

March 2019



THE BC OIL AND GAS COMMISSION'S MANAGEMENT OF NON-OPERATING OIL AND GAS SITES

An independent audit report

www.bcauditor.com



OFFICE OF THE
Auditor General
of British Columbia

CONTENTS

Auditor General's comments	3
Report highlights	5
Summary	6
Summary of recommendations	9
Response from the BC Oil and Gas Commission	11
About the audit	15
Background	15
Audit scope	21
Audit method	21
Audit objective and conclusion	22
Audit objective	22
Audit conclusion	22
Key findings and recommendations	23
Decommissioning inactive wells and restoring sites	23
Operators were not required to decommission wells and restore sites	23
Mitigating risks of unrestored sites	29
The OGC used a risk-based approach to mitigate the potential environmental impacts of unrestored sites	29
Verifying and monitoring restored sites	34
The OGC verified that sites were restored, but some oversight gaps remained	34
Long-term risks from restored sites were not fully understood	38
Managing orphan sites	41
The OGC collected inadequate funding from operators to cover the cost of restoring orphan sites	41
Audit quality assurance	48
Appendix A: complete audit criteria	49
Appendix B: glossary	50

623 Fort Street
Victoria, British Columbia
Canada V8W 1G1
P: 250.419.6100
F: 250.387.1230
www.bcauditor.com

The Honourable Darryl Plecas
Speaker of the Legislative Assembly
Province of British Columbia
Parliament Buildings
Victoria, British Columbia
V8V 1X4

Dear Mr. Speaker:

I have the honour to transmit to the Speaker of the Legislative Assembly of British Columbia the report, *The BC Oil and Gas Commission's Management of Non-Operating Oil and Gas Sites*.

We conducted this audit under the authority of section 11 (8) of the *Auditor General Act* and in accordance with the standards for assurance engagements set out by the Chartered Professional Accountants of Canada (CPA) in the CPA Handbook – Canadian Standard on Assurance Engagements (CSAE) 3001 and Value-for-money Auditing in the Public Sector PS 5400.



Carol Bellringer, FCPA, FCA
Auditor General
Victoria, B.C.
March 2019

The Office of the Auditor General of British Columbia would like to acknowledge with respect that we conduct our work on Coast Salish territories. Primarily, this is on the Lkwungen-speaking people's (Esquimalt and Songhees) traditional lands, now known as Victoria, and the WSÁNEĆ people's (Pauquachin, Tsartlip, Tsawout, Tseycum) traditional lands, now known as Saanich.

AUDITOR GENERAL'S COMMENTS

THE OIL AND GAS INDUSTRY is an important component of B.C.'s economy, but it introduces environmental risk and potential financial liability for government. Contamination from oil and gas activities can affect water and air quality, human health, wildlife, livestock and ecosystems. The timely restoration of non-operating well sites reduces the environmental risk and resulting financial liability.

The BC Oil and Gas Commission (OGC) is responsible for regulating oil and gas activities to protect public safety and the environment. The OGC follows the *polluter pays* approach, where industry is expected to cover the cost of environmental clean-up, at no cost to the taxpayer.

In this audit, we focused on how the OGC is managing the environmental and financial risks of oil and gas well sites that are non-operating, specifically inactive, decommissioned and restored sites. There's a glossary in Appendix B to explain all of these terms, but essentially, decommissioning is taking an inactive well and permanently sealing it with cement. Restoration means restoring the land to pre-activity conditions, including cleaning up any contamination. Decommissioning and restoration are the operator's responsibility, but in cases where sites are 'orphaned' by bankrupt or absent operators, the OGC becomes responsible for the work.

The number of orphan sites in B.C. increased from 45 in 2015/16 to 326 in 2018/19. To pay for orphaned sites, the OGC taxes oil and gas companies based on production. It can also use security deposits collected from operators. The money goes into what's called the Orphan Fund. But more and more sites were orphaned and the fund did not cover the growing restoration costs. In 2016/17, the Orphan Fund was short \$16.6 million, and in 2017/18 it was short \$13.1 million. The OGC anticipates that the number of orphan sites and associated restoration costs will continue to increase.



CAROL BELLRINGER, FCPA, FCA
Auditor General


AUDITOR GENERAL'S COMMENTS

While the OGC had clear standards in place for how to decommission inactive wells and remediate sites, it lacked the tools to compel operators to decommission and restore well sites in a timely way. We found that gaps in the provincial legislation governing the OGC meant operators weren't required to decommission or restore their inactive well sites unless the OGC explicitly ordered them to do so because of specific safety or environmental issues. The number of inactive wells that had not been decommissioned almost doubled – from 3,800 to 7,474 – between 2007 and 2018.

The OGC recognised the limitations in its regulatory framework (i.e. no trigger to compel decommissioning and restoration) and mitigated the environmental risks of non-operating sites through site assessments and inspections, and enforcement actions.

Also, regulatory changes were underway to address environmental risks and the resulting financial liability of unrestored and orphan sites. In April 2018, the legislative assembly passed amendments to the *Oil and Gas Activities Act*, to provide the OGC with the authority to require operators to restore sites, and greater flexibility to collect and use revenue from operators to restore orphan wells. The OGC was developing accompanying regulations that will detail the new requirements, including timelines for decommissioning and restoring sites.

I would like to thank the staff at the Oil and Gas Commission for their support and co-operation throughout our work on this audit.



Carol Bellringer, FCPA, FCA
Auditor General
Victoria, B.C.
March 2019

REPORT HIGHLIGHTS

Oil and gas
**important to
B.C.'s economy,**
but comes with
**ENVIRONMENTAL
RISKS**



OGC regulates oil
and gas activities to
**protect public
safety** and
environment

ORPHAN SITE =
operator bankrupt
or **can't be located.**
Becomes OGC's
responsibility

ORPHAN SITES IN B.C.:

in 2015/16,

45

in 2018/19,

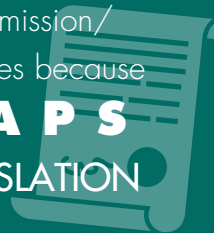
326

OGC **DIDN'T
COLLECT
ENOUGH \$**

from operators to
restore orphan sites.
Short **\$16.6 M**
in 2016/17 and
\$13.1 M
in 2017/18

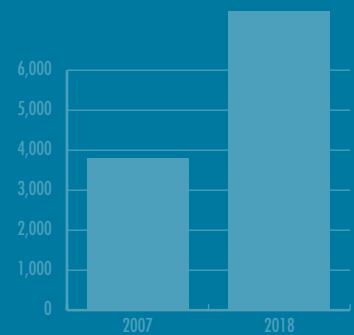


Operators not required
to decommission/
restore sites because
of **GAPS**
IN LEGISLATION



**Inactive wells not
decommissioned
INCREASED**

from 3,800 in 2007
to 7,474 in 2018.



OGC **MITIGATED
ENVIRONMENTAL**

RISKS through site
assessments and
inspections, and
enforcement actions



**REGULATORY
CHANGES
UNDERWAY**

to close gaps & give
OGC more authority

* OGC = The BC Oil and Gas Commission

SUMMARY

BRITISH COLUMBIA'S OIL and gas industry is a key component of the province's economy, but it also introduces environmental risks that result in financial liability. If operators do not restore their inactive sites in a timely manner, environmental risk and resulting financial liability will remain. As of May 2018, there were 10,672 non-operating sites in B.C. that had not been restored. The BC Oil and Gas Commission (OGC) estimated that operators of oil and gas wells and facilities in the province were liable for a total restoration cost of \$3 billion as of February 2019.

The OGC is the provincial Crown corporation responsible for permitting and regulating all oil and gas activities in B.C., including exploration, development and restoration.

For this audit, we examined how the OGC was managing the environmental and financial risks of oil and gas well sites that are non-operating (specifically, inactive, decommissioned and restored sites). This included looking at whether the OGC had collected adequate financial assurances from operators to cover the cost of restoring sites "orphaned" by insolvent operators, and how it managed the environmental risks of orphan sites. The audit focused on the OGC's management of risks from January 2015 to October 2018.

We found that the OGC identified, assessed and took steps to mitigate the environmental and financial risks of non-operating oil and gas sites. However, operators were not required to decommission wells or restore inactive well sites. Furthermore, the funds that the OGC collected from operators were inadequate to cover restoration costs for orphan sites. Because of these deficiencies, the OGC had not effectively managed the environmental and financial risks of non-operating oil and gas sites. The OGC's ability to ensure that sites were restored and that adequate funding was collected from operators to cover restoration costs for orphan sites was impeded by gaps in and limitations of legislation.

Operators were not required to decommission wells and restore inactive sites

We examined whether the OGC had requirements for ensuring that operators are decommissioning wells and restoring inactive sites in a timely and adequate way. We found that the OGC had clear standards in place for how to decommission inactive wells and remediate sites, but lacked legislative triggers to compel operators to decommission wells and restore sites in a timely way. This gap in legislation meant that operators were not required to decommission wells or restore sites unless the OGC explicitly ordered them to do so to address site-specific safety or environmental concerns. Between 2007 and 2018 the number of inactive wells that had not been decommissioned increased from 3,800 to 7,474. We also found that the requirements for reclaiming sites lacked clarity.

The OGC used a risk-based approach to mitigate the potential environmental impacts of unrestored sites

Given the lack of triggers to compel operators to decommission wells and restore sites, we assessed how the OGC was managing the environmental risks of sites that can remain unrestored indefinitely if the operator chooses to not do the work. We examined if the OGC assessed the environmental risks of

SUMMARY

unrestored sites and had a risk-based approach to inspecting these sites and promoted compliance with regulations. We found that the OGC recognized these gaps in its regulatory framework and was mitigating risks through its program of assessments, inspections and enforcement actions.

The OGC verified that sites were restored, but some oversight gaps remained

When site restoration does occur, operators are required to remediate any contamination and reclaim the land to its pre-disturbance condition. We examined if the OGC adequately verified that restored sites were appropriately remediated and reclaimed. This included assessing whether the OGC's coordination with the Ministry of Environment and Climate Change Strategy (ENV) provided for effective remediation of high-risk contaminated sites. We also looked at whether the OGC's oversight considered First Nations' concerns about the adequacy and speed of site restoration.

We found that the OGC had a Certificate of Restoration process in place to confirm that operators had restored sites. The OGC also conducted post-certification audits to verify the adequacy of site remediation, but did not do the same for land reclamation outcomes. In addition, the OGC had not reviewed the effectiveness of its joint oversight of high-risk contaminated sites with ENV. The OGC only recently started a pilot project with three First Nations to restore orphan sites on their traditional territory, and it had not yet evaluated the outcomes.

Long-term risks from restored sites were not fully understood

While decommissioning wells and restoring sites mitigates environmental risks, even wells decommissioned to current standards could still pose long-term risks to the environment if, for example, well casings or cement were to fail. Further, legacy sites that were decommissioned and restored to previous standards could also present ongoing environmental risks.

We examined whether the OGC assessed, monitored and managed the long-term residual risks of restored sites. We found that the OGC had a high-level understanding of the environmental liabilities of legacy sites, but had not assessed the site-specific risks at each site. We also found that the long-term risks from wells that have been decommissioned to current standards were not well understood by the OGC or industry due to a lack of data. The OGC was undertaking research to better understand the potential longer-term risks of restored sites—for example the risk of gas migration from poorly decommissioned wells.

The OGC collected inadequate funds from operators to cover the cost of restoring orphan sites

The OGC follows the *polluter pays* approach, where industry is expected to cover the cost of environmental clean-up at no cost to the taxpayer. The OGC uses its Liability Management Rating program to determine the amount of money to collect as security deposits to ensure that operators meet their requirements under

SUMMARY

legislation. When an oil or gas operator is bankrupt or cannot be located, the sites that they have permits for are designated as orphans by the OGC, unless they can be sold to another operator. In B.C., the OGC is responsible for restoring an orphan site.

We examined whether the OGC had collected adequate funds from operators to cover the costs of work that it carried out on orphan sites. To do this, we assessed the effectiveness of the OGC's tools designed to ensure that operators bear the costs of orphan site restoration. We also assessed whether the OGC had a plan in place to manage the environmental risks of the orphan sites.

We found that the OGC's Liability Management Rating program was not acting as an effective incentive for industry to manage its liability obligations. We also found that securities that the OGC had collected from recently bankrupted operators did not cover the cost of restoring the orphan sites. The number of orphan sites in B.C. increased from 45 in 2015/16 to 326 in 2018/19, contributing to the OGC having a \$33-million liability to cover obligatory costs for restoring sites to ensure public and environmental safety. The Orphan Fund, which was funded through a tax on operators' production, was not responsive to the increase in orphan sites, and its revenue fell short of expenses in 2016/17 and 2017/18. The OGC had a plan in place with a target to restore orphan sites within 10 years of designation.

Regulatory changes were underway

In 2018, the legislative assembly passed amendments to the *Oil and Gas Activities Act* that are intended to provide the OGC with the authority to require operators to restore sites, as well as giving it greater flexibility to collect and use revenue from operators to restore orphan wells. At the time of this audit, the OGC was developing accompanying regulations that will detail the requirements, including timelines for decommissioning wells and restoring sites.

SUMMARY OF RECOMMENDATIONS

WE RECOMMEND THAT THE BC OIL AND GAS COMMISSION:

- 1** review its restoration regulations and guidelines and make changes as needed to ensure that the expected outcomes and timelines for ecologically suitable revegetation are clear.
- 2** complete its work to develop and implement regulations, policies and procedures to ensure that operators decommission wells and restore sites in a timely manner.
- 3** include surface reclamation (Part II of the Certificate of Restoration) as part of its field investigation work to ensure that sites are adequately reclaimed.
- 4** review, in coordination with the Ministry of Environment and Climate Change Strategy, the Memorandum of Understanding and the Oil and Gas Site Classification Tool to ensure the effective oversight of high-risk contaminated oil and gas sites.
- 5** continue to partner with local First Nations to identify and implement improvements to restoration policies and practices.
- 6** report annually on the outcomes of site restoration activities to ensure transparency and accountability to the legislature, the public and First Nations.
- 7** manage the environmental risks of legacy sites by using a risk-based approach to ensure that any contamination is identified and addressed, including setting timelines for completing the work, and monitoring and reporting on progress.

