# Metadata Citation Information

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| **Title:** | **Mallik Weekly Science Report #3 (week February 22- March 1, 2007)** |
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| **Status:** | **Final report** |
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| **Prepared for:** | **General distribution** |
| **Submission date:** | **March 1, 2007** |
| **Review status:** | **R. Bowen/S. Dallimore<br>Unedited technical report as provided by lead NRCan scientist. It is included here as background program documentation only.** |
| **Distribution:** | **Public** |

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JOGMEC

# MALLIK WEEKLY SCIENCE REPORT # 3

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| **Week:** | February 22-March 1, 2007 | **Weekly weather**: Too cold! (-35 to -45°C with wind chills frequently below -50) |
| **Science Supervisor**: | Scott Dallimore | Sun rising about 9:15, setting about 19:00 |
| **Scientists on site:** | Drill site: Nixon, Dallimore (NRCan); Numasawa, Nakamizu, Takayama(JOGMEC)<br>Inuvik: Taylor (Aurora); Sugiyama, Cho, Ikegami, Suzuki, Sakiyama, Fukuhara, Matsuzawa (JOGMEC); Mwenfumbo (NRCan) | |
| **Operations:** | Drill site: Mizuta (JOGMEC), Wakatsuki (Japex) | |

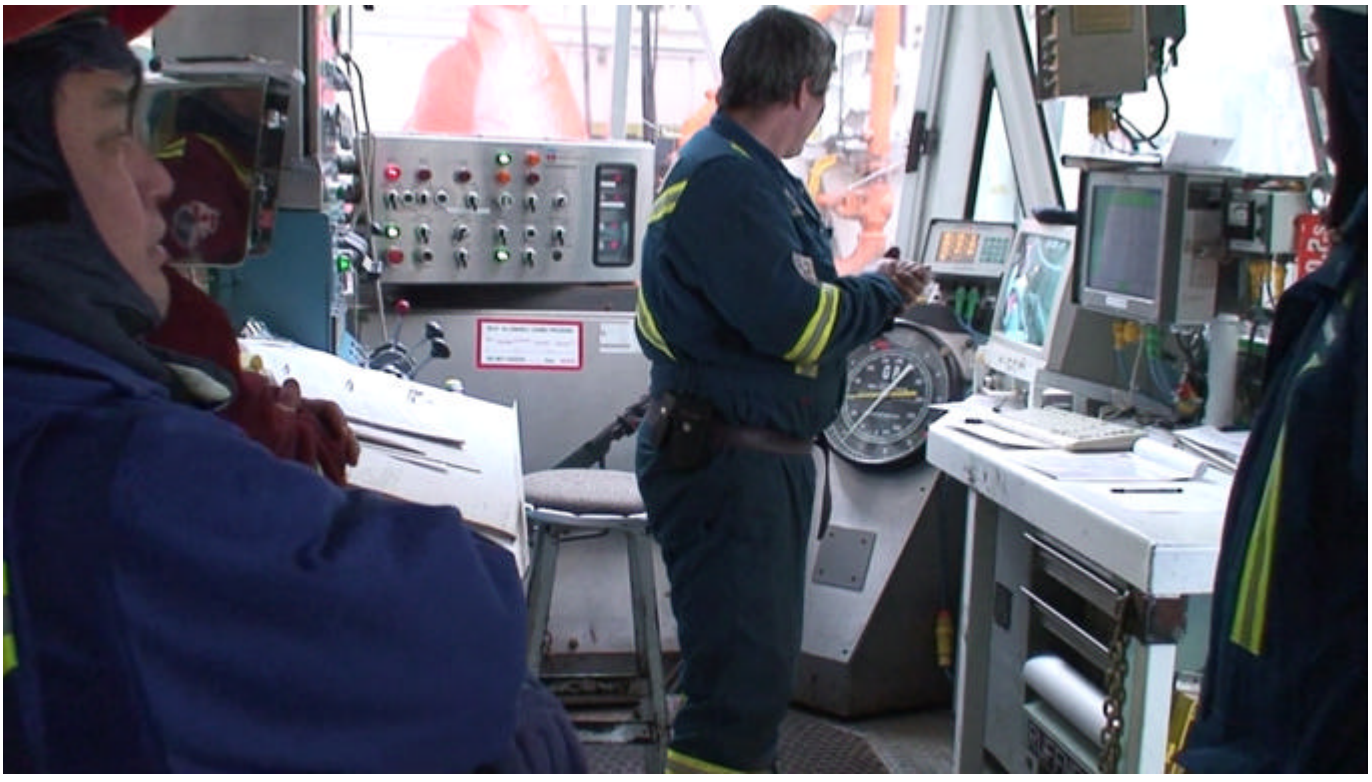

**Photo of the week: In dog house! JOGMEC chief of operations Mizuta-san keeps a close eye on the Akita day shift driller just before spud of Mallik 2L-38**

AURORA RESEARCH INSTITUTE
AURORA COLLEGE


**The JOGMEC brain trust at work in the management office at the rig. Shortly there after with camp clad in PPE (Personal Protective Equipment) a fire drill is held at -42°C.**

