (6718.0 ft RKB).
	Advance hole F/6718 ft RKB T/6778 ft RKB
0338-1330	Advance hole F/6778 ft RKB T/7645 ft RKB
1330-2230	Prepare to acquire Core UT-GOM2-1-H005-01
	JSA to review wireline operations
	RU slick line for coring operations
	MU PCTB-FB inner core barrel at surface
	RIH PCTB-FB inner core barrel F/surface T/7665 ft RKB
	Unsuccessful core barrel failed to land in the BHA
	POOH PCTB-FB inner core barrel F/7665 ft RKB T/surface
	RD upper section of the PCTB-FB core barrel and move to Geotek Service Van

	Geotek clean and repair upper section of PCTB-FB core barrel
	MU PCTB-FB core barrel
	RIH PCTB-FB core barrel F/surface T/7663 ft RKB
2230-2330	**Core UT-GOM2-1-H005-01, F/7645 T/7655 ft MD: Recovered 6.7 ft, 4115 psi**
	POOH PCTB-FB core barrel F/7655 ft RKB T/surface
	Move recovered core sample to chiller for 20 minutes
2330-2400	RIH PCTB-FM center bit F/surface T/7665 ft RKB

4. OPERATIONAL PLAN (Next 24 Hours):

Continue to advance hole by drilling to second core point at 8081 ft RKB and acquire up to 9 cores to the bottom of the hole. The table below contains a detailed listing of the proposed core plan for Hole UT-GOM2-1-H005.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data acquired over the last 24 hr.

6. CORE DATA:

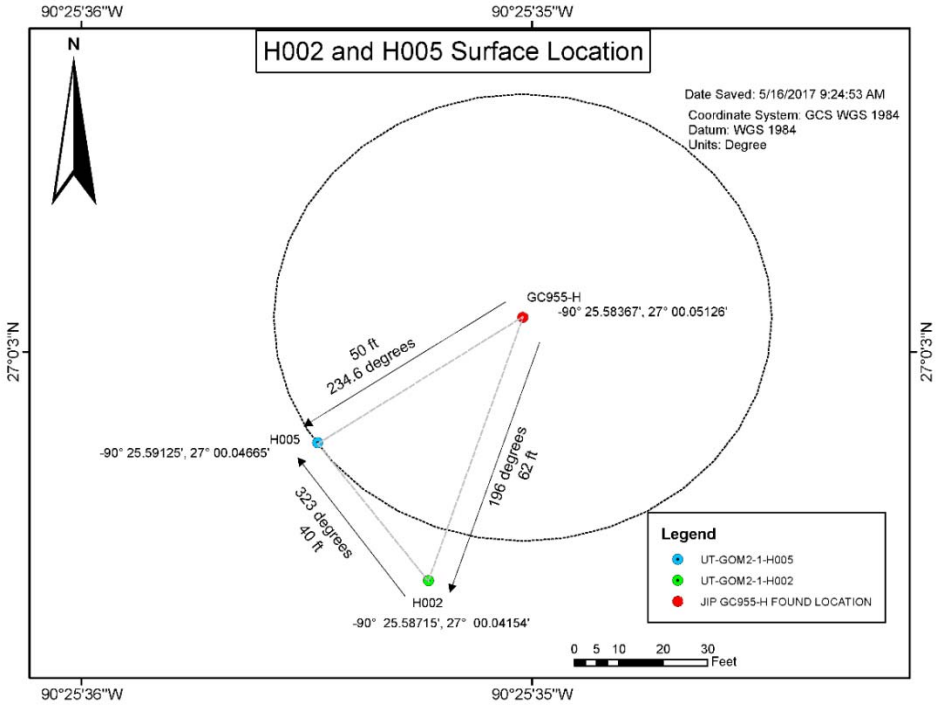
PCTB-FB Coring (pressure coring) Totals: 1 core, 10.0 ft cored; 6.7 ft recovery

Core UT-GOM2-1-H005-01
F/7645 ft RKB T/7655 ft RKB: Recovered 6.7 ft, 4115 psi
Performed coring operations F/7645 ft MD T/7655 ft MD
Drilling/Coring Parameters: 60 RPM w/4.6 K lb torque and Cement Pump circulating sea water at 85 gpm and standpipe pressure of 12 psi, ROP 67 ft/hr, WOB 5 tons, with O-ring seals in the diverter.

The UT-GOM2-1-H005-01 coring run was possibly compromised because of a depth discrepency between the driller-calculated tag depth and the Weatherford sensor-derived well depths. It was determined that the driller-calculated tag depth was accurate and Core UT-GOM2-1-H005-01 was acquired assuming a core point depth of 7645 ft MD. The core throw for the 01 core was 10ft, but from drilling performance data it appeared that the core only cut about 5-6 ft of formation. The slick line deployment and retrieval of Core UT-GOM2-1-H005-01 was completed without any problems. On recovery, the ball valve was closed and the autoclave was conditioned in the cold shuck for 20 minutes before a pressure of 4115 psi was measured in the service van, indicating that the pressure boost had been retained. The autoclave was moved to PCATS for core handling and processing.

7. Science Activities

Operations and science activities over the last 24-hours featured the abandonment of Hole UT-GOM2-1-H002 and the spudding of Hole UT-GOM2-1-H005 along with the acquisition of a successful pressure core from a known fracture dominated hydrate-bearing section that overlies the hydrate-bearing sand-rich reservoir section that is the primary coring target at the Green Canyon 955 test site. The map below shows the location of the two holes drilled and cored during this expedition, along with the location of the JIP Leg II GC955-H hole that was LWD logged on 2009. The target depth for Core UT-GOM2-1-H005-01 was specifically selected to test the impact of mud-rich sediments on the PCTB-FB core system.



The UT Scientific Party also continued to develop the core plan for Hole UT-GOM2-1-H005, which is posted below in this report. The pressure core from Hole UT-GOM2-1-H002 (Core 4) and the conventionalized core material from other cores collected from Hole UT-GOM2-1-H002, obtained from earlier in the expedition, are being processed through their respective labs on the ship. Quantitative pressure core degassing experiments have been completed on one of the two sections from Core UT-GOM2-1-H005-4CS selected for degassing. The other section continues to be degassed, producing large volumes of methane. Additional gas samples were collected for onshore analysis.

Hole UT-GOM2-1-H005 Core Plan

GC955H-005 Coring Plan	
Water Depth (tvdss)	6666
Rig Floor elevation above sl. (ft)	52
Mud line depth RKB	6718
Hydrate Top (fbsf)	1358
Hydrate top (RKB)	8076
Core length (ft)	10

Core #	Top (fbsf)	Bottom (fbsf)	Top (RKB)	Bottom (RKB)
1	927	937	7645	7655
2	1363	1373	8081	8091
3	1373	1383	8091	8101
4	1383	1393	8101	8111
5	1393	1403	8111	8121
6	1403	1413	8121	8131
7	1413	1423	8131	8141
8	1423	1433	8141	8151
9	1433	1443	8151	8161
10	1443	1453	8161	8171

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 18-May-2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 18-May-2017
Hole UT-GOM2-1-H005
Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0625 At Hole UT-GOM2-1-H005
Continued drilling hole F/7655 ft RKB T/8081 ft RKB at 110 RPM, 12 - 20 klbs WOB, 3-5 K torque, 150 - 250 fph ROP while pumping 8.6 ppg S/W w/ HEX #2 @ 336 gpm w/340 psi. Pumping 25 bbl Hi vis sweeps every 2 doubles drilled.