SUMMARY OF RECOMMENDATIONS

WE RECOMMEND THAT THE BC OIL AND GAS COMMISSION:

- 8** continue work to understand the long-term environmental risks of decommissioned wells and restored sites, and develop a plan to mitigate those risks.
- 9** review the Liability Management Rating program to ensure that it is responsive to changing industry risks and results in operators covering their restoration costs.
- 10** monitor and assess whether implementation of the new funding process for the Orphan Fund is resulting in adequate funding to restore orphan sites in a timely manner, and implement changes as needed.
- 11** ensure timely restoration of orphan sites by assessing and reporting on its progress against the orphan site work plan, and making adjustments to the plan as needed.

RESPONSE FROM THE BC OIL AND GAS COMMISSION

THE BC OIL AND GAS COMMISSION (Commission) thanks the Office of the Auditor General for its audit *The BC Oil and Gas Commission's Management of Non-Operating Oil and Gas Sites*, which focused on the period between January 2015 and October 2018. As part of its continual improvement to its strategic management systems, the Commission instigated a number of new initiatives prior to, during and since the audit period, including:

- ◆ Partnering with First Nations from northeast B.C. to restore former oil and gas industry sites to their natural state, News Release 2019-01;
- ◆ Developing a Comprehensive Liability Management Plan, Information Bulletin 2018-02;
- ◆ Changes to orphan liability levy, Industry Bulletins, 2018-20 and 2019-01; and,
- ◆ Developing a Restoration Framework.

Many of the responses below reference these initiatives.

In May 2018, the provincial government enacted the Energy, Mines and Petroleum Resources Statutes Amendment Act (Bill 15) enabling a number of improvements to the regulatory framework in B.C. for management of non-operating oil and gas sites. The amendments have allowed the Commission to improve the funding model, strengthened the Commission's authority to make regulations in the areas of orphan site treatment and closure, risk assessment/mitigation, and accelerate the rate of inactive site restoration. These new tools will address the restoration of orphan sites in a timely manner, while ensuring no direct costs to taxpayers.

As part of its ongoing improvement efforts, the Commission is developing a Comprehensive Liability Management Plan (CLMP), which holds industry accountable, addresses unrestored oil and gas sites, and protects the environment and public safety. Phase one of the CLMP involves the Commission establishing regulations to increase industry's rate of restoration and reduce the number of inactive oil and gas sites. Requiring timely restoration will also reduce the number of potential orphan sites in the province. Engagement on the CLMP with local governments and local First Nations, industry, landowners, stakeholders and the public is ongoing.

The Commission is developing a Restoration Framework that integrates restoration initiatives undertaken by the Commission and other ministries. Incorporating the recommendations from this audit into the Framework will assist in establishing a prioritized, effective and coordinated approach to restoration.

These activities, and the actions associated with implementing the recommendations, will improve the Commission's management of non-operating oil and gas sites within British Columbia.

RESPONSE FROM BC OIL AND GAS COMMISSION

RECOMMENDATION 1: *We recommend that the BC Oil and Gas Commission review its restoration regulations and guidelines and make changes as needed to ensure that the expected outcomes and timelines for ecologically suitable revegetation are clear.*

RESPONSE 1: *Agreed*

Through the establishment of a Restoration Framework, the Commission, in conjunction with the Ministry of Energy Mines and Petroleum Resources will review the current restoration regulations, incorporate input from several pilot programs underway, seek input from Industry, First Nations and government ministries, and consider amendments as appropriate. The Commission will update its restoration guidelines as appropriate.

RECOMMENDATION 2: *We recommend the BC Oil and Gas Commission complete its work to develop and implement regulations, policies and procedures to ensure that operators decommission wells and restore sites in a timely manner.*

RESPONSE 2: *Agreed*

The Commission is committed to ensuring operators decommission and restore wells sites in a timely manner. The passing of Bill 15 in 2018 provides the Commission with the authority to develop regulations for timely restoration outcomes.

The Commission will continue to build on its improvement efforts in this area through the projects

associated with the phased implementation of Bill 15. This includes the development and implementation of the Dormant Site Regulation, designed to achieve timely clean up, provide flexibility to achieve cost-efficient restoration and promote communication with land owners, local governments and First Nations with an interest in such sites.

RECOMMENDATION 3: *We recommend that the BC Oil and Gas Commission include surface reclamation (Part II of the Certificate of Restoration) as part of its field investigation work to ensure that sites are adequately reclaimed.*

RESPONSE 3: *Agreed*

The Restoration Framework under development will include compliance verification activities of surface reclamation.

RECOMMENDATION 4: *We recommend that the BC Oil and Gas Commission review, in coordination with Ministry of Environment and Climate Change Strategy, the Memorandum of Understanding and the Oil and Gas Site Classification Tool to ensure the effective oversight of high-risk contaminated oil and gas sites.*

RESPONSE 4: *Agreed*

The Commission will develop a plan in conjunction with ENV for the review of the Memorandum of Understanding and the Oil and Gas Site Classification Tool with the objective that there is effective oversight of high-risk contaminated oil and gas sites.

RESPONSE FROM BC OIL AND GAS COMMISSION

RECOMMENDATION 5: *We recommend that the BC Oil and Gas Commission continue to partner with local First Nations to identify and implement improvements to restoration policies and practices.*

RESPONSE 5: *Agreed*

The Commission will continue partnering with First Nations from northeast B.C. to restore former oil and gas industry sites and utilize the learnings from these pilot programs in the Restoration Framework. The Commission will continue to consult on the development of the Dormant Site Regulation with First Nations from northeast B.C.

RECOMMENDATION 6: *We recommend that the BC Oil and Gas Commission report annually on the outcomes of site restoration activities to ensure transparency and accountability to the legislature, the public and First Nations.*

RESPONSE 6: *Agreed*

The Commission will report on the development and implementation of various projects associated with the Restoration Framework, including annual outcomes of site restoration as a component of its transparency initiative.

RECOMMENDATION 7: *We recommend that the BC Oil and Gas Commission manage the environmental risks of legacy sites by using a risk-based approach to ensure that any contamination is identified and addressed, including setting timelines for completing the work, and monitoring and reporting on progress.*

RESPONSE 7: *Agreed*

The Commission will develop and implement a plan to manage legacy sites. The risk-based approach will include:

- ◆ Defined environmental risks.
- ◆ Timelines based on risk and the availability of resources.
- ◆ Transparent reporting.
- ◆ Monitoring based on risk and the availability of resources.

RECOMMENDATION 8: *We recommend that the BC Oil and Gas Commission continue work to understand the long-term environmental risks of decommissioned wells and restored sites, and develop a plan to mitigate those risks.*

RESPONSE 8: *Agreed*

Will develop a plan to explore the options with First Nations, Geoscience BC, universities, industry and others.

RESPONSE FROM BC OIL AND GAS COMMISSION

RECOMMENDATION 9: *We recommend that the OGC review the Liability Management Rating program to ensure that it is responsive to changing industry risks and results in operators covering their restoration costs.*

RESPONSE 9: *Agreed*

Under the Comprehensive Liability Management Plan, the Commission has begun to enhance its approach to Liability Management. This initiative will build on the existing Liability Management Rating program and provide additional tools to assess and mitigate risk to the public and the orphan site reclamation fund.

RECOMMENDATION 10: *We recommend that the BC Oil and Gas Commission monitor and assess whether implementation of the new funding process for the Orphan Fund is resulting in adequate funding to restore orphan sites in a timely manner, and implement changes as needed.*

RESPONSE 10: *Agreed*

The Commission has allocated sufficient funding for the \$14 million orphan program for 2018/19. Plans are in place to collect sufficient funds to address orphan expenditures in accordance with the Commission's policy for timely treatment and closure.

RECOMMENDATION 11: *We recommend that the BC Oil and Gas Commission ensure timely restoration of orphan sites by assessing and reporting on its progress against the orphan site work plan, and making adjustments to the plan as needed.*

RESPONSE 11: *Agreed*

The Commission has implemented a policy to restore orphans within 10 years of designation, and progress tracking indicates we are meeting this commitment. Measures are reported through internal and external documents, and additional vehicles will be considered as part of the transparency initiative.

ABOUT THE AUDIT

BACKGROUND

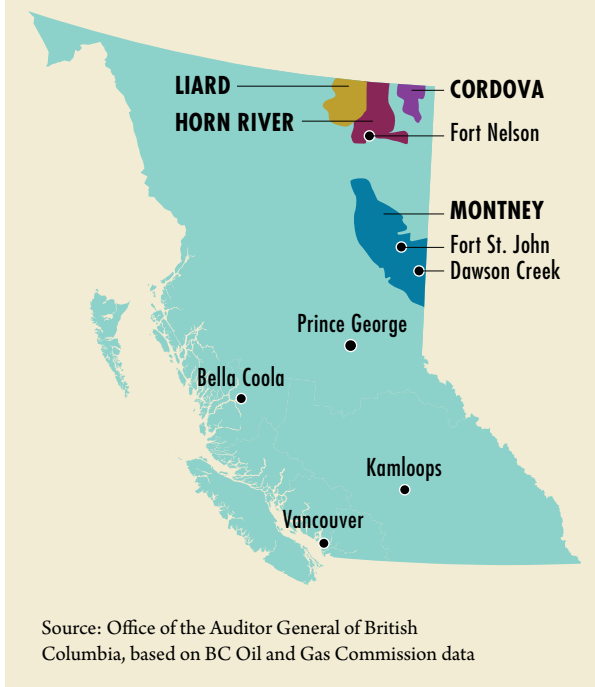
B.C.'s oil and gas industry

BRITISH COLUMBIA'S OIL and gas industry is a key component of the province's economy. The industry provides B.C. with 10,000 jobs and, in 2017, was expected to contribute \$13 billion in provincial government revenues over the next 11 years. In 2017, the industry spent \$4 billion on exploration and development. In fiscal 2018, government received \$498 million in royalties and Crown land sales from oil and gas companies.

B.C.'s oil and gas sector supplies predominantly gas, with approximately 10,000 producing wells. The province is the second-largest natural gas producer in Canada, producing almost a third of the country's marketable natural gas (1.5 trillion cubic feet per year). Oil production averages about 21,000 barrels per day, or about 2% of Canada's production.

The province's oil and gas reserves—the amount of the resource that industry can extract using existing technology—are in northeastern B.C. (Exhibit 1). The natural gas basins in B.C. are estimated to contain 532 trillion cubic feet (tcf) of marketable gas, which is enough to last more than 100 years at current demand levels. As of December 2017, approximately 81% of gas produced in B.C. originated from the Montney Basin.

Exhibit 1: Oil and gas development regions in B.C.



Responsibility for regulating the oil and gas industry

The BC Oil and Gas Commission (OGC) is the provincial Crown corporation and single-window regulatory agency responsible for regulating oil and gas activities in B.C. The single-window regulatory model means that the OGC is responsible for permitting and regulating all oil and gas activities, including exploration, development and restoration.

Under the *Oil and Gas Activities Act* (OGAA), the OGC is mandated to regulate B.C.'s oil and gas activities in a way that protects public safety, respects those affected by oil and gas activities, conserves the environment and supports resource development.

ABOUT THE AUDIT

The OGC's regulatory responsibilities also fall under other acts that allow the OGC to regulate activities in line with the single-window approach to oil and gas operations. These acts include the *Forest Act*, *Heritage Conservation Act*, *Land Act*, *Environmental Management Act* and *Water Sustainability Act*.

The OGC's responsibilities include the following:

- ◆ reviewing and assessing applications for proposed industry activities
- ◆ ensuring industry complies with provincial legislation and all regulatory requirements
- ◆ cooperating with partner agencies
- ◆ consulting with First Nations

The OGC's operating costs are funded through industry fees and levies. It is accountable to the legislature and the public through the Ministry of Energy, Mines and Petroleum Resources (EMPR). The OGC is governed by a board of three directors: the Deputy Minister for EMPR is the Board Chair, the OGC Commissioner is Vice Chair, and a third independent member is appointed by the Lieutenant Governor in Council. The board has the powers to make regulations in areas specified by the OGAA.

Oil and gas life cycle

Oil and gas activities fall into upstream, midstream and downstream categories of the production cycle (see sidebar). This audit focused on upstream oil and gas activities.