**Camp synopsis:**

- **During the past week between 100 and 115 souls have been in camp, which means we are operating at nearly full capacity. Fire drills have been a source of entertainment as they call for evacuation of the camp, movement to a muster area and a role call with safety instructions. Alex Vaughan, a Schlumberger drilling engineer, is the able Grand Marshall of the fire drills. But at -44°C, the whole concept of a fire drill can be a challenge. Recently Scott stood beside a driller who had been having a shower when the alarm went off. He had so much steam exiting from his head, hands and feet that he looked like Darth Vader from the Star Wars movies.**

**Well site operations activities:**

- **Good news folks! As of 07:00 this morning, more than 2.25 kilometres of hole has been advanced in Mallik 2L-38 and Mallik 3L-38. Despite the harsh weather conditions that have seized up drilling equipment and personnel, we have made good progress.**

**Mallik 2L-38- Over the past week our main production well has moved ahead, but not exactly as we expected. The original plan called for drilling out 677m of the old 1998 13 3/8" permafrost casing and then deviating the well to create a S-shaped profile. To accomplish this we needed first to have the old casing in good condition and then to be able to drill out the cement plugs with a 12 ¼ in bit. Thankfully, according to plan we were able to drill out the casing. What did not proceed according to plan however was our plan to kick off the well. Given the soft formations at the base of permafrost, from a drilling perspective we were looking for a competent cement plug at the base of the old casing and cement in the abandoned old open hole section beneath. Encountering competent cement would confirm that the old open hole section had been successfully plugged and also give a firm foundation for the kick off of directional drilling. Unfortunately, while stringers of cement were found, no firm cement pug was observed at the base of the 13 3/8" casing or in the open hole section below. Thus ensued closed door and open door planning meetings at the well site and conference calls with Calgary, Tokyo, Houston etc.. etc.. Key considerations were… where was the 14.4m3 of cement that was placed in the bottom of Mallik 2L?, and could it be that a large volume of drilling mud pumped away beneath the permafrost casing approximately 20 hours after the original 1998 cement job was a factor?**

**Our JOGMEC/NRCan/Aurora/IPM brain trust took a decision that first we had to deal with the old Mallik 2L open hole section to confirm the presence or absence of cement to the bottom of the old drilling. The 12 ¼" bit was run out of the hole and gyro survey was taken of the 13 3/8" casing. A 8 ½" bit (the same size as the old hole) was run in to allow us to delicately 'feather' our way down the old hole. After drilling to 1130m our conclusion was that the old hole was not cemented. A decision was made that we should trip out of the hole and use a 9 5/8" bit with the reaming while drilling (RWD) assembly to open the hole 14 ¼". The assembly was also run with the measurement while drilling (MWD) tool such that we could monitor borehole deviation. As of 07:00 today, the old Mallik well bore has been re-opened to 1080m near the base of the gas hydrate stability field. While it is still too early to tell, there is good news in terms of using this well bore as a production well; 1)the drilling parameters suggest we are in the old hole, 2) no cement has been found in the cuttings suggesting that it has likely been displaced far away from the old well bore and 3) similar to the original drilling of Mallik 2L, multiple intervals have been detected with abundant mud gas flow which suggests the reaming process is intersecting gas hydrate bearing intervals (ie there is still hydrate close to the well bore). The current plan is to advance the hole to 1310m and then undertake open hole well logging. This assessment of gas hydrate properties and the appraisal of formation damage will determine our next steps.**

**Mallik 3L-38: In comparison to 2L-38, activities with the Nabors rig (sorry for last week when I got caught by my spell checker function and inadvertently changed Nabors to Neighbours) were more straight forward. This is not to say however not without challenges. In their case the challenge was the weather as this service rig is basically open to the elements. Fortunately however once they thawed things out and were able to get started most obstacles were overcome and the old 3L casing was re-drilled. As of 07:00 Mallik 3L is at 1159m with the path fairly clear we hope to completing this well at 1268m in the next three days.**

**Science report:**

**The number of R&D scientists participating in the Mallik program continues to grow. By March 1, 12 scientists and engineers (mainly JOGMEC) are in Calgary staging to Inuvik. Another 16 (JOGMEC/NRCan and Aurora) are in the field, with 9 in Inuvik and 7 at the drill site. In the next week numbers in the field will grow to more than 20. Considerable effort will be devoted for the remainder of the program to effectively coordinating this ever growing R&D team.**

**With so much space in this report devoted to operations and our R&D activities just beginning only the briefest of updates this week on our research activities.**

**<u>Geology & Geophysics</u>**

**Nakamizu, Takayama and Nixon-sans have been focussing on logging drill cuttings and looking for evidence of cement in Mallik 2L. A impressive selection of logging tools (some very rare) have also been mobbed the site and readied for deployment. Dallimore, Mizuta and Wakatsuki have been busy as well checking on drilling character of 2L and such things as mud gas peaks and evidence of gas hydrate in the cuttings.**

