

Oil & Natural Gas Technology

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Quarterly Progress Report (April – June 2009)

DRILLING AND PRODUCTION TESTING THE METHANE HYDRATE RESOURCE POTENTIAL ASSOCIATED WITH THE BARROW GAS FIELDS

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Prepared for:
United States Department of Energy
National Energy Technology Laboratory

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Office of Fossil Energy

ELEVENTH QUARTERLY PROGRESS REPORT

APRIL – JUNE 2009

**CHARACTERIZATION AND QUANTIFICATION
OF THE METHANE HYDRATE RESOURCE POTENTIAL ASSOCIATED WITH THE
BARROW GAS FIELDS**

DOE Project Number: DE-FC26-06NT42962

Awarded to

North Slope Borough, Alaska

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EXECUTIVE SUMMARY

Phase 2 of this project commenced December 1, 2008, followed immediately on December 2 with a kick-off meeting in Barrow between the Petrotechnical Resources of Alaska (PRA) technical team and North Slope Borough project management team. In this, the third quarter of Phase 2, and the eleventh project quarter, the team focused on the procurement process, well design, and permitting issues. Technical presentations on the project status were delivered at two conferences this quarter, in Fairbanks at the Alaska Geological Society Annual Technical Conference, and at the Annual Meeting of the Pacific Section of the AAPG in Ventura, California.

PROGRESS, RESULTS AND DISCUSSION

TASK 1: Project Management Plan (PMP) and Project Reporting

The PMP, with details of the project activities, deliverables, milestones, budget, and schedule for the five-year project term was finalized as the first task undertaken in Phase 2. The PMP will be updated and revised at the end of this project period (November 30, 2009).

Project reporting this quarter includes technical presentations made by Tom Walsh at:

- 2009 AGS Technical Conference, Friday, April 24, 2009, Fairbanks, Alaska
- 2009 AAPG Pacific Section Meeting, May 4, 2009 Ventura, California

Additionally, an NSB Assembly meeting for contract approval and discussion of project was conducted on May 5, 2009, in Barrow, Alaska.

TASK 2: Establish Technical Advisory Group

Detailed Design Specifications went out to TAG on March 24, with a follow-up teleconference on April 6, 2009. Valuable feedback was received from TAG members during the teleconference, and via subsequent emails. Ongoing dialogue with TAG members continues on an as-needed basis, and this resource continues to be of great value to the team.

TASK 3: Design optimized well drilling and completion

Well design work

Well design work remained a key activity during this quarter, with progress made in a variety of areas:

- Detailed design specifications for East Barrow monitor & horizontal test well were completed.
- Detailed service company guidelines for East Barrow monitor & horizontal test well were completed.
- Preliminary integrated supply chain model for equipment, personnel and materials for full program term was designed.
- Logistics models were adjusted as required due to gravel (pad) regulatory issues and Conflict Avoidance Agreement (CAA) implications.
- Meetings with Conoco-Philips Intrepid Project Team were conducted to solicit lessons learned from their 2007 Exploration season. (Chip Alvord, Mike Winfree et.al.)
- Logistics modeling inputs from Bob Lewellen were discussed regarding Beaufort Sea transiting and snow pack vs. ice applicability for pads and roads in East Barrow & Walakpa.
- Full program ultra low sulphur diesel (ULSD) fuel burn and water usage model was developed for project duration.
- Detailed Design Specifications were submitted to the TAG for review. Conducted a TAG review of the well design on April 6.
- Historical well operations overview was developed regarding East Barrow Gas field drilling and completions operating practices and lessons learned.
- East Barrow & Walakpa Plan of Operations was written (will be updated as project progresses)

