



NWT OFFICE OF THE REGULATOR OF OIL AND GAS OPERATIONS

Office of the Regulator of Oil and Gas Operations

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Leah Davies
Subsurface Abandonment Lead
Imperial Oil Limited
505 QUARRY PARK BLVD, SE
CALGARY AB T2C 5N1

June 8, 2021

Dear Leah Davies:

**Decision: Request to Continue Monitoring
the Jean Marie B-48 well (WID 0448) (OA-2018-001)**

On May 3, 2021, the Office of the Regulator of Oil and Gas Operations (OROGO) received a request from Imperial Oil Limited (Imperial) to continue monitoring the Jean Marie B-48 well (WID 0448) for five years rather than repair the gas migration and re-abandon the well by March 31, 2022, as directed in my letter of March 2, 2021.

Imperial's monitoring activities with respect to the Jean Marie B-48 well were authorized under Operations Authorization OA-2018-001 and were expected to result in a proposed approach to repairing and re-abandoning the well. By requesting approval to continue monitoring the well rather than repairing and re-abandoning it, Imperial is effectively requesting that I vary the terms of OA-2018-001.

On August 2, 2020, I was designated as Regulator under section 121 of the *Oil and Gas Operations Act* (OGOA). The Regulator may issue an Operations Authorization (OA) under section 10(1)(b) of OGOA and may vary an existing OA under section 10(6) of OGOA.

This letter addresses the following topics:

1. The relevant legislation and regulations;
2. The evidence I considered;
3. The confidentiality of certain evidence;
4. My findings;
5. My conclusions; and
6. My decision.

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Legislation and Regulations

OGOA and the *Oil and Gas Drilling and Production Regulations* (OGDPR) establish the Regulator's mandate and the requirements for suspended and abandoned wells:

- The Regulator's mandate is described in section 2 of OGOA. The mandate is to promote safety and the protection of the environment in oil and gas operations, along with the conservation of the resource, joint production arrangements and economically efficient infrastructures.
- The requirements for suspended and abandoned wells are contained in section 56 of the OGDPR. Suspended and abandoned wells must be left in a condition that isolates all oil and gas bearing zones and discrete pressure zones and that prevents formation fluid from flowing through or escaping the well bore. For onshore wells, potable water zones must also be isolated.
- "Fluid" is defined in section 1 of the OGDPR as "gas, liquid or a combination of the two".

OGOA and the OGDPR also speak to spills and incidents:

- A "spill" is defined in section 61 of OGOA as a "discharge, emission or escape of petroleum" not authorized under "the regulations, an Act of the Northwest Territories or an Act of Canada".
- Section 62(1) of OGOA states that "no person shall cause or permit a spill on or from any area to which this act applies".
- An "incident" is defined in section 1 of the OGDPR as including "... a loss of containment of any fluid from a well...".

Finally, section 18 of OGOA authorizes the Regulator to issue guidelines and interpretation notes. In February 2017, the Regulator issued *Well Suspension and Abandonment Guidelines and Interpretation Notes* (Guidelines), which clarify the Regulator's expectations for the suspension and abandonment of wells in its jurisdiction.

Evidence

Imperial submitted the following documents as evidence in addition to its letter of May 3, 2021:

- A slide titled GHG Considerations for Jean Marie B-48 Well Re-Abandonment; and
- A letter from the Jean Marie River First Nation, dated April 7, 2021, supporting its request.

I have also considered the following evidence from OROGO's records:

- Jean Marie B-48 Final Well Report, dated April 8, 1969, received from the National Energy Board after devolution in 2014;
- Jean Marie B-48 Schematic as of March 1969, received from Imperial on May 18, 2017;
- Jean Marie B-48 Well Inspection Report, received from Imperial on September 18, 2017;
- Jean Marie B-48 Well Inspection Report and attachments, received from Imperial on October 13, 2019;
- Jean Marie B-48 Vent Nanny Data October – November 2019, received from Imperial on November 12, 2019;
- Summary of the 2015, 2017 and 2019 Jean Marie B-48 Vapour Intrusion Analysis Results by GChem, received from Imperial on January 27, 2020;
- Jean Marie B-48 Well Inspection Report, received from Imperial on June 28, 2020;
- Vent Nanny repair report, received from Imperial on June 29, 2020;
- Request for deferral of additional monitoring report, received from Imperial on February 16, 2021;
- 2020 Vapour Intrusion Analysis Jean Marie B-48 (revised February 3, 2021) by GChem, received from Imperial on February 16, 2021; and
- January to October 2020 Monthly Vent Nanny Data – Jean Marie B-48, received from Imperial on February 16, 2021.

Confidentiality of Certain Evidence

Information submitted to the Regulator by Imperial after July 23, 2020 is subject to the provisions of section 22(2) of OGOA, which states that all such information is public unless deemed confidential by the Regulator. None of the information submitted by Imperial since July 23, 2020 has been deemed confidential.