0625-1130 POOH PCTB-FB center bit
JSA for RU slickline and recovering center bit from BHA
RU slickline and recover center bit

1130-1200 Prepare for coring operations UT-GOM2-1-H005-02
MU PCTB-FB core barrel
RIH with core barrel
RIH with pulling tool

1200-1240 **Core UT-GOM2-1-H005-02, F/8081 T/8091 ft MD: Recovered 4.9 ft, 2834 psi**
ROP 29 ft/hr, 60 RPM, WOB 3-7 tons, flow rate 40-90 GPM
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized

1240-1545 Prepare to take core UT-GOM2-1-H005-03
MU PCTB-FB core barrel
RIH with core barrel
DS tagged bottom of the hole at 8086 ft RKB – borehole fill
POOH PCTB-FB and inspect core barrel
Fall in material recovered in liner and saved

1545-1700 Pump 25 bbls gel sweep followed by 280 bbls seawater using HEX Pump 2

1700-1930 Prepare to take core UT-GOM2-1-H005-03
Tagged bottom of the hole confirming no fill
M/U PCTB-FB core barrel
RIH with core barrel

1930-2120 **Core UT-GOM2-1-H005-03, F/8091 T/8101 ft MD: Recovered 10 ft, 1780 psi**
ROP 12 ft/hr, 60 RPM, WOB 2.5-5 tons, flow rate 70-120 Gpm
Upon recovery stabbed into vertical cold shuck
Upon inspection core barrel confirmed to be pressurized, possible slow leak

2120-2230 Circulated 25 bbls gel sweep followed by 128 bbls seawater spotting sweep in drill string using HEX #2 at 220 gpm w/ 53 psi.

2230-2400 Prepare to take core UT-GOM2-1-H005-04

4. OPERATIONAL PLAN (Next 24 Hours):

Continue coring to the next core point at 8111 ft RKB and ultimately acquire up to 13 cores to the bottom of Hole UT-GOM2-1-H005.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data acquired over the last 24 hr.

6. CORE DATA:

PCTB-FB Coring (pressure coring) Totals: 2 cores, 8.0 ft cored; 14.9 ft recovery.

Core UT-GOM2-1-H005-02
F/8081 ft RKB T/8091 ft RKB: Recovered: 4.9 ft, 2834 psi
Performed coring operations F/8081 ft MD T/8091 ft MD
Drilling/Coring Parameters: 60 RPM w/4.6 K lb torque and Cement Pump circulating sea water at 40-90 gpm, ROP 29 ft/hr, WOB 3-7 tons, with O-ring seals in the diverter.
Successful coring run with clean pick up from BHA. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 45 mins before a pressure of 2834 psi was measured in the service van, indicating that there was a very slight leak which was located around the ball valve. The autoclave pressure was increased to 4000 psi before being transferred to PCATS.

Core UT-GOM2-1-H005-03
F/8091 ft RKB T/8101 ft RKB: Recovered: 10.0 ft, 1780 psi
Performed coring operations F/8091 ft MD T/8101 ft MD
Drilling/Coring Parameters: 60 RPM w/4.6 K lb torque and Cement Pump circulating sea water at 70-120 gpm, ROP 12 ft/hr, WOB 2.5-5 tons, with O-ring seals in the diverter.
Another good coring run with clean pick up from BHA. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 45 mins before a pressure of 1780 psi was measured in the service van indicating that there might be a slow leak. The autoclave was transferred to PCATS where pressure was increased to 4000 psi before core handling and processing. DST record showed that autoclave had fully sealed during recovery.

7. Science Activities

Core UT-GOM2-1-H005-2 and Core UT-GOM2-1-H005-3 were logged in PCATS. These scans indicated high P-wave velocities consistent with hydrate at high-saturations and produced X-ray images clearly revealing sedimentary structures (see Figure 1 below). Drilling mud and PCATS water samples were collected for contamination control. The second quantitative core degassing from Core UT-GOM2-1-H002-4 was completed, producing a large volume of methane indicating high gas hydrate saturations. The Scientific Party continued to process data and write reports from Hole UT-GOM2-1-H002.

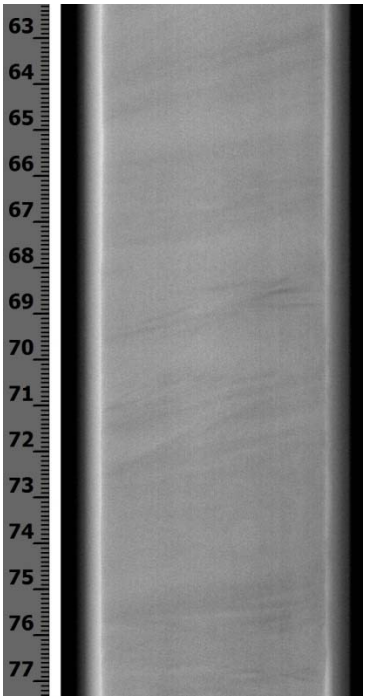


Figure 1. Example PCATS X-ray image from Core UT-GOM2-1-H005-2FB.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 19-May-2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 19-May-2017
Hole UT-GOM2-1-H005
Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0130 Prepare for coring operations UT-GOM2-1-H005-04
MU PCTB-FB core barrel
RIH with core barrel
RIH with pulling tool
0130-0330 **Core UT-GOM2-1-H005-04, F/8101 T/8111 ft MD: Recovered 10.5 ft, 3477 psi**
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized
0330-0400 Gel sweep followed by seawater
0400-0630 Prepare for coring operations UT-GOM2-1-H005-05
MU PCTB-FB core barrel
RIH with core barrel
RIH with pulling tool
0630-0800 **Core UT-GOM2-1-H005-05, F/8111 T/8121 ft MD: Recovered 9.7 ft, 3242 psi**
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized
0800-0900 Gel sweep followed by seawater
0900-1100 Prepare for coring operations UT-GOM2-1-H005-06
MU PCTB-FB core barrel
RIH with core barrel
RIH with pulling tool
1100-1230 **Core UT-GOM2-1-H005-06, F/8121 T/8131 ft MD: Recovered 9.4 ft, 3250 psi**
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized
1230-1300 Gel sweep followed by seawater
1300-1500 Prepare for coring operations UT-GOM2-1-H005-07
MU PCTB-FB core barrel
RIH with core barrel
RIH with pulling tool
1500-1700 **Core UT-GOM2-1-H005-07, F/8131 T/8141 ft MD: Recovered 10.5 ft, 3164 psi**
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized
1700-1830 Displaced well to 9.5 ppg WBM
1830-2000 Prepare for coring operations UT-GOM2-1-H005-08

MU PCTB-FB core barrel
RIH with core barrel
RIH with pulling tool

2000-2300 **Core UT-GOM2-1-H005-08, F/8141 T/8151 ft MD: Recovered 8.2 ft, 3016 psi**
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized

2300-2400 Prepare for coring operations UT-GOM2-1-H005-09
MU PCTB-FB core barrel

4. OPERATIONAL PLAN (Next 24 Hours):

Continue coring to the next core point at 8161 ft RKB and ultimately acquire up to 13 cores to the bottom of Hole UT-GOM2-1-H005.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data acquired over the last 24 hr.

6. CORE DATA:

PCTB-FB Coring (pressure coring) Totals: 5 cores, 50.0 ft cored; 48.4 ft recovery.

