INTERIM DIRECTIVE ID 91-3

28 March 1991

To: All Oil and Gas Operators
   All In Situ Oil Sands Operators
   All Drilling and Servicing Contractors

HEAVY OIL/OIL SANDS OPERATIONS

This directive amends certain minimum regulatory requirements for

- the drilling and servicing of heavy oil/in situ oil sands wells,
- equipment and spacing in the production of heavy oil/in situ oil sands, and
- measurement and accounting for heavy oil/in situ oil sands.

Heavy oil, for the purpose of this directive, is a crude oil product with a density of 920 kg/m$^3$ or greater at 15$^\circ$C. This crude oil density incorporates most of the areas of east-central Alberta, Figure 1, where heavy oil production operations are normally considered to occur.

Oil sands areas, Figure I, are defined in ERCB Informational Letters IL 84-7 and IL 89-3.

These regulatory amendments are a result of the Board's review of the recommendations from the Operating Practices Steering Committee (OPSC) for Heavy Oil/Oil Sands Operations. The OPSC has also developed Alberta Recommended Practices (ARPs) for heavy oil/oil sands operations which will be available from the Petroleum Industry Training Service in April 1991. The Board recognizes that this directive to some extent overlaps the procedures and equipment outlined in the ARPs. However, the Board considers it necessary to formally regulate those matters listed in this directive.

Unless exempted by this directive or ERCB approval, heavy oil/oil sands operations shall be conducted in accordance with the Oil and Gas Conservation Regulations and the Oil Sands Conservation Regulations.

Further information regarding this interim directive may be obtained from the Board's Drilling and Production Department, or the applicable area office.

This directive is effective 1 April 1991.

E.J. Morin
Board Member
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1 DRILLING BLOWOUT PREVENTION REQUIREMENTS

1.1 General

The requirements listed below amend certain drilling blowout prevention requirements as listed in
sections 8.130 through 8.143 and 8.149 of the Oil and Gas Conservation Regulations as they apply to the drilling of heavy oil and in situ oil sands wells.

A new Drilling Blowout Prevention System, Class IA, replaces BOP Class I for certain heavy oil/oil sands wells where an application for a reduction in conventional surface casing setting depth has been approved by the ERCB.

Notwithstanding surface casing reduction for heavy oil/oil sands wells, wells that have the potential for significant lost circulation, hole sloughing, high gas deliverability rates or that may be influenced by a secondary recovery scheme must set surface casing and be drilled in accordance with the Oil and Gas Conservation Regulations with a minimum Class II BOP System.

The blowout prevention and drilling requirements for oil sands core holes and evaluation wells in surface-mineable areas are specified in ERCB Interim Directive ID 89-2.

Requests for further information regarding drilling requirements for heavy oil/oil sands wells should be directed to the Drilling Section of the Board’s Drilling and Production Department at 297-8186, or the applicable area office.

1.2 Drilling Blowout Prevention System

1.2.1 Class IA BOP System

A Class IA drilling BOP system shall conform to the following minimum requirements:

1. Stack components as shown in Figure II.
2. A minimum 152-mm full opening remotely activated valve and 152-mm bleed-off line. The length of the bleed-off line may be reduced to 25 m from 50 m if the line terminates in a flare tank.
3. A daily function test shall be conducted on the annular preventer. The full opening valve shall be function-tested at least once per well. Pressure tests are not required.

1.3 Blowout Prevention Requirements

A Class IA BOP system shall be permitted for the drilling of crude oil or crude bitumen with a density of 920 kg/m$^3$ or greater and where a reduction in conventional surface casing setting depth has been approved by the ERCB.

2 SERVICING BLOWOUT PREVENTION REQUIREMENTS

2.1 General

The requirements listed below amend certain servicing blowout prevention requirements as listed in sections 8.144 through 8.148 of the Oil and Gas Conservation Regulations as they apply to the servicing of heavy oil and oil sands wells.