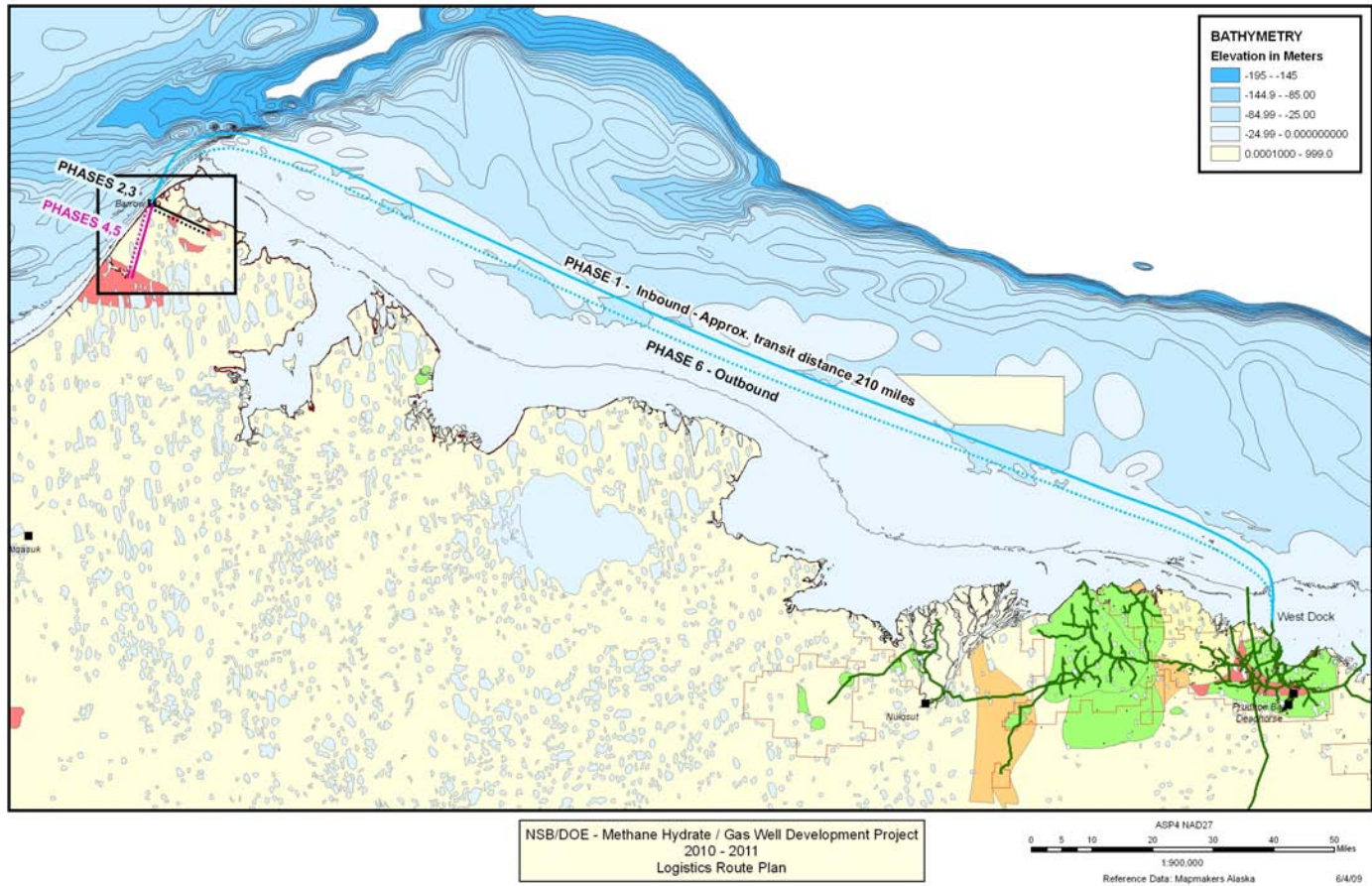


Figure 1. Logistics Map with Bathymetry, for Consideration of Water Depth and Barging Near Barrow

