



Risk Assessment in Upstream Oil and Gas - Case Studies



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Risk Assessments for Upstream Oil and Gas Closure in Different Settings

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Special Thanks

- Colleagues at Secure
- Other experts
- Clients

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Presentation Outline

- What is “closure” in the Upstream Oil and Gas industry?
- What is Risk Assessment?
- Commercial / Industrial Setting in BC
- Upstream Oil and Gas Setting in BC
- Commercial / Industrial Setting in AB
- Upstream Oil and Gas Setting in AB
- Case Study 1
- Case Study 2
- Case Study 3

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Upstream Oil and Gas Closure

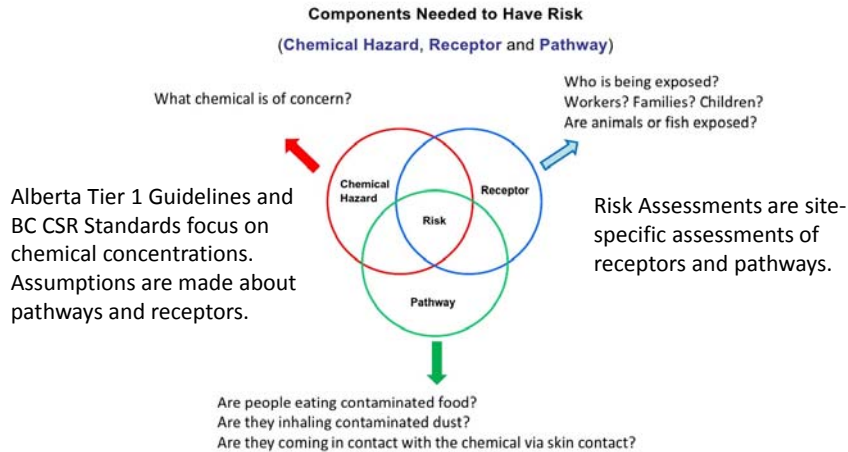
- Asset Retirement Obligation has been addressed
- Surface infrastructure decommissioned and removed, subsurface remediated, surface reclaimed, and land use restored
- Environmental liability associated with the site is considered to be zero
- Reclamation Certificate (AB)
- Certificate of Restoration (BC)



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What is Risk Assessment?

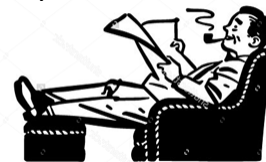


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BC Ministry of Environment

- Regulate the commercial / industrial sector
- Driven by banks (lending) and development permits
 - CSR system developed for lower mainland
- Properties are scarce and financially valuable
- Issue Certificate of Compliance (CoC)
 - 250 – 300 per year, about 50% are risk-based
- Established and prescriptive process ==> relatively level playing field
- Bar of entry is high (CSAP)



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BC Oil and Gas Commission

- Regulate Upstream Oil and Gas (mostly NE BC)
- Driven by ARO and liability management, and to a lesser extent compliance and landowners
- Properties often belong to Crown or have low financial value
- Issue Certificate of Restoration (CoR), Part 1 and Part 2
 - 85 – 220 per year, very few are risk-based
- Semi-prescriptive process ==> allows for “professional judgement”



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Alberta Environment and Parks

- “Regulate” the commercial / industrial sector
- Driven by banks (lending) and development permits
- Properties are not scarce, neither is land
- Issue Remediation Certificate (voluntary)
 - Physical remediation must occur
 - Comes with a government “guarantee”
- Process is clearly defined but still in its infancy
- Environmental regulation in Alberta is driven by oil and gas industry

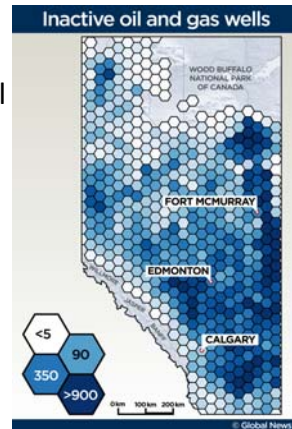


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Alberta Energy Regulator

- Regulate Upstream Oil and Gas
- Driven by ARO and liability management, and to a lesser extent compliance and landowners
- Properties everywhere, large range of financial values
- Issue Reclamation Certificate
 - 3000+ per year, few are risk-based
- Established and fairly prescriptive process allows for some professional judgement
- 50,000+ abandoned wellsites in Alberta



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O&G Producer – Drivers and Issues

- Driver #1 – Liability reduction
 - Low pressure
- Issue #1 – Quality of work
 - OGC and AER do not have a well-established risk-based closure process, so different consultants provide different answers
- Driver #2 – Development pressure
- Issue #2 – Developer pushback
 - People fear the unfamiliar
- Always an issue – timelines, cost certainty, liability return