A new Servicing Blowout System, Class IIA, has been developed for heavy oil/oil sands wells to replace BOP Class I (heavy oil) where the expected bottom-hole pressure is less than 21 000 kPa and the expected H$_2$S release rate will be less than 0.001 m$^3$/s. In addition, the criteria for well servicing
BOP Class III for heavy oil/oil sands has been amended to a flow rate of 0.001 \( m^3/s \) \( H_2S \) from an \( H_2S \) concentration greater than 10 moles per kilomole.

The directive also recognizes the different servicing requirements for heavy oil/oil sands wells under primary vs. secondary recovery where

A. PRIMARY RECOVERY WELL, for the purpose of this directive, is defined as a well having a sandface reservoir pressure equal to or less than the hydrostatic pressure that would be exerted at the sandface if the well were filled with formation fluids, and

B. SECONDARY RECOVERY WELL (EOR), for the purpose of this directive, is defined as a well having a sandface reservoir pressure greater than that described above, by virtue of injection into the formation of fluid(s) other than water at ambient temperatures. This includes all wells that are a part of an active EOR project approved by the ERCB and any offset wells within 1 km of an EOR well within the project.

Requests for further information regarding servicing requirements should be directed to the Servicing and Completions Section of the Board's Drilling and Production Department at 297-3554, or the applicable area office.

2.2 Servicing Blowout Prevention System

A Class IIA servicing BOP system shall conform to the following minimum requirements:

1. Stack components as shown in Figure III.
2. Although a rig pump, tank or circulation manifold is not required during servicing operations, return fluids must be contained. If a rig tank is used it must be located a minimum of 15 m from the well.
3. A 50-mm kill line connected to the wellhead, spool or BOP port and extending a minimum of 15 m from the well is required during the servicing of a secondary recovery well. A bleed-off and kill line is not required during the servicing of a primary recovery well.

2.3 Blowout Prevention Requirements

1. The servicing of a heavy oil/oil sands well shall be conducted with

   (a) Class IIA BOP equipment where the bottom hole or injection pressure is less than or equal to 21 000 kPa and the maximum potential \( H_2S \) release rate for the well is less than 0.001 \( m^3/s \);

   or

   (b) Class III BOP equipment as specified by Schedule 10 of the Oil and Gas Conservation Regulations where the bottom-hole or injection pressure exceeds 21 000 kPa or the maximum potential \( H_2S \) release rate is equal to or greater than 0.001 \( m^3/s \).

2. The BOP components shall be tested to the pressures specified in section 8.147 of the Oil and Gas Conservation Regulations. A 10-minute test shall be conducted prior to servicing the first well of a program, and
(a) thereafter, every 7 calendar days in a secondary recovery well servicing program or every 30 calendar days in a primary recovery well servicing program;

(b) in addition, before servicing each well in a secondary recovery well servicing program, each BOP component shall be tested for at least 2 minutes to the pressures referenced in Regulation 8.147.

3. Bailing operations may be conducted to an open tank. The tank may be adjacent to the well but must be removed as soon as bailing operations are completed.

4. A blowout preventer, capable of closing on the rod string, is required while tripping rods on secondary recovery wells. The preventer must be hydraulically operated with the control(s) located no closer to the well than the driller's control panel. Should the preventer be operated using service rig hydraulics, an alternative method to operate the preventer must be provided with the control(s) located a minimum of 7 m from the well.

3 PRODUCTION EQUIPMENT AND PROCEDURES

3.1 General

The requirements listed below amend certain production equipment requirements as listed in sections 7.060, 7.070, 8.030, 8.090 and 8.100 of the Oil and Gas Conservation Regulations as they pertain to production operations for heavy oil, and sections 6 and 7 of the Oil Sands Conservation Regulations for in situ oil sands operations. New requirements are specified for testing vent gas for \( \text{H}_2\text{S} \) from heavy oil/oil sands wells and facilities.

The criteria for establishing minimum requirements to produce sour gas at heavy oil/oil sands wells or batteries have been modified such that an \( \text{H}_2\text{S} \) release rate of 0.04 \( \text{m}^3/\text{h} \) is utilized instead of an \( \text{H}_2\text{S} \) concentration of 10 moles per kilomole.

