

# Yukon Oil & Gas

ANNUAL REPORT 2016




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*Cover/Back Page: A YGS geologist samples rock from a Lower Jurassic outcrop.*

*All photos Yukon government unless identified otherwise*



The Richardson Mountains in north Yukon.

## Introduction

**Welcome to the Yukon Oil & Gas Resources Annual Report, covering the 2016 calendar year.**

**Highlights for 2016 include:**

- The Fall 2016 oil and gas disposition process attracted 15 Request for Postings in the Kandik and Eagle Plain basins;
- Release of the Action Plan on the Responsible Development of Oil and Gas Resources in Yukon to implement government commitments to the Select Committee Report;
- Attendance at a variety of trade shows and conferences to promote Yukon's oil and gas industry;
- Passage in the Yukon Legislature of amendments to the Disposition Regulation and Royalty Regulations;
- At Kotaneelee in southeast Yukon one well licence was cancelled and other well licences and facilities were transferred to Apache Canada Ltd.;
- Release by the Yukon Geological Survey and partners of The Unconventional Gas Resources of Mississippian-Devonian Shales in the Liard Basin of British Columbia, the Northwest Territories and Yukon; and the establishment of earthquake monitoring equipment in the Liard Basin; and
- Canada's designation of all Arctic waters as indefinitely off limits to oil and gas licensing.

The Yukon government and the Oil and Gas Resources branch (OGR) continue dialogue and collaboration with Yukon First Nations with the objective of increasing understanding of the oil and gas industry and our regulatory framework for oil and gas development. OGR continues its work with the federal and territorial governments and industry partners on management of oil and gas resources in the Beaufort Sea offshore.



A Yukon Geological Survey seismic station near the Beaver River in the Liard Basin.

## Oil & Gas Overview

The Yukon government administers and controls onshore oil and gas resources in the territory. The federal government regulates the offshore Beaufort Sea resources.

The Yukon government's mandate is to promote responsible resource development balanced with environmental management and demonstrable benefits for Yukoners, and to promote oil and gas development outside the Whitehorse Trough and without fracking.

The Department of Energy, Mines and Resources (EMR) manages the natural resources and regulates development within the territory. OGR within EMR deals with all oil and gas matters. OGR is responsible for managing oil and gas resources, regulating oil and gas activity, supporting the responsible development of Yukon's oil and gas resources and the development of an emerging oil and gas industry. These actions are completed through substantive consultation and collaboration with Yukon First Nations.

In carrying out its responsibilities, OGR:

- Continues to work with First Nations on the common oil and gas regime;
- Conducts oil and gas rights dispositions;
- Manages existing oil and gas rights;
- Registers transfer of rights and security notices and licenses oil and gas activities and operations;

- Administers oil and gas royalties and resource revenues;
- Monitors and inspects operations for regulatory compliance;
- Develops and implements oil and gas legislation;
- Supports and coordinates capacity building, education programs and training initiatives related to oil and gas;
- Supports the growth of Yukon's service and supply sector;
- Negotiates benefits agreements;
- Raises awareness of Yukon's oil and gas potential and development activities;
- Represents Yukon's interests in offshore Beaufort Sea issues;
- Liaises with industry;
- Represents the Yukon government on intergovernmental committees dealing with oil and gas development and regulatory matters; and
- Reports on key oil and gas exploration and production statistics, market and investment information and industry-specific economic information.



W.E. Callahan Construction Company pipeline superintendent Bob Shivel makes the “Golden Weld” on the Canol pipeline in February 1944.

# History Of Yukon Oil & Gas

## *Onshore*

Responsibility for onshore oil and gas resources was transferred to the Yukon government from the federal government on November 19, 1998. Yukon's first well was drilled in 1958 in the Eagle Plain basin. Between 1960 and 2004, 60 more wells were drilled in the Eagle Plain, Beaufort Mackenzie, Peel Plateau and Plain, Kandik and Liard basins. In 2005, one well was drilled in Eagle Plain, and four wells were drilled in 2012-2013.

In 1942, construction of the Canol Pipeline from Norman Wells, NWT to Whitehorse began, and oil began flowing in 1944. However, this flow was shut down in 1945 at the end of the Second World War.

The Spectra Energy pipeline, constructed in 1972, transported natural gas to southern markets from the Kotaneelee gas field in southeast Yukon from 1978 until 2012. The Kotaneelee field produced 235 Bcf of natural gas for export, resulting in the collection of approximately \$46 million in royalties.

