

December 12, 2019

3410-7600-59240-09

Earl Ward
ISH Energy Ltd.
900, 700 - 4th Ave SW
Calgary, AB T2G 3J4

Dear Earl Ward:

**RE: PRESSURE MAINTENANCE WATERFLOOD ORDER 96-09-003 AMENDMENT #10
DESAN FIELD – PEKISKO FORMATION – ISH WATERFLOOD PROJECT**

The Commission is presently reviewing and amending waterflood approvals to conform to current requirements. The continued operation of a pressure maintenance waterflood in the Desan field – Pekisko formation by ISH Energy Ltd. requires this review.

The discovery well, ISH et al Desan d-14-D/94-P-7 (WA 5906), was drilled in January of 1984 and began production in the following month. An additional 23 wells were drilled and completed into the pool in 1984 and 1985 and the remaining wells were drilled between 1995 and 2009. Approval for waterflood was granted on August 9th, 1996 and injection began in September of 1996 into the injector ISH et al Desan d-87-L/94-P-2 (WA 6161). Subsequent waterflood approval amendments were granted to allow conversion of an additional 15 wells to injection service.

- 1) Order 96-09-003 Amendment #10 designating Pressure Maintenance Waterflood within the Desan field – Pekisko Pool, as a Special Project under section 75 of the *Oil and Gas Activities Act*, and
- 2) Order 96-09-003 Amendment #10 - 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. The Commission has noted a significant increase in the annual VRR in the last 2 years. With cumulative VRR over 1.5, there is concern regarding the final pool pressure exceeding initial pressure. The ultimate reservoir pressure has been limited to the initial pool pressure.

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 20th 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 96-09-003 – Amendment #10

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 Desan field – Pekisko Pool following area;

NTS	94-P-2:	Block L – units 64, 65, 74-77, 84-87, 94-98
	94-P-7	Block D – units 4-8, 14-18, 24-28, 37, 38

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 (UDOA) is waived.
- b) All associated produced gas must be conserved.
- c) Water may be injected into the wells:

ISH Desan b-24-D/94-P-7	(WA 16611),	interval 599.5-618.0 mKB
ISH Desan a-A38-D/94-P-7	(WA 22426),	interval 606.5-637.5 mKB
ISH Desan a-16-D/94-P-7	(WA 14384),	interval 612.5-623.0 mKB
ISH Desan c-27-D/94-P-7	(WA 20000),	interval 610.0-630.0 mKB
ISH et al Desan d-96-L/94-P-2	(WA 6153),	interval 614.0-635.1 mKB
ISH Desan d-A26-D/94-P-7	(WA 16609),	interval 614.0-621.0 mKB
ISH et al Desan d-5-D/94-P-7	(WA 6054),	interval 615.0-628.5 mKB
ISH et al Desan d-87-L/94-P-2	(WA 6161),	interval 627.0-640.0 mKB
ISH et al Desan d-76-L/94-P-2	(WA 6158),	interval 628.5-636.0 mKB
ISH et al Desan d-85-L/94-P-2	(WA 6236),	interval 630.5-639.0 mKB
ISH Desan a-8-D/94-P-7	(WA 19997),	interval 628.5-645.0 mKB
ISH Desan a-18-D/94-P-7	(WA 19998),	interval 628.5-647.0 mKB
ISH Desan b-28-D/94-P-7	(WA 20001),	interval 629.0-644.0 mKB
ISH Desan d-94-L/94-P-2	(WA 14381),	interval 635.0-649.0 mKB
ISH et al Desan d-74-L/94-P-2	(WA 6269),	interval 635.0-641.0 mKB
ISH Desan a-65-L/94-P-2	(WA 20587),	interval 640.0-661.0 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 8,950 kPa for wells listed in (c), or the pressure required to fracture the formation, whichever is lesser.
- d) An annual reservoir pressure must be obtained from a number of wells equal to 20% of the number of active injection wells (rounded up), and submitted to the Commission within 60 days via e-submission.


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- e) Not exceed an average pool pressure of 4,933 kPaa measured at -6.0 meters subsea.
- 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.

Advisory Guidance for 96-09-003 – Amendment #10

- 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 20th 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.



Ron Stefik, Eng.L.
Supervisor, Reservoir Engineering
Oil and Gas CommissionDATED AT the City of Victoria, in the Province of British Columbia, this 12th day of December 2019.




ORDER 96-09-003 – Amendment #10 – OTN

- 1 Under Section 65.1(2) of the *Petroleum and Natural Gas Act*, Other Than Normal Spacing within the Desan field – Pekisko Formation is hereby approved within the following area;

NTS	94-P-2:	Block L – units 64, 65, 74-77, 84-87, 94-98
	94-P-7	Block D – units 4-8, 14-18, 24-28, 37, 38

- 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.



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 12th day of December 2019.