Requests for further information regarding production operations should be directed to the Production Section of the Board's Drilling and Production Department at 297-8132, or the appropriate area office.

3.2 Hydrogen Sulphide (\( \text{H}_2\text{S} \)) Requirements

Where heavy oil or oil sands is produced at a well or received at a battery:

(1) the licensee or operator shall test all vent gas for the presence of \( \text{H}_2\text{S} \) as soon as possible but no later than 90 days of initial production and every third calendar year thereafter; and

(2) where \( \text{H}_2\text{S} \) is present in the vent gas, the \( \text{H}_2\text{S} \) release rate shall be determined each year using methods acceptable to the Board. The records of these determinations shall be made available to the Board upon request; and

(3) where the maximum potential \( \text{H}_2\text{S} \) release rate is equal to or greater than 0.04 \( \text{m}^3/\text{h} \),
the requirements of sections 7.060 and 7.070 of the Oil and Gas Conservation Regulations and sections 6 and 7 of the Oil Sands Conservation Regulations shall be complied with, except that

- the H₂S may be burned in a minimum 4-metre flare stack or incinerator, or such greater height, required to ensure that ambient concentrations specified by Clean Air Regulations are not exceeded.

3.3 Fired Equipment and Engine Exhausts

The licensee or operator shall comply with sections 8.090 and 8.100 of the Oil and Gas Conservation Regulations, with the following exceptions:

1. No open flame shall be permitted within 25 m of a heavy oil/oil sands well, storage tank or other source of ignitable vapour including Board-approved desand and ecology pits utilized for waste oil storage.

2. No oil storage tanks, or desand and ecology pits, may be located within 25 m of a heavy oil/oil sands well unless approved by the Board or its authorized representative.

3. Tank heaters are permitted in heavy oil/oil sands storage tanks to facilitate shipping of the product.

4. An exhaust pipe from an internal combustion engine, located within 25 m of any heavy oil/oil sands well, shall be constructed such that the end terminates

   a. at least 1 metre from the wellhead, and directed away from the well. Where the exhaust pipe is used for heating it should be sloped to allow drainage of condensation,

   b. at least 1 m outside any engine enclosure.

5. Diesel engines operating within 25 m of an oil sands/heavy oil well, process vessel or production storage tank must be equipped with an adequate air intake shut-off valve.

3.4 Prevention of Losses

1. The area surrounding a tank or groups of tanks may be contoured to contain the volume of the largest tank in lieu of constructing a dike or firewall.

2. Surface flow lines at single well facilities must be adequately marked or buried to prevent damage from equipment working on lease.

4 MEASUREMENT AND REPORTING REQUIREMENTS

4.1 General

The requirements listed below amend certain requirements as listed in sections 7.020, 7.030, 12.030,
12.150, 14.110 and 14.140 of the Oil and Gas Conservation Regulations and sections 15, 39, 40, 44 and 45 of the Oil Sands Conservation Regulations as they apply to both the measurement and reporting of production from heavy oil/oil sands wells.

The necessary amendments largely reflect a move away from conventional measurement and reporting at the well level and provides for some reduction in well measurement accuracy where conventional accuracy guidelines are not warranted. In recognition of the varying need for and accuracy of well-level production measurement and reporting in heavy oil operations, a system of classifying operational scenarios has been developed that makes provision for group or battery-level reporting. This system presents three classifications under which measurement and reporting needs are assessed having regard for royalty matters, working interest and offset equities, and engineering needs.

To summarize, a Class I scenario would be one in which royalty and equity concerns require accurate well-level measurement such that measurement and reporting requirements remain the same as for conventional oil production operations.

A Class II scenario would be one in which royalty concerns are low but production measurement and reporting is required for equity or engineering purposes. A reasonable degree of accuracy is therefore required but some latitude exists to provide for operational flexibility.

A Class III scenario represents one in which royalty, equity, and engineering concerns do not exist and production measurement and reporting can be performed on a group or facility basis to fit the operator's needs. Further details on the criterion for determining the classification are outlined in ARP 3.4.2.