In the 1970s, interest began to construct a pipeline to move Alaska gas to markets in the lower 48. Foothills Pipe Lines Limited was granted permission to construct the Alaska Highway Pipeline Project following the Aleyeska pipeline route to Tok, Alaska and the Alaska Highway thereafter to Alberta.

This approved pipeline was never built, and focus has since shifted to an all-Alaska pipeline which would export liquefied natural gas to Asian markets.

The Mackenzie Gas Project (MGP) is proposed to run natural gas from north of Inuvik to Alberta. In June, the National Energy Board gave Imperial Oil until the end of 2022 to start building the long-delayed project. Spinoffs from construction and operation of the MGP would benefit Yukon.

## *Offshore*

The Beaufort Sea was first explored for hydrocarbons in the 1950s and is estimated to contain 40 trillion cubic feet of natural gas and 4,500 million barrels of oil. Offshore drilling began in 1972; 70 wells were drilled by 1980s; and 93 to date. Only one offshore well has been drilled in the last 23 years.

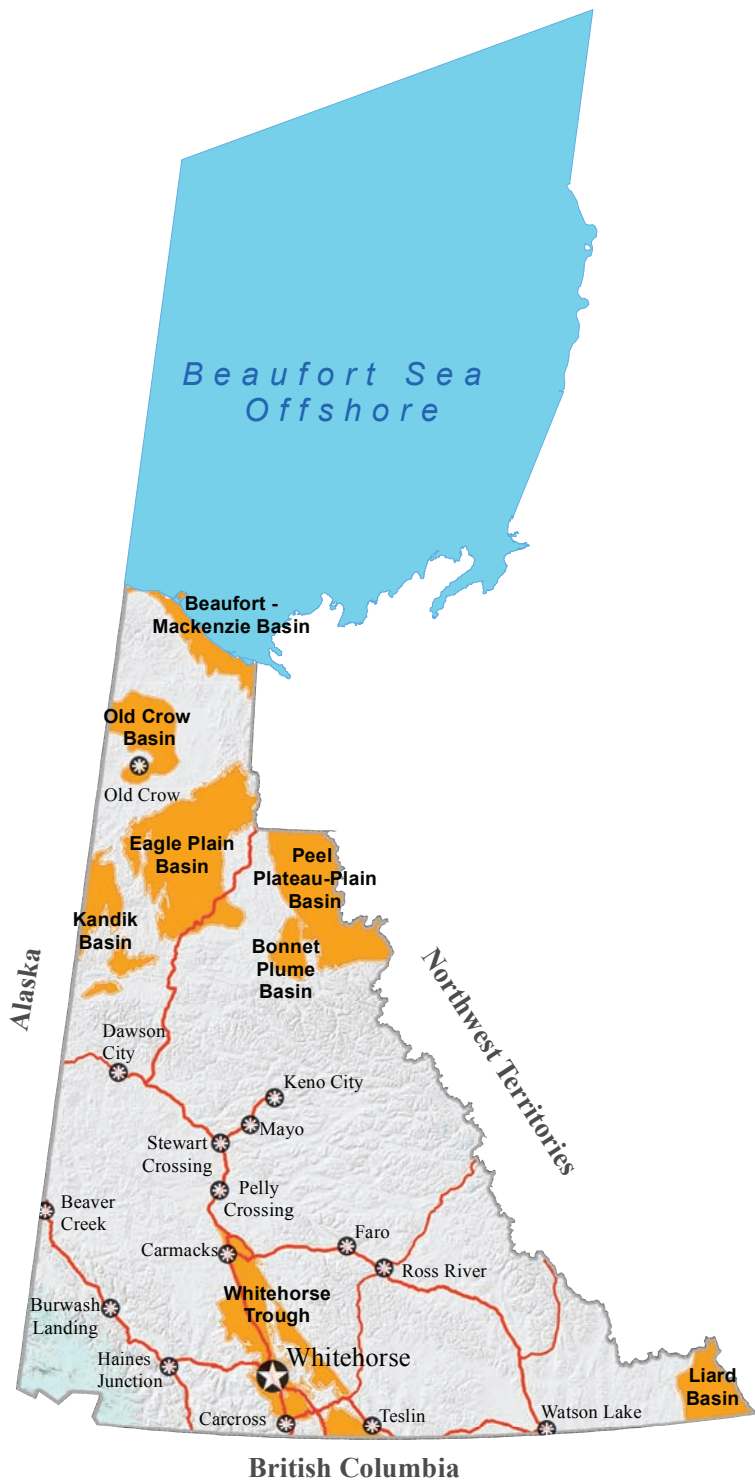
The 1993 Canada-Yukon Oil and Gas Accord committed both governments to negotiate shared offshore oil and gas management and revenue sharing in the Beaufort Sea.