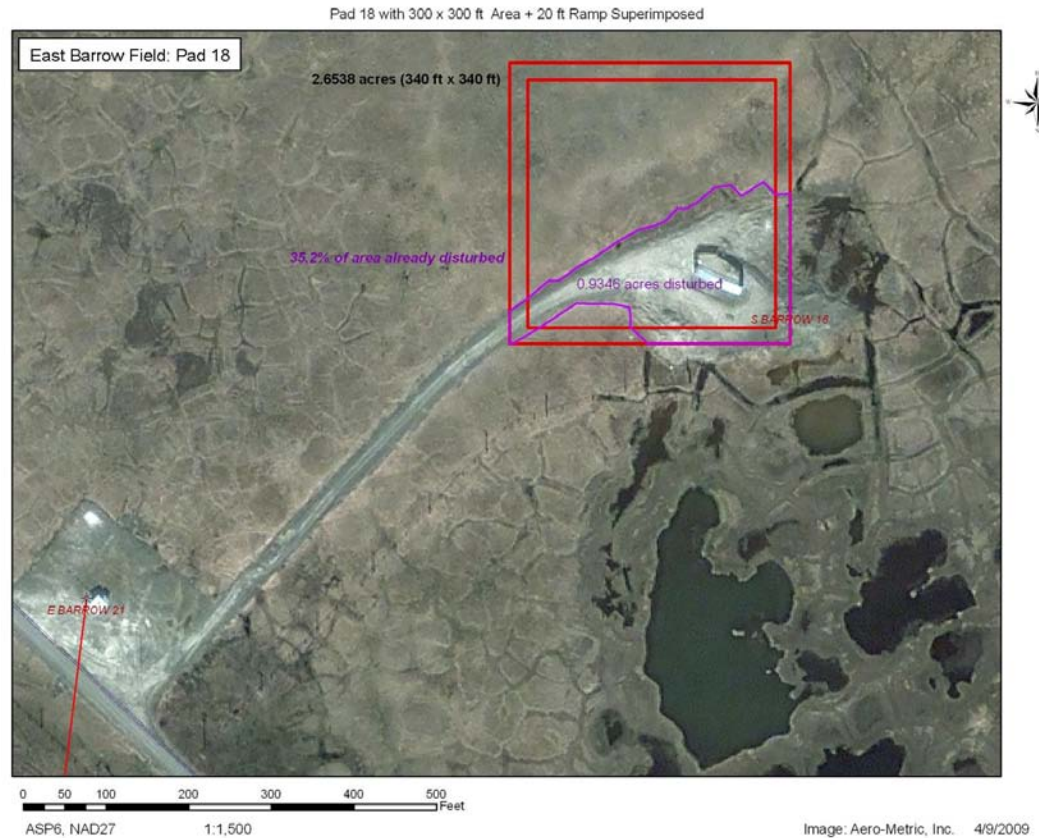


Figure 2. Disturbed Pad Area, East Barrow 18 Pad location

Coring and Coring Analysis Procedures

Researched all relevant references on coring and coring analysis of methane hydrates

Drafted three documents for internal PRA review, as follows:

Volume 1 - Core Acquisition.

Volume 2 - Core Handling

Volume 3 - Core Analysis

A fourth volume, "Criteria to Complete Well" will be drafted once the coring team has reviewed and commented.

A more comprehensive, integrated approach to coring is being taken on the Barrow Hydrate Test well because unlike past projects, this well will require a real time decision to complete the well, based on on-site analysis of the core and log to determine if in fact hydrates are present.

Each volume is targeted to a different target audience, but all parties are encouraged to understand the entire process.

Target audience for Volume 1 are the coring, core fluids, mud chilling, and on-site drilling personnel

Target audience for Volume 2 is the core handling contractor, which interfaces with coring company and Science Party

Target audience for Volume 3 are the on-site scientists, referred to as the Science Party

Target audience for Volume 4 are the decision makers who will decide to complete the well, or move to Walakpa

Currently having the project geologist research offset wells and write a summary of the tops and characteristics of the prognosed coring interval. Expect this section to be completed next week.

