



NELSON Environmental Remediation Ltd.

ND Reclamation Conference 2017
Dickinson, North Dakota



→ Mobile Thermal Soil Remediation

→ Site Reclamation



NERglobal.com

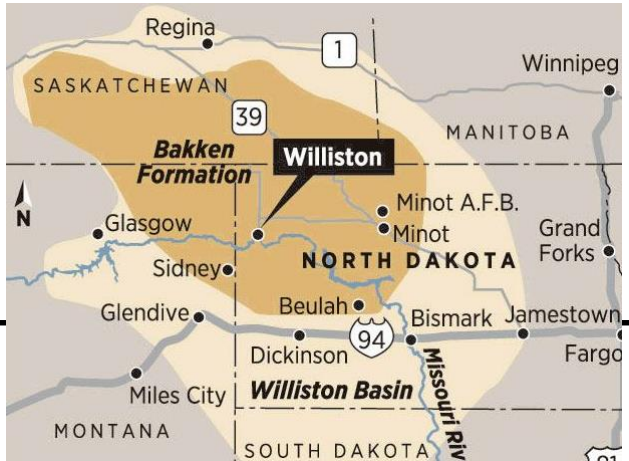
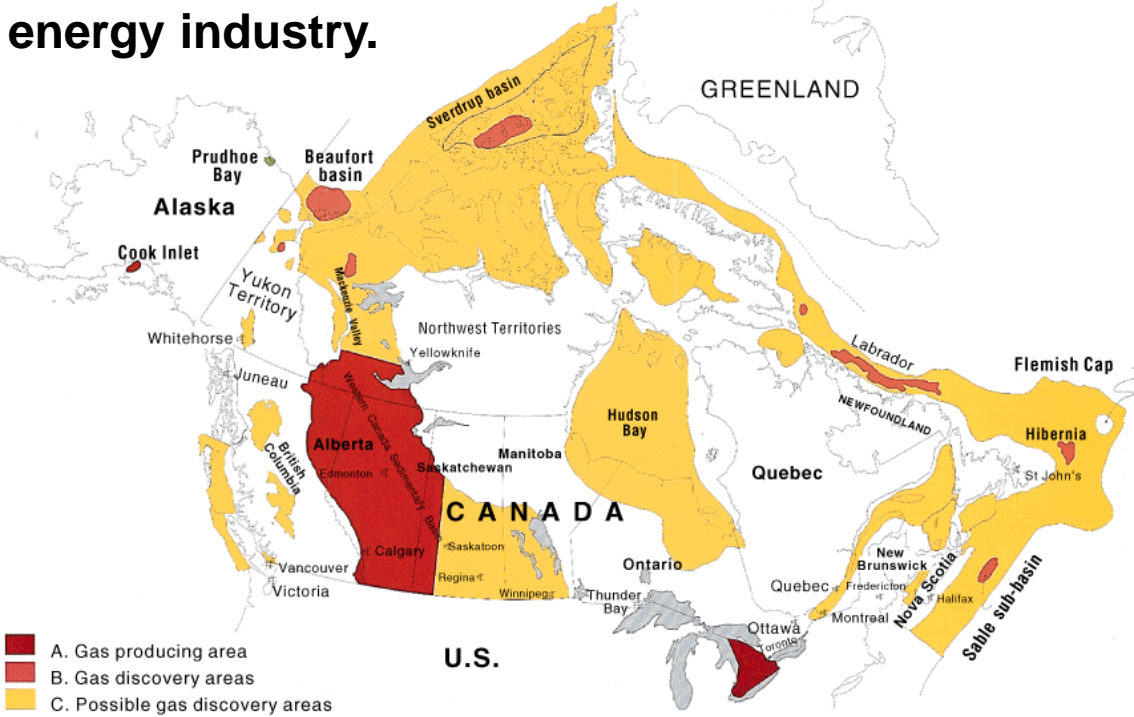
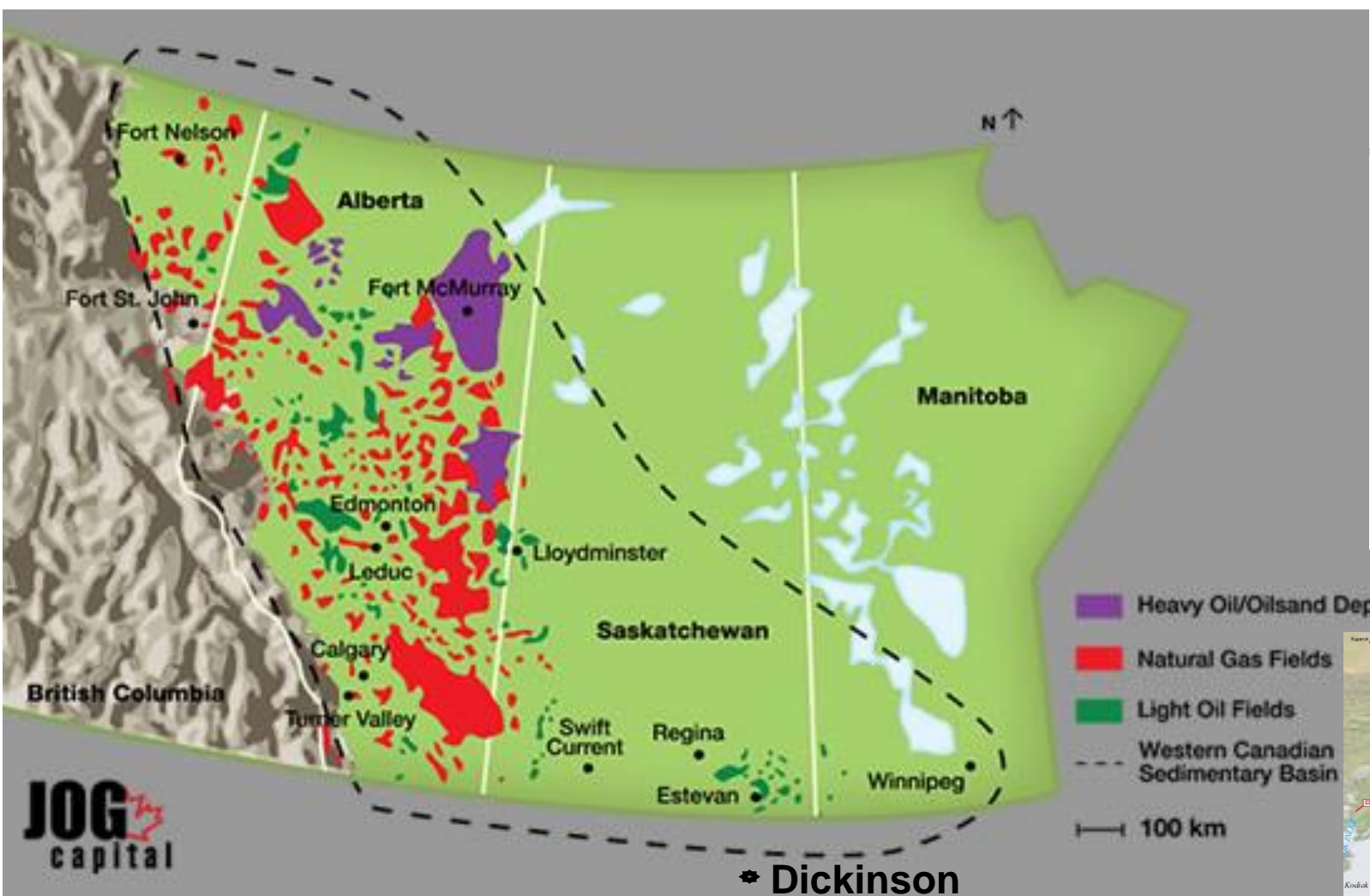