Core UT-GOM2-1-H005-04FB
F/8101 ft RKB T/8111 ft RKB: Recovered: 10.5 ft, 3477 psi
Performed coring operations F/8101 ft MD T/8111 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating sea water at 80 gpm, ROP 50 ft/hr, WOB 2.5-5 tons, with O-ring seals in the diverter.
Good coring run with clean pick up from BHA. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 43 mins before a pressure of 3477 psi was measured in the service van indicating that the autoclave had sealed at in situ pressures. The autoclave was transferred to PCATS for core handling and processing. DST record showed that autoclave had fully sealed as it was lifted from the BHA. Core recovery 321 cm as measured by X-ray image in PCATS

Core UT-GOM2-1-H005-05FB
F/8111 ft RKB T/8121 ft RKB: Recovered: 9.7 ft, 3242 psi
Performed coring operations F/8111 ft MD T/8121 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating sea water at 80 gpm, ROP 60 ft/hr, WOB 5 tons, with O-ring seals in the diverter.
Clean pick up from BHA. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 35 mins before a pressure of 3242 psi was measured in the service van indicating that the autoclave had sealed around the in situ pressure. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 296 cm as measured by X-ray image in PCATS.

Core UT-GOM2-1-H005-06FB
F/8121 ft RKB T/8131 ft RKB: Recovered: Recovered 9.4 ft, 3250 psi
Performed coring operations F/8121 ft MD T/8131 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating sea water at 80 gpm, ROP 55 ft/hr, WOB 8 tons, with O-ring seals in the diverter.
Good coring run with clean pick up from BHA and a sea floor 'cooling stop' for 15 mins. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 35 mins before a pressure of 3250 psi was measured in the service van indicating that the autoclave had sealed around the in situ pressure. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 286 cm as measured by X-ray image in PCATS.

Core UT-GOM2-1-H005-07FB
F/8131 ft RKB T/8141 ft RKB: Recovered: Recovered 10.5 ft, 3164 psi
Performed coring operations F/8131 ft MD T/8141 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating sea water at 70-80 gpm, ROP 27 ft/hr, WOB 10 tons, with O-ring seals in the diverter.
General coring parameters: ROP=27 ft/hr, 60 RPM, WOB=10 tons, SW flow rate = 70-80 gpm. Good coring run with clean pick up from BHA and a sea floor 'cooling stop' for 15 mins. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 46 mins before a pressure of 3164 psi was measured in the service van indicating that the autoclave had sealed around the in situ pressure. The set pressure for this deployment was made at 3000 psi and consequently there was no boost. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 321 cm as measured by X-ray image in PCATS.

Core UT-GOM2-1-H005-08FB
F/8141 ft RKB T/8151 ft RKB: Recovered: Recovered 8.2 ft, 3016 psi
Performed coring operations F/8141 ft MD T/8151 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating sea water at 65 gpm, ROP 26 ft/hr, WOB 5 tons, with O-ring seals in the diverter.
Switched from drilling with seawater to drilling with 9.5 lb/gal mud. Good coring run but the pick up from BHA took multiple efforts before it cane free. The tool was stopped at the sea floor (cooling stop) for 15 mins. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 77 mins before a pressure of 3016 psi was measured in the service van indicating that the autoclave had sealed around the set pressure indicating that the accumulator boost may have assisted sealing the autoclave. The autoclave was transferred to PCATS for core handling and processing. Core recovery was 250 cm as measured by X-ray image in PCATS.

7. Science Activities

Core UT-GOM2-1-H005-04FB, -05FB, 06FB, 07FB, and 08FB were logged in PCATS. These scans indicated interbedded intervals with high P-wave velocities (up to 3500 m/s) consistent with hydrate at high-saturations and produced X-ray images clearly revealing bedding and sedimentary structures (see Figure 1 below). The Scientific Party continued to process data and write reports from Holes UT-GOM2-1-H002 and UT-GOM2-1-H005.

Sediment from the last degassing experiment from UT-GOM2-1-H002-4CS was collected from the storage chamber.

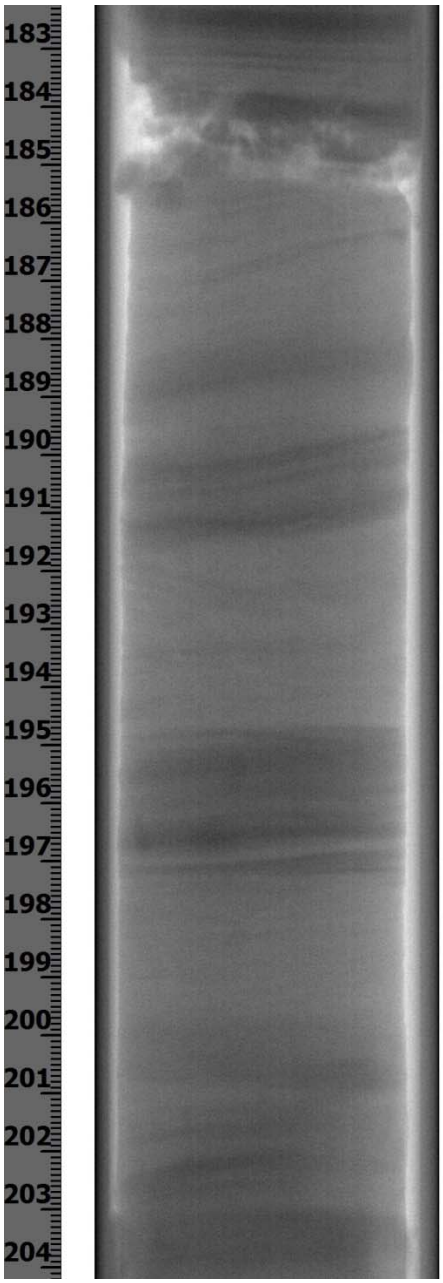


Figure 1. Example PCATS X-ray image from Core UT-GOM2-1-H005-05FB.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 20-May-2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 20-May-2017
Hole UT-GOM2-1-H005
Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0230 At Hole UT-GOM2-1-H005
Prepare for coring operations Core UT-GOM2-1-H005-09
Re-headed slick line
MU PCTB-FB core barrel
RIH with core barrel
POOH running tool
RIH pulling tool

0230-0630 **Core UT-GOM2-1-H005-09, F/8151 T/8161 ft MD: Recovered 10.5 ft, 746 psi**
POOH pulling tool with PCTB-FB inner barrel
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized (low pressure)
Sweep hole with 10.5 ppg mud using Hex Pump 2

0630-1030 Prepare for coring operations Core UT-GOM2-1-H005-10
Change out PCTB pressure control system
MU PCTB-FB core barrel
RIH with core barrel
Unable to latch PCTB-FB inner core barrel in BHA
POOH PCTB-FB inner core barrel
Remove broken latch pin
RIH with core barrel
POOH running tool
RIH pulling tool

1030-1200 **Core UT-GOM2-1-H005-010, F/8161 T/8166 ft MD: Recovered NA ft, 3255 psi**
BHA experienced high torque, stalled, and limited spring-back rotation
POOH pulling tool with PCTB-FB inner barrel
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized
Sweep hole with 10.5 ppg mud using Hex Pump 2

1200-1600 Prepare for coring operations Core UT-GOM2-1-H005-11
MU PCTB-FB core barrel
RIH with core barrel
POOH running tool
RIH pulling tool

1600-1730 **Core UT-GOM2-1-H005-011, F/8166 T/8176 ft MD: Recovered NA ft, 3002 psi**
POOH pulling tool with PCTB-FB inner barrel
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed to be pressurized
Sweep hole with 10.5 ppg mud using Hex Pump 2

1730-2000 Prepare for coring operations Core UT-GOM2-1-H005-12
MU PCTB-FB core barrel
RIH with core barrel
POOH running tool
RIH pulling tool

2000-2400 **Core UT-GOM2-1-H005-012, F/8176 T/8185ft MD: Recovered 5.7 ft, 0 psi**
Partial core throw to accommodate for borehole fill
POOH pulling tool with PCTB-FB inner barrel
Upon recovery stabbed into vertical cold shuck
Upon inspection of core barrel was confirmed not to be pressurized
Sweep hole with 10.5 ppg mud using Hex Pump 2

4. OPERATIONAL PLAN (Next 24 Hours):

Continue coring to the next core point at 8185 ft RKB and ultimately acquire up to 13 cores to the bottom of Hole UT-GOM2-1-H005. Complete directional survey and P&A Hole UT-GOM2-1-H005.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data acquired over the last 24 hr.

