GEOTHERMAL ENERGY

Gaining Steam: A Regulatory and Policy Framework for Geothermal Energy Development in Alberta

Module 2: The Missing Pieces in Alberta's Regulatory Landscape and a Path Forward for Geothermal Energy Development

Environmental Law Centre
Authored by Brenda Heelan Powell

October 2020

Environmental Law Centre

Library and Archives Canada Cataloguing in Publication

Title: Gaining steam : a regulatory and policy framework for geothermal energy development in
Alberta / authored by Brenda Heelan Powell.
Names: Powell, Brenda Heelan, 1971- author. | Environmental Law Centre (Alta.), publisher.
Description: Includes bibliographical references.
Identifiers: Canadiana 20200384503 | ISBN 9781989522110 (PDF ; Module 2)
Subjects: LCSH: Geothermal resources—Law and legislation—Alberta. | LCSH: Geothermal resources—
Government policy—Alberta. | LCSH: Energy development—Law and legislation—Alberta. | LCSH:
Energy development—Government policy—Alberta.
Classification: LCC KEA376 .P69 2021 | DDC 346.712304/679—dc23

The Environmental Law Centre (Alberta) Society

The Environmental Law Centre (ELC) has been seeking strong and effective environmental laws since it was founded in 1982. The ELC is dedicated to providing credible, comprehensive, and objective legal information regarding natural resources, energy and environmental law, policy, and regulation in the Province of Alberta. The ELC's mission is to educate and champion for strong laws and rights so all Albertans can enjoy clean water, clean air, and a healthy environment. Our vision is a society where laws secure an environment that sustains current and future generations.

Environmental Law Centre

#410, 10115 – 100A Street Edmonton, AB T5J 2W2
Telephone: (780) 424-5099
Fax: (780) 424-5133
Toll-free: 1-800-661-4238
Email: elc@elc.ab.ca
Website: www.elc.ab.ca
Blog: www.elc.ab.ca/blog/
Facebook: http://www.facebook.com/environmentallawcentre
Twitter: https://twitter.com/ELC_Alberta
To sign up for email updates visit: http://elc.ab.ca/newsandmedia/news/

Charitable Registration #11890 0679 RR0001

Photos courtesy Environmental Law Centre, unsplash.com and pixabay.com except where otherwise indicated.

ACKNOWLEDGEMENTS

The Environmental Law Centre would like to thank the Alberta Law Foundation for its support of this project.

TABLE OF CONTENTS

MODULE 2: THE MISSING PIECES IN ALBERTA'S REGULATORY LANDSCAPE AND A PATH FORWARD FOR GEOTHERMAL ENERGY DEVELOPMENT

Legal clarity mitigates regulatory risks (thereby ameliorating investment risks)[1] and is an imperative for the successful development of Alberta's geothermal resources. As reviewed in *Module 1: Geothermal Energy and Alberta's Current Regulatory Landscape*, Alberta has some limited provisions addressing geo-exchange and geothermal power plants. However, there is no comprehensive regulatory regime governing the exploration and development of geothermal resources in Alberta.

The ELC recommends Alberta adopt a comprehensive regulatory regime to address the entire lifecycle of geothermal resource development. Key law reforms include:

- definition of geothermal resources;
- clarification of ownership and access to geothermal resources (including related questions regarding royalties);

[1] For a discussion of this in the context of an energy transition see Kaisa Huhta "Anchoring the energy transition with legal certainty in EU law" (2020) *Maastricht Journal of European and Comparative* Law I-20, online: https://journals.sagepub.com/doi/pdf/10.1177/1023263X20932056.

- management of geothermal resource data;
- clarification of requirements for environmental assessment;
- provision of a licensing system for exploratory and development activities;
- connection of geothermal electrical generation to the existing electrical grid; and
- clarification of decommissioning, abandonment, reclamation and remediation requirements.

Aside from legal clarity, successful development of Alberta's geothermal resources requires a comprehensive policy approach designed to encourage a nascent industry. Relevant policy issues and recommendations are discussed in *Module 3: Policy Support Mechanisms for Geothermal Energy Development in Alberta*.

1. The Missing Pieces in Alberta's Regulatory Landscape

As far back as the 1980's in Alberta, legal issues surrounding the development of geothermal resources were recognized.[2] These legal issues include defining and clarifying ownership of the geothermal resources. As well, a licensing regime enabling the exploration and development of geothermal resources is an essential element of a comprehensive regulatory regime. As part of this regulatory regime, provision must be made for environmental assessment, and for decommissioning, abandonment, reclamation and remediation requirements.

[2] Judith A. Snider, *Geothermal Resources, an Overview* (November 1980, Energy Law).

1.1 Definition of Geothermal Resource

The definition of geothermal resource is a key issue with potential legal implications for ownership, tenure, and licensing. In some jurisdictions, geothermal energy is considered an attribute of water (thereby triggering application of the relevant water law). In other jurisdictions, geothermal energy has been treated in the same way as oil and gas resources (via modification of an existing oil and gas regime to accommodate geothermal resources). Geothermal resources could also be defined in a *sui generis* manner meaning it is not water and not a mineral but rather a unique resource.

While a clear legal definition of geothermal resources is essential to an effective regulatory regime, it can be difficult to formulate such a definition. Geothermal heat can exist in alternative forms: steam/vapour dominated systems, hydrothermal/hot water systems, or hot dry rock formations.[3] An overly rigid definition may exclude otherwise viable geothermal resources from being considered geothermal resources.[4] On the other hand, a definition that is not prescriptive enough may create uncertainty over how geothermal resources may be treated.[5]

Across the United States, there is a diversity of approaches to the classification of geothermal resources as water, mineral or an unique category of resource (*sui generis*).[6] In some states, whether a particular geothermal resource is considered water or mineral depends upon some defined aspect of the

---

[3] Paul McDevitt and Del Wells, "Energy Market Impacts of the Legal Definition of Geothermal Energy in the Western United States", (1982) 22 Nat. Resources J. 391.

[4] Nick Martin, *Hot Commodity: Geothermal Electricity in Alberta* (Calgary: 2018, Canada West Foundation).

[5] *Ibid.*

[6] *Ibid.*

resource such as temperature or depth.[7] In the context of the western United States, Paul McDevitt and Del Wells recommend that geothermal resources be defined by designating the highest possible minimum temperature to avoid conflict with traditional and energy water demands.[8] Another commentator, Hargrove, recommends developing a legal regime that emphasizes pressure and temperature aspects of the geothermal resources (rather than making analogies to water or to oil and gas resources).[9] Others have suggested a definition which protects ownership interests in light of the unique properties of heat.[10]

Other jurisdictions have "commonly classified geothermal resources according to depth, temperature or end use".[11] As one example, in British Columbia the geothermal definition is based on temperature. Another example is Washington State which defines geothermal resources on the basis of whether it is "technologically practical to produce electricity commercially".[12] Less common approaches have used parameters such as flow rate, pressure, and installed

---

[7] *Ibid.*

[8] *Ibid.*

[9] Lee Hargrove, "Legal Problems in the Development of Geothermal Energy Resources" (1980) 26 Ann. Inst. On Min. L. 224 [Hargrove].

[10] Alexander Conser, "Double Dipping: Utilizing Oil Wells for Geothermal Energy" (2013) 37 Wm. & Mary Envtl. L. & Pol'y Rev. 813 [Conser].

[11] Peggy Holroyd and Jennifer Dagg, *Building a regulatory framework for geothermal energy development in the NWT: A report for the Government of Northwest Territories, Environment and Natural Resources Department,* (Calgary: 2011, Pembina Institute) at 38 [Holroyd-Dagg].

[12] *Ibid*. at 39.

thermal capacity.[13] If an end use definition is used, it should be flexible enough to avoid restriction to one type of technology.[14]

While definitions of geothermal resources in the United States can be instructive, it is important to remember that the United States has different land and water regimes than Canada (and Alberta). As such, wholesale adoption of an approach taken in the United States (or elsewhere) may not prove appropriate in the Alberta context.

It is recommended that a broad definition of geothermal resources, which classifies geothermal resources as unique, be adopted in Alberta:

> "geothermal resource" means the natural heat of the earth, in whatever form, from which energy can be derived or extracted from such natural heat and all mineral in solution or other products obtained from naturally heated fluids, brines, associated gases, and steam, in whatever forms, found below the surface of the earth, but does not include oil, hydrocarbon gas, or other hydrocarbon substances.

It is further recommended that "geothermal energy" should be defined to mean energy stored in the form of heat beneath the surface of the earth.

---

[13] *Ibid*., see Chapters 3 and 4.

[14] *Ibid*.

1.2 Ownership of Geothermal Resources

Clear title to geothermal resources is critical for effective development of the resource.[15] Without clarity around ownership and control of the resource, there is more risk and uncertainty surrounding use of geothermal resources. Alberta has no explicit legislative statement regarding ownership of geothermal resources (or heat). Without a clear legislative statement, recourse to the courts may be required to resolve ownership and control issues.

Classification of geothermal resources as water or minerals may impact ownership and if the Crown expressly declares ownership of all geothermal resources, it potentially raises the issue of expropriation.[16]

In Alberta, the "property in and the right to the diversion and use of all water in the Province is vested in" the Crown.[17] As such, the Courts or legislation categorizing geothermal resources as water would avoid the potential issue of expropriation and avoid any complaints regarding retroactivity of the law. In other words, if geothermal resources are defined to be water, then the Crown owns the geothermal resources just it owns all other forms of water. This means no individual could attempt to argue that their geothermal resources have been expropriated by an express declaration of ownership by the Crown (because geothermal resources are a form of water which have always been owned by the Crown).

