Alberta Energy Regulator

Canadian Natural Resources Limited

Application for a Single-Well Bitumen Battery Waseca Formation, Cold Lake Area

June 4, 2018

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Decision 2018 ABAER 004: Canadian Natural Resources Limited, Application for a Single-Well Bitumen Battery, Waseca Formation, Cold Lake Area

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Contents

2018 ABAER 004

Canadian Natural Resources Limited
Application for a Single-Well Bitumen Battery
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Application 1880447

Decision

[1] The Alberta Energy Regulator (AER) approves application 1880447 by Canadian Natural Resources Limited (Canadian Natural) subject to the conditions in appendix 2.

Introduction

Application

[2] On February 23, 2017, Canadian Natural applied to the AER under section 7.001 of the *Oil and Gas Conservation Rules* (*OGCR*) and section 5.5(12) of *AER Directive 056: Energy Development Applications and Schedules* for approval to construct and operate a single-well battery to produce and store bitumen containing no hydrogen sulphide (H_2S) at an existing well site in Legal Subdivision 15, Section 18, Township 63, Range 3, West of the 4th Meridian (the 15-18 well site), about 7 kilometres (km) west of Canadian Forces Base Cold Lake.

Background

[3] The existing gas well at the site, which has been shut-in since December 2016, will be recompleted to produce bitumen, and a battery, consisting of a wellhead, storage tank, and compressor, will be constructed to store bitumen containing no H_2S (that is, less than 0.01 moles per kilomole). In its application, Canadian Natural requested a variance to the AER's surface spacing requirements for oil and gas infrastructure to allow its proposed bitumen storage tank to be located near an existing pipeline. Canadian Natural also requested a licence with a two-year term to begin project activities, instead of the standard one-year term, so that it can consider market conditions and related factors before starting construction.

[4] The existing gas well will be recompleted in order to access bitumen in the Waseca Formation. The existing gas well was drilled in July 1985. Surface casing was set to a depth of 101 metres (m) and cemented to surface in accordance with regulations and requirements at the time. Production casing was set to a depth of 495 m and also cemented to surface. The well casing was perforated at a depth of 284 to 287 m to access gas in the Grand Rapids Formation. The well was placed on production in May 1994 and

shut-in in December 2016 after producing about 27.6 million cubic metres (about 1 billion cubic feet) of gas. The gas well and surface lease were acquired by Canadian Natural from Husky Oil Operations Ltd. (Husky) in December 2016.

[5] To recomplete the well, a service rig will be used to isolate (plug) the current perforations in the casing in the Grand Rapids Formation using a casing patch, perforate the casing at a depth of about 307 to 316 m to access bitumen in the Waseca Formation, and install a pump. Equipment to be installed on site will include a hydraulic drive head for the well, an engine to power the drive head, a 160-cubic-metre (1000 barrels) aboveground heated storage tank, and an aboveground flow line connecting the wellhead to the tank. The storage tank will be enclosed by a metal containment ring with an impermeable liner in order to provide secondary containment in case of a spill or leak. Canadian Natural indicated that if there is a sufficient volume of solution gas from the well casing, the gas will be captured and used to fuel equipment on site or will be transported to market. A compressor would need to be installed to capture the gas and tied in to an existing pipeline at the site to transport the gas to market. Canadian Natural expects that construction and completion activities will take about two to four weeks.

Hearing

[6] On September 27, 2017, the AER issued a notice of hearing, which included instructions for interested parties on how to file a request to participate in the hearing.

[7] The 15-18 well site is located on land owned by M. Naubert and C. Trotter (the landowners). The landowners own most of the land in the northeast quarter of Section 18, Township 63, Range 3, West of the 4th Meridian, and their residence is located there. In a letter dated October 12, 2017, the panel exercised its discretion to waive the requirement for the landowners to file a request to participate, granting them full participatory rights in the hearing.