A first draft of volumes 1-3 was sent to TAG member Tim Collet in late July, and a draft to other members of the coring party is to be sent out by early August for peer review.

TASK 4: Design surveillance program and "smart well" components and conduct Phase IIA surveillance and monitoring

The surveillance program began with Pollard Wireline awarded a contract to acquire downhole pressure and temperature data. Pressures and temperatures were taken on wells Walakpa # 2, 3, 5, 6, 7, 8 & 9 and East Barrow 14 and 21.

PRA received the pressure and temperature reports and are currently analyzing these data and compiling the reports.

Additionally, gas samples from E Barrow and Walakpa wells were collected. Analysis and interpretation are currently underway.

This surveillance work is a continuation of similar data collection and analysis on the two gas fields over time, and this effort will continue on a regular basis to build a reliable set of reservoir pressure and temperature data.

TASK 5: Prepare Request for Proposals and evaluate contractor bids

The finalized, completed RFP was sent to 35 technically qualified contractors on July 10, 2009. The RFP included requests for prices of specified services or materials and detailed the NSB sealed bid process to be used by responders. The RFP evaluation schedule includes:

July 10 – RFP release

July 23 – pre-proposal conference (Anchorage)

July 29 – heavy equipment meeting (Barrow)

Aug 21 – responses due

Aug 22 – Sept 7 - RFP evaluation period (NSB and PRA)

Sept 7 – Sept 14 - discussions with bidders

Sept 15 – Oct 1 - best and final submission period

Oct 1 - Notice of Intent to Award posted

Oct 15 - AFE to DOE and NSB

Prior to the RFP release:

- A Request for Un-Priced Technical Offer/Request for Qualification Document (RUTO/RFQ) for East Barrow and Walakpa programs was developed.
- An Alaska /Lower 48/Canada service company contact list for potential service providers for East Barrow & Walakpa programs was developed.
- A pre-submission conference for proposers at the Frontier Building, Suite 336 - April 14th was conducted.
- Responses were made to all questions arising from the RUTO/RFQ.
- RUTO/RFQ response roster from service companies was developed - determining compliance with RUTO/RFQ and segregating into: single service provider, traditional bundling, and subcontractor bundling categories.

In addition to the RFP work and preparative work, an initial RFP service company evaluation spreadsheet per RFP metrics was developed.

TASK 6: Permitting

Regulatory authority research has been completed documenting that no BLM managed properties are affected by the proposed project. Detailed project meetings with United States Fish and Wildlife Service and United States Army Corps of Engineers and coordination with all permitting agencies have been conducted resulting in ongoing cooperation on the project, integration of mitigation measures in project planning, and clear path forward on permitting requirements. As a result of environmental mitigation awareness during project design it was determined that low impact ice/snow packed drilling pad is feasible for the East Barrow Gas Field hydrate wells. This greatly mitigates the area of potential habitat loss due to gravel placement and is considered state of the art for arctic drilling.

Efforts continued to define all regulated surface activities and contingencies compiled in a refined draft Permitting Plan of Operations. Permitting support has identified critical path design decisions needed for permit applications. As a result of extensive coordination with all regulatory agencies, a list of all potential permits and regulatory approvals has been compiled. See list below. Extensive mapping has been prepared to support agency coordination and applications. A detailed process schedule has been developed for all steps of the permitting process.

Permits have been secured for execution of all necessary summer studies for 2009 and 2010 including archaeological clearance of pad sites and other areas, fisheries and water chemistry surveys for additional freshwater source lakes to support East Barrow ice/snow packed pad, EA contractor orientation, and survey crew access to the project area. Conocophillips "Intrepid" project team were approached and have cooperated to provide project design and environmental studies data from a prior project near the Barrow area which significantly reduced the summer study requirements and will reduce costs for the hydrates project. Summer study design and contracting is ongoing with work scheduled for August 2009.