---

[15] P. Dumas, M. Serdjuk, R. Kutschick, S. Fraser, S. Reith, and T. Koelbel, Report on Geothermal Regulations: Report presenting proposals for improving the regulatory framework for geothermal electricity Luxembourg: 2013, GEOELEC, European Union) [Dumas]. See also Bart van Campen, "Comparison of Geothermal Regulation between Chile, Philippines and New Zealand" (Proceedings World Geothermal Congress, Melbourne, Australia, 19-25 April 2015) available at www.researchgate.net/publication/280621073.

[16] Hargrove, *supra.* note 9 discusses the expropriation argument in an US context.

[17] *Water Act*, R.S.A. 2000, ch. W-3, s. 3.

On the other hand, if geothermal resources are categorized by the courts or legislation as minerals (as are precious metals, oil and gas, and others)[18] then ownership of the geothermal resources follows mineral ownership. In most cases, this would mean that geothermal resources would belong to the Crown. In the vast majority of the province, the Crown owns all minerals underlying land (81% of the minerals in the province).[19]

However, there are some instances of private ownership of minerals in Alberta (referred to as freehold minerals). In the relatively rare case of freehold ownership, private ownership of minerals will be reflected on the certificate of title (a person may own only some specific minerals with the remainder reserved to the Crown). In other words, a person with freehold mineral rights could potentially argue that their mineral grant also includes geothermal resource rights. If geothermal resources are (1) defined to be minerals and (2) declared in legislation to be owned by the Crown, then a person with freehold mineral rights could argue there has been expropriation of their geothermal resources.

---

[18] Minerals defined in section 1(1)(p) of the *Mines and Minerals Act* as:

(i)gold, silver, uranium, platinum, pitchblende, radium, precious stones, copper, iron, tin, zinc, asbestos, salts, sulphur, petroleum, oil, asphalt, bituminous sands, oil sands, natural gas, coal, anhydrite, barite, bauxite, bentonite, diatomite, dolomite, epsomite, granite, gypsum, limestone, marble, mica, mirabilite, potash, quartz rock, rock phosphate, sandstone, serpentine, shale, slate, talc, thenardite, trona, volcanic ash, sand, gravel, clay and marl, but

(ii)does not include

(A) sand and gravel that belong to the owner of the surface of land under section 58 of the Law of Property Act,

(B) clay and marl that belong to the owner of the surface of land under section 57 of the Law of Property Act, or

(C) peat on the surface of land and peat obtained by stripping off the overburden, excavating from the surface, or otherwise recovered by surface operations.

[19] See Government of Alberta website: https://www.alberta.ca/mineral-ownership.aspx. The Crown also owns all gold and silver in the province by operation of section 10 of the *Mines and Minerals Act* and all pore space by operation of section 15.1 of the *Mines and Minerals Act*.

The situation in which geothermal resources are characterized as a form of mineral is somewhat different than the situation involving the legislative declaration that the Crown owns pore space. In 2010, the *Mines and Minerals Act* was amended to state that pore space is and always has been owned by the Crown (section 15.1). This legislative change raised concerns that surface landowners' ownership rights to pore space were being expropriated without compensation.[20] This change treated pore space as a unique resource which was declared to be and always have been Crown property. This is different than a clarification from the courts or legislation that geothermal resources are a form of mineral which results in ownership of geothermal resources following mineral ownership (unless that ownership is modified expressly by legislation).

If geothermal resources are defined as a unique resource (neither water nor mineral), then arguably, in the absence of an express legislative statement regarding ownership, geothermal resources would attach to surface ownership.[21]

Regardless of whether geothermal resources are defined as water, mineral or a *sui generis* resource, clear legislative delineation of the ownership and control of the resource is recommended.[22] Without such a legislative declaration, clarification of ownership and control might only be resolved via recourse to the courts. It is recommended that ownership of geothermal resources be explicitly

---

[20] Paul Negenman, Why if the Crown Stealing from Fee Owners?" (2011) The Negotiator: The Magazine of the Canadian Association of Petroleum Landmen 3.

[21] Based on the maxim *cuius est solum, eius est usque and coelum et an inferos* which means whoever owns the soil, holds title all the way up to the heavens and down to the depths of the earth. However, as explained by Bruce Ziff, *Principles of Property Law, 6th Ed*. (Toronto: 2014, Carswell) at 94-95: "[t]he courts have resisted applying the maxim literally. [The maxim] may be a useful point of departure in examining the scope of ownership rights, but it is so laden with qualifications that it best regarded as a "fanciful phrase" and an "imperfect guide".

[22] Conser, *supra*. note 10.

dealt with in legislation (as has been done with pore space) to provide clarity and thereby avoid litigation on the issue. More specifically, it is recommended that geothermal resources be deemed to be and to always have been the property of the Crown.

Once ownership of geothermal resources is established, the matters of access and tenure can be addressed. If geothermal resources are deemed to be privately owned (presumably by the surface owner), then the private market would deal with lease/purchase and access matters. However, a licensing regime to regulate geothermal exploration and operation activities would still be necessary.

If geothermal resources are deemed to be owned by the Crown (which is recommended), then an effective mechanism for granting tenure needs to be established. It is recommended that a distinction be made between shallow geothermal resources and deep geothermal resources for tenure purposes. Specifically, for shallow geothermal resources, it is recommended that obtaining tenure not be required (as these resources would be used for heating/cooling applications onsite). For deep geothermal resources, the existing tenure approach for mines and minerals could be adopted. However, it is recommended that prior to any grants of tenure to geothermal resources, a screening for environmental concerns such as impacts on species at risk, water resources, habitat and so forth be conducted.

Provision will also be required to address access. For those geothermal resources located under public lands, the *Public Lands Act*[23] and its regulations could be adapted to allow access for geothermal operations. For those geothermal resources located under private land, there should also be a legislative framework to address access issues when private negotiations do not suffice.

---

[23] *Public Lands Act*, R.S.A. 2000, ch. P-40.

The existing *Surface Rights Act*[24] and its framework could be adapted to address access to geothermal resources.

1.3 Licensing Regime

We recommend that all geothermal resources – both shallow and deep – be deemed to be and always have been owned by the Crown. However, it is recommended that a distinction be made between shallow geothermal (geo-exchange) versus deep geothermal (direct heat and power plants) for the purposes of securing tenure and for licensing geothermal developments.

1.3.1 Shallow Geothermal (Geo-exchange)

There is already some existing regulation around geo-exchange systems that are completed above the base of groundwater protection (with the exception of horizontal closed-loop systems).[25] Given the typically small scale and the lack of need to access special geological conditions (i.e. do not require deep well construction), there is likely existing capacity to regulate these systems via building codes, municipal building requirements, and environmental laws of general application. An extensive licensing regime addressing exploration, development and operations is likely not necessary (and would likely be an impediment to adoption). However, if there is wider adoption of shallow geothermal applications, there may be a need to revisit the authorization process due to potential subsurface and surface impacts.

However, guidelines and directives for appropriate design and installation would be appropriate. This could be accomplished by making developments above a

---

[24] *Surface Rights Act*, R.S.A. 2000, ch. S-24.

[25] See *Directive,* AEP Water Quality 2018 No.3, at 1.2(2)(c): **Base of Groundwater Protection** is the depth at which groundwater is estimated to transition from non-saline to saline.

certain threshold a registration activity under the *Environmental Protection and Enhancement Act* (EPEA).[26] Under EPEA, activities which require registration are governed by an industry-specific Code of Practice published by Alberta Environment and Parks.[27] The Code of Practice sets out standard terms and conditions governing the activity (this replaces the site-specific terms and conditions that would be imposed with an approval). The Director may determine that an activity, which is usually subject to a registration, requires an approval in order to address environmental protection concerns.[28]

1.3.2 Deep Geothermal (Direct Heat and Power Plants)

The licensing regime should address the exploration, development, operations and reclamation stages of geothermal resource activities. Environmental considerations include impacts of fluid chemicals, reservoir subsidence, noise and visual impacts, surface impacts, and habitat disturbance. As such, the licensing regime should address matters such as security, environmental assessments, pre-construction surveys, and reclamation requirements. As well, the licensing regime should enable the conditioning of licences, along with providing sufficient enforcement powers.

In terms of licensing operations, it is worthwhile to consider whether oil and gas drilling regulations ought to be adopted wholesale for geothermal drilling. Generally, geothermal drilling is less risky which may make the cost of complying

---

[26] *Environmental Protection and Enhancement Act*, R.S.A. 2000, ch. E-12.

[27] EPEA, s. 83.1. See also Jason Unger, *A Guide to Public Participation in Environmental Decision-Making in Alberta* (Edmonton: 2009, Environmental Law Centre) at 47 to 52 [Unger].

[28] EPEA, s.66.1.

with all oil and gas drilling requirements excessively expensive in terms of benefits.[29] Other licensing considerations include:[30]

- The appropriate time period for which licence remains valid and the possibility of extension (usually 4-6 years for exploration and 30 years for exploitation). Must balance the need for enough time to allow exploration and proper development but prevent speculation and fake exploratory projects.

- The need to protect the geothermal resource against other uses, this might require the use of setbacks or other protection.

Above and beyond considerations of accessing the geothermal resources (exploration, drilling and so forth), requirements will need to be in place for construction of geothermal power plants. It is likely appropriate to adjust requirements according to whether the power plant will provide micro-generation or distributed electricity (including small-scale generation). Geothermal power plants which can be characterised as micro-generation should be treated similarly to other micro-generation (i.e. exempt from environmental assessment and *Hydro and Electric Energy Act* approvals). However, larger power plants (which have a large footprint and potentially more significant impacts) should be treated similarly to other types of power plants although recognition should be given to the relatively small footprint as compared to fossil fuel power plants.

---

[29] Donna Ellis, Wayne Vernon and Sam Lord, Challenges of New Zealand Geothermal Legislation (April 2015) Proceedings World Geothermal Congress (Melbourne, Australia, 19-25 April 2015). See also Dumas, *supra.* note 15.

[30] Dumas, *supra.* note 15.