6. CORE DATA:

PCTB-FB Coring (pressure coring) Totals: 4 cores, 39 ft cored; [pending] ft recovery.

Core UT-GOM2-1-H005-09FB
F/8151 ft RKB T/8161 ft RKB: Recovered: 10.5 ft, 746 psi
Performed coring operations F/8151 ft MD T/8161 ft MD
Drilling/Coring Parameters: 60 RPM w/5-6 K lb torque and Cement Pump circulating 9.5 ppg WBM at 84 gpm, ROP 40 ft/hr, WOB 5 tons, with O-ring seals in the diverter.
Good coring run with a clean pick-up from the BHA with a 15 minutes autoclave cooling stop at the sea bed to experiment with further cooling of the autoclave. On recovery the ball valve was closed and the autoclave was left in the cold shuck for 55 minutes before a pressure of only 746 psi was measured in the service van. On this occasion the set pressure was 4015 psi and hence the boost did not function as expected and there was no accumulator function. The pressure was pumped up to 3250 psi before being transferred to PCATS. The DST recordings showed that autoclave did not seal until it close at the surface and was probably aided by at least partial dissociation of gas hydrates. Core recovery was 321 cm as measured by the X-ray image in PCATS (includes a number of voids).

Core UT-GOM2-1-H005-10FB
F/8161 ft RKB T/8166 ft RKB: Recovered: [pending] ft, 3255 psi
Performed coring operations F/8161 ft MD T/8166 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating 10.5 ppg WBM at 42-80 gpm, ROP 33 ft/hr, WOB 10 tons, with O-ring seals in the diverter.
During the coring the cement pumps (mud pumps) stopped temporarily (~30 sec). At approximately 5 ft into formation bit reached very high torque (as much as 30 klbs) and released, causing the drill string to spin in reverse momentarily. Coring was discontinued immediately at this point. On recovery, the ball valve was closed but there was an indication there may be a slight leak (which proved to be wrong) and hence the tool was moved quickly out of the cold shuck to the service van where the pressure was found to be 3255 psi. It was then placed in the cold bath before being transferred to PCATS.

Core UT-GOM2-1-H005-11FB
F/8166 ft RKB T/8176 ft RKB: Recovered: Recovered [pending] ft, 3002 psi
Performed coring operations F/8166 ft MD T/8176 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating 10.5 ppg WBM at 210 gpm, ROP 22-46 ft/hr, WOB 5 tons, with O-ring seals in the diverter.
After the difficulties experience during the last core the main objective of Core UT-GOM2-1-H005-11FB was to advance through what is interpreted on the logs as a water bearing zone before another short gas hydrate interval beneath it. Consequently the pump rates were increased significantly at the expense of the core quality to ensure that a clean hole was developed for the next core (Core UT-GOM2-1-H005-12FB) which is back in a gas hydrate interval. The tool was deployed in the BHA before a core was cut using the 10.5 lb/gal mud. After picking up from BHA and retrieving to the rig floor the ball valve was closed and the autoclave was left in the cold shuck for 45 minutes before a pressure of 3002 psi was measured in the service van. The autoclave was placed in the cold bath while PCATS was being prepared.

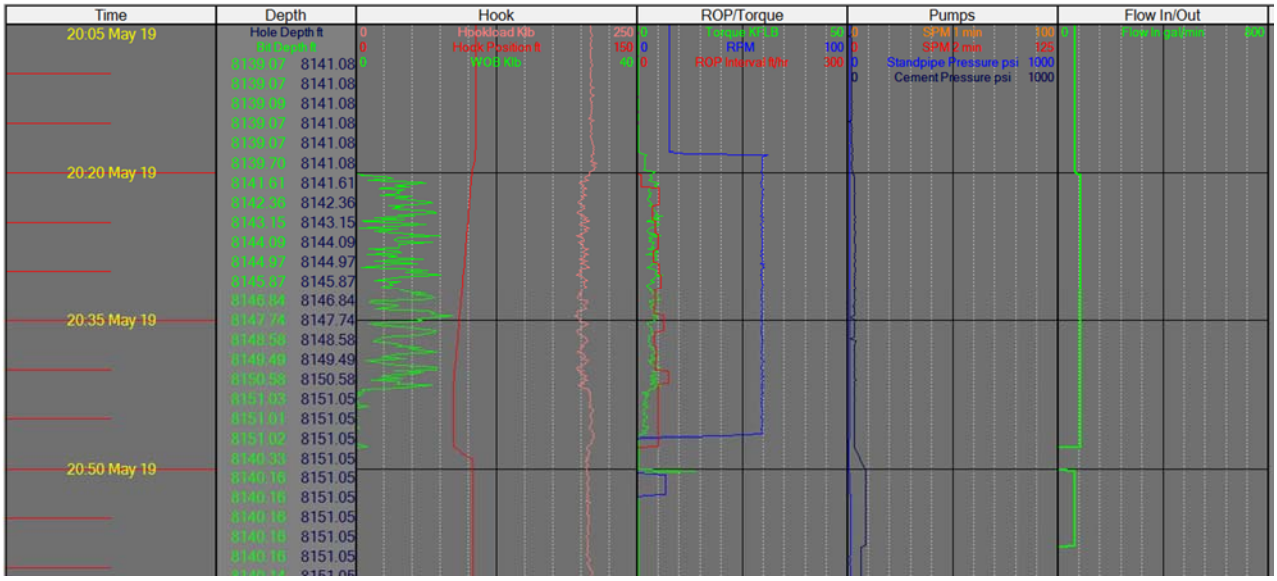
Core UT-GOM2-1-H005-12FB
F/8176 ft RKB T/8185 ft RKB: Recovered: Recovered 5.7 ft, 0 psi
Performed coring operations F/8176 ft MD T/8185 ft MD
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating 10.5 ppg WBM at 61-122 gpm, ROP 22 ft/hr, WOB 5 tons, with O-ring seals in the diverter.
The tool was deployed in the BHA before a core was cut using the 10.5 lb/gal mud. Weight and torque came on bit 1 ft early (above core point) hence the run was stopped after a 9 ft advance. Generally a good coring run with clean a pick up from BHA, however on recovery the ball valve was only half closed trapping sediment in the ball follower and hence having zero pressure. Core barrel was over-filled, with rabbit against top plug and core material across the ball valve. Recovery was 1.75 m.