Global Customers.

Onsite Service.

Guaranteed Results.

Western Sedimentary Basin: The 540,000 sq mile Prairie home of the energy industry.



Global Customers. Onsite Service. Guaranteed Results.



A droplet of oil history:

Canadian petroleum industry developed in parallel with United States and we are inextricably linked.

First intentional oil well in N America was dug by hand in 1858 by James Miller Williams at Oil Springs, Ontario (80 miles NE of Detroit). This was amongst first oil found in British Empire (Canada founded later in 1867). Williams later founded "The Canadian Oil Company" which qualified as the world's first integrated oil company.

Williams struck oil at 66 ft, one year before "Colonel" Edwin Drake drilled the first American oil well in Titusville, Pennsylvania.

But Drake was smarter...he used an engine to drill, found oil at 69ft...wonder how long Williams would have kept hand-digging before deeming it a “duster”?...couldn't find how many other wells he “spudded”, probably too tired after the first to do a second...think about 66ft down-hole by hand.

To date, Canada has drilled nearly 600,000 oil wells plus opened oilsands mining, the largest mining operation on earth, as much mass moved as the next 10 biggest projects on earth combined (Caterpillar corporation loves Canada).

This brings 2017 production to 4M barrels/day, but...!!!!





Environmental regulation and other events shaped industry:

- 1867 Canada is founded...same year Seward scoops Alaska for the US while English and French sort out Ontario, Quebec, New Brunswick and Nova Scotia to form Canada...we missed Alaska, but got the rest of the neighborhood north of 49th parallel over time...we are OK with 2nd largest land mass in world
- 1868 Canadian Fisheries Act (some of the oldest environmental legislation in the world)
- 1870 North West Territories formed and Manitoba becomes Province, 1871 British Columbia, 1885 Canadian Pacific Railroad ties country together, 1898 Yukon Territory
- 1905 Alberta and Saskatchewan become Provinces...Ottawa said “no” to one province but “yes” to two...thought the pair as one might be too powerful



- 1910/20's Oil discovered in SW Alberta, Turner Valley starts the western Canadian oil industry
 - 1930 Alberta Natural Resource Act (recognized Province in control of resources and environment)
 - 1938 Alberta Energy Regulator formed (Turner Valley gas flaring degrades reservoir recovery, Calgary could see the night glow 50 miles away, you could drive 30 miles with your "lights off" at night)
 - Late 40's/50's Leduc #1 near Edmonton finds massive oil & gas deposits, many more pools discovered throughout Alberta, Saskatchewan and NE BC.
 - 1949 Newfoundland joins Canada
 - 1950/60's Holland leads Europe developing "Dutch Standards" for environmental management, the first true environmental movement underway...N America follows shortly behind
 - 1963 Alberta Surface Reclamation Act...first reclamation legislation, one of the oldest environmental acts directed in Alberta
 - 1969 US National Environmental Policy Act, and Canada National Lands Act...both countries advancing land use and environmental policy
 - 1970 US EPA formed, and 1971 Environment Canada formed...both countries advance environment with Federal departments
 - 1973 Alberta Land Reclamation Act...regulatory approval process added to reclamation industry
-
- 1983 Alberta Land Surface Conservation and Reclamation Act...save our precious topsoil!



- **1993 Alberta Environmental Protection and Enhancement Act (AEPEA)...contamination addressed, remediation industry begins...NELSON Environmental Remediation begins!**
- **2001-2003 Alberta Contamination assessment guide**
- **2002 Saskatchewan Environment Management Protection Act**
- **2007-2010 Alberta Remediation guidelines and criteria renewed**
- **2012 Canadian Environmental Assessment Act**

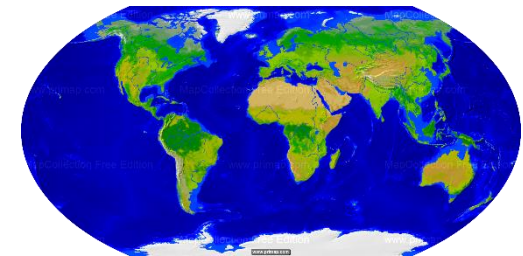
Alberta Legislature
Edmonton



With over a century of energy industry development and legislation:

- **The aging sedimentary basin and its' infrastructure creates remediation and reclamation needs for abandoned wells and failed production infrastructure**
- **70,000+ sites have now been remediated and reclaimed in Alberta alone, industry has gained expertise in oil and gas site reclamation across the prairies**
- **NELSON Environmental began field operations in 1994 and today is the only Canadian company delivering a full service onsite thermal remediation solution**
- **NELSON has become a global leader working throughout N America and internationally remediating millions of tonnes of contaminated soil from O&G, pipeline, petrochemical, utility, mining, industrial redevelopment, etc...if it spills or leaks, we fix it!!...**

...and guarantee “Clean Dirt, No Doubt!”





The NELSON meaning of “Clean Dirt, No Doubt!”

Benefits of TDU (Thermal Desorption Unit) Systems:

- **Safe predictable** results from 25+ years experience, ISO 14034 and ETV Certifications, approvals in many jurisdictions
- ***Value delivered at competitive cost to remediate organic contamination from soil of all types in all conditions and climates***
- ***Mobile onsite equipment recycling soil for beneficial re-use***
- ***Quality of treated soil***
- ***Liability management: soil remediated to criteria and***
>99.99% Destruction Efficiency of extracted organics



Mobilization & Setup



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Soil Excavation & Preparation