1.4 Environmental Concerns

Although geothermal activities have a smaller environmental footprint than fossil-fuel based activities, this does not mean exploration and development of geothermal resources is without environmental impacts. As geothermal activities are developed, it is important to assess any environmental impacts that may occur in light of those impacts being avoided (for example, the relatively smaller environmental impacts of a geothermal power plant versus a fossil fuel power plant). The potential impacts of geothermal operations will vary with shallow and deep geothermal operations.

1.4.1 Shallow Geothermal (Geo-exchange)

Geo-exchange developments may have negative impacts upon the geothermal resource itself. In particular, special consideration may be required for dense geo-exchange developments, such as a residential neighborhood using geo-exchange heating and cooling systems, as this "scales up" the potential impacts. For instance, Vienken et al.[31] conducted a groundwater temperature monitoring program at a residential neighborhood in Germany which had intense geo-exchange use. The monitoring demonstrated that, despite comparably small energy demands and energy extraction rates, there was a "measurable impact on overall groundwater temperatures". [32] It is not unreasonable to think that impacts would increase as proposed development size and intensity increases.

---

[31] Thomas Vienken, Manuel Kreck and Peter Dietrich, "Monitoring the Impact of Intensive shallow geothermal energy use on groundwater temperatures in a residential neighborhood" (2019) 7:8 Geotherm Energy.

[32] *Ibid*. at 11.

There are also environmental concerns associated with geo-exchange developments. These include "protection of groundwater as a drinking water resource as well as related to groundwater ecosystem properties such as biodiversity and ecosystem functions".[33] Temperature changes in aquifers are accompanied by changes in groundwater chemical composition, biodiversity, community composition, and ecosystem functions.[34] Changes to ecosystem functions arise from increased temperatures which result in depletion of oxygen, lower gas solubility, and stimulation of microbial activity that can alter carbon and nutrient cycling.[35] As a result of these concerns, Griebler et al. recommend "systematic planning and management of the subsurface to not only optimize its economic usage for energy production but also to clearly prevent ecological impacts and foster the sustainable production of essential resources"[36] as well as minimizing temperature changes (to avoid a transition from oxic to anoxic conditions in aquifers).

1.4.2 Deep Geothermal (Direct Heat and Power Production)

While there are fewer impacts than energy from fossil fuels, nuclear or hydro developments, geothermal power production still can cause negative environmental impacts that need to be avoided or mitigated.[37] Generally speaking, there are five stages of geothermal development – exploration, test drilling, production testing, field developments, power generation – and

---

[33] Christian Griebler et al., "Potential impacts of geothermal energy use and storage of heat on groundwater quality, biodiversity, and ecosystem processes" (2016) 75 Environ Earth Sci 1391 (2016) at 1406.

[34] *Ibid.*

[35] *Ibid.*

[36] *Ibid.* at 1407.

[37] A. Dan Tarlock and Richard L. Waller, "An Environmental Overview of Geothermal Resources Development" (1977) 13 Land & Water L. Rev. 289.

environmental impacts need to be addressed for each stage. Potential environmental impacts include land disturbances, water pollution, air pollution, noise pollution, and threats to biodiversity.

Land disturbances associated with geothermal development include habitat disruption from surface operations, subsidence from alterations in reservoir pressures (caused by removing or adding water), and seismic activity (caused by injection and reinjection). A regulatory regime will need to address land disturbances via requirements for environmental assessment, operational standards, and monitoring and reporting.

Pollution of both surface and groundwater may be caused by power plant discharges (coolant water contains concentrated salts and metals), spills of naturally occurring geothermal waters, or underground contamination of springs that feed a surface water body or aquifers that penetrate other lands.[38] Contaminants can include lead, arsenic, mercury, metals from corroding pipes or chemical additives.[39] Discharges of bore water or condensate can alter water chemistry and impact aquatic ecosystems and terrestrial communities use the water resources.[40] As well, use of large volumes of water in geothermal production may reduce water tables (leading to subsidence) and loss of natural underground thermal properties such as geysers and hot springs.[41]

Technical and regulatory requirements need to be in place to address water issues associated with geothermal development. These can include

---

[38] Kamaal R. Zaidi, "Environmental Mitigation Aspects of Water Resources in Geothermal Development: Using a Comparative Approach in Building a Law and Policy Framework for More Sustainable Water Management Practices in Canada" (2010) 23 Geo. Int'l Envtl. L. Rev. 97.

[39] *Ibid*.

[40] *Ibid*.

[41] *Ibid*.

environmental assessments to facilitate sustainable water management practices and well-casing designed to prevent cross-contamination of water by reinjection of geothermal fluids.[42] In addition, aquifer testing and monitoring of subsurface hydrological properties and contamination should be required.[43] It is noteworthy that, in Alberta, air-cooled plants are feasible which would place water use footprint on par with wind and solar energy production (because the need for cooling water in binary cycle geothermal plants could be reduced).[44]

Air pollution can be caused by the release of condensate gases such as hydrogen, hydrogen sulfide, methane, and ammonia. Noise related impacts can arise during construction and operational activities. Air pollution and noise issues can likely be mitigated using operational requirements (such as scrubbers and mufflers).

In addition, consideration needs to be given to the fact that geothermal resources provide an unique habitat for thermophilic species that are adapted to extreme temperatures and chemical compositions.[45] The potential for loss of thermophile biodiversity is compounded by lack of knowledge and understanding of thermophiles, by the possibility that they may be unique to each geothermal reservoir, and by the general lack of knowledge of

---

[42] *Ibid.*

[43] *Ibid.*

[44] Jonathon Banks, Deep-Dive Analysis of the Best Geothermal Reservoirs for Commercial Development In Alberta: Final Report (Edmonton: 2016, Earth and Atmospheric Sciences, Faculty of Science, University of Alberta) [Banks].

[45] Donald J. Khan and Tiffany Grant, "In the Heat of the Law, It's Not Just Steam: Geothermal Resources and the Impacts on Thermophile Biodiversity" (2007) 13 Hastings W.-Nw. J. Envt'l L. & Pol'y 35.

geothermal environments (i.e. unknown replenishment rates and undefined aquifers).[46]

Most of the carbon footprint associated with geothermal power development is in the plant construction, including drilling and infrastructure manufacturing.[47] Other environmental concerns include noise pollution, trace gas emissions, water consumption, and mineral precipitant management. [48]

Finally, there must be consideration of issues that may arise with decommissioning of a geothermal operation. These include reclamation and remediation of the site, along with the potential need for ongoing monitoring of the site post-closure and clean-up.

1.5 The Geothermal - Oil and Gas Interface

There must be consideration of the interaction and potential conflicts between the oil and gas industry, the geothermal industry and other subsurface interests. As well, given the potential for co-production and reworking existing oil and gas wells into geothermal wells, there are significant issues of liability to be addressed.

---

[46] *Ibid.*

[47] Banks, *supra.* note 44.

[48] *Ibid.*

2. A Path Forward for Geothermal Energy Development in Alberta

As can be seen from the above discussion, there are a significant number of missing pieces in Alberta's regulatory landscape when it comes to geothermal energy. The following provides a proposal for a geothermal regulatory framework in Alberta. It is important to remember that the regulatory regime must be complimented and supported with a comprehensive policy approach as discussed in *Module 3: Policy Support Mechanisms for Geothermal Energy Development in Alberta*.

2.1 Definition of geothermal resources

Geothermal resources should be defined as a unique resource which falls into the purview of the *Mines and Minerals Act*. The definition should encompass all geothermal resources that can be used for geo-exchange, direct heat, or for electrical production. That is, the definition should not be tied to a particular temperature or to a particular technology; rather, it should focus on the resource as a form of energy.

Section 1(1) of the *Mines and Minerals Act* should be amended to add the following:

> "Geothermal Energy" means energy stored in the form of heat beneath the surface of the earth.
>
> "Geothermal Resource" means the natural heat of the earth, in whatever form, from which energy can be derived or extracted from such natural heat and all mineral in solution or other products obtained from naturally heated fluids, brines, associated gases, and steam, in whatever forms, found below the surface of the earth, but does not include oil, hydrocarbon gas, or other hydrocarbon substances.

It may be necessary to define terms associated with the various stages of development such as exploration, well, and geothermal power plant.

Further, s.2 of the *Mines and Minerals Act* should be amended to include geothermal resources:

> **2** This Act applies
>
> (a) To all mines and minerals, geothermal resources, pore space and related natural resources vested in or belonging to the Crown in right of Alberta.

Where appropriate, reference should be made to geothermal resources: s.5 (regulations); s. 8 (Ministerial powers); s. 9 (Ministerial powers); s.11 (Authorized disposition); ss. 16 to 32 (Agreements); ss. 33 to 43 (royalties); ss. 44 to 63.1 (general); ss. 77 to 79 (road allowance leases); Part 6 (registration of transfers and security notices); Part 7 (unit operation of minerals); and Part 8 (exploration).

In addition - similarly to the parts dealing with coal, oil sands and so forth - a discrete part may be required to be added in the *Mines and Minerals Act* to address particular concerns with geothermal resources.

2.2 Ownership of geothermal resources

Ownership of geothermal resources should be vested in the Crown via legislation. Accordingly, the *Mines and Minerals Act* should be amended to include the following provision:

> **10.2** (1) It is hereby declared that no grant from the Crown, whether relating to land, minerals in land or otherwise, has operated or will operate as a conveyance of geothermal resources unless geothermal resources are expressly named and conveyed in the grant.