7. Science Activities

The onboard Scientific Party continued to process data and write reports from Holes UT-GOM2-1-H002 and UT-GOM2-1-H005. Conventionalized core samples from Core UT-GOM2-1-H005-12FB were transferred to the onboard UT core lab for processing and subsampling. Core UT-GOM2-1-H005-09FB was logged in PCATS at a total length 321 cm but including voids created during partial gas hydrate dissociation. This core was cut into 4 sections with one transferred to a 1.2 m storage chamber. Sections 2 and 4 were put on degassing manifolds and Section 3 was kept for long term storage as a possible experimental core for transport to UT. Despite partial dissociation, the degassing experiments have produced large volumes of gas, and gas samples have been collected for onboard and onshore analyses. PCATS and drilling fluid samples have continued to be collected for contamination control.

Rotary coring is accomplished by the manipulation of numerous drilling parameters that are designed to maintain safe operations and to yield in this expedition high quality pressure cores. To help visualize how the rotary core process works, the computer capture of the "real-time" Weatherford generated drillers displays of the acquisition of the Core UT-GOM2-1-H005-08 (cored from 8141 to 8151 ft MD, yielded a 8.2 ft long core at a pressure of 3016 psi) has been shown below in this report. As shown the core cutting event started at about 2020 hr ended about 23 minutes later at about 2043 hr. In this case, the flow rate of the drilling fluid (which was sea water) being pumped down the drill pipe was set at 65 gpm. The driller, by regulating the amount of weight that is applied to the drill bit (WOB) at the bottom of hole and the drilling fluid (mud) flow rate they can control rate of which the hole is advanced (ROP) and how much torque the formation transfers back onto the drill bit. In the example below we see a relatively uniform ROP and weight on bit that generally will yield a high quality core.

Core UT-GOM2-1-H005-08



Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 21-May-2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 21-May-2017
Hole UT-GOM2-1-H005
Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0030	At Hole UT-GOM2-1-H005
	Prepare for coring operations for Core UT-GOM2-1-H005-13FB
	MU PCTB-FB core barrel
	RIH with core barrel
	POOH running tool
	RIH pulling tool
0030-0230	**Core UT-GOM2-1-H005-013FB, F/8185 T/8193ft RKB: Recovered 5.8 ft, 2806 psi**
	Partial core throw to accommodate for borehole fill
	POOH pulling tool with PCTB-FB inner barrel
	Upon recovery stabbed into vertical cold shuck
	Upon inspection of core barrel was confirmed to be pressurized
0230-0800	MU gyroscopic directional survey logging tool
	RIH gyroscopic survey tool F/6718 ft RKB T/8100 ft RKB (in DP)
	Conduct uphole gyroscopic survey F/8100 ft RKB T/surface (Run-1)
	RIH gyroscopic survey tool F/6718 ft RKB T/8100 ft RKB
	Conduct uphole gyroscopic survey F/8100 ft RKB T/surface (Run-2)
	RD slickline
0800-0930	Prepare to set cement plug in Hole UT-GOM2-1-H005
	Pump and spot 11.5 ppg high-viscosity mud at bottom of hole
	POOH BHA F/8193 ft RKB T/7900 ft RKB
	JSA with personnel involved in performing cement job
0930-1230	Set cement plug in Hole UT-GOM2-1-H005
	Conduct pressure test of surface equipment
	Pump 17 bbls of 10.5 ppg gel spacer
	BO cement head and load nerf ball
	Pump 3 bbl of 10.5 ppg spacer
	Mix and pump 54.7 bbls of 16.4 ppg cement
	Set cement plug F/7400 ft RKB T/7900 ft RKB
	Pump 6.7 bbl of 10.5 ppg gel spacer
	Pump 180.7 bbls of seawater
1230-1830	POOH BHA F/7900 ft RKB T/6600 ft RKB
	Flush DP with 350 bbls of seawater and 2 nerf balls
1830-2230	RIH BHA F/6600 ft RKB T/7621 ft RKB unable to tag cement

2230-2400 POOH BHA F/7621 ft RKB T/6800 ft RKB
Waiting on cement

4. OPERATIONAL PLAN (Next 24 Hours):

Complete P&A operations in Hole UT-GOM2-1-H005. Begin demobilization of project equipment and people from *D/V Q4000.*

5. DOWNHOLE LOGGING OPERATIONS:

Wireline Log: Gyroscopic directional survey F/8100 ft RKB T/surface (Run-1)
Wireline Log: Gyroscopic directional survey F/8100 ft RKB T/surface (Run-2)

6. CORE DATA:

PCTB-FB Coring (pressure coring) Totals: 1 core, 8 ft cored; 5.8 ft recovery.

Core UT-GOM2-1-H005-13FB
F/8185 ft RKB T/8193 ft RKB: Recovered: 5.8 ft, 2806 psi
Performed coring operations F/8185 ft RKB T/8193 ft RKB
Drilling/Coring Parameters: 60 RPM w/2-5 K lb torque and Cement Pump circulating 10.5 ppg WBM at 61-105 gpm, ROP 34 ft/hr, WOB 4 tons, with O-ring seals in the diverter.

Before the deployment of the PCTB-FB inner core barrel, a 3/8 inch hole was drilled in the middle barrel and the set boost pressure was raised above the in situ pressure to ~4000 psi. This modification was designed to test whether the additional flow path would help create a boost pressure. Good coring run with a clean pick-up from the BHA with a 15 minutes autoclave cooling stop at the sea bed to experiment with further cooling of the autoclave. After picking up from BHA and retrieving to the rig floor the ball valve was closed and an autoclave pressure of 2806 psi was measured in the service van. The autoclave was placed in the cold bath while PCATS was being prepared. Core recovery was 5.8 ft (177 cm) as measured by the X-ray image in PCATS.

7. Science Activities

The onboard Scientific Party continued to process data and write reports from Holes UT-GOM2-1-H002 and UT-GOM2-1-H005. In the Geotek degassing lab, the controlled degassing of Sections 1 and 3 from Core UT-GOM2-1-H005-09FB were completed, chambers were emptied and cleaned, and the sediment residues were provided to UT for curation. Conventionalized core from UT-GOM2-1H005-12FB was sampled by UT for geochemistry, microbiology, and physical properties. After the early difficulties extracting Core UT-GOM2-1-H005-10FB from the autoclave in PCATS, a core 'fishing tool' was manufactured and the core was recovered with a length of 2.4 ft (72 cm). This included 2 pieces of core which are interpreted as gas hydrate rich with P-wave velocities over 3000 m/s; this sample was stored in a storage chamber. Core UT-GOM2-1-H005-13FB, after waiting for a while in the cold bath, the core was extracted in PCATS where the recorded recovery was 5.8 ft (176 cm); this core also produced some high quality samples consisting of what is interpreted as interbedded gas hydrate saturated sandy intervals with P-wave velocities up to 3300 m/s. PCATS scans of Core UT-GOM2-1-H005-11FB revealed only 0.9

(27 cm) of washed sediments, which is not a surprise considering the high pump rates required to safely penetrate this apparent unconsolidated water-wet stratigraphic section.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 22-May-2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 22-May-2017
Hole UT-GOM2-1-H005
Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0900	At Hole UT-GOM2-1-H005
	Continue borehole cementing operation
	POOH BHA above mudline F/6800 ft RKB T/6600 ft RKB
	Waiting on cement
	Flush DP with 250 bbls of seawater
0900-1100	RIH BHA F/6600 ft RKB T/7691 ft RKB
	Tagged Top of Cement and set down at 15K WOB
1100-1200	POOH BHA F/7691 ft RKB T/7172 ft RKB
1200-1230	POOH BHA F/7172 ft RKB T/6868 ft RKB
1230-1330	Circulate 10.5 ppg WBM – 300 bbls
1330-1600	Backload project equipment to HOS Red Rock
1600-1730	RIH BHA F/6868 ft RKB T/7691 ft RKB
	Tagged Top of Cement and PU 5 ft
1730-2130	Backload project equipment to HOS Red Rock
2130-2200	JSA with personnel involved with performing cement job
2200-2400	Pumped 96 bbls of 10.5 ppg WBM
	Cementer performed pressure test of deck iron to 3,000 psi visual
	Cementer pumped 17 bbls of 10.5 ppg spacer at 4 bpm
	Nerf ball in DP and cementer pumped 3 bbls of 10.5 ppg spacer
	Cementer cleaned cement unit and caught mix water
	Cementer mixed 16.4 ppg class H cement
	Cementer pumped 58 bbls cement slurry
	Cementer pumped 17 bbls tail spacer