Support was provided to DOE NEPA personnel including NEPA citation research and orientation to regional environmental and logistic issues.

Comprehensive Permit List (Note: The need for some permits is dependent on pending design decisions and is so noted).

Federal :

- USFWS endangered species consultation
- USFWS incidental take permit for working in endangered species habitat
- USEPA NPDES General Permit AKG-33-0000 and AKG-57-0000 for wastewater discharges as well as associated Best Management Practices Plan
- USACE 404 permit and/or General Permit for gravel placement as needed
- Bridge/culvert work if needed may require approval from USCG and US Dept. Transportation
- USACE Section 10 based on Jurisdictional determination for temporary rig mats and gravel leveling at barge unloading area
- FAA Notification of Rig Height (Distance of towers from Airports/Airstrips)
- Spill Prevention, Control, and Countermeasures Plan for Rig
- Stormwater Pollution Prevention Planning measures
- Wildlife Interaction Plan

State:

- ADEC Minor General Air Permit 1 (MGPI)
- AOGCC/ADEC ODPCP Contingency Plan Waiver for gas only drilling
- ADNR Temporary Water Use Permit
- ADNR Title 16 Fish Habitat Permit
- ADNR Snow and Ice Removal Fish Habitat Approval
- Coastal Zone Management Consistency Review
- ADEC Authorization for Temporary Waste Storage (Plan Approval)
- SHPO Archaeological and Cultural Clearance
- Wildlife Interaction Plan
- ADNR Land Use for activities in Tidelands (Barge unloading) 11 AAC 96
- 40CFR 60 Subpart JJJ compliance for Walakpa Engines supporting proposed hydrate well alternative location

Note: AOGCC Permits Permit to Drill, Annular Injection Permit, and any necessary Sundry Notices are also required which are not typically considered “environmental permits”. State bonding for gas wells may also be necessary.

Local

- North Slope Borough (NSB) Development Permit
- Notification to UIC per NSB/UIC Access Agreement
- Agreement(s) with Allotment Owners for any lands to be crossed
- Subsistence Use Coordination including Barge Activities (Conflict Avoidance Agreement)
- Acknowledgement of Beneficial Reuse for Exempt Drilling Wastes to Barrow Landfill
- Ballot Agreement for Waste Disposal