> (2) Geothermal resources are vested in and are the property of the Crown in right of Alberta and remain the property of the Crown in right of Alberta whether or not
>
> > (a) this Act, or an agreement issued under this Act, grants rights in respect of the subsurface reservoir or in respect of minerals occupying the subsurface reservoir, or
> >
> > (b) minerals or water is produced, recovered or extracted from the subsurface reservoir.
>
> (3) It is deemed for all purposes, including for the purposes of the *Expropriation Act*, that no expropriation occurs as a result of the enactment of this section.
>
> (4) No person has a right of action and no person shall commence or maintain proceedings
>
> > (a) to claim damages or compensation of any kind, including, without limitation, damages or compensation for injurious affection, from the Crown, or
> >
> > (b) to obtain a declaration that the damages or compensation referred to in clause (a) are payment by the Crown,
>
> as a result of the enactment of this section.

Given we have recommended that geothermal resources be declared to be owned by the Crown, there needs to be consideration of the appropriate tenure regime for geothermal resources (that is, a process to obtain rights to extract geothermal resources). It is recommended that a distinction be drawn between shallow geothermal resources (for geo-exchange applications) and deep geothermal resources (for direct heat and electrical applications). The

former would not require the surface owner to secure tenure (i.e. there would be a shallow geothermal usury right for surface owners). However, for the latter, it is recommended that a new stand-alone regulation pursuant to the *Mines and Minerals Act* be made to specifically address tenure of geothermal resources (as opposed to adding geothermal resources to the *Metallic and Industrial Minerals Tenure Regulation* or the *Petroleum and Natural Gas Tenure Regulation*).

A key issue to be addressed by this regulation is whether a staking or bidding system for obtaining tenure should be adopted.[49] The use of bidding has been adopted in BC and has been criticized; it may be that a staking approach would be more appropriate at least in the early days of the industry.[50] The staking approach is currently used for many of Alberta's non-energy minerals, as described in the *Alberta Mineral Development Strategy 2002*:[51]

> Alberta does not use the traditional physical claim-staking and free entry system that some other provinces and territories have retained. Rather, the province uses a map staking system, where mineral rights are applied for and granted under ministerial discretion. In certain circumstances, the rights may be posted and bids taken.

We recommend that the proposed *Geothermal Resources Tenure Regulation* adopt a hybrid approach incorporating staking which would allow geothermal rights to be applied for and granted under ministerial discretion. In addition, however, the Minister should have the authority to post rights and accept bids. It

---

[49] Grant Van Hal, *Legal Obstacles to the Development of Geothermal Energy in Alberta, CIRL Occasional Paper #42 (*Calgary: 2013, Canadian Institute of Resources Law).

[50] *Ibid.*

[51] Alberta Energy, Alberta Mineral Development Strategy 2002 (2003) available at https://open.alberta.ca/dataset/12953e89-3cc8-44bc-950c-fab48144fd41/resource/e741a7d8-bf25-4c96-8889-a349f1da22ce/download/2969666-2002-alberta-mineral-development-strategy.pdf.

should be made clear that any tenure allocation will be screened for species at risk and other environmental factors that should be preserved, in which case the tenure may not be available.

Provisions must be made for surface access and licenses of occupation. Required amendments would include incorporating a geothermal resource surface lease into the *Public Lands Administration Regulation* via s. 1(1)(o) (formal dispositions) and either a new geothermal specific division in Part 3 or an amendment of Part 3, Division 5 to include geothermal resources in mineral surface leases.

In the case of geothermal resources located under private lands, a developer would be required to enter lease negotiations with the landowner or seek access pursuant to the *Surface Rights Act* (in the same way as other energy activities). The *Surface Rights Act* would need to be amended to include the definition of geothermal resources in s. 1. Further, s. 12 should be amended to include geothermal resources:

> **12(1)** No operator has a right of entry in respect of the surface of any land
>
> (a) For the removal of minerals or geothermal resources contained in or underlying the surface of the land, or for or incidental to any mining or drilling operations,
>
> (b) For the construction of tanks, stations and structures for or in connection with a mining or drilling operation, or the production of minerals or geothermal resources, or for or incidental to the operation of those tanks, stations and structures
>
> …

> until the operator has obtained the consent of the owner and the occupant of the surface of the land or has become entitled to right of entry by reason of an order of the Board pursuant to this Act.
>
> …
>
> (3) The Board may make an order granting right of access in respect of the surface of
>
> > (a) the land in which the operator or the operator's principal has the right to a mineral or geothermal resource or the right to work a mineral or geothermal resource

As with changes to the *Mines and Minerals Act*, reference should be made to geothermal resources where appropriate in the *Surface Rights Act*: s.16 (rights conferred by order), regulations.

Given our recommendation that geothermal resources be deemed to be and always have been owned by the Crown, the question of royalties arises. It is recommended that Alberta, via legislation, maintain the authority to impose a royalty on the use of deep geothermal resources. However, it is recognized that imposition of a royalty in the early stages of the industry is not likely conducive to encouraging development of geothermal resources in Alberta and, as a matter of policy, the authority to impose a royalty should not be exercised until some time in the future (if at all).

2.3 Licensing Regime: Shallow Geothermal (Geo-exchange)

While both shallow and deep geothermal resources should be vested, by legislative declaration, in the Crown, a distinction should be made for tenure (as discussed above) and for licensing purposes. Shallow geothermal resources are those which are less found less than 400m deep and are above the base of

groundwater protection. These resources should be allowed to be used by the surface landowner in geo-exchange applications without need to obtain tenure. We recommend that this distinction be made in the proposed *Geothermal Resources Tenure Regulation*.

Although we recommend that there should be no need to obtain tenure for shallow geo-exchange applications, this does not mean that such activities would be exempt from regulation. There is already some existing regulation (under the *Water Act*) around geo-exchange systems that are completed above the base of groundwater protection (with the exception of horizontal closed-loop systems).[52] This includes the *Directive for Water Wells and Ground Source Heat Exchange Systems*[53] which provides standards for the design and installation of ground source heat pump systems in commercial and residential applications. As of January 1, 2020, contractors installing vertical closed-loop ground source heat exchange wells above the base of groundwater protection must have an approval to drill[54] under the *Water Act*. An approval to drill water wells is required for contractors drilling water wells for open-loop systems[55] under the *Water Act*. As well, the *Directive for Water Wells and Ground Source Heat Exchange Systems*[56] provides standards for the design and installation of ground source heat pump systems in commercial and residential applications.

---

[52] See Alberta Environment and Parks, *Water Wells and Ground Source Heat Exchange Systems Directive,* AEP Water Quality 2018 No.3 at 1.2(2)(c): **Base of Groundwater Protection** is the depth at which groundwater is estimated to transition from non-saline to saline [*Ground Source Heat Directive*].

[53] *Ibid.*

[54] Government of Alberta, Ground Source Heat Exchange Systems In Alberta: Facts at your fingertips (2018).

[55] *Ibid.*

[56] *Ibid.*

Given the typically small scale and the lack of need to access special geological conditions (i.e. do not require deep well construction), there is likely existing capacity to regulate these systems via building codes, municipal building requirements, and environmental laws of general application. As an extensive licensing regime addressing exploration, development and operations is not necessary (and would likely be an impediment to adoption).

However, it may be that additional guidelines and directives for appropriate design and installation would be appropriate (especially for more dense neighbourhood scale or district heat applications). This could be accomplished by making developments above a certain threshold a registration activity under EPEA. Under EPEA, activities which require registration are governed by an industry-specific Code of Practice published by Alberta Environment and Parks.[57] The Code of Practice sets out standard terms and conditions governing the activity (this replaces the site-specific terms and conditions that would be imposed with an approval). The Director may determine that an activity, which is usually subject to a registration, requires an approval in order to address environmental protection concerns.[58]

2.4 Licensing Regime: Deep Geothermal (Direct Heat and Power Plants)

There are essentially four potential approaches to regulation of geothermal resources: oil and gas, mineral, water or geothermal specific.[59] We do not recommend that geothermal resources be treated as a form of water. Further, rather than trying to pry geothermal resources into existing oil and gas or mineral

---

[57] EPEA, s. 83.1. See also Unger, *supra.* note 27 at 47 to 52.

[58] EPEA, s.66.1.

[59] Holroyd-Dagg, *supra.* note 11.

regimes, the ELC recommends development of a geothermal specific regulation.

We recommend a stand-alone regulation promulgated pursuant to the *Mines and Minerals Act* which is subject to the oversight of the Alberta Energy Regulator (AER). The *Responsible Energy Development Act* (REDA)[60] sets out the authority of the AER. Geothermal energy could be seen to fit into the definition of energy resource under that Act:

> **1(1)(h)** "energy resource" means any natural resource within Alberta that can be used as a source of any form of energy, but does not include hydro energy as defined in the *Hydro and Electric Energy Act*.

Under s. 2 of the Act, the AER has the mandate to regulate "energy resource activities" which are activities that require an approval issued under identified "energy resource enactments" (such as the *Coal Conservation Act*) or "specified enactments", or any enactments prescribed by regulation.[61] There are currently no "energy resource enactments" which address geothermal resources. While there are several "specified enactments", including EPEA and Part 8 of the *Mines and Minerals Act* (which addresses exploration for minerals), none address geothermal resources. Given that we recommend geothermal resources be regulated by a new specific part of the *Mines and Minerals Act* and stand-alone regulations under the *Mines and Minerals Act*, these enactments would have to be prescribed as falling within the purview of REDA and the authority of AER. This would necessitate amendment of either REDA, its regulations, or both.

---

[60] *Responsible Energy Development Act*, S.A. 2012, ch. R-17.3.

[61] REDA, ss. 1(1)(i), 1(1)(j), and 1(1)(s).

The proposed *Geothermal Resource and Energy Regulation* would address the licensing of geothermal exploration and development/extraction activities (similarly to the *Oil and Gas Conservation Act* which regulates oil and gas activities). This regulation would need to:

- Provide key definitions associated with the various stages of exploration, development, and production (for example: well, facilities, operator, project, power plant).

- Set out the purposes of the regulation including protection and minimization of damage to the environment, useable ground waters, geothermal resources, life, health, property, and other subsurface interests. In addition, one purpose should include maximum long-term efficiency of the resource by ensuring extraction rates do not exceed natural recharge rates.