In B.C., the Crown owns most subsurface rights to oil and gas. Private sector oil and gas operators must have

OIL AND GAS INDUSTRY SECTORS

Upstream: Finding, extracting, processing and storing oil and gas for transport

Midstream: Transporting oil and gas by pipeline, road or tanker and processing into marketable products

Downstream: Distribution and sale of final products such as gasoline, heating oil, natural gas and petrochemicals

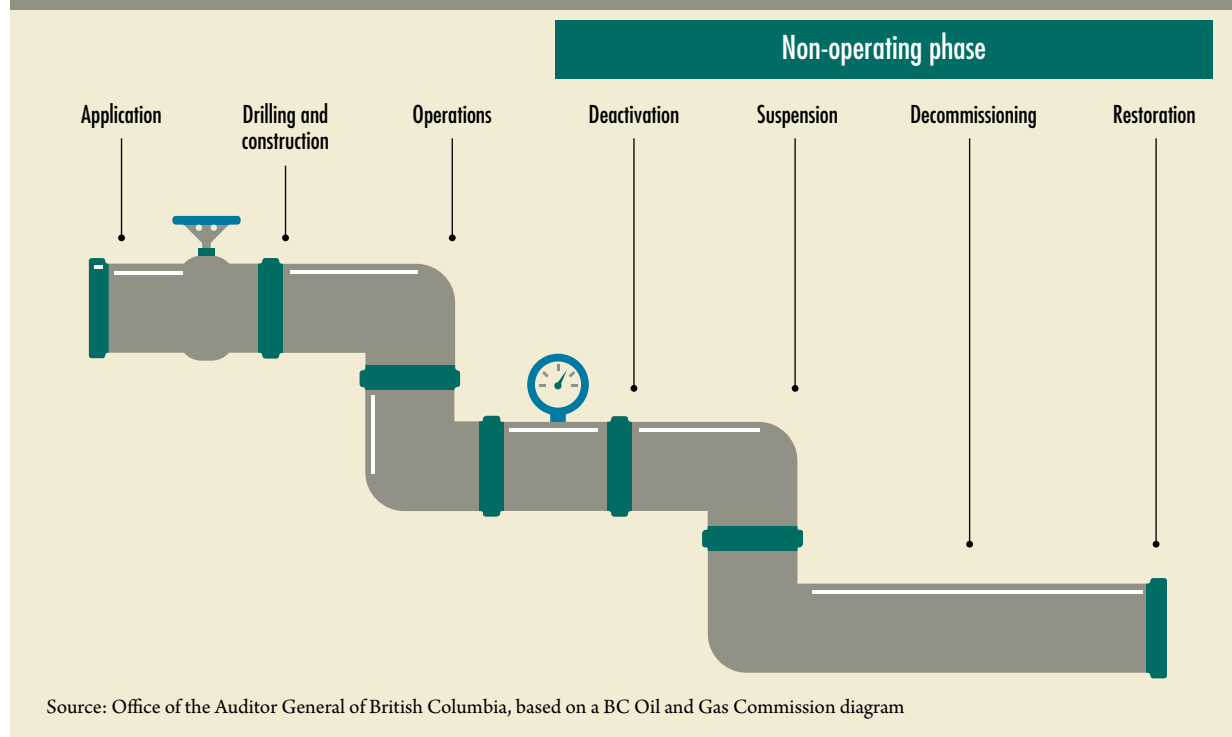
a tenure agreement with the provincial government (through EMPR) if they want to develop resources below the surface of Crown land or private property.

The tenure agreements give the operators rights to explore for, or produce, oil and gas, but each oil and gas activity requires approval from the OGC. Operators must apply to the OGC for permits to conduct activities, such as exploration, building roads, drilling wells or building pipelines and facilities. When an operator proposes activities on private land, the operator is required to negotiate a surface lease agreement with the private land owner.

If, during exploration, an operator finds oil and gas in an amount that is economically viable, then it may complete the well and put it into production. Depending on the circumstance, the operator may suspend or decommission the well. Surface lease agreements end when the OGC deems that an operator has restored the surface of a site in compliance with regulatory requirements (see [Exhibit 2](#)).

ABOUT THE AUDIT

Exhibit 2: Upstream oil and gas life cycle



Suspending a well involves securing and plugging it to reduce risks to the public and environment. For some low risk wells, plugging the well is not required. Suspension usually occurs after production has ceased, but suspended wells may be brought back into production if market conditions change and the well becomes economically viable. When an operator no longer needs a well because it is depleted or no longer profitable, the well can be permanently sealed and taken out of service, also known as decommissioning. Finally, the operator can restore the site by cleaning up any contamination and reclaiming the land to pre-activity condition.

The shift to unconventional gas via hydraulic fracturing

Prior to 2007, 85% of wells in B.C. targeted conventional gas. As of 2016, 85% of producing wells in B.C. were unconventional gas wells, and 98% of those were hydraulically fractured.

Unconventional gas is the same as conventional natural gas in terms of chemical composition. The difference is the type of rock it is contained in and the technology used to produce it. Conventional gas wells are primarily vertical wells that produce from conventional reservoirs comprised of rock that has

ABOUT THE AUDIT

abundant pore space (to contain the gas) and good permeability (to allow gas to flow through the rock). Unconventional gas is found in shale, tight rock (with extremely low permeability) and coal. These rocks

share the characteristic of lacking permeability, so fluids trapped in the rock will not flow.

To develop these reservoirs, industry uses newer technologies that allow for the drilling of long-reach horizontal wellbores along the target rock formation. These horizontal wellbores are then hydraulically fractured (or fracked) by injecting large volumes of fluids and sand under high pressure in multiple stages. This hydraulic fracturing cracks the rock, and the injected sand props the cracks open, creating pathways for the natural gas to flow through the rock into the wellbore. Multiple horizontal wells can be drilled from one well site (see Exhibits 3 and 4).

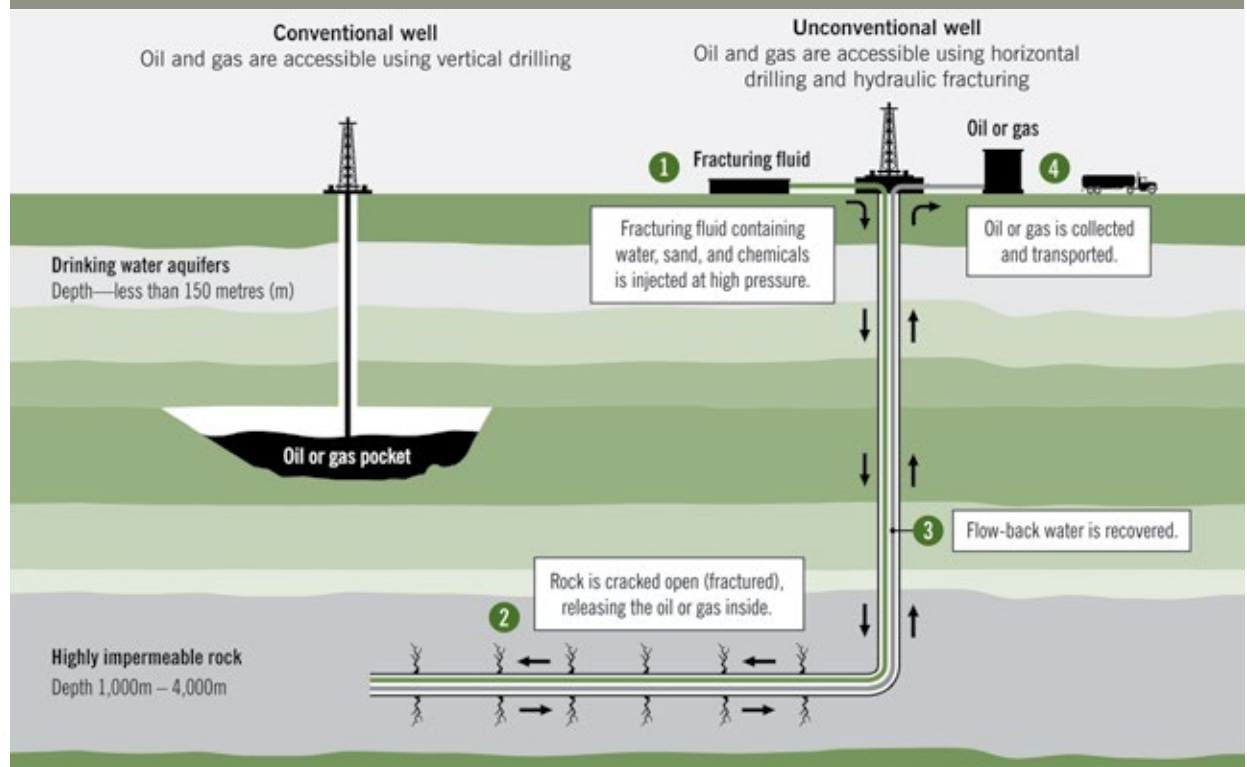
In March 2018, the B.C. government commissioned an independent scientific review of the regulatory

Exhibit 3: Site producing natural gas condensate with multi-well pad and associated piping and facility in northeastern B.C.



Source: BC Oil and Gas Commission

Exhibit 4: Conventional and unconventional gas production



Source: Report of the Commissioner of the Environment and Sustainable Development (2012), Office of the Auditor General of Canada; reproduced with the permission of Her Majesty the Queen in Right of Canada, as represented by the Auditor General of Canada, 2019 (not to scale)

ABOUT THE AUDIT

framework for hydraulic fracturing to ensure it is adequately managing safety and environmental risks. A three-member independent panel is carrying out the review and will look at the role of hydraulic fracturing as it relates to induced seismicity (earthquakes caused by human activity) and its impacts on water quantity and quality. The panel will also look into fugitive methane emissions that may occur in the process of hydraulic fracturing. Methane, the primary component of natural gas, is a greenhouse gas that is more potent than carbon dioxide. “Fugitive” methane can unintentionally vent or leak from wells, pipelines and equipment.

Environmental and financial risks of upstream oil and gas

While the upstream oil and gas industry is an important component of B.C.’s economy, it introduces environmental risks that result in financial liability. Potential contamination from oil and gas activities

Exhibit 5: Aerial view of oil and gas activities’ impact on the landscape

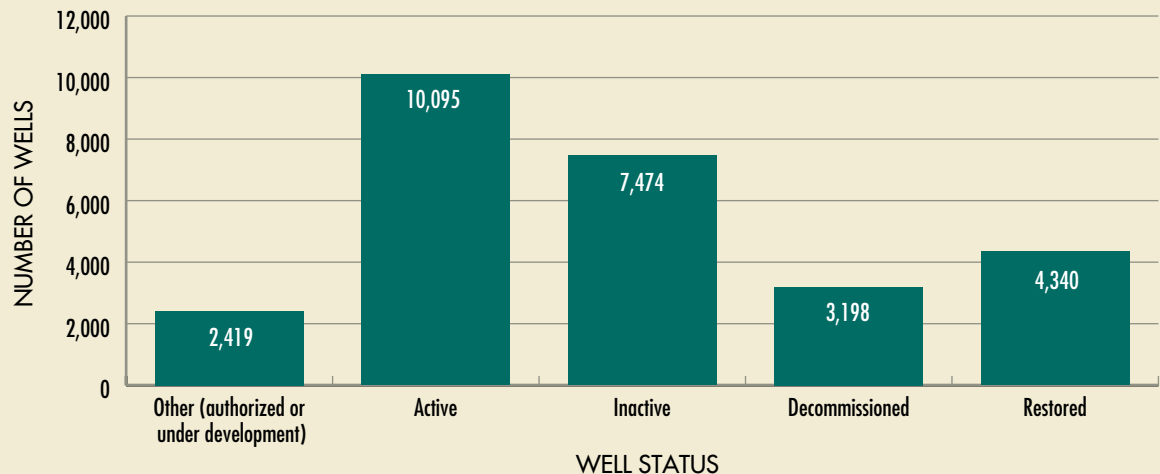


Source: Office of the Auditor General of British Columbia

can affect ground and surface water quality, air quality, human health, wildlife and livestock.

Oil and gas activities can also fragment the landscape and ecosystems through the development of well sites and linear features such as roads, which impact wildlife and habitat (see Exhibit 5). If operators do not restore their inactive sites in a timely manner, environmental risk and resulting financial liability will remain.

Exhibit 6: Number of wells in B.C., by status



Source: Office of the Auditor General of British Columbia, based on BC Oil and Gas Commission data from May 2018

ABOUT THE AUDIT

In 2014, a downturn in the energy sector reduced the profitability of the oil and gas industry across western Canada. Diminished profits potentially limited the funding that operators had to decommission and restore sites. The downturn contributed to bankruptcies and an increased number of orphaned well sites that the OGC manages. The OGC designates these sites as orphans because the operators have become insolvent.

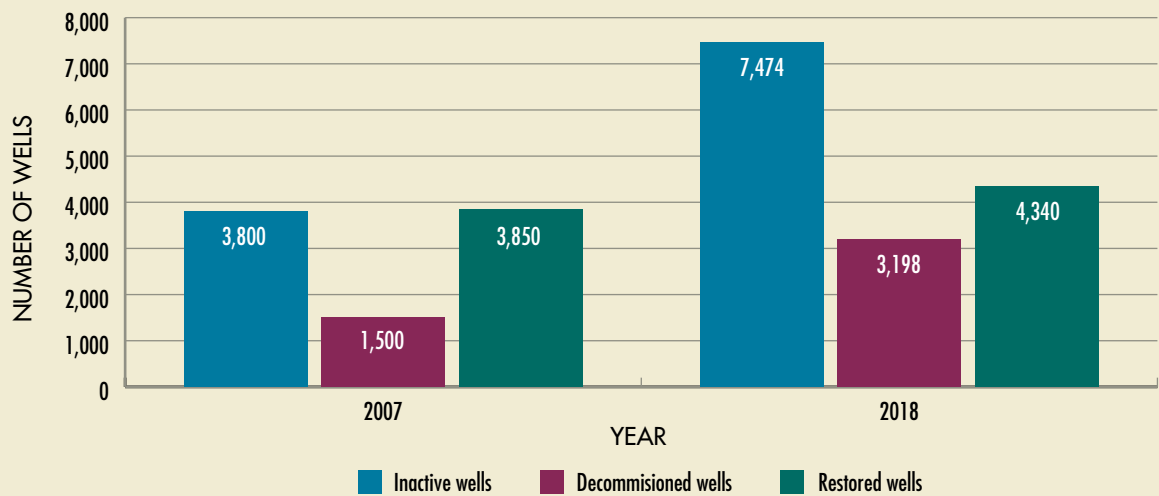
As of May 2018, B.C. had 27,526 oil and gas wells, with 7,474 inactive wells that had not been decommissioned, and a further 3,198 decommissioned wells on sites that had not been restored. This means that 10,672 non-operating well sites in B.C. had not been restored to mitigate environmental risks (see [Exhibit 6](#)). The OGC estimated that operators of oil and gas wells and facilities in the province were liable

for a total restoration cost of \$3 billion, as of February 2019.

The number of inactive wells in the province almost doubled—from 3,800 to 7,474—between 2007 and 2018. Over the years, operators have not restored sites as quickly as they have developed wells, resulting in an increase in the number of inactive and decommissioned wells on sites that have not been restored (see Exhibit 7).

In our 2010 audit of the OGC, we found that it needed to improve its oversight of the upstream oil and gas industry in order to adequately manage the environmental and financial risks of the growing number of well sites that had not been restored (see [Oil and Gas Site Contamination Risks: Improved oversight needed, February 2010](#)).