4. OPERATIONAL PLAN (Next 24 Hours):

Complete P&A operations in Hole UT-GOM2-1-H005. Continue demobilization of project equipment and people from *D/V Q4000.*

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

The boarding of University of Texas scientists on the *D/V Q4000* more than 23 days ago in Brownsville, Texas not only marked the start of the "UT-GOM2-1: Hydrate Pressure Coring Expedition," it also represented a critical milestone in the engineering and scientific research needed to understanding the role that gas hydrates map play as a potential energy resource, as a geohazard, or as an agent of climate change. The primary goal of UT-GOM2-1 expedition is to conduct a systematic and rigorous field marine test of the DOE Pressure Coring Tool with Ball Valve (PCTB) system. The UT-GOM2-1 expedition has featured the test of two unique designs of the PCTB system, often referred to the cutting shoe (CS) and face bit (FB) versions. Hole UT-GOM2-1-H002, which was spud on 11-May-17 and completed on 17-May-17, featured the test of the PCTB-CS tool through a series of flow and full-function tests in the drill pipe as it was suspended from the drilling vessel. PCTB-CS tool was also deployed a total of 8 times with only one of the deployments returning a pressurized core to the ship. However, all 8 of the PCTB-CS deployments recovered sediment cores (see below the composite well log and core recovery display for Hole UT-GOM2-1-H002). Hole UT-GOM2-1-H005, which was spud on 17-May-17 and completed on 23-May-17, featured the test of the PCTB-FB tool. The testing plan for Hole UT-GOM2-1-H005 also included a series of full-function tests of the PCTB-FB tool in the drill pipe. The PCTB-FB was deployed a total of 13 times and returned to the ship 12 cores under pressurized conditions. As shown below in the composite well log and core recovery displays for Hole UT-GOM2-1-H005, the core recovery for most of the runs was very high and for the most part the entire gas hydrate-bearing reservoir section was sampled with the PCTB-FB pressure core system.

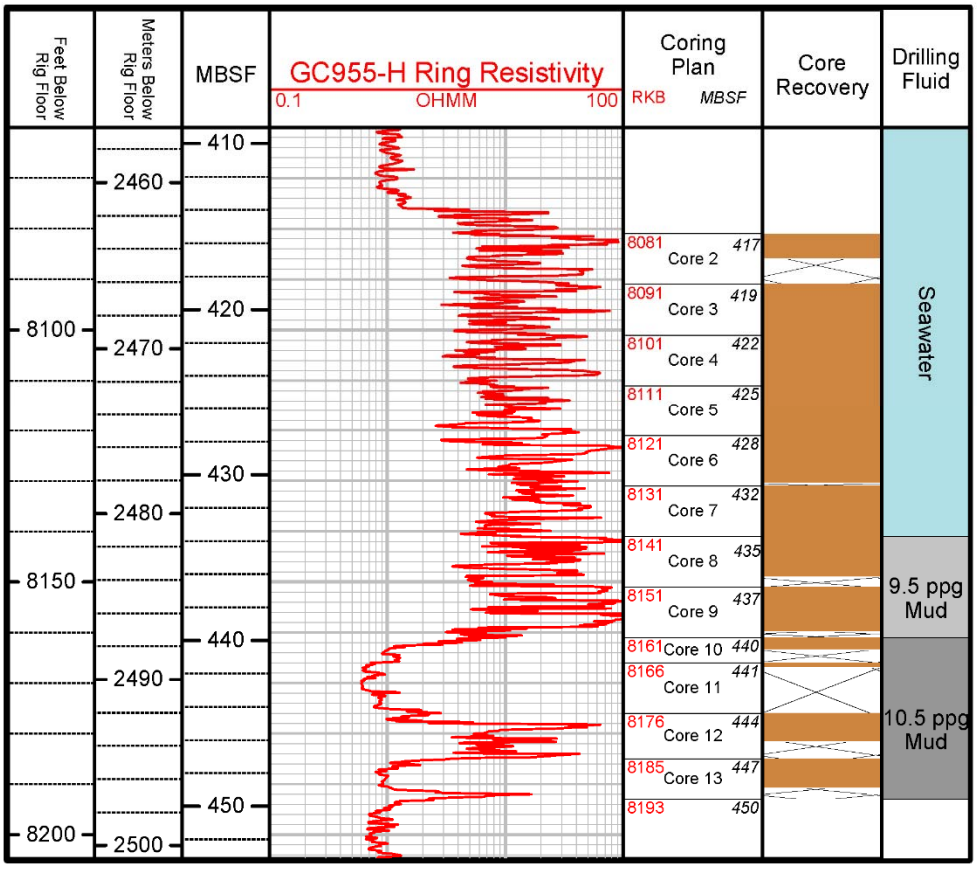
All of the cores recovered at pressure during UT-GOM2 have been processed through the onboard Geotek Pressure Core Analysis and Transfer System (PCATS) lab to perform a preliminary characterization of the cores. These core studies have included core logging of physical properties and X-ray imaging of the recovered cores. The PCATS has also been used to subsample a portion of the recovered pressure cores under conditions where hydrates are stable. The PCATS system has also been used to transfer some number of samples to pressurized storage chambers. A limited number of subsamples have undergone quantitative degassing to determine hydrate concentrations.

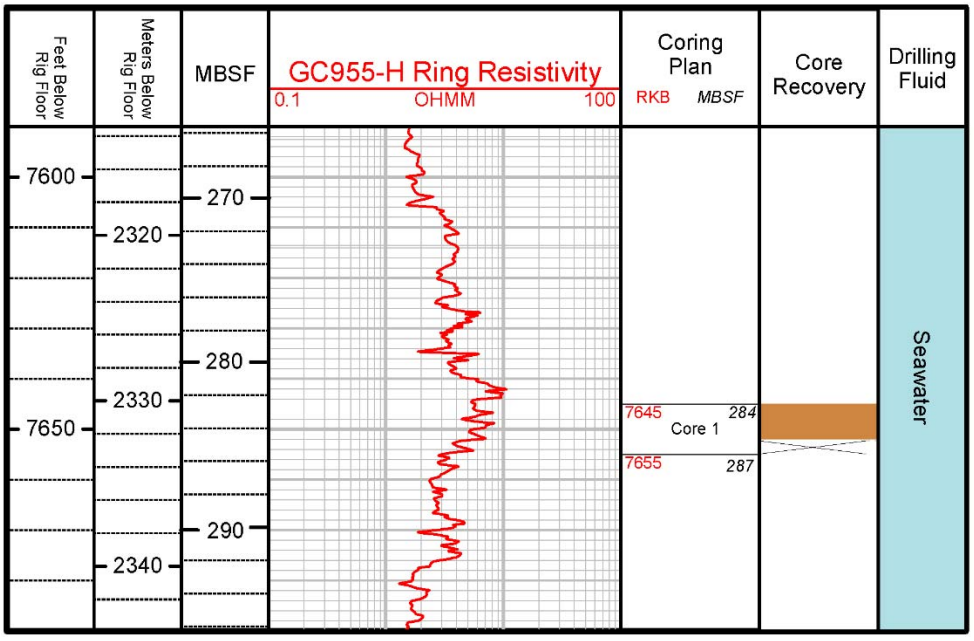
With the approaching end of the UT-GOM2-1 expedition, we now see the transition to the next and equally challenging stage of this project with the transfer of recovered and preserved pressure core samples to the UT shore-based pressure core laboratory that will be established in the Port Fourchon, Louisiana. PCATS data is now being interpreted in preparation for generating core cut plans for the work at the port. It is expected that the pressure core processing laboratory in Port Fourchon will be operational for about two weeks, after which approximately 20 (1.2-m-long) pressure core samples and an unprecedented number of conventionalized core samples will be transferred to University of Texas at Austin (UT). We will analyze these cores at the UT Pressure Core Center (PCC) and distribute them to the USGS Woods Hole, the National Energy Technology Laboratory, and others. Additional CT scans and quantitative degassing experiments are planned for Port