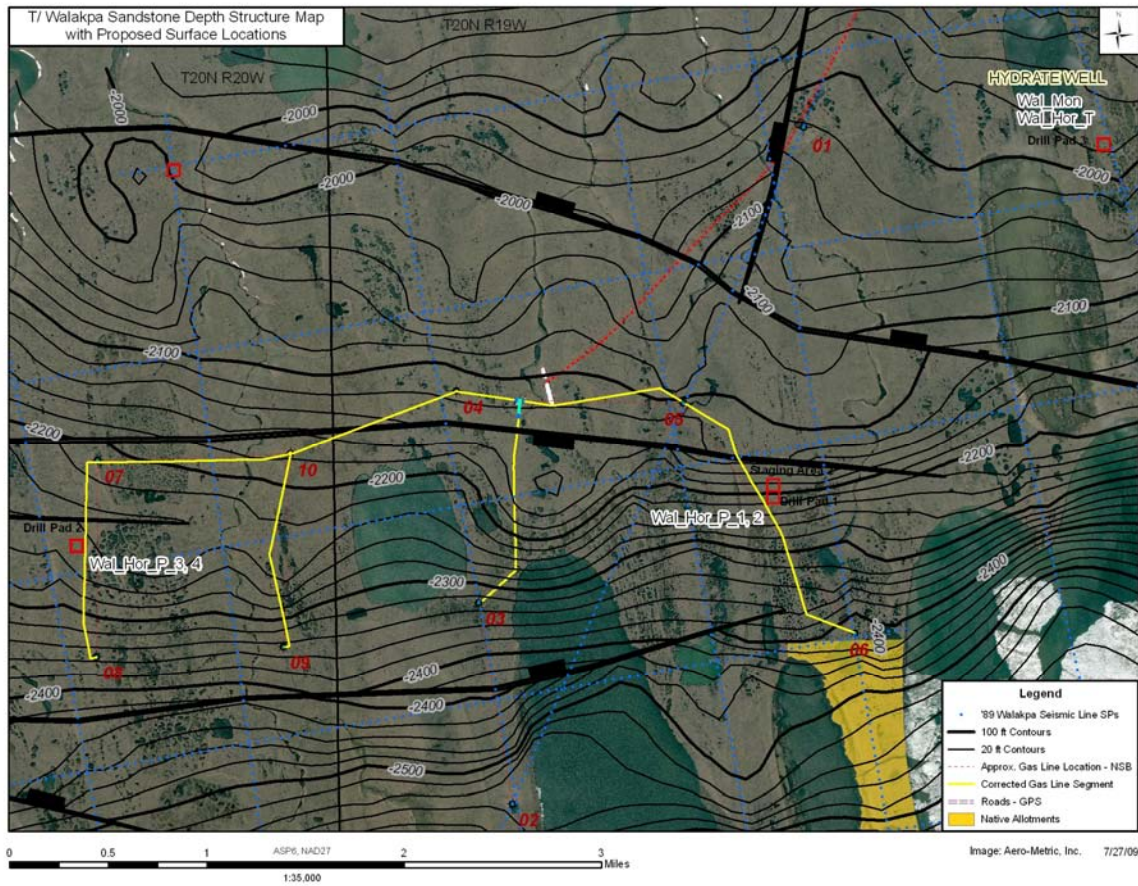


Figure 3. Preliminary Proposed Walakpa Surface Locations

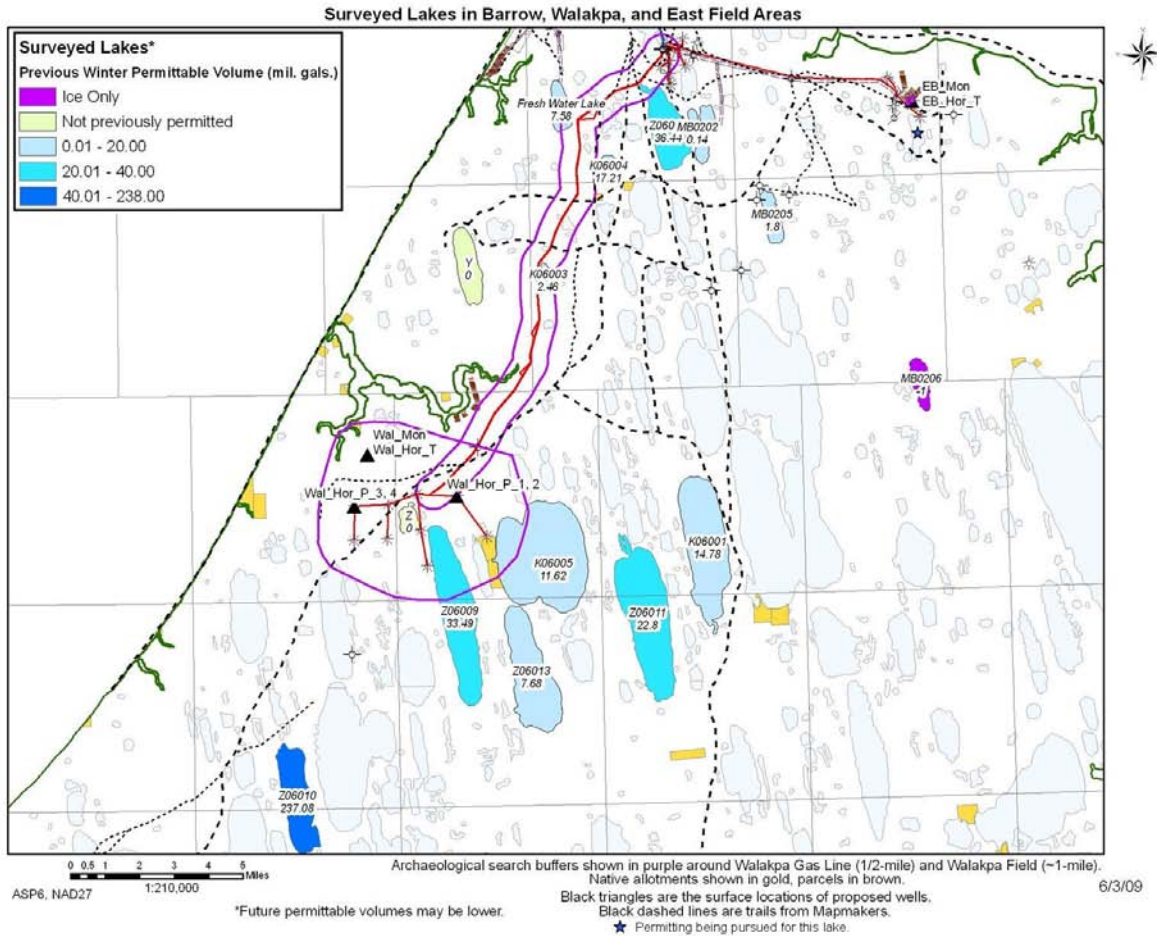


Figure 4. Previously Surveyed Lakes Map Showing Previous Winter Permittable Volumes

GIS project support

There are key benefits to building and using a GIS in the Hydrates project, due to the spatial nature of some of the planning involved. The GIS project supports the Hydrates project by enabling the integration of many types of data for viewing and analysis. In particular, GIS work has supported two tasks in the months April through June, 2009. The majority of the work has pertained to Task 6,

Permitting. Occasional work has supported Task 3, Design Optimized Well Drilling and Completion.

Contributions to the Hydrates project through GIS have been made by integrating and using the following data types:

1. satellite imagery,
2. maps available only in scanned form, and
3. tabular data.

Using these data has provided assistance to the permitting specialist.

Satellite Imagery

The satellite imagery has allowed:

- a first pass at proposing potential new water sources by enabling comparison of water bodies based on their appearance on the satellite image (via water color and clarity),
- the determination that the NSB-provided GIS file representing the location of the gas line at Walakpa Field is “approximate”,
- corrections to the Walakpa gas line file by digitizing the gas line based on the visibility of its support members on the satellite image,
- calculations of gas line crossings by transferring distances onto the satellite image based on measurements from engineering drawings,
- inspection of the land surface where wells are proposed, to help avoid undesirable and/or problematic locations, and
- an approximate calculation of the surface area amount of tundra previously disturbed by a drill pad (East Field Pad 18).

Maps available only in scanned form

Geo-referencing maps available only in scanned form has enabled the incorporation of other necessary data into the GIS, such as:

- the known archaeological (AHRs) sites in the Barrow area, and
- the proposed Intrepid (exploration well drilled south of Walakpa in 2007) ice road route.

Tabular Data

Inputting tabular data into the GIS has permitted:

- the posting of the surface locations of proposed wells to check the locations against all other relevant data available in the GIS,
- creation of a “previously surveyed lakes” file by adding the tabular data to the spatial lakes file, and

- specific portrayal of gas line and creek crossings where spatial coordinates are available.

Some example maps produced in the GIS during the period April 2009 through June 2009 have been included in this report (Figures 1-4).