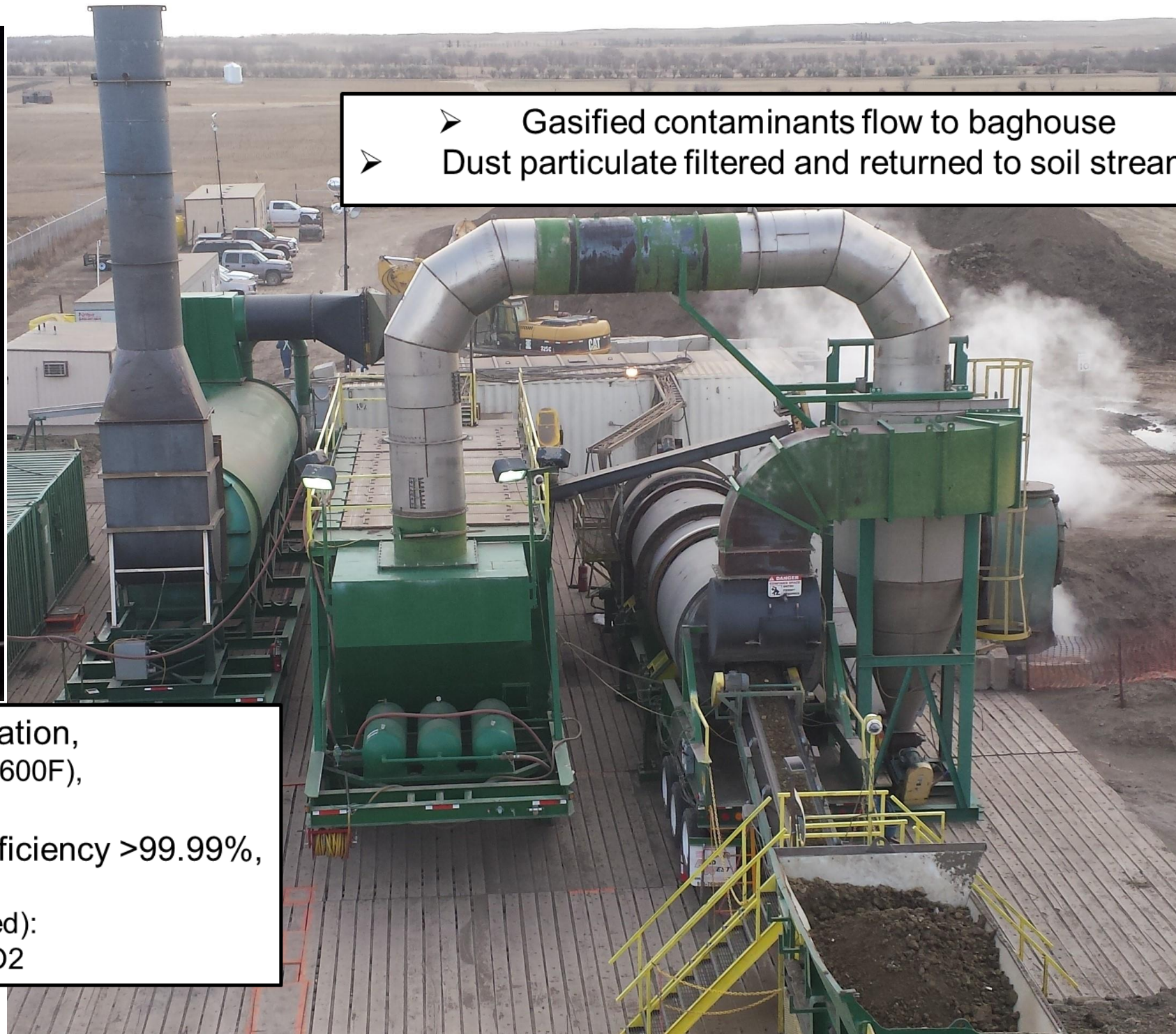
Soil Remediation – Rotary Kiln Desorption



- Weigh scale belt measures tonnage and feeds direct-fired counterflow kiln (solids and gasses flow opposite)
- 15 to 60+ T / hr depending on system sizing
- Soil heated to **200 – 500 °C** (400-900 °F) in kiln by various fuel
- Remediation by gasification of contaminants
- *Soil cooled, re-hydrated, discharged & stockpiled*
- *Very low residual contamination meeting regulatory criteria*



Emission Control and Thermal Oxidation



- Gasified contaminants flow to baghouse
- Dust particulate filtered and returned to soil stream

- Destruction by Thermal Oxidation,
- Contaminants heated to 870C (1600F),
 - Atmospheric O₂ added,
- 1-2 second retention yields destruction efficiency >99.99%,
 - Stack Emissions (Dry Corrected):
83-85% N₂, 7-8% O₂, 7-9% CO₂