- Empower the AER to make rules for a comprehensive licensing regime including fees, notices, and technical requirements.

- Establish license and approval requirements. There should be a requirement for exploration licenses issued for a term of 1 year which can be renewed as long as prescribed conditions are met. In addition, there should be a requirement for well drilling and facilities approvals issued for 20-year terms which can be renewed if prescribed conditions are met. The AER should be enabled to impose conditions on licenses and approvals, and both should be subject to suspension or cancellation if specific license or approval conditions are not met.

- Provide authority to seek security before geothermal resource activities commence.

- Set out requirements set for the different stages of geothermal resource development: exploration, well drilling, field development, power plant operations, and closure/reclamation.

- Set out requirements for record-keeping, monitoring and reporting. In some cases, the regulator may determine that immediate filing and release of certain data is required as a matter of public safety (as is the case with the *AER's Directive 059: Well Drilling and Completion Data Filing Requirements*).

- Consider opportunities to increase access to exploration data, including the potential for making data public after a prescribed time.

- Set out offences and penalties.

It will be essential that the proposed *Geothermal Resource and Energy Regulation* address matters such as setbacks, well control, casing, surface control, spacing, fracking, injection, hydrologic isolation, abandonment, and the storage, handling, treatment, and processing of wastes (including waste waters).

Specific environmental matters to be addressed within the licensing regime include consideration of impacts on micro-organisms and thermophiles (a regulatory feature in Iceland[62]), and subsidence monitoring and mitigation (as proposed in California). Given the potential for extraction and reinjection of water, matters associated with hydrologic integrity and isolation are key environmental matters to be addressed by the regulation.

---

[62] *Act on the survey and utilisation of ground resources,* 1998 No. 57 10 June (Amended by Act No. 5/2006, art. 34 and Regulation No. 234/1999.

Furthermore, geothermal resource activities will be subject to environmental laws of general application such as the *Water Act* and EPEA. However, it may be appropriate to establish specific provisions to accommodate geothermal activities.

For instance, the requirements for approvals and license under the *Water Act* likely apply to deep geothermal resource activity. Given the definition of activity under the *Water Act* and the lack of exemptions in the *Water (Ministerial) Regulation*,[63] there is a good chance that geothermal developments will require an approval under the *Water Act*. In addition, depending on the design of the direct heat or power plant, there is a good chance that a water licence will also be required.

While there is a directive under the *Water Act* in place for geo-exchange systems (either vertical closed-loop or open-loop systems),[64] there is no directive in place for deep geothermal developments. It is recommended that the possibility of a directive or code of practice for deep geothermal developments (direct heat and power) be explored. In particular, direct heat applications or geothermal power plants that qualify as micro-generators might be likely candidates for a directive or code of practice that could be used to streamline approval or license requirements under the *Water Act*. Any such directives or codes of practice should be incorporated by reference into statute or regulation in order to be enforceable. Given the early stages of development of the geothermal industry, it is likely not appropriate to consider directives or codes of practice until there is more geothermal exploratory and operational experience in Alberta (that is, this is a potential future direction). Furthermore, we reiterate our recommendation that prior to tenure for geothermal resources being granted, screening for environmental concerns should occur.

---

[63] *Water (Ministerial) Regulation*, A.R. 205/1998.

[64] See *Ground Source Heat Directive*, *supra*. note 52.

In terms of EPEA requirements, as previously discussed, it appears that a geothermal power plant falls into EPEA's Schedule of Activities.[65] Depending upon its size, it is conceivable that an approval and even a provincial environmental assessment may be required.[66] An environmental assessment is required for any "thermal electrical power generating plant that uses non-gaseous fuel and has a capacity of 100 megawatts or greater".[67] Since there is no exemption in the regulation related to thermal electrical power plants, a power plant smaller than 100 megawatts may be subject to an environmental assessment at the discretion of the director. We recommend that consideration be given to exempting geothermal power plants smaller than 1 megawatt from the environmental assessment process. A precedent for such an exemption is found in the *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, Alta. Reg. 111/93 specifically exempts wind and solar electric plants less than 1 megawatt from the environmental assessment process (Schedule 2, (h)). Regardless of the size of the geothermal power plant, prior to granting tenure to any geothermal resources, we recommend that screening for environmental concerns occur.

It is also recommended that the possibility of registration along with a code of practice be explored, particularly for those direct heat applications or

---

[65] The EPEA's Schedule of Activities includes the construction, operation or reclamation of a plant, structure, or thing for the generation of thermal electric power or steam (s. 2(n)). Further, the *Activities Designation Regulation*, Alta. Reg. 276/2003 defines a power plant as a plant that produces steam or thermal electrical power with a rated production output greater than one megawatt (s.2(2)(vv)). Under the regulation, a power plant is an activity for which an approval is required (s. 5 and Schedule 1).

[66] The *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, Alta. Reg. 111/93, Schedule 1(k) requires an environmental assessment for any "thermal electrical power generating plant that uses non-gaseous fuel and has a capacity of 100 megawatts or greater".

[67] The *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, Alta. Reg. 111/93, Schedule 1(k) requires an environmental assessment for any "thermal electrical power generating plant that uses non-gaseous fuel and has a capacity of 100 megawatts or greater".

geothermal power plants that qualify as micro-generators, as a means to streamline EPEA requirements (in terms of design standards, operations and reclamation requirements).

2.5 The Geothermal – Oil and Gas Interface

Given Alberta's long experience in the oil and gas industry, there is good potential for synergy between that industry and geothermal development in the province. Relevant oil and gas technology, expertise, and knowledge may be transferable to the geothermal industry. There is potential to offset some of the oil and gas industry's energy requirements with geothermal co-production and to repurpose existing oil and gas wells into geothermal wells. While this potential overlap offers a promising synergy, it also brings with it complex legal issues around subsurface interactions and liability.

2.5.1 Subsurface Issues

Given that the rights to extract different resources (oil, gas, geothermal) may be held by different parties, this can result in subsurface issues. Firstly, there may be communication issues where activities in one reservoir or zone have impacts in another. Secondly, extraction of one resource may result in incidental extraction of another (to which the operator does not have rights), and/or may negatively impact the potential recovery of another resource.

While the following looks specifically at subsurface issues at the geothermal – oil and gas interface, it is possible that geothermal operations may impact upon other mineral resources and water resources. For instance, geothermal waters may contain dissolved minerals. While our proposed definition of geothermal resources includes dissolved minerals, there is a possibility that tenure to extract certain minerals may have already been granted (for example, lithium in brine waters) prior to granting of tenure to the geothermal waters. Similar principles as those discussed below should be applicable to dissolved minerals. In terms of

water resources, the jurisdiction of the AER does not extend to consideration of water resources except in the context of oil and gas operations. Assuming the AER is granted authority to regulate geothermal resources (which is recommended), then authority to address interactions with water resources in the context of geothermal activities should be granted to the AER.

The AER's existing regulatory framework provides procedures and authority to address subsurface issues pertaining to oil and gas. In the context of communication issues, Howard summarizes the existing regulatory framework as follows:[68]

> The current regulatory framework equips the AER and industry with procedural steps to access the regulatory tools to resolve subsurface communication disputes. First, industry can monitor applications by other operators that could affect their operations, and can participate in the application process by filing a statement of concern. Where communication is suspected and the applications have already been approved, industry can file an application for the AER to review and vary the applicable approval(s). In addition, the AER has a process for receiving and investigating complaints, which could also be used to trigger an investigation by the AER.
>
> When faced with these concerns and objections by industry, the AER then has the options (to the extent that each may be applicable) to shut-in or suspend operations, order mandatory testing, monitoring and reporting, implement a commingling or subsurface order, or deny development application. [footnotes omitted]

---

[68] Kimberly Howard, "Regulating Hydraulic Fracturing: Regulatory Recourse for Subsurface Communication" (2016) 54(1) *Alberta Law Review* 141 at 182.

These tools are also applicable to subsurface issues where production of one resource may negatively impact the recovery of another.[69] Indeed, Alberta has a history in dealing with this: the gas over bitumen situation.[70] In this situation, bitumen and natural gas resources within the same reservoir were held by different parties. The depletion of the gas pool resulted in lower pressure above the bitumen reservoir making recovery of bitumen more difficult and costly. In 1998, the Alberta Energy Regulator (as it then was, the Alberta Energy and Utilities Board) issued its Inquiry Report: Gas/Bitumen/Production in Oil Sands Areas[71] which recognized the potential negative impacts of gas production on bitumen resources and initiated several measures to ensure protection of bitumen. Subsequently, decisions were made to shut-in gas wells which could impact on bitumen recovery.[72] The decisions to shut-in gas wells are meant to be interim until a technological solution can be achieved. The Government provided compensation for those gas producers affected by the decision via

[69] See for instance, section 42 of the OGCA provides that gas cannot be produced from a pool that is or could be productive of oil unless in accordance with an approved scheme for concurrent production, or another manner which is approved by the AER as not being detrimental to the recovery of hydrocarbons from the pool.

[70] See Government of Alberta website at https://www.alberta.ca/gas-over-bitumen.aspx for an overview.

[71] AEUB, *EUB Inquiry Gas/Bitumen Production in Oil Sands Areas* (March 1998).

[72] See for instance, EUB Decision 2004-045, Phase 3 Proceedings under Bitumen Conservation Requirements and Applications for Approval to Produce Gas in the Athasbasca Wabiskaw-McMurray Area (May 31, 2004); ERCB Decision 2009-061, Sunshine Oilsands Ltd. and Total E&P Canada Ltd., Applications for Interim shut-In of Gas Liege Field, Athabasca Oils Sands Area (October 15, 2009); and 2011 ABERCB 012, Athabasca Oil Sands Corp. Requests for Interim Shut-In of Gas, Liege Field, Athabasca Oil Sands Area (May 10, 2011).

compensation payments[73] and royalty adjustments.[74] Although the regulator's approach was not without criticism,[75] the gas over bitumen situation illustrates that the regulator is equipped to address such subsurface conflicts.