**The Mallik 2L open hole logging run will include deployments of many newly developed state of the art of tools. Photos show set up for Mallik 2L-38 logging and selection of open hole logging tools which will be deployed. The Nabors drill rig on Mallik 3L-38 is in background.**

**Production**

**- The production team continues to fine tune the completion and production program working closely with IPM staff in the field and in Calgary. As mentioned last week equipment is presently either in Calgary or at the well site.**

**Monitoring**

**-The monitoring team is tracking and receiving last minute equipment shipments and further testing equipment in Inuvik. Five monitoring cables will be installed in Mallik 2L-38 so there is considerable preparation required first to spool all of the instrument reels together and then to consider the very critical operational steps to install the casing.**

**Mallik in the News:**

**The old adage is that any press coverage is generally better than no press coverage even if they get the story wrong. In our case we have had a few start up press stories over the past week with mention on the CBC National radio news and some nice stories from the Asia press. A radio quote from Nakamizu-san about weather in Inuvik is worth a read, as is a clip from AsiaNews (the reporter got most of the story right except for mentioning methyl hydrate not methane hydrate.**

**February 27, 2007** CBC Radio News

***Mallik gas hydrates project progressing***

February 26, 2007 – Inuvik - Scientists in the North West Territories are set to drill a well through the permafrost hoping to find a way to convert frozen gas - mostly methane - into useable fuel. They say there is more energy bound up in frozen gas than in all conventional energy sources combined. Canada is teaming up with Japan to learn more about this resource.

"In Japan, this year is very warm, not too cold..." Masaru Nakamizu says as he arrived in Inuvik to be greeted by Arctic weather.

Nakamizu is with Japan's national energy company which is covering most of this project's forty-to fifty million dollar budget over the next two years.

He says the work is interesting, but that temperatures of –50 C. at the well site are hard to endure.
"I am very surprised. My lung was frozen. Oh, this is very cold."
Dozens of Japanese and Canadian scientists are at the well site - about two hundred kilometers north of Inuvik - looking for ways to withdraw frozen gas from depths of more than 1000 meters and then convert it to a useable fuel.

Scott Dallimore is the lead researcher for Natural Resources Canada.
"It's of great interest to countries like Japan because they produce a relatively small amount of their domestic requirements. And gas hydrates occur off their coast."

Dallimore says gas hydrates - technical term for frozen gas - could be the fuel of the future.
"As our conventional supplies start to dwindle, and the price of energy is so high, there's an interest to understand the potential of gas hydrates."

Dallimore says Japan plans to start offshore production in 2017, but that it will be at least several decades before Canada is ready to start producing the resource.



*JAPAN*

## *Gas trapped in ice could revolutionise the world economy*

***In Canada's permafrost and ice trapped methyl hydrate becomes like normal natural gas once released. There are huge technical obstacles to surmount but also vast deposits to commercially exploit. If production becomes possible the United States and the United Kingdom could become leading world producers.***

Tokyo (AsiaNews/Agencies) – Japan will begin test drilling and extracting methyl hydrate—natural gas trapped in frozen water—in March. If the technology to harvest and utilise this natural gas is successful, it could transform the face of the world.

In March, state-run Japan Oil, Gas and Metals National Corp (JOGMEC) will begin test production of natural gas from methyl hydrates—natural gas trapped in frozen water—extracted from Canadian permafrost in conjunction with Canada's Department of Natural Resources.

Methyl hydrate is natural gas trapped in a solid matrix of frozen water. Once released, it becomes just like normal natural gas. It is found in and under permafrost, and on the ocean floor at depths greater than 500 metres or 1,600 feet.

An increase in temperature can trigger the release of the methyl hydrate as natural gas.

The most recoverable deposits of methyl hydrate are found in coarse, porous sandstone deposits, which primarily occur on land in permafrost conditions in the Arctic.

Traditional natural gas reserve estimates total about 370 trillion cubic metres (tcm) and are expected to last about 60 years; rough estimates of methyl hydrate deposits range from 2,800 tcm to 8.5 million tcm.

Deep-sea deposits are more liberally distributed around the globe but are found in thinly distributed deposits that are harder to recover.

Moreover, if ocean-floor deposits are disturbed by poorly implemented extraction attempts, or by earthquakes, it can cause the sea to "boil" as natural gas bubbles up from the bottom. The resultant high waves and lowered water density can sink both ships and drilling platforms.

JOGMEC plans to extract the methyl hydrate by reducing the pressure, allowing the hydrate to vaporise in the drill well, which then allows the harvesting of natural gas by more conventional means.

Developing these deposits is not however a short-term goal. Not only does a reliable technology need to be developed, but a reasonable infrastructure—extensive pipelines and storage facilities—must also be built.

In places like the North Slope of Alaska, where there are established pipelines and roads, methyl hydrate extraction could develop relatively rapidly. For the ocean floor, it would be a different story. If any of these methods could be made to work on a wide scale, it would revolutionise the world energy market, potentially turning major natural gas importing states such as the United States or the United Kingdom into net exporters.