Exhibit 7: Inactive, decommissioned and restored wells, 2007 - 2018



Source: Office of the Auditor General of British Columbia, based on BC Oil and Gas Commission data

ABOUT THE AUDIT

AUDIT SCOPE

For this audit, we examined how the BC Oil and Gas Commission (OGC) was managing the environmental and financial risks of oil and gas well sites that are non-operating (specifically, inactive, decommissioned and restored sites). This included looking at whether the OGC had collected adequate financial assurances from operators to cover the cost of restoring orphan sites. We focused on the OGC's oversight of well sites but excluded related activities, such as pipelines, access roads and water storage sites and dams. We did not look at the OGC's authorization of activities or its regulatory oversight of active wells.

The audit focused on the OGC's management of risks from January 2015 to October 2018, but we also considered any earlier work done by the OGC in response to recommendations from our [2010 audit](#).

AUDIT METHOD

Our work involved:

- ◆ interviewing OGC staff and other government officials
- ◆ visiting oil and gas sites in northeastern B.C.
- ◆ speaking with numerous stakeholders, including non-government and industry organizations, municipal governments
- ◆ speaking with representatives from several First Nations
- ◆ reviewing relevant legislation and policy
- ◆ reviewing documents and the OGC public reports
- ◆ reviewing work done in response to our [2010 audit](#)
- ◆ reviewing work done by our financial audit team on the OGC's orphan site liability
- ◆ consulting with two subject matter experts

The report is dated March 4, 2019. This is the date the audit team completed obtaining the evidence used to determine the findings and conclusions of the report.

AUDIT OBJECTIVE AND CONCLUSION

AUDIT OBJECTIVE

Our objective was to determine whether the BC Oil and Gas Commission (OGC) effectively managed the environmental and financial risks of non-operating oil and gas sites.

AUDIT CONCLUSION

We found that the OGC identified, assessed and took steps to mitigate the environmental and financial risks of non-operating oil and gas sites. However, operators were not required to decommission or restore inactive well sites. Furthermore, the funds that the OGC collected from operators were inadequate to cover restoration costs for wells “orphaned” by

bankruptcies. Because of these deficiencies, the OGC had not effectively managed the environmental and financial risks of non-operating oil and gas sites. The OGC’s ability to ensure that sites were restored and adequate funding was collected from operators to cover restoration costs for orphaned sites was impeded by gaps in and limitations of legislation.

In 2018, the legislative assembly passed amendments to the *Oil and Gas Activities Act* that are intended to provide the OGC with the authority to require operators to restore sites, as well as giving it greater flexibility to collect and use revenue from operators to restore orphan sites. The OGC was developing accompanying regulations that will detail the requirements, including timelines for decommissioning wells and restoring sites.

KEY FINDINGS AND RECOMMENDATIONS

DECOMMISSIONING INACTIVE WELLS AND RESTORING SITES

Operators were not required to decommission wells and restore sites

In B.C., an operator must continue making surface lease payments to the owner of a well site until it decommissions the well and restores the land.

Decommissioning (referred to as “abandonment” in the regulations) is the act of taking an inactive well that is no longer capable of producing profitably and permanently sealing it with cement.

Decommissioning an inactive well reduces the likelihood that oil, methane gas and saline water will move up through the well into freshwater aquifers, surface water, the ground or the atmosphere. According to a review on managing environmental liability done by the OGC, operators should decommission wells as soon as they deem them economically unviable, and then follow up with site remediation and reclamation, together referred to as restoration. Well site remediation is the clean-up of any contamination, and reclamation returns the land, including soil and vegetation, to pre-activity conditions.

Adequate and prompt decommissioning and restoration reduce risks to groundwater, drinking water, people, wildlife, ecosystems and habitats, and air quality. See [Exhibit 8](#) for examples of sources of contamination on well sites in agricultural and natural settings.

We examined whether the OGC had requirements in place to manage the environmental risks of inactive wells that have not been decommissioned, and of decommissioned wells on sites that have not been restored. Specifically, we examined whether the OGC had requirements to ensure that operators are restoring sites in a timely and adequate way. We found that the OGC had clear standards in place for how to decommission inactive wells and remediate sites, but lacked legislative triggers to compel operators to decommission wells and restore sites in a timely way. This meant that operators were not required to decommission wells or restore sites unless the OGC issued orders for site-specific safety or environmental concerns. We also found that regulations and guidance were unclear for revegetating sites.

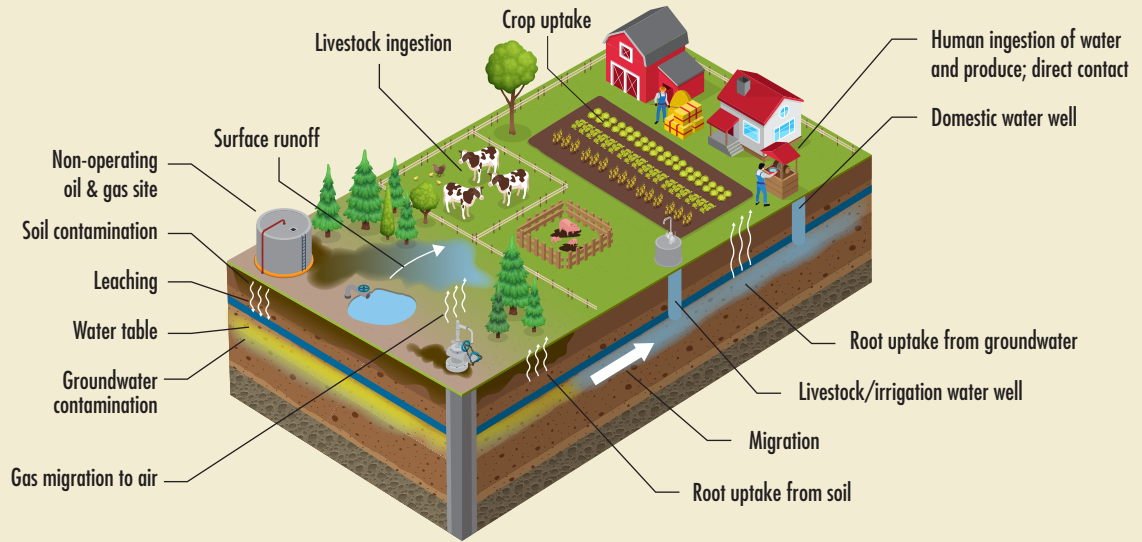
Clear standards were in place for how to decommission inactive wells

We found that the OGC’s requirements and standards provided clear expectations for operators regarding how to suspend and decommission inactive wells

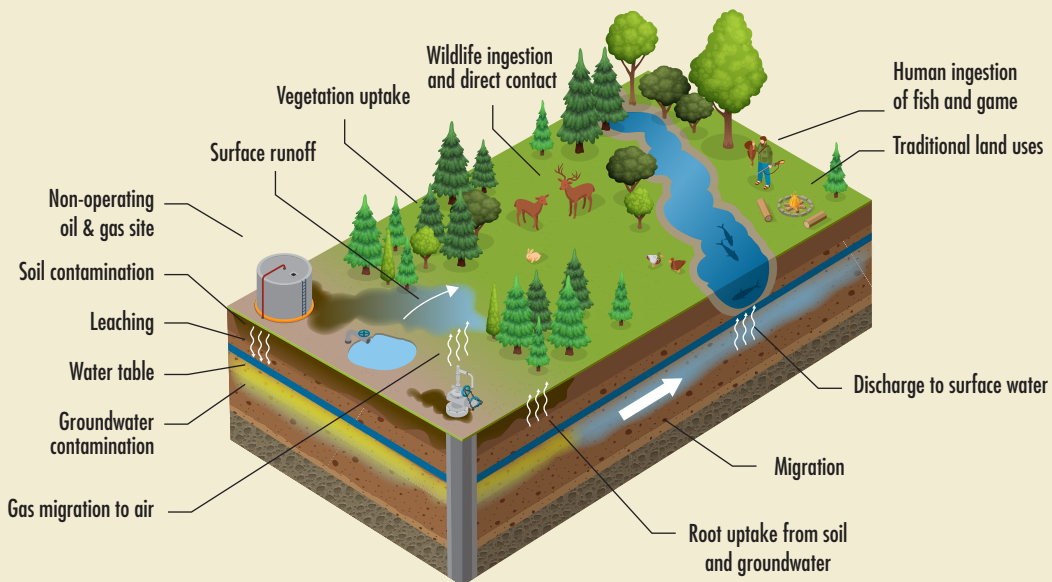
KEY FINDINGS AND RECOMMENDATIONS

Exhibit 8: Pathways of contamination on oil and gas well sites on agricultural land and natural areas

AGRICULTURAL LAND



NATURAL AREA



Source: Office of the Auditor General of British Columbia (not to scale)

KEY FINDINGS AND RECOMMENDATIONS

to protect the environment. We also found that the OGC took steps to ensure that the standards kept up with advances in technology and good practices in other jurisdictions. For example, the OGC worked closely with industry and other provincial regulators to develop standards that were often integrated into the OGC's manuals and regulations.

The OGC outlines requirements for suspending and decommissioning wells in the Oil and Gas Operations Manual and the Drilling and Production Regulation. Well suspension involves securing the wellhead and in some cases plugging the well below the surface. Plugging the well prevents the unintentional release of oil or gas and ensures that the operator can bring it back into production (if, for example, the resource prices or technologies improve the cost-effectiveness of producing oil or gas for that well).

The wellhead (the structure at the top of a well that manages the pressure and flow of oil or gas) is also locked to prevent unauthorized access (see [Exhibit 9](#)). Suspension requirements become more stringent for different well types. For example high-risk wells have more stringent requirements than medium- and low-risk wells. For some low-risk wells, plugging is not required. Examples of high-risk wells are those that produce elevated levels of sour gas, a natural gas that contains hydrogen sulphide, which is toxic in high concentrations, and wells that are used to dispose of acid gas, which is a mixture of carbon dioxide and hydrogen sulphide that is separated from natural gas before it is sent to market.

When decommissioning a well (referred to as “abandonment” in the regulations), operators must take steps to reduce its risk to the environment and the public and maintain its long-term integrity (see sidebar).

REQUIREMENTS FOR DECOMMISSIONING A WELL

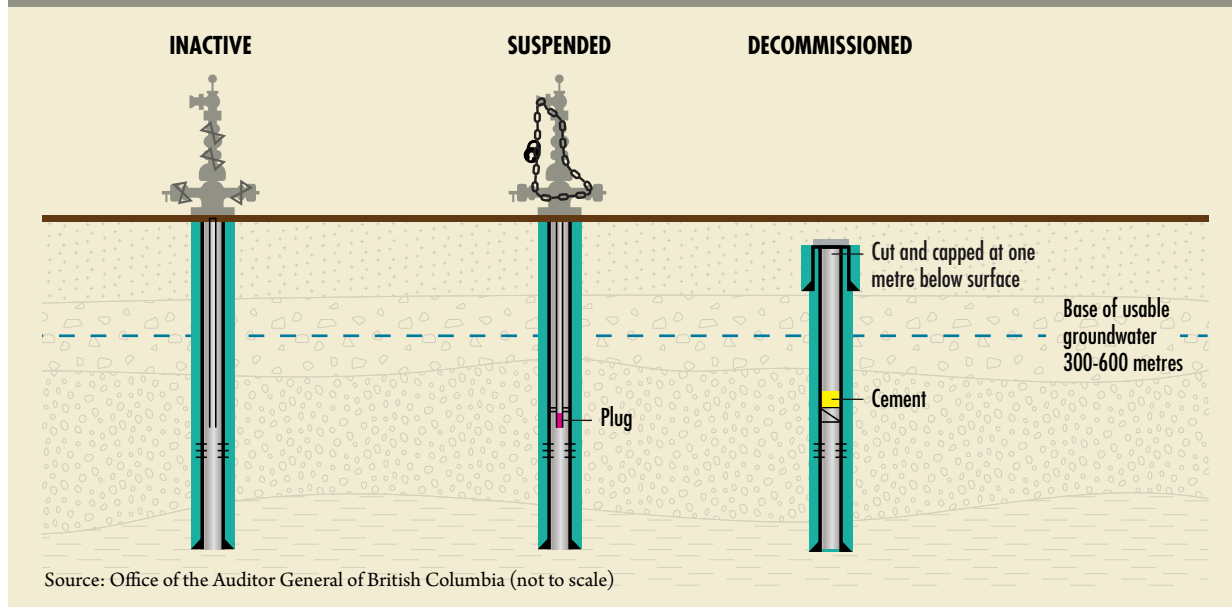
To decommission a well, an operator must:

- ◆ identify any issues with the integrity of the well
- ◆ identify and protect groundwater aquifers (sources of underground freshwater)
- ◆ permanently plug the well
- ◆ evaluate the quality of the cement used to plug the well
- ◆ repair any identified issues to ensure that fluids will not leak from the well
- ◆ fill the well with non-saline water, or other non-corrosive fluid
- ◆ cut and cap the well by cutting the well casing below the surface and placing a vented cap on top to prevent excessive pressure from building up in the well (see [Exhibit 9](#))

Source: Adapted from the Drilling and Production Regulation and Alberta Energy Regulator Directive 020: Well abandonment

KEY FINDINGS AND RECOMMENDATIONS

Exhibit 9: The differences between inactive, suspended and decommissioned wells



SOURCES OF CONTAMINATION ON AN OIL OR GAS WELL SITE

Contamination can result from various activities during the life cycle of an oil and gas well. For example:

- ◆ Pits used for storage and disposal of waste products from natural gas and oil well drilling activities, such as drilling fluids and cuttings (bits of rock)
- ◆ Spills of chemicals and oils used or generated during production, storage and transportation
- ◆ Leaks from surface ponds used to store wastewater from hydraulic fracturing
- ◆ Flare pits – earthen pits (used historically to vent and burn waste gas) that hold liquid contaminants (new flare pits are not permitted by the OGC)

Remediation standards were clear but expectations for reclaiming sites were not

Soil, surface water and groundwater contamination can occur during drilling, production, processing (e.g., spills from the well or equipment) and waste management (see sidebar). Remediation is the cleaning up of contaminants to ensure they do not further adversely affect humans, aquatic life, wildlife and vegetation. Reclamation is the process of returning the land to its original form and use, including removing equipment and replanting the site with vegetation.