The courts have also been asked to resolve conflicts between holders of different oil and gas rights within the same reservoir. For instance, in *Goodwell* there were different lessees for the natural gas resources (Goodwell) and oil sands resources (AEC) in the same land area and geological horizon (a.k.a. split title).[76] In this case, there was gas-cap over the bitumen (i.e. an accumulation of natural gas over the oil sands) which meant the bitumen could not be produced without producing some of the gas-cap gas (that is, incidental production of gas-cap gas). The regulator took the position that, unless the oil sands lessee obtained the natural gas lessee's consent, the gas-cap gas could not be produced by the oil sands lessee. If there is no agreement, the oil sands lease is breached and the bitumen well shut-in. On this basis, the AEC's bitumen wells were shut-in. The Court of Appeal disagreed with the approach taken by the regulator and held that AEC could produce gas-cap gas incidentally to its bitumen recovery, subject to Goodwell's rights to compensation. This is because a right to recover bitumen includes the right to do all things reasonably necessary to recover the bitumen, including some production of gas-cap gas.

---

[73] See for example *News Release: Paramount Resources Ltd. Financial and Operating Results for the Year Ended December 31, 2002* at http://paramount.mediaroom.com/index.php?s=2429&item=122691 which references $47.1 million in compensation. See also Alexander Roth, "The unexpected benefit gas producers got when they shut on to protect Alberta bitumen" (August 18, 2013) JWN Energy at https://www.jwnenergy.com/article/2016/8/unexpected-benefit-gas-producers-got-when-they-shut-protect-alberta-bitumen/ which mentions the assistance program.

[74] *Natural Gas Royalty Regulation, 2009,* A.R. 221/2008, s. 7(10) to 7(14).

[75] See for example, Deborah Yedlin, "Alberta bitumen saga far from over" (September 1, 2003), The Globe and Mail at https://www.theglobeandmail.com/report-on-business/alberta-bitumen-saga-far-from-over/article772209/.

[76] *Alberta Energy Company Ltd. v. Goodwell Petroleum Ltd.*, 2003 ABCA 277 (CanLii).

The leases, which contain express rights to work and capture specific hydrocarbons, should not be interpreted in a way which nullifies those rights.

Special attention may need to be given to instances in which geothermal activities incidentally bring up oil or gas products, or the reverse (where oil or gas activities produce heat). Again, there is analogous experience in Alberta (with evolved gas) which can prove helpful in addressing this type of conflict. Within an undisturbed reservoir, hydrocarbons can exist as both liquid and gas. Once the reservoir is disturbed, pressure changes can cause some liquid hydrocarbons to evolve into a gaseous state. An issue can arise as to who rightfully owns the evolved gas, that is should evolved gas be considered gas or oil? The Court established long ago, in the *Borys* decision, that liquid hydrocarbons belong to the petroleum lessee/owner and that gaseous hydrocarbons belong to the natural gas lessee/owner.[77] While it is established that, for ownership purposes, the determination of the hydrocarbon is liquid or gas is to be made while it is in the ground. There were some question as to the exact point in time: at the time the hydrocarbon enters the well-bore (i.e. at the time of capture)? or prior to human intervention in the reservoir? This question was considered by the Supreme Court of Canada in *Anderson v Amoco Canada Oil and Gas.*[78] The Court stated that "*Borys* decided the reservation of petroleum involved all hydrocarbons which were in liquid phase in the ground at the time of the transaction" [time of transfer of the rights to petroleum or gas].[79] As such, in this case, the Court found that the petroleum owners were entitled to the evolved gas.

---

[77] *Boris v Canadian Pacific Railway Co.*, [1953] 2 D.L.R. 65, aff'g [1952] 3 D.L.R. 218, rev'g In part [1951] 4 D.L.R. 427.

[78] *Anderson v Amoco Canada Oil and Gas,* [2004] 3 SCR 3.

[79] *Ibid.* at para. 42.

The practical result is that, as expressed by Low:[80]

> To the extent that competing interests in gas/oil/bitumen production are not addressed through concurrent production schemes provided for in conservation legislation, [ed: under section 39(1)(f) of the *Oil and Gas Conservation Act*]… there is no reason why compensation or an accounting for gas incidentally produced could not be required.

In other words, if a producer incidentally produces a substance which they do not own or have rights to, then compensation or an accounting to the owner/rights-holder should be required. This same principle could be extended to oil or gas products incidentally produced with geothermal activities. While the converse also holds true, it is acknowledged that it may be more challenging to determine the appropriate compensation or accounting for heat incidentally produced or lost through oil and gas operations.

Currently, a variety of regulatory tools are enabled by the *Oil and Gas Conservation Act* to address subsurface conflicts. In general terms, section 94 of the *Oil and Gas Conservation Act* allows the AER to examine, inquire into, hear, and determine all matters and questions arising under the Act.[81] Specific regulatory tools used by the AER can include postponing, curtailing or preventing production to conserve resources and prevent waste.[82] Licences can be conditioned to impose testing, monitoring, and reporting obligations.[83] The

---

[80] Cecilia A. Low," The Rule of Capture: It's Current Status and Some Issues to Consider" (2009) 46(3) *Alberta Law Review* 799 at 827.

[81] OGCA, s. 94.

[82] *Giant Grosmont Petroleum's Ltd et al v. Gulf Canada Resources Ltd et al.*, 2001 ABCA 174 (CanLii).

[83] See for example OGCR, Part 11.

AER may set allowable rates of production from a well.[84] The AER may designate special spacing units (typically, only one oil or two gas wells are allowed per drilling unit).[85] Typically, if a single well produces from more than one pool, then fluid from each pool must be segregated but this restriction may be eased.[86] The AER may also issue subsurface orders which allows adaptation of subsurface regulatory requirements for specific geological zones over specific geographical areas to better suit the resources being developed and the practices being used in the area.[87] These orders are based on geological parameters, engineering, and reservoir characteristics, existing decisions and approvals, and industry activity and forecasts.[88]

The ELC recommends that the proposed *Geothermal Resource and Energy Regulation* provide similar tools or enable use of the *Oil and Gas Conservation Act* tools for resolving subsurface issues that may arise with geothermal development and other subsurface interests. In order to minimize potential conflict, it may be appropriate to legislate minimum setbacks for geothermal wells from existing oil and gas wells and water wells. There should be clear articulation of the approach to be adopted in the case where geothermal activities might negatively impact the extraction of oil or gas resources (or vice versa). It is recommended that prior to extensive disposition of rights to geothermal resources, that an approach to addressing subsurface conflicts be articulated by the provincial government.

---

[84] OGCA, s. 1(1)(d)

[85] OGCR, ss. 4.021, 4.030 and 4.040.

[86] OCGA, s. 27 requiring segregation and OCGR, ss. 3.040, 3.050, 3.051 and 3.060 excusing segregation in some cases.

[87] OCGR, s. 11.104.

[88] See https://www.aer.ca/regulating-development/compliance/orders/subsurface-orders.html for subsurface orders issued to date.

2.5.2 Liability for abandonment, reclamation and remediation of well sites.

There is significant interest in using geothermal resources to offset costs of oil, gas, or other fossil fuel production (co-production), and in reworking oil or gas wells into geothermal wells. These possibilities raise both technical and legal questions. Specifically, there is a need to clarify the appropriate assignment of regulatory liability for environmental damages, accidents, and clean-up requirements between past oil and gas operators and new geothermal entrants. There may also be legal liability arising from common law rules such as negligence, nuisance, and trespass.[89] Liability can arise on both a short-term and long-term basis.

The following policy questions should be answered by regulation for dealing with potential liability for incoming geothermal operators who wish to use existing oil and gas wells: Who is liable for an oil or gas well which has been converted to a geothermal well? Is it the oil and gas company? Is it the geothermal company? Does this liability extend to impacts on the land (surface lease and beyond)? Should it depend on the type or timing of damage? Is there a way to ensure costs are covered? What is the mechanism for release of regulatory liability?

In order to discuss liability issues with respect to the geothermal – oil and gas interface, some background on the various status of oil and gas wells is necessary. Wells can be active, inactive/suspended, abandoned, or certified reclaimed and remediated. Each of these indicate where a well is along its lifecycle from operational to fully dismantled and cleaned-up. Regardless of where a well is along its lifecycle, a well without a legally responsible and/ or

---

[89] See Mary Griffiths, *Policy Option Paper - Closing the Liability Gap* (Drayton Valley, AB: 2008, Pembina Institute) which discusses liability issues in the context of carbon capture and storage.

financially viable person to deal with the closure and remediation responsibilities is called an orphan.

2.5.2.1 Active Well

An active well is currently producing oil or gas. The production of oil or gas is a regulated activity which requires authorization issued by the AER. There are myriad operational and environmental responsibilities imposed upon an operator by the authorization, by the AER's directives and bulletins, and by statutes and regulations.

The *Oil and Gas Conservation Act* provides that the AER may order or undertake containment and clean-up of any escaped substances (i.e. oil, crude bitumen, water or any other substance).[90] The AER may recover any costs incurred from the licensee, approval holder and operator. As well, the AER may undertake necessary steps when the control, completion or operation of a well is not in accordance with an order, direction or requirement of the AER.[91] The AER may recover any costs incurred from the licensee, approval holder, or working interest participant.[92]

With its release of substances provisions,[93] the EPEA also has relevance to active well operations. An environmental protection order (EPO) may be issued where

---

[90] OGCA, s. 104. Section 41 provides that AER may take any means necessary to prevent or control an escape of oil, gas, water, or any other substance from a well.

[91] OGCA, s. 100.

