

October 31, 2019

4900-4575-59240-09

Ryan Gill  
Canadian Natural Resources Ltd.  
2100, 855 – 2nd St SW  
Calgary, AB T2P 4J8

Dear Ryan Gill:

**RE: PRESSURE MAINTENANCE WATERFLOOD ORDER 68-09-003 AMENDMENT #7  
INGA FIELD – INGA “A” POOL UNIT #1**

The Commission is presently reviewing and amending waterflood approvals to conform to current requirements. The continued operation of a pressure maintenance waterflood in the Inga field, Inga “A” pool Unit #1 by Canadian Natural Resources Ltd. (CNRL) requires this review.

The Inga Inga “A” pool began production in June of 1966 from the well CNRL et al Inga 10-25-88-24 (WA 1776). 38 of the total 50 wells were drilled in the 1960s and the remaining 12 were drilled between 1970 and 2004. Approval for waterflood scheme was granted in December of 1968 and injection began in June of 1969 into 10 injection wells. Additional amendments were granted to allow conversion of a further 8 wells to injection wells. Currently, the majority of the wells (39) are either abandoned or zonally abandoned, 6 wells are suspended, and 5 are active. Of those active wells, 2 are oil producers, CNRL Inga 8-19-88-23 (WA 5095) and CNRL Unit Inga 6-33-87-23 (WA 1989). The other three active wells are injectors CNRL Unit Inga 6-19-88-23 (WA 1982), CNRL et al Inga 6-20-88-23 (WA 2393), and CNRL Inga 14-18-88-23 (WA 3224).

The following Orders are attached;

- 1) Order 68-09-003 Amendment #7 designating Pressure Maintenance Waterflood within the Inga field – Inga “A” pool, as a Special Project under section 75 of the *Oil and Gas Activities Act*, and
- 2) Order 68-09-003 Amendment #7- OTN approving Other Than Normal Spacing under section 65.1 of the *Petroleum and Natural Gas Act* for the subject area and formation.

This amended approval includes a maximum wellhead injection pressure (MWHIP), an ultimate pool pressure limit, restriction of injection for the purpose of oil recovery, the submission of annual packer isolation tests, and a requirement for annual reservoir pressure tests on the injectors. Only the three active injectors (WA 1982, 2393, and 3224) are approved for injection in the Order as all other injectors have been abandoned. The ultimate reservoir pressure has been limited to the initial pool pressure. Order condition 2i) requires a packer isolation test on the CNRL et al Inga 6-20-88-23 (WA 2393), as a 2019 test has not been received.

Please note that, as per section 75 of the *Drilling and Production Regulation*, a record of the volume of water injected and the MWHIP must be included on a Monthly Injection statement to the Commission via Petrinex not later than 20<sup>th</sup> day of the month following the reported month.

Should you have any questions, please contact Logan Gray at (250) 419-4465 or the undersigned at (250) 419-4430.

Sincerely,



Ron Stefik, EngL  
Supervisor, Reservoir Engineering  
Oil and Gas Commission

Attachments

**ORDER 68-09-003 – Amendment #7**

1. Under Section 75 (1) (a) of the *Oil and Gas Activities Act*, the Commission designates by Order the development and production of petroleum and natural gas from a pool using pressure maintenance waterflood enhanced recovery scheme within the Inga field – Inga “A” pool Unit #1 following area;

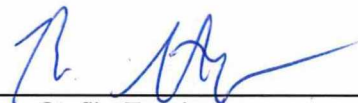
DLS	Twp 87 Rge 23 W6M: N/2 Sec 32 and Sec 33
	Twp 88 Rge 23 W6M: Sec 4-8, S/2 & NW/4 Sec 9, S/2 Sec 16, Sec 17-19, S/2 Sec 20 and S/2 Sec 30
	Twp 88 Rge 24 W6M: N/2 Sec 1, Sec 12, 13, N/2 Sec 23, Sec 24 – 26, Frac Sec 35 and Frac Sec 36
NTS	94-A-12: Block J - units 5-8, 15-18 and 27

2. Under section 75(2) of the *Oil and Gas Activities Act*, the special project designation in this Order is subject to the following conditions:

- a) The project unadjusted daily oil allowable (UDOAA) is 1151.5 m<sup>3</sup>.
- b) All associated produced gas must be conserved.
- c) Water may be injected into the wells CNRL Unit Inga 6-19-88-23 (WA 1982), interval 1647.1-1649.9 mKB, CNRL et al Inga 6-20-88-23 (WA 2393), interval 1632.4-1634.0 mKB, and CNRL Inga 14-18-88-23 (WA 3224), interval 1656.2-1659.3 mKB.
  - i) Inject only through tubing with a packer set as near as is practical above the injection interval.
  - ii) Not exceed an injection pressure, measured at the wellhead of 19,800 kPa for well CNRL Unit Inga 6-19-88-23 (WA 1982), 19,300 kPa for well CNRL et al Inga 6-20-88-23 (WA 2393), and 19,550 kPa for well CNRL Inga 14-18-88-23 (WA 3224), or the pressure required to fracture the formation, whichever is lesser.
- d) An annual reservoir pressure must be obtained from the injectors listed in (c), and submitted to the Commission within 60 days via e-submission.
- e) Not exceed an average pool pressure of 16,035 kPa measured at 768.0 meters subsea for the wells listed in (c).
- f) Cease injection for the well listed in (c) and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation
- g) Include the monthly injected volume, injection hours and the maximum injection pressure value for the well listed in (c) via Petrinex.
- h) Injection must cease upon termination of production from the pool.
- i) Complete and submit a pack isolation test on the well CNRL et al Inga 6-20-88-23 (WA 2393) before January 1<sup>st</sup>, 2020.

Advisory Guidance for 68-09-003 – Amendment #7

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion and frost inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required to be completed and submitted, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered and the injection pressure measured at the wellhead, as per section 74 of the Drilling and Production Regulation.
- IV. A monthly injection statement must be submitted to Petrinex not later than the 20<sup>th</sup> day of the month following the reported month, as per section 75 of the Drilling and Production Regulation.
- V. Seismic events must be reported and injection operations suspended as per section 21.1 of the Drilling and Production Regulation.



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Ron Stefik, Eng.L.  
Supervisor, Reservoir Engineering  
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 31<sup>st</sup> day of October 2019.




**ORDER 68-09-003 – Amendment #7 – OTN**

1 Under Section 65.1(2) of the *Petroleum and Natural Gas Act*, Other Than Normal Spacing within the Inga Field – Inga “A” pool Unit #1 is hereby approved within the following area;

DLS	Twp 87 Rge 23 W6M: N/2 Sec 32 and Sec 33
	Twp 88 Rge 23 W6M: Sec 4-8, S/2 & NW/4 Sec 9, S/2 Sec 16, Sec 17-19, S/2 Sec 20 and S/2 Sec 30
	Twp 88 Rge 24 W6M: N/2 Sec 1, Sec 12, 13, N/2 Sec 23, Sec 24 – 26, Frac Sec 35 and Frac Sec 36
NTS	94-A-12: Block J - units 5-8, 15-18 and 27

2 Under section 65.1(3) of the *Petroleum and Natural Gas Act*, I specify the following:

- a) the target area for an oil well completed within the project area is not nearer than 100 m to the sides of the Other Than Normal Spacing area,
- b) an oil well completed outside the specified target area may be subject to an off-target production penalty,
- c) oil wells drilled within the specified project area are not subject to spacing requirements.

  
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Ron Stefik, Eng.L.  
Supervisor, Reservoir Engineering  
BC Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 31<sup>st</sup> day of October 2019.