We found that the OGC's regulatory framework provided clear standards for remediating inactive sites, but that requirements concerning the expected outcomes for some reclamation activities lacked clarity.

The *Environmental Management Act* and Contaminated Sites Regulation provide detailed requirements,

KEY FINDINGS AND RECOMMENDATIONS

standards and guidelines for remediating sites.

Operators are required to investigate sites that have potential for contamination, and to clean up areas where there are concentrations of substances in soil, surface water, groundwater and sediment at the bottom of a water body that exceed the standards.

For example, soil remediation at well sites typically involves excavating the contaminated soil and disposing of it at a secure landfill, or treating and containing the soil on site. Remediation options for groundwater and surface water include biological, chemical and physical treatment technologies.

According to the OGC's requirements and standards, when operators reclaim oil and gas sites, they need to:

- ◆ remove structures and equipment
- ◆ restore and stabilize soil and natural drainage patterns
- ◆ control weeds
- ◆ replant vegetation

In addition, the OGC established an agreement for reclamation requirements with the provincial Agricultural Land Commission (ALC). The ALC is an administrative tribunal dedicated to preserving agricultural land in B.C. The agreement sets out requirements for returning soil, topography and vegetation of sites within the Agricultural Land Reserve to equivalent condition and capability. The Agricultural Land Reserve is a provincial zone in which agriculture is recognized as the priority use, and non-agricultural uses are restricted.

For sites outside the Agricultural Land Reserve, the objectives of revegetation, as set in the Environmental Protection and Management Regulation (under the

OGAA), are to both control erosion and restore wildlife habitat through the planting of ecologically suitable plants. The OGC's accompanying guidelines present options that would allow for quick erosion control but do not promote the rapid reestablishment of native plants and wildlife habitat. For example, OGC officials and local First Nations told us that operators usually sow a non-native grass seed mix because it is inexpensive and reestablishes quickly to reduce soil erosion (see Exhibit 10). However, seeding with non-native grasses can hinder the reestablishment of native plants and trees, and hence the restoration of wildlife habitat. Because the requirements do not specify timelines for succession to native species and restoration of wildlife habitat, the OGC is challenged to ensure that its guidance is consistent with the objectives in the regulations, or to verify whether the reclamation activities achieved the objectives, as discussed later in this report.

Exhibit 10: A restored site reseeded with grass



Source: BC Oil and Gas Commission

RECOMMENDATION 1: *We recommend that the BC Oil and Gas Commission review its restoration regulations and guidelines and make changes as needed to ensure that the expected outcomes and timelines for ecologically suitable revegetation are clear.*

KEY FINDINGS AND RECOMMENDATIONS

No triggers to ensure that wells are decommissioned and sites restored

Legislation and regulations provide clear requirements for how to decommission wells and remediate sites, but we found that the OGC doesn't have any regulatory triggers to ensure that operators are decommissioning wells and restoring sites. This gap in legislation means that operators are not required to decommission wells or restore sites, unless the OGC explicitly orders them to do so to address specific safety or environmental issues on a case by case basis.

The Drilling and Production Regulation prescribes time frames for well suspension, but not for well decommissioning. Operators must suspend an inactive well within 60 days of its becoming inactive and must inspect the well periodically to ensure its ongoing integrity. However, operators are not obligated to

decommission wells as long as their permits are valid.

OGC officials told us that due to the regulations, operators may choose to leave wells in a suspended state indefinitely, because continuing to pay surface leases can be more cost effective than paying to decommission a well. Wells left in a suspended state may present a greater risk of contamination from fluid migration than decommissioned wells. See Exhibit 11 for an example of an oil well on agricultural land that the operator suspended in 2003, but decommissioning and restoration work was not completed.

We also found that the OGC lacked regulatory triggers to compel operators to assess sites for contamination following well decommissioning, and to restore sites within a specific time frame. Under OGAA, there is no requirement or timeline for operators to apply for, or obtain, a Certificate of Restoration unless a permit is spent (i.e., when the OGC determines the permit is no longer required by the permit holder), cancelled or expired (see sidebar).



Source: Office of the Auditor General of British Columbia

CERTIFICATE OF RESTORATION

Operators can apply to the OGC for a Certificate of Restoration as the final step in restoring a site. The Certificate of Restoration is a two-stage process. Part I requires that operators conduct a professional environmental assessment of the site and, if necessary, address potential contamination issues. Part II requires the operator to complete surface reclamation that restores the site to the equivalent of pre-development conditions.

KEY FINDINGS AND RECOMMENDATIONS

Because the operator is not required to investigate sites for contamination until voluntarily initiating the Certificate of Restoration process, the OGC does not know if unrestored sites are contaminated, unless contamination is discovered by an inspection or reported by the operator. This means that contaminated, non-operating sites could remain undetected by the OGC and continue to impact the environment.

Changes underway to address gaps in the regulatory framework

In April 2018, the legislative assembly passed amendments to OGAA (Bill 15), which will provide the OGC with the authority to require operators to decommission wells and restore sites when the accompanying regulations bring the amendments into force. At the time of this report, the OGC was developing the regulations that will detail the requirements, including timelines for decommissioning wells and restoring sites.

RECOMMENDATION 2: *We recommend that the BC Oil and Gas Commission complete its work to develop and implement regulations, policies and procedures to ensure that operators decommission wells and restore sites in a timely manner.*

MITIGATING RISKS OF UNRESTORED SITES

The OGC used a risk-based approach to mitigate the potential environmental impacts of unrestored sites

Given the lack of triggers to compel operators to decommission wells and restore well sites, we assessed how the OGC was managing the environmental risks of sites that can remain unrestored indefinitely if the operator chooses to not do the work. We looked to see if the OGC assessed the environmental risks of unrestored sites, had a risk-based approach to inspecting these sites and promoted compliance with regulations. We found that the OGC recognized these gaps in its regulatory framework and was mitigating risks through its program of assessments, inspections and enforcement actions. We also found that the OGC was publicly reporting on the results of its compliance and enforcement activities.

The OGC understood the environmental risks of unrestored well sites

Managing risk begins with identifying threats and assessing the likelihood and significance of their impact. We found that the OGC maintained an inventory of oil and gas sites in B.C. and assessed the environmental risks of the sites that were non-operating and unrestored with the following:

- ◆ a review of environmental liabilities

KEY FINDINGS AND RECOMMENDATIONS

- ◆ corporate and environmental risk assessments
- ◆ site-specific risk assessments on a case-by-case basis

In response to our [2010 audit](#), the OGC analyzed the environmental risks (based on proximity to features such as domestic water wells and wildlife habitat areas) and resulting liability of:

- ◆ wells that have been inactive for 10 years or more
- ◆ wells that have been decommissioned for 24 months or more

The OGC identified a lack of timelines to trigger well decommissioning and site restoration, and the resulting risk that operators could take advantage of the lack of triggers and delay site restoration activities so as to avoid the associated costs. This delay results

in an increase in inactive, unrestored sites and related environmental liabilities.

To manage this risk, the OGC proposed the legislative changes introduced with Bill 15, which will allow the OGC to require operators to restore sites. It was also developing new plans to address prioritized risks, including a five-year Environmental Improvement Plan.

The OGC also conducted, or required operators to conduct, site-specific risk assessments on a case-by-case basis, including risk assessments for orphan sites, and when identified, contaminated sites and wells with gas migration or surface casing vent flows (see sidebar). The OGC used these assessments to help prioritize oversight activities, including inspections and work plans for orphan sites.

The OGC had a systematic and risk-based inspection program

In the absence of prescribed time frames for well decommissioning and remediation, the OGC used compliance inspections to identify and mitigate the ongoing environmental risks of unrestored sites. Inspections are an important tool that a regulator like the OGC can use to ensure compliance with requirements.

Compliance inspections are oversight tools that identify risks and assess whether operators are following rules. Inspections can be carried out by an external body (e.g., a regulator, such as the OGC) or internally by an operator. Inspections of non-operating oil and gas well sites may involve visual inspection of the equipment and the site, pressure testing of the well, identifying any leaks needing repair, and flagging

SURFACE CASING VENT FLOW AND GAS MIGRATION

Surface casing vent flow and migration of gas outside the well casing are two types of gas leaks that can occur at oil or gas wells due to imperfections within well seals. These imperfections may result from drilling or cementing conditions, or from methods practised at older wells not constructed to present-day standards. Surface casing vent flow leads to the release of methane (a greenhouse gas) into the air, and gas migration may pose a risk to groundwater.

KEY FINDINGS AND RECOMMENDATIONS

Exhibit 12: Gas bubbling up at a wellhead from a leak



Source: BC Oil and Gas Commission

any risks of surface casing vent flow or gas migration. See Exhibit 12 for an example of gas bubbling up at a wellhead, evidence of a leak.

We found that the OGC had a systematic and risk-based inspection program in line with good practice. A site visit allows the OGC to identify, for example, any obvious surface contamination. In addition to conducting its own inspections, the OGC also requires

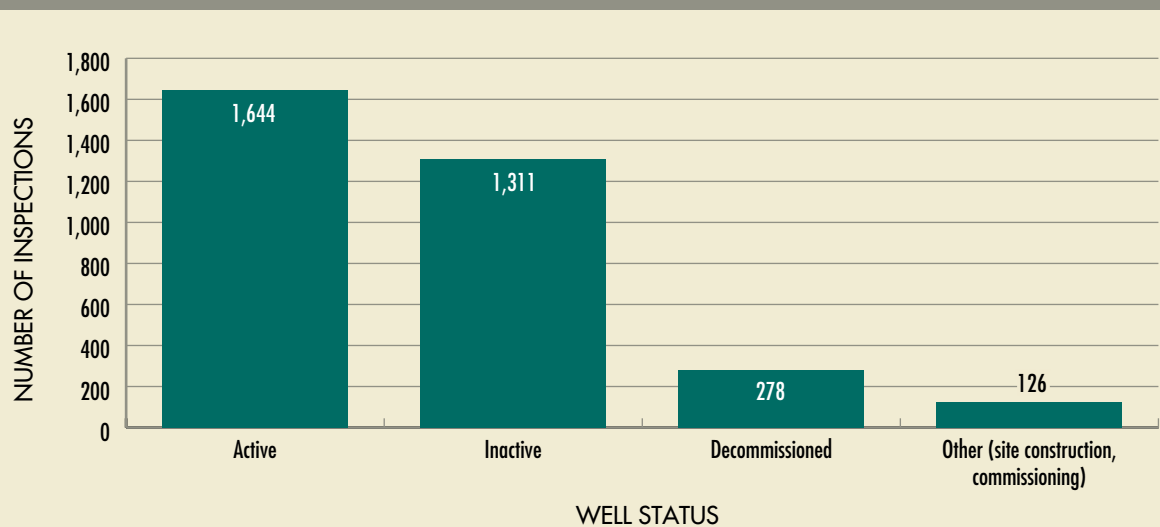
that operators conduct inspections, and monitor and report any issues.

The OGC's inspection planning process considered risk factors, such as:

- ◆ the operator's incident and compliance history, or financial health
- ◆ type of activity (e.g., sour gas production)
- ◆ status of production (e.g., active, inactive, decommissioned)
- ◆ location (e.g., proximity to protected areas or wildlife habitat)
- ◆ geographic coverage
- ◆ public complaints

In 2017, the OGC conducted 3,359 inspections (or site visits) of wells to assess compliance with requirements (see Exhibit 13).

Exhibit 13: Number of inspections by well status, 2017



Source: Office of the Auditor General of British Columbia based on BC Oil and Gas Commission reporting

KEY FINDINGS AND RECOMMENDATIONS

The OGC promoted compliance with regulations

Environmental compliance and enforcement programs are effective when they promote operators' compliance with regulations.

We examined whether the OGC took action to help ensure that operators corrected deficiencies that the OGC had identified during inspections. We were particularly interested in whether the OGC ensured that inactive wells were suspended in time to reduce contamination risks, given that there are no timelines for decommissioning wells. We also examined if the OGC had reviewed its compliance and enforcement program for continual improvement, according to good practice.

We found that the OGC had compliance management systems and processes in place and took steps to encourage operators to comply with legislation, regulations and requirements set out in permits and authorizations. These include the deficiency and correction process, compliance management plans and enforcement actions.

The OGC assigned deficiencies (identified during inspections) a severity ranking and corresponding timeline for correction. Operators were issued a deficiency notice and were required to correct the issue and report within the specified timeline. The OGC extended the specified timelines if it deemed there was a valid reason for doing so (e.g., seasonal constraints that prevent the operator from accessing the site).

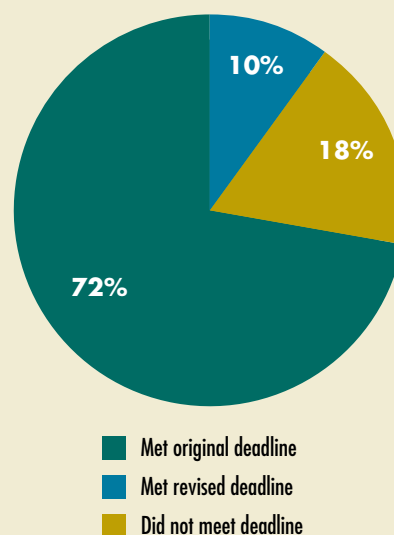
If deficiencies are not corrected within the extended timelines, the OGC can take enforcement actions,

which are a set of legal tools used to manage compliance. Under the *Oil and Gas Activities Act*, the OGC can issue enforcement orders to mitigate a risk to public safety, protect the environment, or promote conservation of oil and gas. We did not assess the effectiveness of the OGC's enforcement actions.