Fourchon. Depressurized (conventionalized) cores will be shipped to Ohio State University, University of Washington, Oregon State University, ExxonMobil, USGS Woods Hole, UT and other institutions.

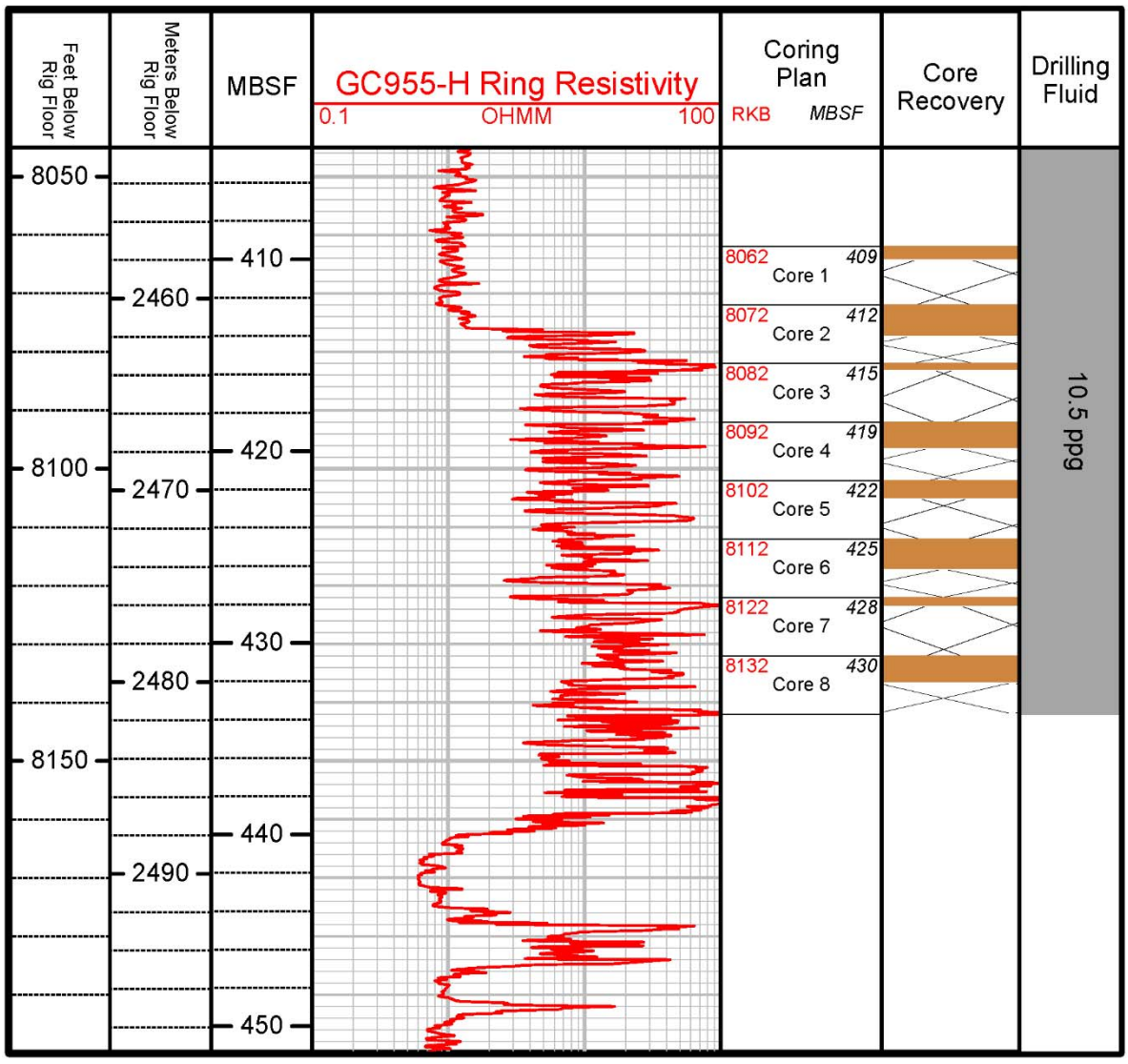
Special thanks are extended to the crew of the Helix *D/V Q4000* for their unyielding support of this project and for their commitment to running a safe and efficient scientific expedition.

Hole UT-GOM2-1-H005





Hole UT-GOM2-1-H002



Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 23-May-2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 23-May-2017
Hole UT-GOM2-1-H005
Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-0100	At Hole UT-GOM2-1-H005 Continue borehole cementing operations Cementer continued pumping 171.4 bbl of seawater
0100-0345	Cement in place ETOC 7391 ft RKB POOH F/7685 ft RKB T/5976 ft RKB BHA clear of seafloor Flushed drillstring with 400 bbls seawater
0345-11:39	RIH BHA F/5976 ft RKB T/6674 ft RKB Standby at 6674 ft RKB waiting on BSEE approval
11:39	Received BSEE approval to abandon Site 005 without tagging cement as per revised APM.
1200-1300	JSA with personnel involved in POOH POOH F/6674 ft RKB T/6100 ft RKB
1300-1330	Waiting on weather due to lightning
1330-2400	POOH F/6100 ft RKB T/203 ft RKB JSA for personnel involved in breaking down the BHA Continue to breakdown BHA

4. OPERATIONAL PLAN (Next 24 Hours):

Continue demobilization of project equipment and people from *D/V Q4000.*

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

Demobilization operations continued throughout the last 24 hours with the transfer of equipment to the *HOS Red Rock*. Borehole cementing operations in Hole UT-GOM2-1-H005 was completed.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 24-May-2017, 0000-2400hr

2. LOCATION:

0000 – 2400 hr, 24-May-2017
Hole UT-GOM2-1-H005
Location: Lat: 27° 00.04665', Long: -90° 25.59125' (WGS 84)
Water depth: 6666.0 ft (6718.0 ft RKB)
Per Datum: RKB 52.0 ft above SL

3. DESCRIPTION OF OPERATIONS:

0000-1200	At Hole UT-GOM2-1-H005
	JSA for personnel involved in breaking down the BHA
	Continue to breakdown BHA
	Backload BHA and DP
1200-2200	Backload project equipment to the *M/V HOS Red Rock*
	Recover compatts
2200-2400	D/V Q4000 moved to one mile off location
	M/V HOS Red Rock depart location
	2400 hrs - End of Lump sum demobilization