The Board is prepared to approve measurement systems and procedures, reduced from conventional oil measurement requirements, under this classification system. Most impacted by the classification system are requirements for the level of production measurement and reporting (ie. well vs. group vs. battery) and well test frequencies. The determination of the classification is judgemental and requires agreement between the ERCB and the operator.

Requests for further information regarding measurement and reporting requirements for heavy oil/oil sands wells should be directed to the Production Section of the Board's Drilling and Production Department at 297-8448 or 297-7232.

4.2 Testing of Wells in a Battery

The following minimum requirements amend section 7.030 of the Oil and Gas Conservation Regulations, specific to heavy oil/oil sands:

(1) Where a battery or group of wells receives flow lined heavy oil and the production is commingled before measurement, the operator of the battery shall test each well or group of wells in accordance with this section.

(2) The minimum duration of each well test shall be the lesser of 24 hours or the time required to obtain four consecutive data points which result in normalized test rates determined as follows:
(a) within 5 per cent of the mean of the four test rates, for total fluid production greater than 15 m$^3$/d, or

(b) within 10 per cent of the mean of the four test rates, for total fluid production less than 15 m$^3$/d.

(3) The minimum test frequency for all wells producing to a proration battery under primary production or waterflood operations shall be

(a) two tests per month where royalty or equity, and engineering concerns exist, or

(b) one test per month where accurate measurement is required solely for engineering purposes, but

(c) the licensee may be exempt from testing where it can be shown to the satisfaction of the Board that well test information is not needed for royalty, equity, or engineering purposes.

(4) The minimum test frequency for wells producing to a proration battery under thermal production shall be two tests per month; however,

(a) the licensee may be exempt from the requirement for such tests during periods of flowback where temperatures preclude testing, and

(b) the licensee may be exempt from testing where it can be shown to the satisfaction of the Board that well test information is not needed for royalty, equity, or engineering purposes.

### 4.3 Metering and Measurement of Gas

The following minimum requirements amend section 14.040 of the Oil and Gas Conservation Regulations, specific to heavy oil/oil sands wells:

Where heavy oil/oil sands is produced at a well, battery, or group of wells,

(1) the licensee of the well, battery, or group of wells shall accurately measure all gas produced in association with the heavy oil or oil sands with an approved gas meter;

(2) the licensee shall be exempt from subsection (1), subject to the condition that it supply to the Board satisfactory estimates of the volumes of the gas produced in accordance with subsections (3) and (4);

(3) within Designated Oil Sands Areas, associated gas production may be estimated, at the point of collection or emission, as follows:

(a) for single well batteries, gas production shall be estimated on the basis of an initial, representative, 24-hour GOR test performed on the well within 6
months of the on-production date. The GOR shall be updated on an annual basis if greater than 100 m³/m³, and every 3 years if less than 100 m³/m³;

(b) where associated gas from a number of wells is flow lined to a central point and total gas rates at the point of collection or emission are less than 2000 m³/d, gas production shall be estimated on the basis of a group or battery GOR determined on an annual basis without allocation to individual wells;

(4) outside Designated Oil Sands Areas, associated gas production shall be determined for each well by representative 24-hour GOR tests where well gas production is less than or equal to 2000 m³/d. The GOR tests shall be updated

(a) annually, where the total well gas rate is less than or equal to 500 m³/d,

(b) semi-annually, where the total well gas rate is less than or equal to 1000 m³/d and greater than 500 m³/d, or

(c) monthly, where the total well gas rate is less than or equal to 2000 m³/d and greater than 1000 m³/d.

4.4 Measurement of Test Oil Production

The licensee or operator of a battery or group of wells shall comply with section 14.110 of the Oil and Gas Conservation Regulations, except

(1) a calibration or re-calibration required by subsection (1) or (3) of section 14.110 pertaining to initial calibration or annual re-calibration may be performed, on the meter only, in the shop using water as the calibration fluid, against a tank, master meter, or other approved method or device which will provide a meter factor, and

(2) calibrations shall be made using a documented calibration procedure.