Project Milestones:

Table 1. Milestone Plan for NSB Methane Hydrate Phase II Project

Task	Milestone	Due date	Comments
1	Updated Project Management Plan	1/12/09	Compl 2/4/09
1	Technology Status Assessment Report	2/6/09	Compl 2/26/09
2	TAG Members Confirmed	2/13/09	Compl 2/27/09
3	Well Drilling and Completion Plan Review submitted to TAG	3/16/09	Compl 3/16/09
3	RFP Specification Review submitted to TAG	5/1/09	Completed 5/29/09
4	Well Instrumentation Plan Review submitted to TAG	3/16/09	Completed 5/29/09
5	Request for Unpriced Technical Offer/Request for Qualifications Document	3/27/09	
5	Request for Proposal (RFP) with Specifications Documents	5/12/09	Completed 7/10/09
5	List of Prime Contractor selected for contracted service, equipment and materials	9/18/09	
6	Permits required for Drilling Methane Hydrate Test wells at E. Barrow and Walakpa Fields	2/9/10	
7	Approval for Drilling and Authority for Expenditure Topical Report	9/30/09	*
	Proceed to Budget Period 4	12/1/09	
8	Updated Project Management Plan	12/21/09	
9	Contracts between NSB and all Prime Contractors providing services, equipment and materials	4/30/10	
10	Hydrate Test Well Drilled, cored and logged at East Barrow	11/30/10	*
10	**DECISION POINT** Complete or Abandon Hydrate Test Well Drilled at East Barrow	11/30/10	
10	Technical Presentation on Drilling of Hydrate Production Test Well	11/18/10	
11	Hydrate Production Test Well and Reservoir Surveillance Data and Analysis Topical Report	8/6/10	
	DECISION POINT Proceeding to Task 12 requires the written authorization of the DOE and the NSB	12/1/10	
12	Updated Project Management Plan	12/22/10	
13	Hydrate Test Well Drilled, cored and logged at Walakpa	6/30/11	*
13	**DECISION POINT** Complete or Abandon Hydrate Test Well Drilled at Walakpa	6/30/11	
13	Technical Presentation on Hydrate Production Test	10/24/11	

	Well		
14	Hydrate Production Test Well and Reservoir Surveillance Data and Analysis Topical Report	8/5/11	
14	Technical Presentation on Hydrate Production Well Performance	5/22/12	
15	Updated Project Management Plan	6/22/12	
16	Hydrate Production Test Well and Reservoir Surveillance Data and Analysis Topical Report	8/5/13	
17	Technical Presentation on NSB/DOE Hydrate Project	1/30/13	
17	Technical Presentation on NSB/DOE Hydrate Project	5/30/13	
17	Technical Presentation on NSB/DOE Hydrate Project	9/27/13	

Accomplishments

- Permits have been secured for execution of all necessary summer studies for 2009 and 2010 including archaeological clearance of pad sites and other areas, fisheries and water chemistry surveys for additional freshwater source lakes to support East Barrow ice/snow packed pad, EA contractor orientation, and survey crew access to the project area.
- Efforts continued to define all regulated surface activities and contingencies compiled in a refined draft Permitting Plan of Operations.
- Permitting support has identified critical path design decisions needed for permit applications.
- As a result of extensive coordination with all regulatory agencies, a list of all potential permits and regulatory approvals has been compiled..
- Extensive mapping has been prepared to support agency coordination and applications. A detailed process schedule has been developed for all steps of the permitting process.
- Technical presentations made by Tom Walsh at:
 - 2009 AGS Technical Conference, Friday, April 24, 2009, Fairbanks, Alaska
 - 2009 AAPG Pacific Section Meeting, May 4, 2009 Ventura, California
- Coring program design document has been drafted and submitted for TAG review

Ongoing Procurement Effort

- RFP release date July 10, 2009
- Pre-proposal conference for all potential vendors scheduled for July 23 (Anchorage)
- Heavy equipment meeting scheduled for July 29 (Barrow)

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