

SUMMARY WATER DATA – ALBERTA UPSTREAM OIL & GAS (O&G) INDUSTRY

DATA	SOURCE
TOTAL LICENCED VOLUMES IN ALBERTA: 9,510,955,000 m ³ . Of this figure: <ul style="list-style-type: none"> • 97% is surface water (9,227,619,000 m³) • 3% is groundwater (283,336,000 m³) 	AENV (2005)
TOTAL WATER ALLOCATION IN ALBERTA (includes surface and groundwater) (%) <ul style="list-style-type: none"> • Combined Agriculture 45.5% • Municipal 11.2% • Commercial 31% • Industrial (oil, gas, petroleum) 5.2%] • Injection (oil recovery) 1.8% } ~ 7.2% • Drilling (developing wells) 0.1%] • Other 5.2% <p>Σ - O&G is allocated to use 7.2% of the total licensed water. (Note: In 2006, only 30% of the allowable allocation was used (Source: CAPP <i>Best Management Practice</i>)</p>	CAPP (using AENV 2005)
GROUNDWATER ALLOCATIONS IN ALBERTA (2004 data: does not represent water use) <ul style="list-style-type: none"> • Agriculture: ~29% • Municipal: ~19% • Commercial (with cooling): ~9% • Drilling (developing O&G wells): 0.10%] • Industrial (O&G, petroleum): 19.34% } ~37% • Injection (Oil recovery): 17.93%] <p>Σ This is equivalent to 1.1 per cent of all licensed water in Alberta. (CAPP)</p>	AENV's <i>Focus on Groundwater</i>
<u>Water Use by Alberta's O&G Industry</u> <ul style="list-style-type: none"> • 7.2% O&G's allocation of total licensed water – licenses issued ensure water diversions are sustainable • 12% decrease in fresh water use for EOR (enhanced oil recovery) and in-situ projects from 2001 to 2005 • 18.3 million m³ Saline groundwater used for EOR and in-situ projects as an alternative to fresh water – almost doubled from 2001 to 2005 • ~90% water in major projects is recycled and reused – alternatives to fresh water must be investigated for all water use before licenses are issued 	CAPP (2006)
<u>Summary of O&G Industry Water Use</u> ¹ <ul style="list-style-type: none"> • O&G Industry is a comparatively small but important water user • Public concerns about water supply and industry use • Water use is vital to the Upstream O&G industry today and the industry is important to Alberta's and Canada's economy • O&G Industry water use shows historical & continual improvement • Sound regulatory/policy basis to manage industry water use but a more comprehensive inventory of groundwater resources is critical • O&G Industry water use needs to be put in context of overall use • Substantial improvements in water efficiency depend on technological and innovation 	

Water Use Trends for Upstream Oil and Gas

- Freshwater use for conventional EOR is declining
- Freshwater use for thermal EOR is increasing
- Saline water use has increased (AENV 2001)
- Continual Improvement in Industry Water Use

ALBERTA: TOTAL WATER ALLOCATED

~9.5 billion m³

~98% SURFACE water (~9.2 billion m³)

~2% GROUNDWATER (~283 million m³)

~7.2% O&G Allocated (713 million m³ (2004))

1/3rd used (2004)

Actual volume diverted: 57.1 million m³ – ground, surface, saline

~ 23.6 million m³ from surface water

~ 15.4 million m³ from groundwater (Source: EUB + Environment EMS Database 2004)

~6.2% allocated to O&G

~37.3% allocated to O&G

- ~1.1% of all licenced water
- Of AB total, injection < ½%

Freshwater: increase use for thermal projects

- Up to 7.9 million m³ in 2005 (from 7.2 million m³ in 2004)
- SAGD: water reuse reported between 85% and 93.3%

60% (915,000 bbls/day) production is water-assisted

Underground injection improves oil recovery:

- Without it, typically 15% recovery
- Enhanced (secondary, tertiary) production, typically 25% -30% more
- Ab Gov. policy → max. recovery for conservation

1972 to 2001 decline usage: from 88.7 million m³ from 47.5 million m³ (= 37 million m³ fresh and 10.5 million m³ saline or brackish)

Saline: increase use in conventional and thermal in last 30 years. In 2005, 7.2 m³ for conventional (from 27.4 million m³ of total water) and 3.2 million m³ for thermal (from 16.8 million m³ of total water)