# Yukon's Oil and Gas Basins and Resources

Hydrocarbon potential has been identified in Yukon in both offshore and onshore sedimentary basins. Onshore, these include Beaufort-Mackenzie, Old Crow, Eagle Plain, Peel Plateau and Plain, Kandik, Bonnet Plume, Whitehorse Trough and Liard Plateau. Offshore potential exists in the Yukon portion of the Beaufort Sea basin. The Yukon Geological Survey, in partnership with other government surveys and academic researchers, conducts hydrocarbon-related geoscience studies in several of these basins to increase knowledge of Yukon's oil and gas potential.

Yukon's eight onshore sedimentary basins contain an estimated 14.77 trillion cubic feet (Tcf) of conventional natural gas and 662.6 million barrels (MMbbls) of conventional oil. Offshore conventional resources in the Beaufort Sea include an additional estimated 40 Tcf of natural gas and 4,500 MMbbls of oil.

A spring 2016 assessment revealed a marketable, unconventional natural gas potential of 8 Tcf in Yukon's Liard basin (see page 10).



Conventional		
Onshore Resource Potential (mean in place)		
Basin	Gas (Tcf)	Oil (MMbbls)
Beaufort-Mackenzie	1.01	216.7
Old Crow	1.15	0.0
Kandik	0.65	99.3
Eagle Plain	3.40	329.0
Bonnet Plume	0.80	0.0
Peel Plateau and Plain	2.92	0.0
Liard	4.46	0.1
Whitehorse Trough	0.38	17.5
<b>Total</b>	<b>14.77</b>	<b>662.6</b>
Offshore Resource Potential (mean in place)		
Basin	Gas (Tcf)	Oil (MMbbls)
Beaufort Sea	40	4500

Unconventional		
Onshore Resource Potential (mean in place)		
Basin	Gas (Tcf)	Oil (MMbbls)
Liard	8.00	

A Water Resources hydrology technician measures stream flow in the Labiche River in southeast Yukon.



## Action Plan

In 2016, in response to the report by the Select Committee Regarding the Risks and Benefits of Hydraulic Fracturing, the Yukon government moved forward with a broad strategy in support of oil and gas development called the Action Plan on Responsible Oil and Gas Development in Yukon. The Action Plan had four pillars: engagement; First Nations relations; technical research; and effective regulatory regime.

The engagement strategy included posting of new information on our website between April and June 2016. In addition to the postings, two interactive story maps were created and a public talk on energy was held. The Yukon government also supported a Yukon Chamber of Commerce campaign on the advantages of using local energy sources to fuel Yukon's economy.

The Yukon government initiated discussions with affected First Nations on regulatory changes, engagement models, potential partnerships and future agreements.

Technical research included increased collection of baseline data such as seismic and water quality information in Yukon's two most prospective sedimentary basins - Liard and Eagle Plain. An economic assessment of the impact of shale gas development in Liard basin was done and the final report is under review.

## Events

### *TRADE SHOWS/CONFERENCES*

#### *Arctic Oil & Gas Symposium*

Yukon government representatives travelled to Calgary for the annual Arctic Oil & Gas Symposium in March. EMR's Minister and officials met with representatives from various other governments and industry, and the OGR director delivered a presentation during the symposium. Also of significance was the release of the Liard Basin unconventional resource assessment (see page 10).

#### *Mineral Exploration Roundup*

OGR staff teamed up with Mineral Resources branch at a booth at the annual Mineral Exploration Roundup in Vancouver in January. The conference brings together geoscientists, prospectors, investors, suppliers and First Nation partners to share ideas that will help shape the future of oil and gas and mineral exploration and development.

#### *Global Petroleum Show*

OGR staff once again hosted a booth at the Global Petroleum Show in Calgary in June. More than 40,000 delegates passed through the trade show portion of the event over three days.

# Oil & Gas Management

## DISPOSITION OF RIGHTS

### Onshore

Under the *Yukon Oil and Gas Act* and *Yukon Disposition Regulation*, the right to explore for and develop resources in oil and gas sedimentary basins is obtained through a competitive disposition process.