[92] A working interest participant is a person with a beneficial or legal interest in a well under relevant ownership agreements (OGCA, s. 1(1)(fff)).

[93] EPEA, ss. 107 to 122.

> (a) a release of a substance may occur, is occurring or has occurred, and
>
> (b) the release may cause, is causing or has caused an adverse effect.[94]
> An EPO may be issued to the **person responsible for the substance** which means:[95]
>
> > (i) the owner and a previous owner of the substance or thing,
> >
> > (ii) every person who has or has had charge, management or control of the substance or thing, including, without limitation, the manufacture, treatment, sale, handling, use, storage, disposal, transportation, display or method of application of the substance or thing,
> >
> > (iii) any successor, assignee, executor, administrator, receiver, receiver-manager or trustee of a person referred to in subclause (i) or (ii), and
> >
> > (iv) a person who acts as the principal or agent of a person referred to in subclause (i), (ii) or (iii).

These provisions of the OGCA and the EPEA illustrate two statutory environmental liabilities that can potentially arise with the operation of an active well. As discussed, the statutes indicate which parties can be held liable, effectively a broad range of parties associated with the offending activity. However, in oil and gas operations, there may be attempts to apportion these

---

[94] EPEA, s. 113.

[95] EPEA, s. 1(tt).

liabilities via commercial agreements (which is beyond the bounds of this report).[96]

2.5.2.2 Inactive/Suspended

An inactive well is one that has not produced in 12 months (or, in the case of critical sour wells, 6 months).[97] Inactive wells are required to be suspended in accordance with AER *Directive 13: Suspension Requirements for Wells* within 12 months of the inactive status date. *Directive 13* sets requirements for minor surface clean-up (contain and clean-up any releases, remove debris) and securement of the area, for securing the wellhead to protect against leaks, and for ongoing maintenance, monitoring and reporting. A suspended well may be reactivated to begin production at a later date.

The licensee is responsible for the actions required by *Directive 13*. Section 27 of the OGCA provides that the AER may allow or direct suspension of a well by a working interest participant other than the licensee or approval holder. As well, if the well was not suspended properly, the AER may step in to authorize suspension of a well by any person.[98] In its inactive or suspended state, there is still potential for liability associated with a release of substances under the OGCA or EPEA (as discussed above).

---

[96] For more detail on this area of law, see H.E. Lilles (2017) *The Statutory Liabilities of Joint Operators and Non-Participating Parties* (Unpublished Master's Thesis). University of Calgary, Calgary, AB doi:10.11575/PRISM/28390 http://HD.handle.net/11023/3577.

[97] AER, Directive 13: Suspension Requirements for Wells (December 6, 2018).

[98] OGCA, s. 28.

2.5.2.3 Abandoned

Once a well is no longer needed, it must be permanently dismantled, sealed, and taken out of service. This process is called abandonment and, once complete, the well is abandoned. If a licence is cancelled or suspended, the liability to abandon and reclaim a well still rests with the licence holder.[99]

Abandonment requirements are set out in *Directive 020: Well Abandonment* and the "objective is to cover all non saline groundwater… and to isolate or cover all porous zones".[100] In other words, the abandonment requirements are focused on sub-surface impacts of a well. There is no mandatory timeline in place directing when a suspended well must be abandoned.

The OGCA provides that liability for a well continues post-abandonment.[101] This liability attaches to the licensee, approval holder or working interest participants. The provisions relating to release of substances under the OGCA and EPEA, as discussed above, would still be applicable to an abandoned well.

2.5.2.4 Reclaimed and Remediated

Once abandonment has been completed, the final steps of a well lifecycle are reclamation and remediation. Reclamation is the process of bringing the well-site land back to an equivalent land capacity as before the development (i.e. focused on surface impacts). Remediation means the well-site has been cleaned up to meet soil and water standards.

---

[99] *Ibid.*

[100] AER, *Directive 020: Well Abandonment* (2018) at 4.

[101] OCGA, s. 29.

The EPEA's conservation and reclamation provisions[102] address reclamation of former well-sites with the goal of returning the land to equivalent capability.[103] Equivalent land capability means that "the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the individual land uses will not necessarily be identical".[104]

The conservation and reclamation requirements apply to **specified land**, which is defined in the *Conservation and Reclamation Regulation,*[105] and includes land which was a well-site. Conservation of specified land is defined as the "planning, management and implementation of an activity with the objective of protecting the essential physical, chemical and biological characteristics of the environment against degradation".[106] Reclamation requires removal of equipment, buildings and structures; the decontamination of buildings, structures, land and water; the stabilization, contouring, maintenance, construction and reconstruction of the land surface; and other operations as may be required by regulation.[107]

An operator has a duty to conserve specified land, to reclaim specified land, and, unless exempted by regulation, to obtain a reclamation certificate.[108] The term **operator** is broadly defined and includes the person who conducted the

---

[102] EPEA, Part 6.

[103] *Conservation and Reclamation Regulation*, A.R. 115/93, s.2 (*Conservation and Reclamation Regulation*).

[104] *Ibid.*, s. 1(k).

[105] *Ibid.*, s. 1(t).

[106] EPEA, s. 1(l).

[107] EPEA, s. 1(ddd).

[108] EPEA, s. 137.

activity, the statutory authorization holder, a working interest participant in certain oil and gas operations, the surface lease holder, the successor/assignee/executor/administrator/receiver/receiver-manager/trustee of the foregoing, or the principal or agent of the foregoing.[109] Once the AER is satisfied that the applicable standards have been achieved, a **reclamation certificate** will be issued to the operator.[110] For a well-site, once a reclamation certificate has been issued, an environmental protection order cannot be issued more than 25 years after issuance.[111]

The EPEA's remediation requirements apply to all lands which have experienced a substance release with significant adverse effects. The goal of remediation is to clean-up any releases at a former well-site in terms of soil and groundwater. Section 117 of the EPEA allows for issuance of a **remediation certificate** to the person responsible for the substance. In order to receive a remediation certificate, the site must be remediated in accordance with the guidelines adopted under the *Remediation Regulation*.[112] These guidelines include the Alberta Tier 1 and Tier 2 Soil and Groundwater Remediation Guidelines.

Once a remediation certificate is issued, then no environmental protection order requiring further work in respect of the same release of the same substance may be issued;[113] although an environmental protection order may still be issued in circumstances indicated by regulation (such as presence of substance exceeding guidelines established at the time the certificate was

---

[109] EPEA, s. 134.

[110] EPEA, s. 173 and *Conservation and Reclamation Regulation*.

[111] *Conservation and Reclamation Regulation*, s. 15.

[112] *Remediation Regulation*, AR 154/2009 (*Remediation Regulation*).

[113] EPEA, s. 118.

issued).[114] The issuance of a remediation certificate does not change the obligation to obtain a reclamation certificate.[115]

2.5.2.5 Orphan

Although not related to where a well is along its lifecycle, it is important to discuss orphan wells. A well without a legally responsible and/or financially viable person to deal with the abandonment, reclamation, and remediation responsibilities is called an orphan. In theory, a well can become an orphan at any point in its lifecycle (although it is less likely for an active well as that can still be a valuable asset to sell). Thorough discussion of insolvency, bankruptcy, and orphan wells is beyond the scope of this report.[116] Discussion here will be limited to an overview of Alberta's orphan well legislation and any opportunities or impediments it presents for geothermal activity.

In Alberta, orphan wells are designated by the AER and administered by the Orphan Well Association (OWA) which is a non-profit organization operating under the delegated legal authority of the AER.[117] Part 11 of the OGCA establishes the orphan fund (as well as, the levy payable by industry to support the fund) which is to be used to pay for suspension costs, abandonment costs and reclamation costs in respect of orphan wells. The OWA is delegated authority to administer the fund by the *Orphan Fund Delegated Administration Regulation*.[118] The OWA has been delegated authority of the AER under sections 28(b), 104(1)(b), and 104(2)(b) of the OGCA with respect to suspension and

---

[114] *Remediation Regulation*, s.8.

[115] EPEA, s. 119.

[116] Jason Unger, *Clean Slate, Contaminated Land* (Edmonton: 2020, Environmental Law Centre).

[117] Orphan Well Association website at www.orphanwell.ca.

[118] *Orphan Fund Delegated Administration Regulation*, A.R. 45/2001.

abandonment of orphan wells. Section 28 allows the AER (or the OWA) to take steps to suspend or abandon a well. Section 104 allows the AER (or the OWA) to capture, recover, clean-up and dispose of escaped substances (oil, crude bitumen, water, or other substances). If the escaped substance is sold, the proceeds may be used to pay the associated costs incurred by the AER or the OWA as the case may be.

As a result of recent legislative amendments,[119] the OWA is now authorized to continue operation of and production from an orphan well. In addition, the purposes for which the orphan fund may be used were changed and extended the use of funds to cover suspension costs, abandonment costs, **remediation costs**, and reclamation costs for orphan wells, and to monitor the behaviour and condition of orphan wells.

2.5.3 Interaction with Geothermal Industry: Co-producing

In light of the potential for geothermal co-production with oil and gas wells and for repurposing existing oil and gas wells, the question of allocating liability arises.

Co-production of geothermal energy with fossil fuel production is likely the more straight-forward scenario in terms of liability.

In a co-production scenario, the geothermal production would most likely be incidental to the oil and gas operations. In other words, the geothermal production would be designed to use what would otherwise be waste heat associated with the oil and gas operations. This would not be a geothermal well *per se*. An example of this type of operation is underway as a pilot project (by

---

[119] *Bill 12: Liabilities Management Statutes Amendment Act, 2020* which has been passed and comes into force on proclamation. See bill status at https://www.assembly.ab.ca/net/index.aspx?p=bills_status&selectbill=012&legl=30&session=2.