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Case Study #1 – Some Problems are Massive

- Located 130 km NW of Fort St. John
- Oil production from 1962 to 1970, water disposal until 1987



- \$6M+ to landfill contaminated soil (PHC and salinity)

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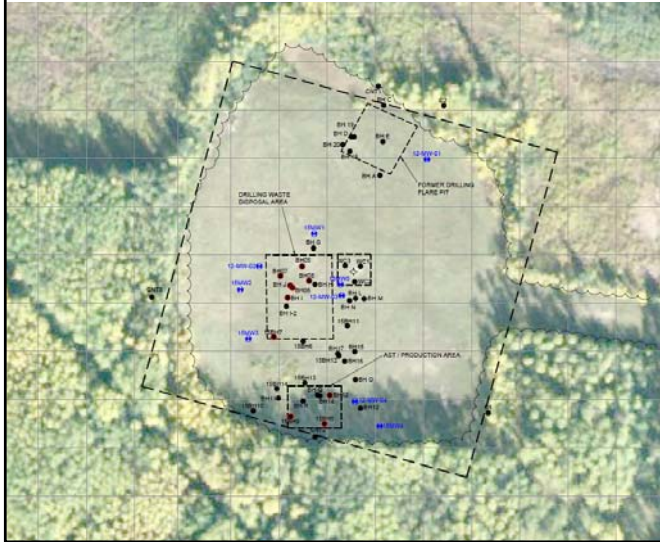
Case Study #1 – Timelines and Cost Certainty

- Various investigations, and three different (unsuccessful) remediation trials from 2003 to 2012
- Large volume of site information had been collected
- But not the required information for risk assessment
- Secure started work on the site in 2012
- Worked with client and OGC for four years to obtain risk-based closure
- Took longer and cost more than anticipated
- Considerable savings over traditional remediation

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Case Study #2 – Quality of Work and Liability Return

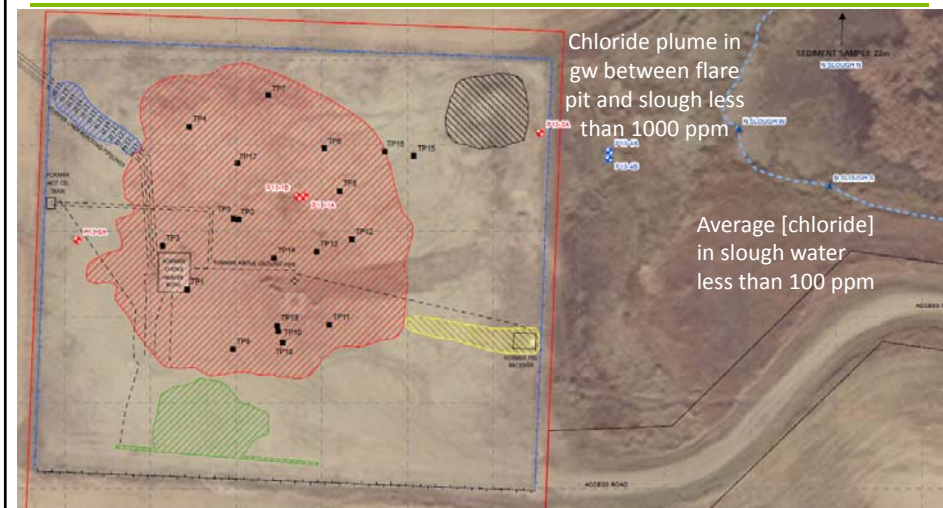
- Drilling investigations in 2012, 2013, and 2015



- Evolution of Secure and, to a lesser extent, the OGC

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Case Study #3 – Developer Pushback



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Case Study #3 – Developer Pushback

- All contaminated soil removed
- Residual chloride plume in groundwater
- Alberta Energy Regulator reviewed chloride plume risk assessment and gave approval in principle – this is an informal process for AER
- Developer was not comfortable accepting site due to potential liability associated with chloride plume
- Developer would be first party to be liable
- After two meetings and lengthy discussions, developer agreed to accept the site

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Finale – the perfect cocktail exists

	BC	AB
Commercial / Industrial	<p><u>MOE</u></p> <ul style="list-style-type: none"> -Established system -Comfortable with risk assessment -Certificate of Compliance provides level of comfort 	<p><u>AEP</u></p> <ul style="list-style-type: none"> -Remediation Certificate provides certainty regarding liability return
Upstream O&G	<p><u>OGC</u></p> <ul style="list-style-type: none"> -Two-stage process -Less expensive than MOE process 	<p><u>AER</u></p> <ul style="list-style-type: none"> -Lots of liability so innovation is welcome

- Env regulation in BC is largely driven by commercial/industrial
- Env regulation in AB is largely driven by upstream oil and gas

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Thank you

▪ Questions?

