

Remediation

- Removal of contaminants from the soil and groundwater at the site
- Contaminant concentrations compared to regulatory guidelines
- Technologies include in-situ methods (treat contamination without removing soils) and ex-situ methods (excavation and disposal to landfill, treatment onsite)
- Soil and groundwater samples collected after remediation to confirm contaminant concentrations meet regulatory guidelines



Big Valley Energy 00/10-06-048-20W4/0
Removal of Underground Storage Tank



Legal Oil and Gas 00/11-31-049-26W4/0
Remedial Excavation



Gammon Resources 00/13-21-043-22W4/0
Remedial Excavation



Big Valley Energy 00/02-07-048-20W4/0
Produced Water Impacts



Big Valley Energy 00/02-07-048-20W4/0
Petroleum Hydrocarbon Impacts

Reclamation

- Returning disturbed land to equivalent land use,
- Contouring the land to match surrounding landscape and to restore drainage,
- Topsoil replacement,
- Promote growth of desired vegetation (seeding, natural regeneration, seedling planting),
- Monitoring vegetation growth (weed management, interseeding).



Big Valley Energy 00/03-19-048-20W4/0
Stripping Topsoil



Big Valley Energy 00/12-06-048-20W4/0
Screening Rocks from Topsoil



Big Valley Energy 00/03-19-048-20W4/0
Seeding

Detailed Site Assessment

- For Alberta upstream oil and gas facilities/wellsites, the reclamation regulatory criteria requires a Detailed Site Assessment (DSA).
- This assesses the landscape, soil profile and vegetation growth at the well or facility site and access road.
- The reclaimed site is compared for similarities in landscape, soil, and vegetation with background locations.
- Once the specified criteria is met and documented, an application can be made for a reclamation certificate for the site.



Big Valley Energy 00/03-19-048-20W4/0
Reclaimed Site

Reclamation Certificate

- After an upstream oil and gas facility/wellsite has been decommissioned, assessed, remediated, and reclaimed, operators are to apply for a reclamation certificate.
- Landowner declaration of information disclosure required.
- Environmental reports (Phase 1 ESA, Phase 2 ESA, Remediation, DSA) are submitted to AER for review.
- If the specific requirements for assessment, remediation of contaminated land, and reclamation of soil disturbance and vegetation productivity are met, a Reclamation Certificate is issued for the upstream oil and gas facility/wellsite