4. OPERATIONAL PLAN (Next 24 Hours):

Transfer project equipment and cores to the Port of Fourchon, LA via *M/V Red Rock*, ETA 1430 hrs on 5/25/17

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

Demobilization operations continued throughout the last 24 hours with the transfer of equipment to the *HOS Red Rock*, which departed location 2337hr.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 25-May-2017, 0000-2400hr

2. LOCATION:

0000 – 1330 hr, 25-May-2017
***M/V HOS Red Rock* transiting from GG985 to the Port of Fourchon, LA**
1330 – 2400 hr, 25-May-2017
Intermoor, Port of Fourchon
540 Dudley Bernard Road
Fourchon, LA 70357

3. DESCRIPTION OF OPERATIONS:

0000-1230 *M/V HOS Red Rock* transiting from GG985 to Port of Fourchon, LA
1230-1300 Arrive Intermoor dock/facilities
1300-1500 Offload project equipment
PCATS system transfer, with pressure cores
UT core processing lab transfer
1500-2400 Setup PCATS and UT core labs

4. OPERATIONAL PLAN (Next 24 Hours):

Complete setup and PCATS/UT lab setup at Intermoor, begin processing pressure cores by about 1300 hr. Complete offloading of HOS Red Rock mud boat. Move HOS Red Rock to Francis Drilling Fluids (FDF) to offload the excess mud & cement followed by tank cleaning operations.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

In the last 24 hours, completed UT-GOM2-1 demobilization operations with the arrival and offloading of the *M/V HOS Red Rock* in the Port of Fourchon, LA (Intermoor facilities). The pressure core storage van was offloaded by 1500 hr. From power disconnect to power hookhoop the transfer of the pressure core sample van took only 15 minutes. Also today, the UT and Geotek technical team met to review and finalize the pressure core cut, sampling, and degassing plans to be conducted at the PCATS/UT labs in Fourchon.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 26-May-2017, 0000-2400hr

2. LOCATION:

0000-2400
Intermoor, Port of Fourchon
540 Dudley Bernard Road
Fourchon, LA 70357

3. DESCRIPTION OF OPERATIONS:

0000-1100 Setup PCATS and UT core labs
1100-2400 PCATS operation

4. OPERATIONAL PLAN (Next 24 Hours):

Continue PCATS and degassing activities.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

Setup of Geotek and UT labs at Intermoor were completed. UT continued to work on the expedition report, planning degassing activities, and preparing to ship geochemistry and microbiology samples. Geotek began PCATS scanning and cutting of Core UT-GOM2-1-H005-10FB.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 27-May-2017, 0000-2400hr

2. LOCATION:

0000-2400
Intermoor, Port of Fourchon
540 Dudley Bernard Road
Fourchon, LA 70357

3. DESCRIPTION OF OPERATIONS:

0000-2400 PCATS and degassing operations
1000 Delivery of overpack container

4. OPERATIONAL PLAN (Next 24 Hours):

Continue PCATS and degassing activities.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

Geotek worked on scanning and cutting of Cores UT-GOM2-1-H005-11FB and 04FB. Geotek/UT began quantitative degassing of two sections from Core UT-GOM2-1-H005-10FB. UT continued to work on the expedition report.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 28-May-2017, 0000-2400hr

2. LOCATION:
0000-2400
Intermoor, Port Fourchon
540 Dudley Bernard Road
Fourchon, LA 70357

3. DESCRIPTION OF OPERATIONS:
0000-2400 PCATS and degassing operations

4. OPERATIONAL PLAN (Next 24 Hours):
Continue PCATS and degassing activities.

5. DOWNHOLE LOGGING OPERATIONS:
No additional log data were acquired over the last 24 hr.

6. CORE DATA:
No additional cores were acquired over the last 24 hr.

7. Science Activities
Geotek worked on scanning and cutting of Cores UT-GOM2-1-H005-4FB and -5FB. Geotek worked on preparing the overpack unit for the first shipment of 1.2 m storage vessels to UT. UT finished quantitative degassing of core sections UT-GOM2-1-H005-10FB-2 and -3, and began quantitative degassing core sections UT-GOM2-1-H005-4FB-2, -3, -4, -5, and -7, completing section UT-GOM2-1-H005-4FB-5. Gases were sampled for post-cruise analysis and the remaining sediment after degassing was processed through the mud lab. UT continued to work on the expedition report.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 29-May-2017, 0000-2400hr

2. LOCATION:

0000-2400
Intermoor, Port Fourchon
540 Dudley Bernard Road
Fourchon, LA 70357

3. DESCRIPTION OF OPERATIONS:

0000-2400 PCATS and degassing operations
0000-1100 Preparation of overpack for shipping
1115 Overpack departure

4. OPERATIONAL PLAN (Next 24 Hours):

Continue PCATS and degassing activities.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

Geotek worked on scanning and cutting of Core UT-GOM2-1-H005-5FB. It was determined that seals need to be purchased and replaced in PCATS and PCATS operation was paused. Geotek worked on preparing the overpack unit for the first of three shipments of storage vessels to Austin. The truck arrived in Fourchon and began transport with an expected arrival in Austin the next day 30 May 2017. UT finished quantitative degassing of core sections UT-GOM2-1-H005-4FB-2 and -7, while continuing to degas core sections UT-GOM2-1-H005-4FB-3 and -4. Gases were sampled for post-cruise analysis and remaining sediment after degassing was processed through the mud lab. UT continued to work on the expedition report.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 30-May-2017, 0000-2400hr

2. LOCATION:

0000-2400
Intermoor, Port Fourchon
540 Dudley Bernard Road
Fourchon, LA 70357

3. DESCRIPTION OF OPERATIONS:

0600-1200 Locate seals for PCATS in New Orleans
1400-1800 Replace seals in PCATS
1800-2400 PCATS operations
0000-2400 Ongoing degassing experiments

4. OPERATIONAL PLAN (Next 24 Hours):

Continue PCATS and degassing activities. Visit of DOE and UT personnel.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

Geotek worked on obtaining and replacing seals for PCATS. UT continued quantitative degassing of two core sections UT-GOM2-1-H005-4FB-3 and -4, and began to measure samples for grain size analysis. UT continued to work on the expedition report. Back at UT, the first batch of pressure core storage vessels arrived at the UT Pressure Core Center at 0800 hr.

Daily Operational and Science Report
UT-GOM2-1: Hydrate Pressure Coring Expedition

1. DATE: 31-May-2017, 0000-2400hr

2. LOCATION:

0000-2400
Intermoor, Port Fourchon
540 Dudley Bernard Road
Fourchon, LA 70357

3. DESCRIPTION OF OPERATIONS:

0000-2400 PCATS and degassing operations

4. OPERATIONAL PLAN (Next 24 Hours):

Continue PCATS and degassing activities. Loading and departure of the second batch of pressure core storage vessels.

5. DOWNHOLE LOGGING OPERATIONS:

No additional log data were acquired over the last 24 hr.

6. CORE DATA:

No additional cores were acquired over the last 24 hr.

7. Science Activities

Geotek worked on scanning and cutting of Cores UT-GOM2-1-H005-7FB and -8FB. The overpack unit was returned to Fouchon from Austin after the first delivery of cores. Geotek worked on preparing the overpack unit for the second of three shipments of storage vessels to Austin. UT continued quantitative degassing of core sections UT-GOM2-1-H005-4FB-3 and -4, and made additional grain size measurements. UT continued to work on the expedition report. DOE and UT personnel arrived today for a tour of the labs and a discussion of expedition results. Junbong Jang from the USGS arrived and joined the science party.

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