We reviewed the OGC's data from January 2016 to May 2018 and found that operators had corrected 93% of deficiencies that the OGC identified during inspections. Operators had corrected 82% of all deficiencies within their deadlines, with 72% being corrected within their original deadline and 10% being corrected within a revised deadline (see Exhibit 14). The OGC tracked and followed up on deficiencies and operator responses.

The OGC also monitored and managed compliance with legislation and regulation outside of inspections.

Exhibit 14: Proportion of deficiencies corrected within specified timeframes



Source: Office of the Auditor General of British Columbia, based on BC Oil and Gas Commission data from January 2016 - May 2018

KEY FINDINGS AND RECOMMENDATIONS

For non-operating oil and gas wells, the engineering team monitored compliance with the Drilling and Production Regulation by tracking whether operators were meeting suspension requirements. In cases where operators had not met requirements, the OGC worked with them to develop compliance management plans to bring the operators into compliance with regulations.

The OGC initiated a plan in 2015 to bring operators into compliance with suspension requirements, including the requirement to suspend wells within 60 days of becoming inactive. The OGC’s plan prioritized operators according to their risk of insolvency and the number and type of non-compliant wells. The OGC reported that compliance rates improved from 60% to 78% in a 3.5-year period and was working to further improve compliance rates (see Exhibit 15).

Regarding continual improvement, we found that the OGC had periodically commissioned external reviews of its compliance and enforcement program and made

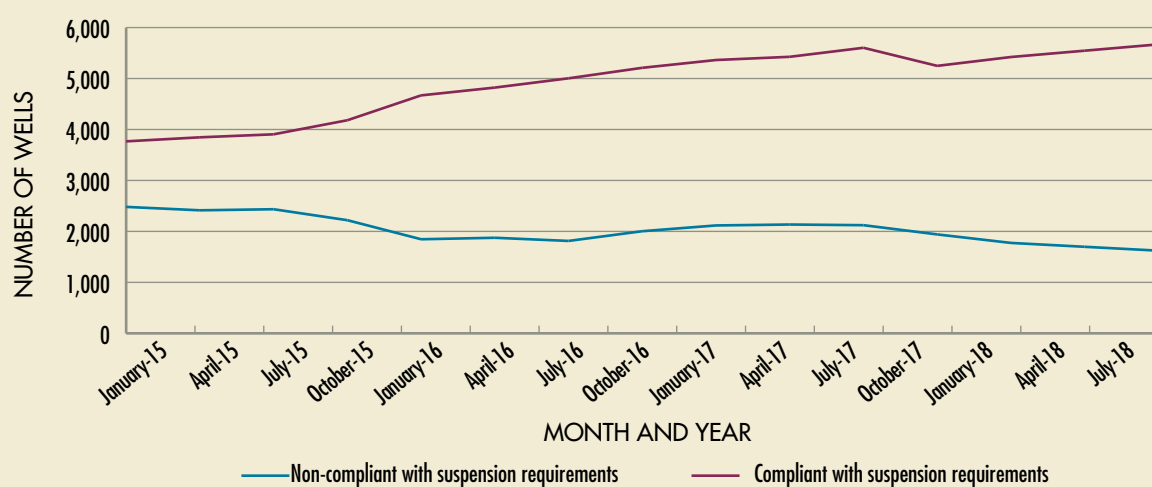
changes to improve it. For example, in 2017, the OGC commissioned an external review of its enforcement program. The review looked at key risks and found that, for the most part, the OGC’s enforcement program had adequate controls in place to address potential risks, and that enforcement actions were consistent with regulations.

We noted that the OGC made improvements in response to the reviews, including shifting to risk-based inspection planning, emphasizing planned inspections and covering the full regulatory life cycle of oil and gas sites.

The OGC reported on compliance and enforcement activities

Reporting on key results promotes an organization’s accountability by providing important management information to the legislature and the public about whether programs are working well and where adjustments should be made. We examined if the

Exhibit 15: The number of wells not in compliance with suspension requirements is decreasing



Source: Office of the Auditor General of British Columbia, based on BC Oil and Gas Commission data from August 2018

KEY FINDINGS AND RECOMMENDATIONS

OGC was gathering information on the results of its oversight of non-operating sites and publicly reporting this information in a timely manner.

We found that the OGC reported publicly on compliance and enforcement activities, and had updated its reporting processes in recent years. For example, in 2016/17, the OGC switched from publishing quarterly summary reports on enforcement activities, to publishing individual enforcement reports in real time on its website. The OGC also stopped publishing detailed annual reports on inspections (e.g., number of deficiencies) in 2015/16 and instead reported on its inspection compliance rate and number of inspections completed.

VERIFYING AND MONITORING RESTORED SITES

The OGC verified that sites were restored, but some oversight gaps remained

Operators restore well sites by remediating any contamination and reclaiming the land to its pre-disturbance condition. We looked to see if the OGC adequately verified that restored sites were appropriately remediated and reclaimed. This included assessing whether the OGC's coordination with the Ministry of Environment and Climate Change Strategy provided for effective remediation of high-risk contaminated sites. We also looked at whether the OGC had fulfilled its commitments to engage with

First Nations on site restoration requirements, and if it had reported publicly on site restoration outcomes.

We found that the OGC had tools and processes in place to verify site restoration, but there were several gaps in its oversight processes. We also found that the OGC was not reporting publicly on its oversight of restoration activities.

The OGC reviewed restoration applications certified by professionals

We found that the OGC used the Certificate of Restoration process to ensure that operators had addressed any contamination (Part I) and completed adequate surface reclamation on sites (Part II). The OGC's Environmental Stewardship staff review the applications, which are prepared by registered professionals on behalf of the operator.

The OGC's records show that since 2010 it accepted most applications (1,177 of 1,234 Part I applications; 881 of 924 Part II applications), and rejected applications where it found that further information or work was required. The OGC also expects that operators will seek private landowner sign-off on the adequacy of restoration on their land, and we found that OGC officials worked with landowners to settle cases of disagreement before accepting a Part II application and certifying a site as restored.

The OGC verified remediation, but not reclamation outcomes

In our [2010 audit](#), we recommended that the OGC implement an independent audit program to

KEY FINDINGS AND RECOMMENDATIONS

verify restoration work on sites that have received a Certificate of Restoration. We found that the OGC responded by developing a Restoration Verification Audit Program in 2012 to evaluate industry compliance with remediation requirements (Certificate of Restoration Part I) through field investigation of a sample of certified sites.

The OGC used risk-based, stratified random sampling to select sites for its audit program. The method is designed to include a variety of operators and a mix of private and Crown land, as well as inclusion of sites with known previous contamination. As part of its verification audit, OGC officials reviewed files and collected soil samples from areas of potential concern, such as well centres, storage areas, drilling waste disposal areas and flare pits. The OGC also used electromagnetic surveys, which measure soil conductivity, to identify potential subsurface contamination that would need investigation.

We found that the OGC conducted verification audits annually until 2014, but not in 2015 and 2016 due to resource constraints. The OGC began the audits again in 2017 and 2018, including auditing sites that received Certificates of Restoration in the years that were missed. From 2012 to 2018, the OGC verified 50 sites with Certificates of Restoration. Two sites have failed the audit, requiring that additional remediation work be completed by the operator.

We also found that the OGC did not assess the adequacy of the final site restoration step—surface reclamation—as part of its audit program. We heard from OGC officials that the OGC needs to develop clearer standards for revegetation and wildlife

habitat restoration in order to judge the adequacy of operators' reclamation outcomes. As we've discussed previously, the OGC needs to clarify revegetation requirements so that it can then verify if the sites that it has certified as restored are achieving the desired outcomes.

RECOMMENDATION 3: *We recommend that the BC Oil and Gas Commission include surface reclamation (Part II of the Certificate of Restoration) as part of its field investigation work to ensure that sites are adequately reclaimed.*

Effectiveness of joint oversight of contaminated sites uncertain

The OGC and the Ministry of the Environment and Climate Change Strategy (ENV) share oversight responsibilities for contaminated oil and gas sites. These responsibilities are outlined in a 2008 Memorandum of Understanding (MOU), which was updated in 2016.

In our [2010 audit](#), we recommended that the OGC and the Ministry of Environment (now ENV, as mentioned above) implement appropriate site-classification guidelines for contaminated oil and gas sites. Following our audit, the OGC and ENV finalized an Upstream Oil and Gas Site Classification Tool that supports the MOU.

Under the MOU, the OGC refers all high-risk contaminated sites to ENV to oversee the remediation process. If the OGC classifies a site as high-risk

KEY FINDINGS AND RECOMMENDATIONS

(as part of the Certificate of Restoration Part I application), that site is referred to ENV for review. When the operator has completed remediation and ENV determines that the operator has addressed high-risk conditions, ENV refers it back to the OGC to oversee the remainder of the remediation process. This has created complex administrative processes with two different oversight regimes for high-risk and non-high-risk contaminated oil and gas sites. See Exhibit 16 for an example of a site undergoing excavation of contaminated soil as part of remediation.

We found that the OGC oversaw contaminated site remediation as per its responsibilities under the Contaminated Sites Regulation and the MOU. However, for the procedures of the MOU to take effect, high-risk contaminated sites must first be identified. As discussed earlier in this report, there is no requirement for operators to assess sites for contamination after decommissioning unless the operator chooses to apply for a Certificate of Restoration. This has limited the OGC's ability to

know the extent of contamination on unrestored sites unless it is discovered by an inspection or reported by the operator. Between 2012 and 2018, the OGC identified 12 high-risk contaminated sites using the classification tool and referred them to ENV.

We also found that the OGC and ENV had not reviewed the effectiveness of the joint oversight processes set out in the MOU, including the classification tool. This includes assessing whether the MOU has resulted in increased administrative efficiencies as intended, as well as reviewing the effectiveness of the classification tool in allowing the OGC to identify high-risk sites and ensure timely remediation. The OGC and ENV had also not assessed if their oversight processes can accommodate a possible increase in the number of identified contaminated sites, including high-risk sites, resulting from the OGC's pending changes to the regulatory framework to improve the pace of site restoration.

Exhibit 16: Excavating contaminated soil as part of site remediation



Source: Winter Hawk Studios

RECOMMENDATION 4: *We recommend that the BC Oil and Gas Commission review, in coordination with ENV, the Memorandum of Understanding and the Oil and Gas Site Classification Tool to ensure the effective oversight of high-risk contaminated oil and gas sites.*

The OGC had begun to collaborate with First Nations on restoration outcomes

Northeastern B.C. is the traditional territory of Treaty 8 First Nations. The proliferation of inactive, unrestored oil and gas sites has raised concerns from

KEY FINDINGS AND RECOMMENDATIONS

First Nations regarding impacts on ecosystems and wildlife from contamination and loss of habitat, as well as concerns regarding the standards, methods and timing related to the restoration of well sites. We looked to see whether the OGC had considered the concerns of local First Nations regarding the adequacy and timing of restoration outcomes in its oversight of site restoration.

We found that despite long-standing commitments to engage with local First Nations on restoration priorities and preferences, the OGC had only recently taken directed action to collaborate with First Nations communities on improving the outcomes of site restoration.

In 2018, the OGC began to engage with local First Nations communities to discuss and enhance the pace of and outcomes for restoration, including outlining the changes introduced with Bill 15, and sharing information about the number and location of inactive sites on traditional territory. In response to concerns about the growing number of unrestored sites and the adequacy of site restoration, the OGC partnered with three First Nations to restore orphan sites on their traditional territory. These pilot projects were still in early planning at the time of this audit, and the outcomes had not been evaluated (see sidebar).

RECOMMENDATION 5: *We recommend that the BC Oil and Gas Commission continue to partner with local First Nations to identify and implement improvements to restoration policies and practices.*

THE OGC'S FIRST NATIONS ORPHAN SITE RESTORATION PILOT PROJECT

In 2018, the OGC partnered with Saulteau, Fort Nelson and Doig River First Nations on pilot projects to restore orphan sites on their traditional territories. The objectives of the projects are to:

- ◆ support First Nations' interests through partnerships and knowledge sharing on the environmental impacts of oil and gas development
- ◆ understand restoration successes and areas for improvement
- ◆ provide opportunities for direct community participation in the restoration process

The pilot projects involve the OGC working with the First Nations partners to:

- ◆ conduct risk assessments for selected orphan sites
- ◆ establish ecologically suitable and culturally appropriate restoration plans
- ◆ complete the required surface restoration work
- ◆ monitor restoration outcomes
- ◆ decide whether to grant a Certificate of Restoration for the sites

Subject to the success of the pilot projects, the OGC planned to expand the projects to a broader orphan site restoration program for all Treaty 8 First Nations.

KEY FINDINGS AND RECOMMENDATIONS

The OGC did not report publicly on restoration

In our [2010 audit](#), we recommended that the OGC improve its reporting to the legislature and the public about whether it was effectively managing site contamination risks. The OGC agreed with the recommendation and began to publish annual site restoration reports. The reports included statistics on the number of Certificate of Restoration applications received and accepted, the results of the OGC's verification audits, and the ratio of restored wells to decommissioned wells.

We found that the OGC ceased reporting on restoration in 2013 due to resource constraints, so there is no current public information about how well the OGC is managing the risks of contaminated sites and ensuring that sites are adequately restored.

RECOMMENDATION 6: *We recommend that the BC Oil and Gas Commission report annually on the outcomes of site restoration activities to ensure transparency and accountability to the legislature, the public and First Nations.*

Long-term risks from restored sites were not fully understood

Decommissioning and restoring wells to established standards mitigates environmental risks. However, even wells decommissioned to current standards could

still pose long-term risks to the environment if, for example, well casings or cement were to fail. Further, legacy sites (well sites that were decommissioned and restored to standards prior to 2004) could present ongoing risks.

We examined whether the OGC assessed, monitored and managed the long-term residual risks of restored sites. We found that the OGC had a high-level understanding of the environmental liabilities of all legacy sites, but had not assessed the site-specific risks at each site. We also found that the OGC was undertaking research to better understand the potential longer-term risks of restored sites.

More work needed to understand the environmental risks of legacy sites

Legacy sites are well sites that were decommissioned and restored prior to 2004, when the OGC implemented current restoration requirements. We found that although the OGC had a general understanding of the potential environmental impacts at these sites, it had not assessed the site-specific environmental risks of most legacy sites.

