

August 14, 2024

6140-2885-32640-02

Brad Makowecki
Crew Energy Inc.
Suite 800, 250 – 5th Street S.W.
Calgary, Alberta
T2P 0R4

Dear Mr. Makowecki:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL; AMENDMENT #1
CREW HZ MONIAS B8-22-82-20 (WA #30266)
MONIAS FIELD – CADOMIN-NIKANASSIN FORMATION**

The subject well was purpose drilled for disposal into the Cadomin-Nikanassin formation on Feb 29th, 2020, and approved for disposal on April 2nd, 2020. The well commenced disposal in April of 2020 and has continued to date, with total cumulative disposal of 458 e³m³ of water.

On November 6th, 2023, Crew Energy Inc. applied for approval to dispose produced water into the nearby well, Crew HZ Monias H8-22-82-20 (WA #30383). During the application review, the Regulator conducted a thorough evaluation of the surrounding Cadomin-Nikanassin welltests and revised the estimate of initial reservoir pressure and fracture gradient. Additionally, it has been observed province-wide that the density of disposal fluid from Montney flowback operations has increased, resulting in a higher fluid gradient of 11.4 kPa/m being used to calculate the maximum wellhead injection pressure (MWHIP). As such, the MWHIP and maximum formation pressure have been amended, as per conditions 2b) and 2i), respectively.

Attached please find **Order 20-02-002 Amendment #1**, designating an area in the Monias field, Cadomin-Nikanassin, as a Special Project under section 75 of the Energy Resources Activities Act, for the operation and use of a storage reservoir for the injection of produced water. The Regulator recognizes the Cadomin and Nikanassin formations as a compound, unsegregated zone in this area for disposal use. This Order includes a number of detailed operational, measurement and reporting conditions. Disposal wells are subject to regular field inspection and audit. Contravention of a condition of this Order may be subject to enforcement under section 62 of ERAA, or suspension or cancellation of the Order under section 75(2)(b).

The BCER notes the current seismic monitoring array. As noted in Advisory Guidance item V, the permit holder must report seismic events and suspend operations in the circumstances outlined section 21.1 of the Drilling and Production Regulation.

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure. It is the responsibility of the permit holder make adjustments to wellhead injection pressure.

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

Sincerely,



Ron Stefik, P.L.Eng.
Supervisor, Reservoir Engineering
Energy Regulator

Attachments



ORDER 20-02-002 Amendment #1

1. Under Section 75(1)(c.1) of the *Energy Resources Activities Act*, the Regulator designates the operation and use of a storage reservoir for produced water, including flowback from fracturing operations, in the Monias Field – Cadomin-Nikanassin formation as a special project in the following area:

DLS	Twp 82 Rge 20 W6M	Section 14 – LSDs 9 – 16 Section 22 – LSDs 1, 2, 7, and 8 Section 23 – LSDs 3 – 6
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2. Under section 75(2) of the *Energy Resources Activities Act*, the special project designation in this Order is subject to the following conditions. The Permit Holder shall:
 - a) Inject water into the well Crew HZ Monias B8-22-82-20; WA# 30266 Cadomin-Nikanassin from 1,049.0 – 2,386.0 mKB MD.
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 10,525 kPag or the pressure required to fracture the formation, whichever is lesser.
 - c) Inject only through tubing with a packer set as near as is practical above the injection interval.
 - d) Continually measure and record the wellhead casing and tubing pressures electronically.
 - e) Alarm the casing-tubing annulus pressure monitoring system to indicate when casing pressure varies outside the normal operating range.
 - f) Cease injection and notify the Regulator at Reservoir@bc-er.ca immediately if there are any indications that hydraulic isolation is lost in the wellbore or formation.
 - g) Conduct and submit an annual Surface Casing Vent Flow test to the Regulator within 30 days of the completion of the test.
 - h) Conduct an annual reservoir pressure test on the formation in the subject well, with a shut-in period of sufficient length to provide data for calculation of the reservoir pressure, and submit a report of the test within 60 days of the end of the test.
 - i) Cease injection upon reaching a maximum formation pressure of 10,500 kPaa, measured at 919.5 mKB TVD.
 - j)
 - i) Perform a casing inspection log on the subject well and submit results to the Regulator within 30 days of the completion of logging, at an interval of not more than every 10 years, commencing from the date of initial disposal.
 - ii) Perform a hydraulic isolation temperature log on the subject well and submit results to the Regulator within 30 days of the completion of logging, at an interval of not more than every 5 years, commencing from the date of initial disposal.
 - k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Regulator approval.

Ron Stefik, P.L.Eng.
Supervisor, Reservoir Engineering
Energy Regulator

DATED AT the City of Victoria, in the Province of British Columbia, this 14th day of August 2024.



Advisory Guidance for Order 20-02-002 Amendment #1

- 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 conducted and the associated report must be submitted to the Regulator within 30 days of test completion, 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 disposal statement including the volume of disposal fluid, maximum wellhead injection pressure, and total operating hours must be submitted to the Regulator via 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 disposal operations suspended as per section 21.1 of the Drilling and Production Regulation.