Information submitted to the Regulator by Imperial prior to July 23, 2020 is subject to section 91 of the *Petroleum Resources Act* (PRA) that came into force on April 1, 2014 and the similarly-worded section of the *Canada Petroleum Resources Act* that was in force prior to April 1, 2014:

- Section 91(2) states that “information or documentation is privileged if it is provided for the purposes of this Act or the *Oil and Gas Operations Act*.”
- Section 91(3) states that “information or documentation that is privileged under subsection (2) shall not knowingly be disclosed without the consent in writing of the person who provided it, **except for the purposes of the administration or enforcement of this Act or the *Oil and Gas Operations Act*...**” (emphasis added).
- Section 91(8) identifies information that may be disclosed after a specified period. For an exploratory well such as the Jean Marie B-48 well, the information or documentation “obtained as a direct result of drilling of the well” is disclosable two years after the well termination date.

The April 8, 1969 Jean Marie B-48 Final Well Report is subject to section 91(8) and is therefore not confidential.

The documents submitted by Imperial to OROGO between April 1, 2014 and July 23, 2020 are confidential under section 91(2) unless disclosure is necessary for the purposes of the administration of OGOA.

As this decision is being issued after July 23, 2020, it is a publicly available document and will be posted on OROGO’s public registry. For Imperial and the public to understand the decision, some references must be made to the information provided to OROGO before July 23, 2020.

These references are limited to document names and summary information from those documents, to respect the confidentiality established under section 91(2) while also allowing for the administration of OGOA as envisioned under section 91(3).

Findings

Imperial's request to continue monitoring the Jean Marie B-48 well, rather than repairing and re-abandoning the well, is primarily based on Imperial's assertion that environmental impact of leaving the well in its current state is low because:

- The level of methane being released from the wellbore has decreased from 2019 to 2020;
- The amount of gas migration from the well was measured at 88 ppm in 2020 and there are no observed impacts on the surrounding vegetation;
- Methane stopped coming out of the wellbore during monitoring in 2020, which could indicate that there has been a change to the source formation or the pathway to the surface.

Based on its assessment of the environmental impact of the well in its current state, Imperial argues that the environmental impact of repairing and re-abandoning the well, including land disturbance and greenhouse gas emissions, would be significantly higher.

Imperial also identifies that, based on industry experience, the repair and re-abandonment of the well may not guarantee that the gas migration associated with the well will be reduced to zero.

Finally, Imperial hypothesizes that the gas migration at the well may decrease to zero over time.

I address each of Imperial's arguments in the sections below.

Environmental Impact of the Well - Isolation of Oil and Gas Bearing Zones and Pressure Zones

The Vent Nanny data for the period from October 2019 to November 2020 includes the rate at which gas was flowing through the Vent Nanny (flow rate), the maximum pressure on the wellbore and the average pressure on the wellbore during the monitoring period. The Vent Nanny data shows that:

1. There is a trend of increasing pressure in the wellbore, although the pressure readings fluctuate throughout the monitoring period;
2. Flow rates are minimal. During the 2020 reporting period, the flow rate was zero.

Imperial's letter of May 3, 2021 suggests that the decrease in flow rates in 2020 could indicate that there has been a change to the source formation or the pathway to the surface. Imperial does not suggest that the decrease in flow rates means that the formation fluid has ceased to flow altogether.

The natural gas samples from the inside of the casing at surface (taken by GChem and reported in the Vapour Intrusion Analysis Reports since 2017) indicate that the gas is coming from a thermogenic formation.

I find that the Vent Nanny data and Vapour Intrusion Analysis Reports provided by Imperial show that the existing abandonment of the Jean Marie B-48 well is not isolating the oil and gas bearing zones or the pressure zones intersected by the wellbore, as there is thermogenic gas inside the casing at surface and the pressure in the wellbore, while fluctuating, is increasing over time.

Environmental Impact of the Well - Gas Migration

The Vapour Intrusion Analysis Reports confirm the presence of gas migration outside the wellbore.

The sampling reported on in the Vapour Intrusion Analysis Reports was done at different times of year and in different locations. Therefore, the results cannot be compared from year to year to show a trend over time.

While Imperial's letter of May 3, 2021 indicates that it has not observed negative impacts on the vegetation surrounding the well from the gas migration, this does not negate the findings of the Vapour Intrusion Analysis Reports.

Imperial hypothesizes that the gas migration at the well may decrease to zero over time but has not provided any evidence to support this hypothesis.

I find that the Vapour Intrusion Analysis Reports show that formation fluid (gas) is escaping the wellbore and causing gas migration at the Jean Marie B-48 wellsite. This gas migration is an unauthorized discharge, emission or escape of petroleum. It is also a serious gas migration as defined in section 4 of the Guidelines.

Environmental Impact of the Well - Ground Water Protection

The 1969 Final Well Report for the Jean Marie B-48 well indicates that the well has a surface casing that extends to 141.1 mKB (meters below Kelly Bushing). The remaining wellbore has no casing and extends to 785.2 mKB.

Imperial has not provided evidence that the surface casing extends far enough below ground to isolate the groundwater or information on the salinity / potability of this groundwater.

