EUB Requirements for Enhanced Recovery and Water Disposal

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EUB's mandate

- Energy conservation
- Safe operations
- Environment protection
- Fair opportunity to recover share of resources
- Information

EUB's Role in Water Allocation

- Provide support to AENV: the lead regulator of water (AENV approves, conditions and monitors water diversion)
- Ensure the effective use of water in enhancing oil/bitumen recovery
- Regulate oilfield activity to protect water
- Provide information to AENV and others
- Assist in communication and response to water issues

Water Use for Oilfield Injection

- Conventional oil reservoir – water is injected to push the oil to production wells.
- In Situ bitumen deposits – water is used to generate steam that is injected into the formation to allow the bitumen to flow to wells.

Conventional Enhanced Recovery

- Often can double primary recovery
- Need to maintain pressure & displace fluids
- Need to re-pressure pool, replace oil production (1 to 1), after breakthrough water is re-injected and makeup volumes needed to replace declining oil volumes
- Water needs generally mirror oil decline curve

In Situ Oil Sands

- Recover a resource that can not be recovered by primary production.
- Water is used to generate steam to allow the bitumen to flow to wells.
- Other mechanisms being researched.

EUB Legislation Conventional ER

- *Oil and Gas Conservation Act and Regulations* – governs enhanced recovery of conventional oil.

- Guide 65 contains the specific application requirements

Guide 65: Resources Applications Guide

- Application requirements for enhanced recovery (ER) for conventional oil reservoirs
- Includes applications for enhanced recovery and water disposal

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Guide 65 / ER Application

PURPOSE:

- Check technical appropriateness and test alternatives
- Confirm geological pool description
- Set reserves
- Check impact on offset mineral owners
- Assurance of adequate injection potential

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Conventional ER Feasibility

- All pools are screened by EUB and Industry to identify candidates for possible increased recovery opportunities.
- EUB production controls may be applied until it is shown that further optimization is not practical, or not in the public interest, or a successful project is in place.

Conventional ER Schemes

- 40 application per year for new or expansion of existing projects
- Add about one million cubic metres of incremental reserves
- Majority of existing ER projects are mature, with over half of the recoverable reserves produced

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Guide 65 - Surveillance & Reporting

If an ER application is approved then:

- Approval with conditions is issued
- Production, injection, and water source volumes are reported monthly
- Extensive discussion occurs between EUB and operator to ensure appropriate operation of the scheme

Conventional ER - Summary

- New conventional schemes are small but widespread throughout much of Alberta
- Provincial oilfield injection water needs expected to continue to decline (excluding oil sands)
- Tertiary operations may introduce non-water displacement but most will need some water

Guide 65 - Non-Saline Water Use

- If a non-saline water source is proposed, the status of the of Water Act Application is an EUB application requirement
- Water Act application should be filed before Guide 65 application
- If there is public concern with water source, the EUB application is held pending an AENV decision on the Water Act application
- If a non-saline water source is approved by AENV, the EUB will resume processing of the application

Guide 65 – Alternate Water Sources

- If a practical or alternate water source is not available, the pool may need to be produced under less effective primary recovery
- If partial volumes of water are available, project redesign, scheduling or partial voidage replacement may be appropriate

EUB Legislation In Situ Oil Sands

Oil Sands Act:

Section 10 governs oil sands recovery

- **Guide 23 defines the application requirements for commercial oil sands applications**
- **Production of > 2,000 cubic metres/day requires an environmental impact assessment (EIA)**

Water Use for In Situ OS Projects

- Most projects use groundwater to generate steam
- Trend toward use of saline groundwater
- Groundwater is more mineralized, so waste is generated by treatment:
  - lime sludge from softening
  - salt solids from desalinization
  - oilfield landfills/cavern disposal

Oil Sands – Recycle Requirements

- Water recycle requirements are defined in Informational Letter (IL) 89-5
- Recycle is encouraged where ever possible
- Required if water use is> 500,000 cubic metres per year. (1370 m3/day)
- Most recycle rates >80%
- Required recycle rates are included in scheme approvals

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In Situ Future Use

- In situ projects are increasing
- Overall unit of non-saline water use per unit of bitumen recovered is decreasing
- Early trend to saline water use – several new projects do not anticipate using non-saline water
- Recycle is required
- Water use is addressed in the EIA review

Water Disposal

- Water that can not be used for another purpose is returned to the subsurface
- Generally returned to formation of origin or deeper.
- May provide limited pressure support to producing reservoir.
- Application under Guide 65 – Resources Applications.
- Disposal wells must also meet the requirements of Guide 51: Injection and Disposal Wells.