In our [2010 audit](#), we recommended that the OGC assess the risks associated with legacy sites and develop a plan to deal with the risks. In response, the OGC conducted a desktop review in 2012 of the environmental liability posed by 3,721 legacy sites, and assessed the risks of these sites according to well type (e.g., production, disposal, test wells) and whether they had produced oil or gas (see [Exhibit 17](#)).

KEY FINDINGS AND RECOMMENDATIONS

Exhibit 17: Types of legacy sites in B.C.

Site type		Number
Well sites	Never produced	3,507
	Gas production	119
	Oil production	64
	Mixed oil and gas production	6
	Water source wells	11
	Water disposal wells	5
Test holes*	Drilled	9
Total		3,721

* Shallow holes drilled by operators to obtain data about the geological conditions at the site

Source: Office of the Auditor General of British Columbia, based on the OGC's Assessment of Environmental Liabilities of Historically Reclaimed Sites

The OGC can compel operators to address any contamination issues on legacy sites, if required. The OGC determined that 54 sites had no active operators. Of these sites, two had produced oil and gas and had potential for contamination. The OGC designated these two sites as orphans and targeted them for investigation. The OGC field-investigated one of the sites and identified contamination.

In 2016, the OGC also collected samples from a subset of six legacy sites that it considered likely to be contaminated. It did this work in response to an assessment by the Ministry of Health in 2014. The ministry assessed health risks of oil and gas activity in northeastern B.C. and identified legacy sites as a potential emissions source that presents a risk to human health and water sources. The OGC found that four of the six sites had levels of contamination exceeding the current regulatory standards for hydrocarbons. The OGC issued a remediation order to the former permit holder of the site with the highest level of contamination.

At the time of this audit, the OGC was conducting further research on this topic, and its 2018 Annual Compliance Plan included inspections of legacy sites to assess the adequacy of groundwater and drinking water protection (see the sidebar for an example of a legacy site in B.C.). However, the OGC had not determined which legacy sites pose significant environmental risk so that it can prioritize any required restoration work.

EXAMPLE OF A LEGACY SITE

Exhibit 18 illustrates a legacy site that was decommissioned in 1990 and received a Certificate of Restoration in 1992. The site and its access road are overgrown, making it challenging for the OGC to access the site to determine if any further remediation activities may be required. The OGC was considering whether the impact of removing established trees and vegetation outweighs the need to investigate the site for contamination and the need for potential remediation.

Exhibit 18: A hard to access legacy site



Source: BC Oil and Gas Commission

KEY FINDINGS AND RECOMMENDATIONS

RECOMMENDATION 7: *We recommend that the BC Oil and Gas Commission manage the environmental risks of legacy sites by using a risk-based approach to ensure that any contamination is identified and addressed, including setting timelines for completing the work, and monitoring and reporting on progress.*

The OGC had initiated research on the long-term risks of restored oil and gas sites

We found that the long-term risks from wells that have been decommissioned and restored to current standards were not well understood by the OGC or the industry due to a lack of available data. Decommissioning standards are intended to mitigate long-term risks from gas leakage; however, existing

DETECTING LEAKS FROM DECOMMISSIONED WELLS: THE OGC'S WELL FLYOVER PROGRAM

In 2017, the OGC piloted research on a sample of 105 wells using a laser methane detector mounted on a helicopter (see Exhibit 19). The purpose of the study was to determine whether the methane detector could be used to inspect decommissioned wells for leakage. The study included 82 decommissioned wells and 23 active wells, including those with known leakage, as controls. The OGC completed follow-up inspections on 16 sites to confirm the findings. The follow-up inspections found that one decommissioned well had minor methane emissions.

The study confirmed that the laser detector was capable of successfully detecting methane emissions from decommissioned wells. However, it was less accurate on sites with both active and decommissioned wells, because emissions from active wells could cause false positives.

Exhibit 19: Helicopter with methane detector mounted on the underside



The OGC intended to follow up on this pilot study by:

- ♦ developing a risk-rating system for leaks to rank all decommissioned wells
- ♦ conducting annual flyover inspections with a focus on highest-risk wells
- ♦ developing a long-term aerial inspection schedule that focuses on wells in remote or winter-access-only locations

In 2018, the OGC conducted a second survey of 103 wells and found that one decommissioned well was leaking methane. The OGC had contacted the permit holder about the leak.

KEY FINDINGS AND RECOMMENDATIONS

best practices cannot ensure long-term prevention. We found that the OGC does work to continuously improve well integrity standards, rather than focusing on assessing or monitoring wells after restoration.

The OGC also had several research initiatives underway to fill gaps in understanding of the long-term risks. This included research on gas migration that can happen from the degradation of a well's integrity over time (see [sidebar](#)). Other research included studies commissioned through the BC Oil and Gas Research and Innovation Society to assess, for example, the use of drones to monitor the outcomes of site restoration.

RECOMMENDATION 8: *We recommend that the BC Oil and Gas Commission continue work to understand the long-term environmental risks of decommissioned wells and restored sites, and develop a plan to mitigate those risks.*

MANAGING ORPHAN SITES

The OGC collected inadequate funding from operators to cover the cost of restoring orphan sites

The OGC follows the *polluter pays* approach, where industry is expected to cover the cost of environmental clean-up at no cost to the taxpayer. When an oil or gas operator is bankrupt or cannot be located, the sites

that they have permits for are designated as orphans by the OGC, unless they can be sold to another operator. In B.C., an orphan site becomes the responsibility of the OGC, meaning that the OGC is responsible for decommissioning the well and restoring the site.

We examined whether the OGC had collected adequate funds from operators to cover the costs of work carried out by the OGC on orphan sites. To do this, we assessed the effectiveness of the OGC's tools designed to ensure that operators bear the costs of orphan site restoration. The tools are called the Liability Management Rating (LMR) program and the Orphan Site Reclamation Fund (Orphan Fund or OSRF).

Through the LMR, the OGC determines the amount of money it should collect as security deposits to ensure that operators meet their requirements under the *Oil and Gas Activities Act* (OGAA) and carry the financial risks of their activities. If an operator goes bankrupt, the OGC can transfer the security deposit held to the Orphan Fund to complete restoration work. The Orphan Fund was established under the OGAA to cover restoration costs in cases where the operator is insolvent or cannot be located. It is mainly funded through a tax on operators' production.

We found that the OGC's Liability Management Rating program was not acting as an effective incentive for industry to manage its liability obligations and that securities that the OGC had collected from recently bankrupted operators did not cover the cost of restoring orphan sites. The number of orphan sites increased, contributing to the OGC having a \$33 million liability to cover obligatory costs for restoring

KEY FINDINGS AND RECOMMENDATIONS

sites to ensure public and environmental safety. The Orphan Fund was not responsive to the increase in orphan sites and its revenue fell short of expenses in 2016/17 and 2017/18. The OGC had a plan in place with a target to restore orphan sites within 10 years of designation.

The OGC did not collect sufficient securities from recently bankrupt operators to cover restoration costs

In our [2010 audit](#), we recommended that the OGC ensure that operator net assets and security deposits were sufficient to cover the potential cost to the OGC of assuming responsibility for site decommissioning and restoration. In response, the OGC implemented the LMR program to manage the financial risks of operators not meeting their obligations to restore sites. The LMR is designed to protect the Orphan Fund, and ultimately the Crown, from bearing restoration costs, as well as to provide incentive for industry to actively manage liabilities.

The OGC uses the LMR to determine the amount each operator should pay as a security deposit, based

on the ratio of the projected production value of the oil and gas over three years to estimates of how much it would cost to restore the sites. The OGC monitors any changes in the ratio between assets and liability and may update the amount of security required. For example, if an operator has a greater number of non-producing unrestored well sites (liabilities) than productive well sites (assets), the OGC may request more security from the operator.

Operators with more liabilities than assets can bring their ratio back up by reducing liability (by restoring sites or selling less-productive sites), increasing their assets (by purchasing highly productive sites) or submitting a security deposit to the OGC.

However, we found that the program was not acting as an effective incentive for industry to manage its liability obligations and in the case of bankruptcies in 2016 and 2017 (e.g., Terra Energy, Quattro Exploration and Production Ltd.), the LMR failed to protect the Orphan Fund from bearing most of the costs of orphan site restoration. Security collected by the OGC from operators did not cover the cost of restoring potential orphan sites (see [sidebar](#) and Exhibit 20).

Exhibit 20: Examples of restoration liabilities and security deposits for recently bankrupt operators

Operator	Number of sites	Full restoration costs	Security deposit available	Difference (Orphan Fund responsibility)
Calver Resources Inc.	4	\$1,142,000	\$108,000	\$1,034,000
TransEuro Beaver River Inc.	7	\$10,258,000	\$2,069,000	\$8,189,000
Tenaka Drilling Consortium Ltd	1	\$638,000	\$96,000	\$542,000
Terra Energy Corp.	175	\$54,702,000	\$952,000	\$53,750,000
Quattro Exploration and Production Ltd.	75	\$18,955,000	\$0	\$18,955,000

Source: Office of Auditor General of British Columbia, based on the OGC's estimates of liability when it designated the sites as orphans.

KEY FINDINGS AND RECOMMENDATIONS

IMPACTS OF THE TERRA ENERGY AND QUATTRO BANKRUPTCIES

The insolvency of Terra Energy in 2016 left the OGC with 175 new orphan sites and insufficient security from the operator to cover the costs of restoration. The total restoration cost for Terra Energy's wells was approximately \$55 million, but the OGC only held \$952,000 as security.

The case of Quattro Exploration and Production Ltd. is another example of the failure of the LMR program to mitigate risks of orphan sites. Based on an LMR rating in 2014, the OGC returned a \$1.39 million security deposit to Quattro. Subsequent to that release of security, the operator's financial health declined. Requests from the OGC for \$1.80 million in security in July 2017 and \$2.23 million in August 2017 were not met. As a result, the OGC had no security from the operator for the estimated \$19 million liability of its 75 sites.

The OGC's calculation of assets did not keep pace with operators that were experiencing rapidly declining financial health. By the time their LMR rating triggered action from the OGC, some operators could not pay the required security because of their poor financial status, and became non-compliant.

Following recent bankruptcies, the OGC reviewed the LMR program and made some changes to how it monitors and manages risky operators. For example,

the OGC started examining financial reports from public companies more frequently, tracking new financial indicators and monitoring oil and gas reserves. However, the OGC had not implemented adjustments to the LMR formula (e.g., changing the calculation of assets and liabilities) identified through its review. For the LMR program to be effective, the OGC needs to ensure it is responsive to changing industry risks.

RECOMMENDATION 9: *We recommend that the BC Oil and Gas Commission review the Liability Management Rating program to ensure that it is responsive to changing industry risks and results in operators covering their restoration costs.*

The OGC had a reasonable estimate of orphan site liability

The disclosure of liability for orphan sites is important for legislators and the public to understand the OGC's future financial obligations. As part of preparing annual financial statements, which are audited by the Office of the Auditor General, the OGC estimates the liability of designated orphan sites. This includes estimating the costs to deactivate, decommission, investigate, remediate and restore the sites.

In accordance with accounting standards, the OGC estimated its liability based on the costs of returning sites to the required legal standard (obligatory costs). The OGC determined that this legal requirement ensures public and environmental safety. The OGC also disclosed additional estimated costs to fully

KEY FINDINGS AND RECOMMENDATIONS

restore sites (discretionary costs), as well as potential uncertainties with estimates (e.g., to account for unexpected contamination).

We found that the OGC had a reasonable assessment of the financial liabilities of orphan sites and disclosed the costs of fully restoring sites, including potential uncertainties with estimates, as part of its annual financial statements. In 2017/18, the liability for the obligatory cost of restoring orphan sites was \$33 million. The liability for full restoration, including discretionary costs, was estimated to be in the range of \$73 million to \$104 million.

The Orphan Fund and security deposits did not keep pace with the costs of restoring orphan sites

Once sites have been designated as orphans, the OGC draws from the Orphan Fund to pay for decommissioning and restoration. The OGC transfers any security deposits for the sites to the Orphan Fund. We examined whether the Orphan Fund had sufficient

funds to cover restoration costs in cases where the operator was insolvent or could not be located. We found that the OGC did not have enough funding in the Orphan Fund, even including security deposits collected from operators through the LMR, to keep pace with the costs of restoring recently orphaned sites.

Over two years, the number of orphan sites in B.C. increased from 45 sites in 2015/16 to 307 sites in 2017/18 (see Exhibit 21). As of January 2019, the number had increased to 326. These increases were the result of a number of industry factors, including the financial downturn in the oil and gas sector.

An increase in the number of orphan sites meant that the OGC took on a \$33-million liability to cover obligatory costs for ensuring public and environmental safety (see the liability for orphan sites in 2017/18 in Exhibit 21) and will require an estimated \$73 million to \$104 million overall to fully restore those sites. Orphan Fund assets did not keep pace with the growing liability. This resulted in the fund's positive balance of \$931,000 in 2015/16 turning into a net

Exhibit 21: Orphan sites, revenues, and expenses

Fiscal Year	2015/16	2016/17	2017/18
Number of orphan sites	45	220	307
Orphan Fund assets	\$4,420,000	\$5,329,000	\$13,326,000
Liability for orphan sites	\$3,489,000	\$21,965,000	\$33,054,000
Net assets (liability)	\$931,000	\$(16,636,000)	\$(19,728,000)
Revenue—Orphan Fund	\$1,422,000	\$1,454,000	\$1,521,000
Security deposits transferred to Orphan Fund	\$76,000	\$952,000	\$2,373,000
Expenses—Orphan Fund	\$(741,000)	\$(19,043,000)	\$(17,029,000)
Net surplus (deficit) for orphan activities	\$757,000	\$(16,637,000)	\$(13,135,000)

Source: Office of the Auditor General of British Columbia, based on the BC Oil and Gas Commission's Audited Financial Statements

KEY FINDINGS AND RECOMMENDATIONS

liability of \$16.63 million in 2016/17 and \$19.72 million in 2017/18. A 2016 Alberta court decision on the Redwater Energy case increased the liability exposure of provincial oil and gas regulators but was overturned by the Supreme Court of Canada (see sidebar).