4.5 Measurement of Water

The licensee or operator shall comply with section 14.140 of the Oil and Gas Conservation Regulations, except where a product analyser is used to determine water production, the licensee shall calibrate the instrument annually using a documented calibration procedure.

4.6 Release of Information

The Board shall make records, reports, or information available to the public in accordance with section 12.150 of the Oil and Gas Conservation Regulations, except that the word "well" in subsection 2(d) shall be replaced by the phrase "well, battery, or group of wells" to provide for battery or group production reporting.

In addition, the Board shall make records, reports, or information available to the public in accordance with section 15 of the Oil Sands Conservation Regulations, except that the word "well" in subsection 1(b) shall be replaced by the phrase "well, well pad, or other appropriate grouping of
wells" to provide for group production reporting.

4.7 Production Operations

The licensee or operator shall comply with section 39 of the Oil Sands Conservation Regulations, except

(1) subsection (1) requiring application and approval of the method for determining well-level production is amended by replacing the word "well", as it pertains to production, with the phrase "well, well pad, or other appropriate grouping of wells",

(2) subsection (2) requiring a procedure for allocating production back to individual wells is amended by replacing the word "wells" with the phrase "wells or groups of wells", and

(3) the licensee or operator shall be exempt from subsection (2) of section 39 where it can be shown to the satisfaction of the Board that allocation of production back to individual wells or groups of wells is not needed for royalty, equity, or engineering purposes.

4.8 Records and Reports of Operations and Production

The licensee or operator shall comply with section 12.030 of the Oil and Gas Conservation Regulations, except the word "well", as it pertains to production, shall be replaced by the phrase, "well, battery, or group of wells" to provide for battery or group production reporting.

4.9 Daily Record and Reporting

The licensee or operator shall comply with Section 44 of the Oil Sands Conservation Regulations, except the word "well", as it pertains to production, shall be replaced by the phase, "well, well pad, or other appropriate grouping of wells" to provide for group level production reporting.

4.10 Reporting from a Facility

The licensee or operator shall comply with section 45 of the Oil Sands Conservation Regulations, except the licensee or operator shall be exempt from the requirement to prorate production among the individual wells or groups of wells where it can be shown to the satisfaction of the Board that such proration is not needed for royalty, equity, or engineering purposes.

4.11 Common Flow Lines

The licensee or operator shall comply with section 7.020 of the Oil and Gas Conservation Regulations, except subsection (3) is amended as follows:

- common flow lines may be used without approval where the reporting of production has been approved on a well group or battery basis.

Also, the licensee or operator shall comply with section 40 of the Oil Sands Conservation Regulations, except
- common flow lines may be used without approval where reporting of production has been approved on the basis of a well pad or other appropriate grouping of wells.
FIGURE II
DRILLING BLOWOUT PREVENTION SYSTEMS – CLASS IA
FOR HEAVY OIL AND OIL SANDS

Minimum 152-mm full opening remotely activating valve

Minimum 152 mm throughout

Line to flare tank must extend minimum of 25 m from well. A minimum 50-m line is required if a flare tank is not used.

Minimum surface/conductor casing of 20 m

NOTE:
1. Flanged or welded connections are not mandatory.
2. A manifold is not required.
FIGURE III

SERVICING BLOWOUT PREVENTION SYSTEMS — CLASS II A
Bottom-hole or injection pressure less than or equal to 21 000 kPa
H₂S release rate is less than 0.001 m³/s

ACCUMULATOR SYSTEM

To Pump or Tank

Full Opening Safety Valve

Ram-type Preventers

Wellhead

NOTE:
1. Pressure rating of preventers is equal to or greater than formation or injection pressure.
2. The positioning of subleg and blake same may be interchanged.
3. The preventer connection to the wellhead may be threaded.
4. If spool installed, the valve connection to spool may be threaded.
5. A flanged blowout preventer port (and valve below the lowest set of same may replace spool (valve may be threaded) on primary wells.
6. All threaded connections in the working spool shall be backwelded.
7. 50-m ann kill line is required during the servicing of a secondary recovery well.