The Yukon government is committed to ensuring a strong environmental and socio-economic assessment process without unnecessary duplication of effort.

OGR conducted two disposition processes in 2016. The Fall 2016 Request for Postings (RFPs) closed on July 13, 2016, and 15 RFPs were received: 13 in the Kandik basin and two in the Eagle Plain basin (see map).

The disposition process consists of three steps:

- Request for Postings (RFP)
- RFP Review
- Call for Bids (CFB)

RFPs give industry an opportunity to identify areas in which they are interested in exploring for oil and gas. Land availability may change from time to time and interested parties are encouraged to review the Land Status Map with Oil and Gas Interests: <http://www.emr.gov.yk.ca/oilandgas/mapsdata.html>.

After the closing of an RFP, consultation on the postings is undertaken with affected First Nations, and government agencies. Following completion of consultation, the Yukon government may make changes to the size and/or number of postings prior to proceeding with a public review process. This process compiles input on environmental, socio-economic and surface access concerns regarding the postings. An RFP review was not initiated during 2016 with respect to the Fall 2016 RFP.

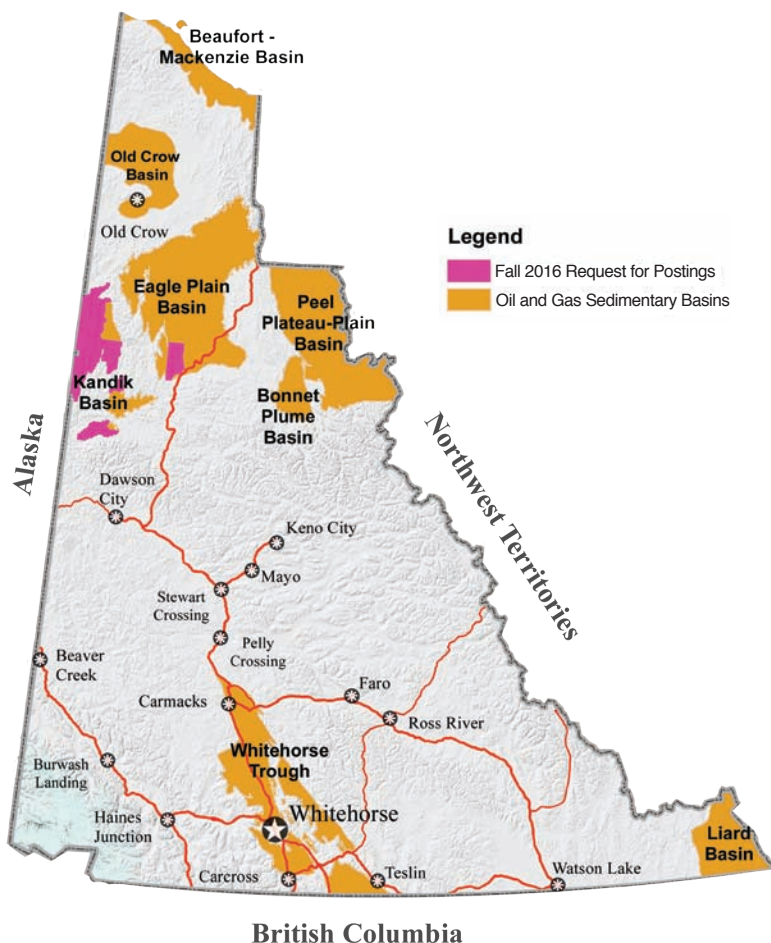
After the review, submissions from all sources are compiled into a Report to the Minister that includes a recommendation on whether or not to go forward to a CFB with some or all of the posting(s). If the EMR Minister approves a CFB, industry is invited to submit bids on the postings. Oil and gas permit(s) are then issued to the highest bidder.

Prior to any oil and gas activity, a permit holder is required to obtain all regulatory approvals and undergo environmental and socio-economic assessment through the Yukon Environmental and Socio-economic Assessment Board (YESAB).

The Yukon government may issue a permit for an initial term and a right of renewal for a second term for a period normally totaling 10 years. The EMR Minister can extend permits beyond 10 years under certain circumstances.

### Offshore

In December 2016, Canada designated all Arctic waters as indefinitely off limits to oil and gas licensing, to be reviewed every five years through a climate and marine science-based life-cycle assessment. Existing rights holders can continue to apply for and acquire licenses to undertake oil and gas activity, however, no new offshore rights will be issued in the Beaufort Sea for at least the next five years. There will also be no call for nominations during that time period.