Guide 65 – Water Disposal

Purpose:

- EUB ensures that the disposed water is contained in disposal zone
- No detrimental impact to resource recovery
- DISPOSAL ABOVE THE BASE OF GROUNDWATER PROTECTION IN NOT PERMITTED

Guide 51: Disposal & Injection Wells

Applies to conventional and oil sands water/steam injection wells and disposal wells.

Purpose:

- Well classifications – injectant type
- Well completions
- Logging and testing requirements
- Injection pressures are controlled and limited

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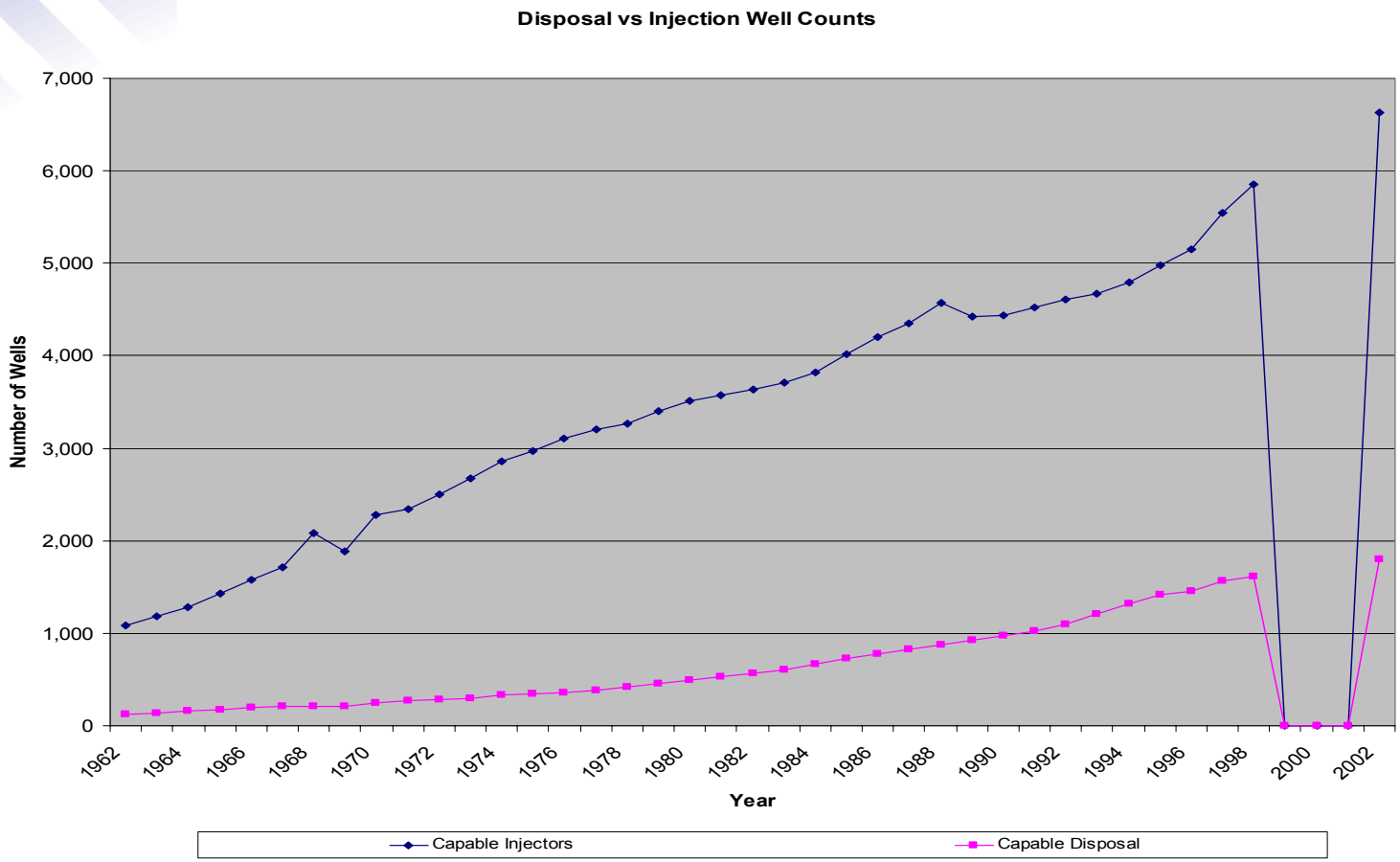
Disposal and Injection Wells



Energy Resources Conservation Act

- Section 26 & 27 (Rules of Practice) of the ERCA state that all parties whose rights may be directly and adversely impacted have the right to:

- Learn the facts about the proposed energy development.
- Have the opportunity to ask questions
- Have input into the decision

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