Razor Energy with the University of Alberta) in Swan Hills, Alberta.[120] As part of Razor Energy's normal operations, there is a large amount of heat in produced water. As such, this project will repurpose an oil and gas battery to capture geothermal heat thereby reducing overall emissions of its oil and gas operations and add power revenues to Razor Energy (up to 5 MWe).[121]

In this case, given the geothermal aspect of the operations is an adjunct to the oil and gas operations, statutory liability would fall in accordance with existing provisions under the OGCA and EPEA as discussed above.

However, in the case where the geothermal operator is a different party than the oil and gas operator, this might prove a hindrance to geothermal development because it potentially exposes the geothermal operator to liability for the oil and gas operations. While there may be contractual arrangements between the different working interests to apportion potential liability amongst the parties, the AER is not bound to accept the contractual arrangements for apportioning liability. For instance, in considering a proposal by Shell and Pieridae to split regulatory liability for remediation and reclamation for some sour gas facilities, the AER refused the license transfers necessitated to reflect the contractual arrangements on the grounds of public interest.[122] Thus, contractual

---

[120] See Razor Energy press release (June 27, 2019) at https://static1.squarespace.com/static/5ba9071b9d41490a35a48592/t/5d14d2461d6147000120a106/1561645638862/Razor+Press+Release+Geothermal+Funding.pdf.

[121] See project description at https://www.nrcan.gc.ca/science-and-data/funding-partnerships/funding-opportunities/current-investments/geothermal-energy-co-production-active-oil-and-gas-operation/22151.

[122] AER Decision, Shell Canada Limited Transfer of Ownership including the Waterton Sour Gas Plant EPEA Application No. 021-258 and Jumping Pound Sour Gas Plant EPEA Application No. 015-11587 (May 13, 2020). See also Shaun Fluker and Nigel Bankes, "AER Refuses Transfer of Foothills Sour Gas Approvals from Shell Canada to Pieridae Energy" (May 15, 2020) ABlawg.

arrangements may not be sufficient to insulate such a geothermal operator from liability.

It is recommended that clarity be provided by regulation on apportionment of liability in cases where geothermal operations are undertaken by a party other than the oil and gas operator. In particular, the question of whether such a geothermal operator should be treated the same as the oil and gas operator from a liability perspective needs to be answered. Is it a desirable approach to potentially hold the geothermal operator liable for regulatory obligations, such as remediation and reclamation, directly associated with the oil and gas operations?

2.5.4 Interaction with Geothermal Industry: Reworking and Re-entry

The possibility of reworking existing oil and gas wells into geothermal wells raises a couple of questions. Does the current regulatory regime allow reworking by geothermal operators? And, if so, how is regulatory liability allocated between the oil and gas operator and the geothermal operator?

There are existing provisions dealing with reworking suspended or abandoned wells in the OGCA. The OGCA currently restricts reworking of a well to the approval holder/licensee or to a person acting under the direction or with the consent of the AER.[123] If a person does not meet these requirements, they may apply for and obtain a license or approval to undertake operations. Once such a license or approval is granted, the former approval holder/licensee is relieved from all obligations with respect to the well except for outstanding debts owed to the AER or the OWA. Under the current regime the ability to obtain a licence is limited to instances where a person is a working interest participant and is

[123] OGCA, s. 23.

entitled to the "oil, gas or crude bitumen" from the well" or any "authorized purpose".[124] This would exclude shallow wells (below 150 metres) as these are not within the definition of a "well" under the Act.

The *Oil and Gas Conservation Act* does not define "reworking" but given the context of the Act (which is the production of oil and gas, and storage and disposal of substances), it likely doesn't envision "reworking" for geothermal energy purposes. This could be addressed by including a provision allowing the issuance of permits and approvals to rework oil and gas wells for geothermal energy purposes in the proposed *Geothermal Energy and Resource Regulation*.

Reworking existing oil and gas well into geothermal wells is a more challenging situation from a liability perspective. There are various scenarios that will impact how regulatory liability may be transferred, assigned, or assumed by a geothermal operator. Factors determining the liability related to reworking existing wells will be determined by the existing mineral regulation, the administrative procedures of the AER, and the status of the well being reworked. For this reason, the following outlines various scenarios of regulatory approaches and the nature of liability that may accrue (assuming the current rules applicable to oil and gas operators will apply to geothermal operators):

1. Geothermal operators are transferred licences as though they are a typical successor in well sites, that is, the well is not abandoned.

2. Geothermal operators obtain new rights of entry for sites that are abandoned.

3. Geothermal operators obtain new rights where reclamation and/or remediation certificates have been issued.

---

[124] OGCA. s.16.

2.5.4.1 Geothermal operators are transferred licences as though they are a typical successor in well sites, that is, the well is not abandoned

Under section 24 of the OGCA, the transfer of licenses must be approved by the AER. Upon transfer, liability for abandonment and reclamation of the well transfers to the new licensee.

2.5.4.2 Geothermal operators obtain new rights of entry for sites that are abandoned

Under the OGCA, when a new licensee or approval-holder undertakes reworking of a suspended or abandoned well, the former licensee or approval holder is relieved from continuing liability for that well (i.e. liability is transferred to the new licensee or approval holder). Assuming that converting an oil and gas well into a geothermal well is included in the definition of reworking, then liability would fall in accordance with this provision.

2.5.4.3 Geothermal operators obtain new rights where reclamation and/or remediation certificates have been issued

For those instances where a geothermal operator wishes to re-enter upon lands that have received reclamation and remediation certificates then the regulatory liability may be significantly different. As highlighted above, the duty to reclaim applies to defined activities on specified land. This duty arises both for oil and gas activities and for renewable energy operations.[125]

If land is not adequately reclaimed, then an environmental protection order (EPO) may be issued directing that appropriate measures be taken to reclaim the land. Even if a reclamation certificate has been issued, an EPO can be

[125] EPEA, s. 37.

issued to the party that received the reclamation certificate or a successor, assignee, executor, and other positions clearly related to the reclaiming party.

If, in fact, the reclamation efforts were insufficient or have failed, the geothermal operator may still have to deal with land as given and be required reclaim it to an "equivalent land capability" (as opposed to the condition that the site was actually in when the geothermal operator took over). This means, for example, on a site with former oil and gas operations for which a reclamation certificate was issued more than 5 years ago, the geothermal operator may still be required to reclaim the land to an equivalent land capacity even though there may be problematic weeds on site at the time the geothermal operator stepped in. The geothermal operator cannot claim sufficient reclamation by returning to the land to the state it was in when it began operations (i.e. the degraded state left by the oil and gas operator).

Based on the broad definition of a "person responsible for a substance" found under EPEA, the government historically has been of the view that an EPO may be issued to remediate sites by subsequent owners or occupiers of land (rather than original "polluters"). However, the Alberta Environmental Appeals Board recently limited this view in its decision *Sears Canada Inc. et al.*[126] The pivotal issue being a matter of who has "charge, management and control" of a substance that may cause an adverse effect. Insofar as geothermal operators are likely to be disturbing some areas of the land this may result in a clear taking of management and control of any contaminating substance.

[126] *Sears Canada Inc. et al.* v. *Director, Regional Compliance, South Saskatchewan Region, Alberta Environment and Parks* (3 February 2020), Appeal Nos. 17-069-070 and 18-013-R, 2020 AEAB. 6.

Once a remediation certificate has been is issued, an EPO may be issued to a person who:[127]

> (a) causes a change in the condition of the remediated area or the remediated zone specified in the remediation certificate in such a manner that, in the opinion of the Director or an inspector, the substance present within the remediated zone may cause, is causing or has caused an adverse effect, or
>
> (b) changes the use of the remediated area specified in the remediation certificate in such a manner that, in the opinion of the Director or an inspector, the substance present within the remediated zone may cause, is causing or has caused an adverse effect.

This means if the operations of the geothermal operator undermine risk management or exposure controls at the site the geothermal operator will become liable.

2.5.4.4 The Need for a Pre-Transfer Site Assessment Process

The foregoing describes the likely liability scenarios when reworking an existing oil and gas well into a geothermal well. It is important to ask if these are desirable outcomes. If the policy is to encourage the reworking of wells to address the backlog of suspended and abandoned wells on the landscape and to secure a renewable, low impact energy resource, then simply transferring liability to the geothermal operator may not be desirable as this might cause a geothermal operator to be liable for damages associated with the past oil and gas operations. On the other hand, a geothermal operator will be disturbing the suspended or abandoned well in a manner unconnected to

---

[127] *Remediation Regulation,* s.8(3).

the actions of the past oil and gas operator. Further, what can be done to ensure that liabilities do not fall on the public purse?

Certainly this is a significant issue that should be addressed by weighing desired outcomes and should be clearly answered in legislation (rather than leaving the matters for resolution by resort to the courts).

We recommend that a pre-transfer inspection and assessment process be implemented prior to reworking oil and gas into geothermal wells (as part of the transfer process regulated by the AER). This process would apply regardless of whether the well was in a pre-abandonment, abandoned, reclaimed, or remediated stage. The object of the process would be to provide a snapshot of the condition of the well, the subsurface, and the surface. This would bring issues to the forefront which must be resolved by the oil and gas operator.

If there are outstanding issues, the oil and gas operator would be required to resolve the issue. For instance, in the case of incomplete or failed remediation efforts, then the oil and gas operator may be required to obtain a (or even another) remediation certificate. In some instances, it may be appropriate to allow provision of security sufficient to address the issue once geothermal activities are completed.

It must be kept in mind that geothermal operations can have significantly long life cycles (upwards of 80 years) which may outlive the oil and gas operator existing at the time of transfer. In this case, provision of security sufficient to address issues apparent at transfer but not suitable for resolution until certain stages of geothermal activities are completed, should be required.

The results of the pre-transfer inspection and assessment process would also provide some evidence as to which operator – the oil and gas operator or the geothermal operator – caused the issues requiring reclamation, remediation or otherwise to assist with apportioning liability that might arise in the future.