New McDougal-Segur 02/11-12-020-03W5/0



Phoenix Resources 00/10-18-051-07W5/0

Environmental Consulting



What my friends think I do



What Society thinks I do



What Government thinks I do



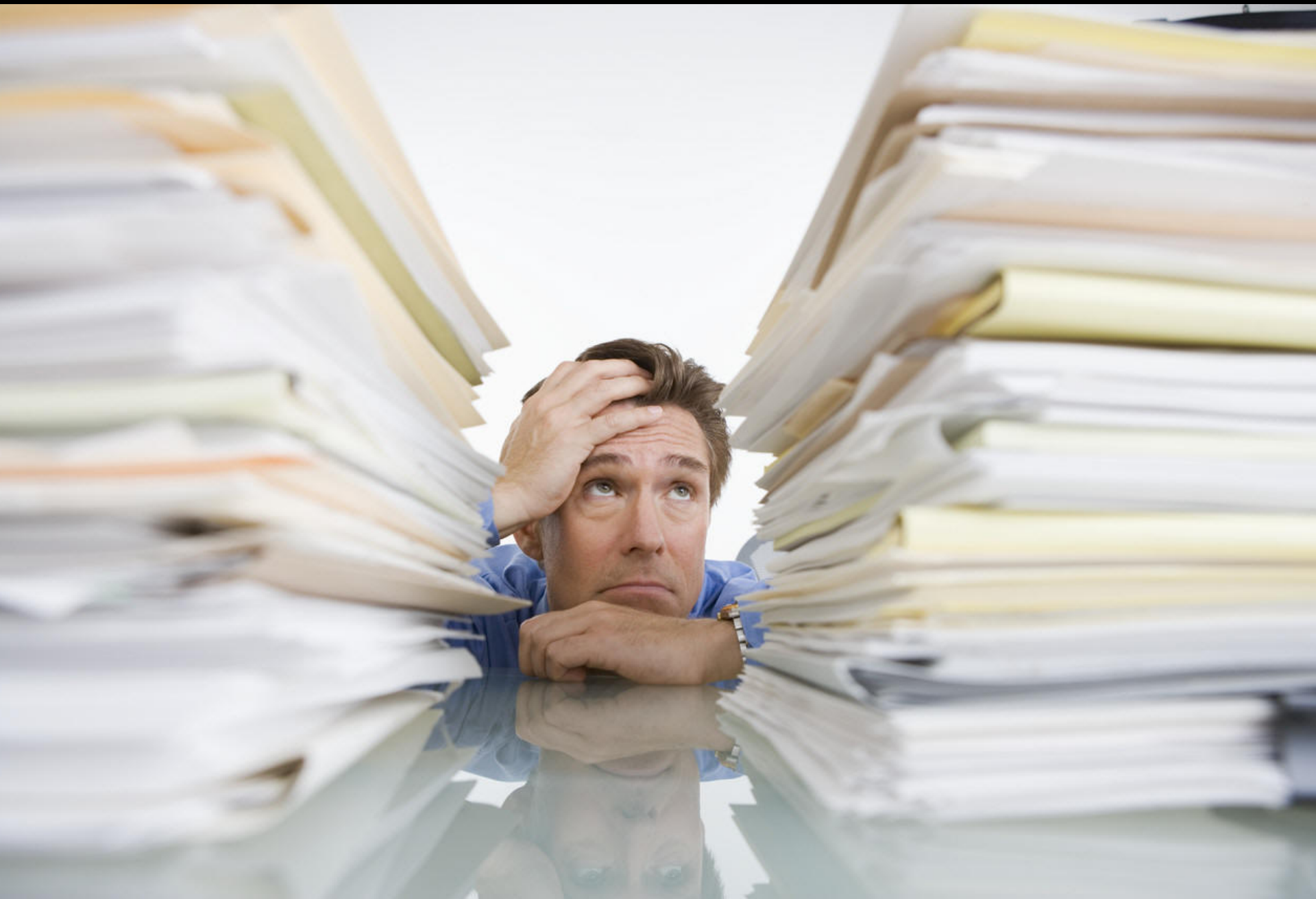
What my Clients think I do



What I think I do



What I do



Regulatory changes

Year	Regulatory Change
1990	Alberta Tier 1 Criteria for Contaminated Soil Assessment and Remediation released for use as draft
1994	Reclamation criteria developed
1995	1995 update to 1994 reclamation criteria Alberta Tier 1 Criteria for Contaminated Soil Assessment and Remediation finalized
1998	Review of 1994 reclamation criteria (not implemented)
2001	Draft pipeline reclamation criteria Review of 1994 reclamation criteria (not implemented) Standardized DSA form Mandatory Phase I assessments Revised Tier I/II remediation criteria (CCME and SCARG) SCARG and Upstream Petroleum Hydrocarbon Guidelines released
2003	Change in reclamation process; dropping of site inquiry and reliance on audit process Phase II environmental site assessment requirements Guidance on use of natural recovery reclamation techniques in the native prairie and forested zones Guidance on problem species in native prairie reclamation Guidance on minimal disturbance construction techniques
2004	Assessment of drilling waste area Information Letter Barite remediation guidelines
2005	Assessment of drilling waste area guidance (significant difference to 2004 IL)

Regulatory changes

2007	Revised Phase I and reclamation certificate application forms
	Increased reclamation certificate application fee (from \$300 to \$700)
	Forested reclamation guide
	Revised Tier I/II remediation criteria
2008	Revised assessment of drilling waste area
	Change in reclamation process; routine and non-routine applications
	Professional sign off requirement
2009	Revised assessment of drilling waste area
	Record of Site Condition reporting
	Revised barite remediation guidelines
2010	Remediation certificate development
	2010 Reclamation Criteria for Wellsites and Associated Facilities
	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
	Alberta Tier 2 Soil and Groundwater Remediation Guidelines
2011	Subsoil Salinity Tool, first release
	Subsoil Salinity Tool (SST) v. 2.5.2,
2012	Revised assessment of Drilling Waste Disposal Areas (AER Directive 050 revised)

35 Regulatory changes since 1990.

25 Regulatory changes since 2002.

Joffre Oils Ltd.

00/14-35-014-01W5/0

\$1,209,000 Remediation





Joffre Oils Ltd.

00/14-35-014-01W5/0

***Reclamation Certificate
received July 4, 2011***

after 14 Years and \$1,302,095.19

Summary

Orphan Well Association Benefits

- Handle clean up of orphan wells and sites which otherwise would be left to Alberta taxpayer.
- Encourage government to be proactive in enforcement and the prevention of orphans.
- Encourage industry to be proactive in conducting well abandonments and site reclamations.



***Orphan Well Association:
Dealing with the Legacy of
Abandonment and Reclamation***

Thank you

*Pat Payne, Manager
403-297-8555
pat.payne@aer.ca*