Treated Soil Holding Piles



Soil has exceptional quality for
agricultural reclamation





Backfill & Compaction / Engineered Systems

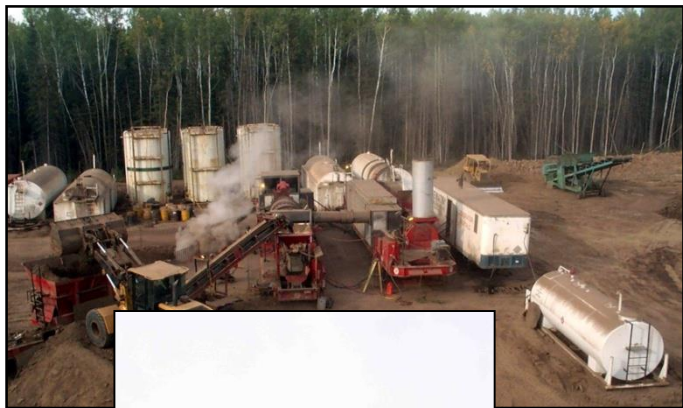


Soil has exceptional geotechnical
quality for civil engineering





Remote Harsh Operations (Cold or Hot Climate)





Projects...across many time zones from Arctic to tropics



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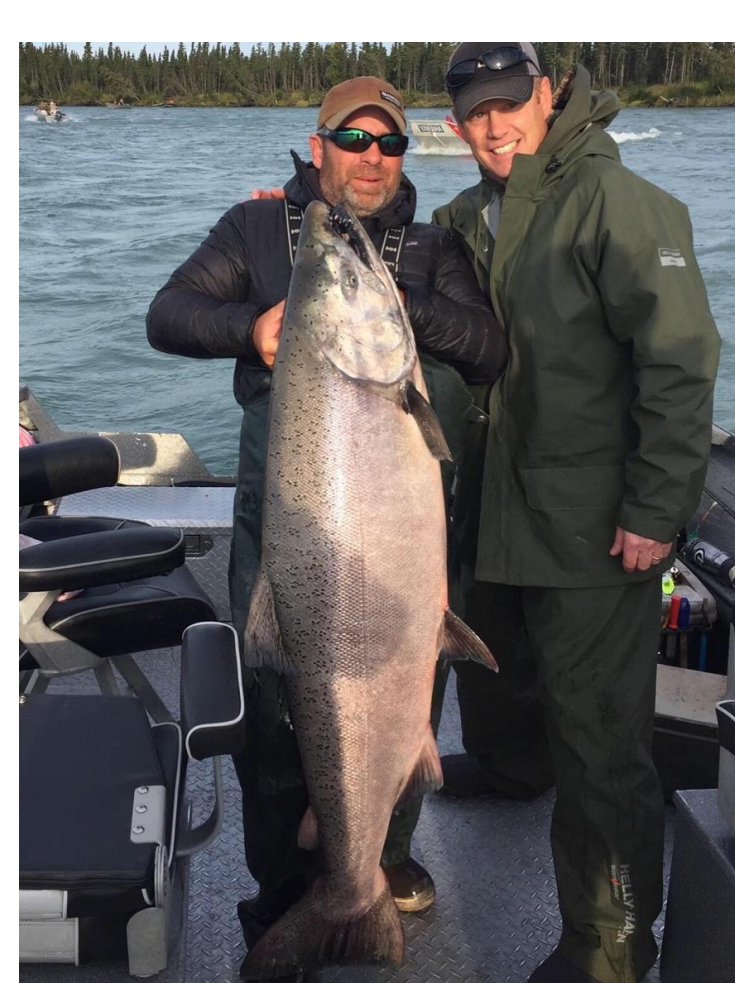
Remediation and reclamation industry developing around the world...



Global Customers. Onsite Service. Guaranteed Results.



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Clean Dirt, No Doubt!
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An invitation to visit Canada for our 150th celebration of Confederation July 1st 1867-2017:

Drive the prairies in July, visit Regina, Saskatoon and Edmonton (see Canadian football with the Edmonton Eskimos beating Saskatchewan Rough Riders)...see canola bloom for several hundred miles through the oilfields...see how similar our land is to N Dakota.

Head west through the boreal forest to Jasper, drive one of the greatest mountain roads in the world to Banff, experience the Rockies and the Columbia icefield, go up on the glaciers.

Calgary Stampede, Drumheller Tyrel Dinosaur museum, Cyprus Hills....etc.

Experience the Canadian Prairies and Rocky Mountains at their best.



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www.NERglobal.com