Section 6B of the Guidelines states that, if no data is available on the groundwater and its salinity, groundwater protection must extend to 600 meters below the surface.

The confirmed gas migration at the wellsite indicates that gas has already exited the wellbore and contaminated the surrounding soil. Imperial has not sampled the groundwater near the well to determine whether it has been contaminated.

Therefore, the three existing cement plugs and surface casing have not prevented gas from exiting the wellbore and potentially contaminating groundwater.

I find that Imperial has not demonstrated that potable water zones intersected by the Jean Marie B-48 wellbore have been isolated or that gas migration has not affected groundwater surrounding the well.

Greenhouse Gas Emissions and Land Disturbance

Imperial's letter of May 3, 2021 argues that the greenhouse gas emissions associated with repairing and re-abandoning the Jean Marie B-48 well will be greater than those caused by leaving the well in its current state.

While Imperial states that other jurisdictions are researching this topic, it does not identify any other Canadian regulators that have accepted this approach.

Imperial did not provide any evidence to support the amounts of greenhouse gas emissions associated with repairing and re-abandoning the well shown in the slide titled GHG Considerations for Jean Marie B-48 Well Re-Abandonment. Nonetheless, it is possible that the greenhouse gasses associated with repairing and re-abandoning the well would be greater than those resulting from leaving the well in its current state.

Imperial's letter of May 3, 2021 also describes potential land disturbances associated with repair and re-abandonment of the Jean Marie B-48 well. Chief Stanley Sanguiez of the Jean Marie River First Nation (JMRFN) wrote a letter to OROGO, dated April 7, 2021, indicating that, based on discussions with Imperial, JMRFN supports Imperial's request to continue monitoring the well instead of completing the re-abandonment due to concerns over environmental disturbance.

Imperial's description of the potential land disturbances is based on establishing road access to the site, clearing the lease, bringing in a drilling rig and establishing a camp. Imperial did not present options to reduce the area of land disturbance created by the abandonment operations. Imperial also did not provide information on potential reclamation efforts to mitigate the impacts of the potential land disturbance.

I find that there will be land disturbance associated with repairing and re-abandoning the Jean Marie B-48 well. However, it may be possible to design the operation to reduce and/or mitigate those impacts. There will also be greenhouse gas emissions from the repair and re-abandonment process. These may be greater than the amount of greenhouse gasses emitted if the well remains in its current state.

Possible Failure of Repair and Re-abandonment

Imperial's letter of May 3, 2021 identifies the possibility that attempts to repair and re-abandon the Jean Marie B-48 well may not be successful in eliminating the gas migration associated with the well.

Imperial did not provide any evidence of the likelihood of such a failure or the factors commonly associated with such failures.

The Guidelines do not address the abandonment of a non-cased (open hole) well such as Jean Marie B-48. However, an acceptable well repair and re-abandonment program would, at minimum, include assessing the wellbore, installing pressure tested cemented casings to the full depth of the well and modern well plugs with cement on top to isolate pressure zones and potable water.

While a failure of the repair and re-abandonment program is a possibility, I find that Imperial has not demonstrated that there is a reasonable likelihood of a failure occurring in the case of the Jean Marie B-48 well. Furthermore, even if the program were not completely successful, it would result in a well that has effective engineered controls to isolate the pressure zones and potable water zones intersected by the wellbore and to allow for more effective monitoring in the future.

Conclusions

The Jean Marie B-48 well is:

1. Non-compliant with section 56 of the OGDPR because the oil and gas bearing zones and pressure zones are not isolated and because formation fluid is flowing through the wellbore and has escaped from the wellbore (gas migration);
2. Non-compliant with section 56 of the OGDPR because there is no evidence that potable water zones have been isolated; and
3. Discharging or emitting petroleum into the air and the soil surrounding the well, which meets the definition of a spill under section 61 of OGOA and an incident under section 1 of the OGDPR.

There will be land disturbance and greenhouse gas emissions associated with the repair and re-abandonment of the well. However, these factors do not change the well's non-compliance with the OGDPR and the triggering of section 62(1) of OGOA, which states that "no person shall cause or permit a spill on or from any area to which this act applies". The legislation and regulations do not identify land disturbance or greenhouse gas emissions as a reason for leaving a well in non-compliance with the OGDPR or allowing a spill to continue, even when considering the Regulator's mandate for environmental protection under section 2 of OGOA.

Imperial's arguments with respect to the potential for the failure of the repair and re-abandonment activities are not supported by the evidence. Furthermore, even a repair program that fails to eliminate the gas migration would still improve the overall state of the well.

Decision

Based on the requirements established in OGOA and the OGDPR, the evidence, and the findings and conclusions described above, I deny Imperial's May 3, 2021 request to continue monitoring the Jean Marie B-48 well for five years and confirm my direction that the well must be repaired and re-abandoned by March 31, 2022 and that Imperial must submit applications for an Operations Authorization and a Well Approval to carry out these activities to OROGO no later than August 2, 2021.

Sincerely,



Pauline de Jong
Regulator