## LEGISLATION & LICENSING

### LEGISLATION

#### Onshore

The Yukon government seeks to promote responsible oil and gas development balanced with environmental management and demonstrable benefits for Yukoners, and is working to maintain a competitive oil and gas regime. On August 31, amendments to the *Disposition Regulation* were passed that allowed for renewal term deposits to be paid instead of rentals. If a proponent conducts certain work during the renewal term of their permit, they would be eligible to offset all or a portion of their work expenditures against the renewal term deposit. The purpose of this change is to incentivize exploration so that production decisions are enabled.

The amendments to the *Disposition Regulation* are consistent with oil and gas legislation in other jurisdictions, allow Yukon to be more competitive, and are removing outdated federal provisions. These amendments were initially brought forward as part of the 2015 public consultation on proposed changes to the *Yukon Oil and Gas Act*.

A small administrative amendment was made to the *Royalty Regulations*.

#### Offshore

The federal government has responsibility and authority for oil and gas management in the Beaufort Sea. In 2016, the Yukon government participated in the review of the *Canada Petroleum Resources Act*, undertaken by a minister's special representative appointed by the Minister of Indigenous and Northern Affairs Canada. A review was also undertaken of the *Canada Oil & Gas Operations Act* by the Frontier and Offshore Regulatory Renewal Initiative.

### LICENSING

Licensing activity in 2016 consisted of the cancellation of the licence held by EFLO Energy Yukon Ltd. for the well, EFLO et al Kotaneelee L-38.

The EMR Minister also transferred four well licences to Apache Canada Ltd. from EFLO Energy Yukon Ltd. The Minister also transferred three field facility licences to Apache Canada Ltd.



Lower-Middle Jurassic mudstone-sandstone sequence.

# Yukon Geological Survey

## *Liard Basin Unconventional Resource Assessment*

In spring 2016, the National Energy Board, in conjunction with the Geological Survey of Canada (GSC), Yukon Geological Survey (YGS), Northwest Territories (NWT) Geological Survey, BC Oil and Gas Commission and the BC Ministry of Natural Gas Development released The Unconventional Gas Resources of Mississippian-Devonian Shales in the Liard Basin of British Columbia, the Northwest Territories and Yukon.

The results of this assessment show the marketable, unconventional gas potential of the Exshaw and Patry shales of the Liard Basin's Besa River Formation are expected to contain 219 trillion cubic feet (Tcf) of marketable natural gas. Yukon's portion of this amounts to 8 Tcf.

To put this in perspective, the annual gas demand in Canada in 2014 was 3.2 Tcf. These findings would extend Canada's natural gas resource by 90 years, and Yukon's potential reserves alone would supply Canada's demand for 2.5 years.

## *Earthquake Monitoring In Liard Basin*

In June, YGS worked with the Arctic Institute of North America and Nanometrics to install five seismometers in the northern part of the Liard basin. Four of the instruments belong to YGS and the fifth was purchased by the GSC.

The seismic instruments serve two purposes. First, a widespread network of seismic instruments is deployed (or will soon be deployed) across Alaska, Yukon, northern British Columbia and western NWT. The bulk of the instruments are part of the U.S. Array project, a multi-year National Science

Foundation-funded study being managed by a consortium of U.S. based universities. Other instruments currently installed in Yukon include ones operated by NRCan, and the universities of Ottawa and Colorado. South of the border, a BC-based seismic consortium operates several instruments to monitor seismicity induced by oil and gas development activity. The seismometers installed by YGS in the Liard basin fill a gap in the existing coverage and will contribute to a more complete picture of seismic activity in Yukon.

The second reason for the Liard seismic installations is linked to the regulation of potential future oil and gas exploration in the region. Collection of regional baseline data will help to determine background levels of seismicity in the area in advance of any potential future development. Data from the five new instruments will be integrated with seismic information being collected in northeastern BC to provide a more comprehensive picture of the crust in this area.

## *YGS 2016 Publications*

National Energy Board, 2016. The unconventional gas resources of Mississippian-Devonian shales in the Liard basin of British Columbia, the Northwest Territories and Yukon. Yukon Geological Survey, Miscellaneous Report 14.

Hutchison, M., 2016. Analytical methods and non-interpretative data compilation for unconventional shale plays of Yukon's Liard basin. Yukon Geological Survey, Open File 2016-33, 13 p. plus appendices.



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