The Orphan Fund collected approximately \$1.5 million annually, and this has largely remained the same, even though the number of orphan sites and costs have increased. This funding mechanism was not

responsive to the increase in new orphan sites, and the funds that the OGC collected from operators did not keep pace with expenditures. Revenue from the Orphan Fund fell short of expenses by \$16.6 million in 2016/17 and \$13.1 million in 2017/18 (see [Exhibit 21](#)). Because the Orphan Fund is funded through a tax on oil and gas production volume (the orphan site restoration tax) specified in legislation (OGAA), it's cumbersome to change if the OGC needs more funds to pay for orphan site restoration.

REDWATER

A 2016 Alberta court decision regarding Redwater Energy Corporation set legal precedent by ruling that provincial laws based on the *polluter pays* principle were in conflict with federal bankruptcy legislation that protects creditors. When Redwater went bankrupt in 2015, it owned 127 wells, but only 20 of them were productive. Redwater's receiver wanted to sell the operator's productive wells to pay off its debts, but the Alberta Energy Regulator (AER) said the proceeds should be used to clean up Redwater's unrestored wells, as required by

provincial regulations. Two lower court rulings sided with the receiver, and Alberta's Orphan Well Association was left with the unproductive wells to clean up.

Alberta, B.C. and Saskatchewan appealed the Redwater decision in the Supreme Court of Canada in February 2018. On January 31, 2019, the Supreme Court overturned the lower court decision and ruled that companies must fulfil environmental obligations to clean up sites, even in bankruptcy.

BILL 15 AND THE ORPHAN SITE RECLAMATION FUND

The amendments made to the *Oil and Gas Activities Act* (OGAA) changed the funding process for the Orphan Fund, from a tax set in legislation to one determined by the OGC board via regulation with Treasury Board approval. Beginning April 1, 2019, a new liability levy will be based on forecasted annual site restoration costs for all orphan sites in the province, replacing the previous tax that was a set cost per cubic metre of marketable oil or gas product.

In the interim, in October 2018, the OGC implemented increases in industry oil and gas production levies to raise funds for orphan site restoration. The production levy increase will also continue to support the Orphan Fund over a three-year period, while the liability levy is phased in. By 2021/22, the OGC expects the liability levy will provide the entire estimated \$15 million per year required to sustain the orphan fund.

KEY FINDINGS AND RECOMMENDATIONS

The OGC used surplus operating funds from industry production levies to supplement the Orphan Fund and ensure that it could respond to new orphaned sites in a timely way. In Spring 2018, amendments to the OGAA enabled changes to the way the Orphan Fund will be funded in the future (see [sidebar](#)).

RECOMMENDATION 10: *We recommend that the BC Oil and Gas Commission monitor and assess whether implementation of the new funding process for the Orphan Fund is resulting in adequate funding to restore orphan sites in a timely manner, and implement changes as needed.*

The OGC was working to restore orphan wells

We also looked to see if the OGC had a plan for managing the environmental risks of orphan sites and if it was reporting publicly on orphan site restoration. We found that the OGC had a plan to respond to

the increased number of orphan sites that prioritized restoration, based on site-specific environmental risks. We also found that the OGC reported publicly on its orphan site restoration work.

Prior to the increase in orphan sites in 2016, the OGC managed orphan sites incrementally, within the budget available through the Orphan Fund. Following the influx of orphan sites, the OGC developed a comprehensive policy and work plan for orphan sites, which included a target to restore sites within 10 years of designation and prioritize higher-risk activities and sites (see Exhibit 22).

Principles and policy direction of the orphan work plan include:

- ◆ prioritizing public safety and protection of the environment
- ◆ a 10-year target timeline for restoring orphan sites
- ◆ maintaining the *polluter pays* principle, whereby industry (not taxpayers) is responsible for costs associated with orphan sites

Exhibit 22: The OGC's 10-year orphan site work plan



Source: Office of the Auditor General of British Columbia, based on the OGC's 10-year plan

KEY FINDINGS AND RECOMMENDATIONS

- ◆ working collaboratively with First Nations communities and private landowners
- ◆ acknowledgment of circumstances where remediation and/or reclamation may not be possible or in the public interest
- ◆ commitment to transparency

The OGC started work on new orphan sites in 2017/18, and had a detailed work plan for 2018/19. The OGC also reported publicly on the state of orphan site restoration; however, the most recent report is from 2016/17, which reduces the timeliness and relevance of the information provided.

The number of orphan sites increased from 45 in 2015/16 to 326 in 2018/19. At the time of the audit the OGC had restored 16 sites. Many of the new orphan sites were in intermediate stages of decommissioning and restoration. For example, in 2017, the OGC decommissioned 46 high-priority wells. With the number of orphan sites expected to increase, tracking and assessing progress to implement the plan will be important. For an example of the work that the OGC does to restore orphan sites see the sidebar.

RECOMMENDATION 11: *We recommend that the BC Oil and Gas Commission ensure timely restoration of orphan sites by assessing and reporting on its progress against the orphan site work plan, and making adjustments to the plan as needed.*

AN EXAMPLE OF OGC'S WORK ON ORPHAN SITES

The former Terra Energy produced gas at the site shown in Exhibit 23 from 2004 to 2006. The OGC recently designated the site as an orphan and decommissioned the well.

Remaining steps for restoring the site include:

- ◆ removing the surface equipment (including compressor, dehydrator, tanks, onsite piping, pumping equipment and flare stack)
- ◆ investigating the site for contamination
- ◆ remediating as required
- ◆ completing surface reclamation to recontour the site, replace topsoil and revegetate the land in accordance with the delegation agreement between the OGC and the Agricultural Land Commission

Exhibit 23: Terra Energy orphan site



Source: Office of the Auditor General of British Columbia

AUDIT QUALITY ASSURANCE

WE CONDUCTED THIS audit under the authority of section 11 (8) of the *Auditor General Act* and in accordance with the standards for assurance engagements set out by the Chartered Professional

Accountants of Canada (CPA) in the CPA Handbook – Canadian Standard on Assurance Engagements (CSAE) 3001 and Value-for-money Auditing in the Public Sector PS 5400. These standards require that we comply with ethical requirements, and conduct the audit to independently express a conclusion on whether or not the subject matter complies in all significant respects to the applicable criteria.

We apply the CPA Canadian Standard on Quality Control 1 (CSQC), and accordingly, maintains a comprehensive system of quality control, including

documented policies and procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements. In this respect, we have complied with the independence and other requirements of the code of ethics applicable to the practice of public accounting issued by the Chartered Professional Accountants of BC that are founded on the principles of integrity, objectivity and professional competence, as well as due care, confidentiality and professional behaviour.

APPENDIX A: COMPLETE AUDIT CRITERIA

1. The OGC had regulatory requirements and policies in place to effectively manage the environmental risks of inactive, suspended and abandoned (decommissioned) wells and ensure the timely and adequate restoration of sites.
2. The OGC assessed the environmental risks of non-operating sites and developed a plan to manage the risks
3. The OGC verified that permit holders adhered to environmental requirements and policies for inactive, suspended and abandoned wells
4. The OGC provided adequate oversight of site restoration activities to mitigate environmental risks
5. The OGC collected adequate financial assurances from industry to cover the cost of restoring orphan sites
6. The OGC managed the environmental risks of orphan sites

We developed our audit criteria using:

- ◆ *Oil and Gas Activities Act* and regulations
- ◆ Environmental Management Act and Contaminated Sites Regulation
- ◆ MOU between the OGC and ENV
- ◆ Agricultural Land Commission–OGC Delegation Agreement
- ◆ BC Crown Agencies Secretariat’s Risk Management and Internal Controls
- ◆ OGC service plans, public reports and manuals
- ◆ International Network for Environmental Compliance and Enforcement, Principles of Environmental Compliance and Enforcement Handbook, 2009

APPENDIX B: GLOSSARY

Acid gas – Acid gas is a gas mixture that is predominantly composed of hydrogen sulfide (H₂S) and carbon dioxide (CO₂) and is produced during the processing of natural gas.

Active well – Active wells are those that are currently being drilled or are producing oil, gas or water. This term may also be applied to injection wells, disposal wells and observation wells.

Certificate of Restoration (CoR) – The OGC will issue a CoR when an operator has achieved the final step in restoring a site. The CoR confirms all current standards and requirements have been met and any known contamination issues or hazards have been mitigated.

Conventional oil and gas – Conventional oil or gas refers to petroleum, or crude oil, and raw natural gas produced from reservoirs using primarily vertical wells on single-well pads. Natural gas wells flow as a result of pressure depletion. Oil wells are usually pumped.

Deactivation – Deactivation happens when pipelines are depressurized and purged, and vessels have been drained of liquids and gases (on sites that have surface equipment and/or pipelines).

Decommissioning – Wells are decommissioned (referred to as “abandonment” in the regulations) when they are permanently plugged to prevent fluids and gases from escaping a reservoir. Decommissioning also involves any remedial work required to repair integrity issues (i.e. leaks). Finally, the well is “cut and capped,” which includes cutting the well casing a minimum of one metre below the surface and placing a cap on top of the well.

Disposal well – Disposal wells are used to dispose of waste fluids, such as produced water and acid gas, into an underground geological formation.

Fracturing fluid – Fracturing, or “fracking,” fluid is a mixture of water, sand and chemicals that is injected at a high pressure into an underground formation through a wellbore. This creates fractures in the formation, and the injected sand props the cracks open, creating pathways for the natural gas to flow through the rock into the wellbore. The fluid prevents corrosion of the well, lubricates the extraction process, and prevents clogs and bacterial growth.

Gas migration – Gas migration is the flow of gas outside the surface casing of a well. Gas migration can enter the groundwater, which may cause changes to groundwater chemistry in the vicinity of the well. This can occur due to imperfections within well seals. These imperfections may result from drilling or cementing conditions, or from methods practised at older wells that were not constructed to present-day standards.

Hydraulic fracturing – Hydraulic fracturing, or fracking, is a well stimulation technique in which rock is fractured by a pressurized liquid. The process involves the high-pressure injection of fracturing fluid into a wellbore to create cracks in the deep-rock formations through which natural gas, petroleum and brine will flow more freely.

Inactive well – Inactive wells are those that have not been active for 12 consecutive months (six months for a special sour or acid gas disposal well) and have not been decommissioned.

APPENDIX B: GLOSSARY

Legacy site – Legacy sites are those that have received a CoR or were exempt from the requirement to receive a CoR, prior to October 1, 2004.

Marketable oil or gas – Oil or natural gas that is in a marketable condition after the removal of impurities and after accounting for any volumes used to fuel surface facilities.

Multi-well pad drilling – Multi-well pad drilling means that multiple wellbores are drilled from a single, compact piece of land, known as a pad.

Orphan site – The OGC considers a well, facility, pipeline and/or site as orphaned when the operator is insolvent or cannot be located.

Produced water – Produced water is saline water produced in conjunction with, and as a byproduct of, the production of oil and gas. When oil and gas flow to the surface, the water also comes to the surface.

Production well – Production wells are those being used to extract oil or gas from an underground reservoir.

Reclamation – Reclamation is the redistribution of surface soils in order to revegetate and return the ecosystem and/or land to the equivalent pre-development condition.

Remediation – Remediation is the removal or treatment of soil and/or water contaminants from well sites to mitigate risks to public health and the environment.

Reserves – Reserves are the estimated remaining quantities of oil and natural gas and related substances that are recoverable. The reserves are estimated as of a given date, and are based on the analysis of drilling, geological, geophysical and engineering data; the use of established technology; and specified economic conditions, which are generally accepted as being reasonable.

Restoration – Restoration is the two-part process of remediation and then reclamation.

Site decommissioning – Sites are decommissioned when production and facility equipment is removed from the site.

Site investigation – Sites are identified for investigation when there are areas of potential environmental concern. An investigation confirms the presence or absence of contamination.

Surface casing vent flow – Surface casing vent flow involves the movement of gas outside the well casing. In rare instances, a liquid could also follow the same flow path. This can occur at some oil or gas wells due to imperfections within well seals. These imperfections may result from drilling or cementing conditions, or from methods practised at older wells not constructed to present-day standards.

Suspended well – Suspended wells have been temporarily plugged to reduce risks to the public and environment. Suspended wells may be brought back into production if market conditions change and the well becomes economically viable.

APPENDIX B: GLOSSARY

Sour oil/gas – Sour oil or gas is oil or natural gas with measurable amounts of hydrogen sulphide.

Unconventional oil and gas – Unconventional oil and gas come from geological formations that are difficult (or unconventional) to produce, requiring special completion, stimulation, such as hydraulic fracturing, and other techniques to be economical (e.g., coalbed gas, tight gas, shale and hydrates).



OFFICE OF THE
Auditor General
of British Columbia

Location

623 Fort Street
Victoria, British Columbia
Canada V8W 1G1

Office Hours

Monday to Friday
8:30 am – 4:30 pm

Telephone: 250-419-6100

Toll free through Enquiry BC at: 1-800-663-7867

In Vancouver dial: 604-660-2421

Fax: 250-387-1230

Email: bcauditor@bcauditor.com

Website: www.bcauditor.com

This report and others are available at our website, which also contains further information about the office.

Reproducing

Information presented here is the intellectual property of the Auditor General of British Columbia and is copyright protected in right of the Crown. We invite readers to reproduce any material, asking only that they credit our office with authorship when any information, results or recommendations are used.



AUDIT TEAM

Morris Sydor,
Deputy Auditor General

Peter Nagati,
Executive Director

Melissa Miller,
Manager

Tracey Janes,
Assistant Manager

Ruwa Mgodu,
Auditor

Michelle Crawford,
IT Audit Analyst

SUBJECT MATTER EXPERTS

Cal Hill

David Williams



OFFICE OF THE
Auditor General
of British Columbia