[8] Subsequently, the AER received one request to participate from Claudia Charlton and Steven Charlton (the Charltons). The Charltons own about 10 acres of land immediately north of the proposed project area, on the other side of Highway 55, in the southeast quarter of Section 19, Township 63, Range 3, West of the 4th Meridian. The 10-acre parcel has been subdivided into three lots (acreages), and the Charltons reside on one of the acreages. The panel granted full participatory rights to the Charltons.

[9] The AER issued a notice on January 9, 2018, indicating that the public hearing would start on March 6, 2018, in Bonnyville, Alberta. The parties to the hearing were Canadian Natural, the landowners, and the Charltons.

[10] The hearing started on March 6, 2018, and ended on March 7, 2018, before hearing commissioners A. Bolton (presiding), C. McKinnon, and D. O’Gorman (the panel). Those who appeared at the hearing are listed in appendix 1.

[11] Before the hearing, the panel visited the 15-18 well site and surrounding area on March 5, 2018. At the hearing, we told the participants about what we saw during the site visit.

Framework for the Decision

[12] As set out in section 2(1) of the *Responsible Energy Development Act* (*REDA*), the AER's mandate is to provide for the efficient, safe, orderly, and environmentally responsible development of energy resources in Alberta and to regulate, in respect of energy resource activities, the protection of the environment.

[13] The AER's mandate is carried out through the exercise of its powers, duties, and functions, including the power to consider and decide applications under energy resource enactments in respect of wells and facilities. Our decision must be consistent with the purposes of the *Oil and Gas Conservation Act* set out in sections 4(b), (c), and (f), which are

> (b) to secure the observance of safe and efficient practices in the locating, spacing, drilling, equipping, constructing, completing, reworking, testing, operating, maintenance, repair, suspension and abandonment of wells and facilities and in operations for the production of oil and gas or the storage or disposal of substances;
>
> (c) to provide for the economic, orderly and efficient development in the public interest of the oil and gas resources of Alberta; and
>
> (f) to control pollution above, at or below the surface in the drilling of wells and in operations for the production of oil and gas and in other operations over which the Regulator has jurisdiction.

[14] As required under section 15 of *REDA* and section 3 of the *REDA General Regulation*, we must consider the following factors in making our decision:

- social and economic effects of the proposed battery
- effects of the proposed battery on the environment
- interests of landowners
- impacts on a landowner from use of the land for the proposed battery

[15] Lastly, under section 20 of *REDA*, our decision must be consistent with any applicable regional plans established under the *Alberta Land Stewardship Act* (*ALSA*). The proposed battery is located on private land within the boundaries of the *Lower Athabasca Regional Plan* (*LARP*), but it is not within a conservation, tourism, or recreation area. We must therefore consider this regional plan when making our decision.

[16] In reaching our decision, we have considered all relevant materials constituting the record of this proceeding, including the evidence and arguments provided by each party. References in this decision to specific parts of the record are intended to assist the reader in understanding our reasoning on a particular matter and do not mean that we did not consider all relevant portions of the record with respect to that matter.

Issues

[17] A number of issues were identified before or during the hearing. In reaching our decision, we considered the following issues to be of key importance:

- participant involvement program
- surface lease area
- infrastructure spacing requirements
- project need and location
- potential impacts on the leaning tree
- potential impacts of air emissions, dust, and odours on human health
- noise
- traffic and safety concerns
- pasturing of horses on adjacent lands
- future subdivisions, land use, and land sales
- emergency response
- potential impacts on water wells, groundwater, or aquifers

Participant Involvement Program

[18] Under the *OGCR* and *Directive 056*, a single-well facility producing resources containing no H_2S does not require a licence if there are no outstanding concerns about the development. However, applicants must notify landowners and occupants, the local authority, and residents living within 300 m of the proposed project. Because there are no other residents within 300 m of the project, Canadian Natural notified only the landowners, as well as the Municipal District of Bonnyville No. 87. Because Canadian Natural was unable to resolve the concerns of the landowners, it was required to file a nonroutine application with the AER. The AER reviewed the application and landowner concerns, and determined that a hearing was needed to make a decision on the application.

[19] Before the hearing, the landowners noted that other nearby residents would be affected by the project and should be given an opportunity to express their concerns. In response, Canadian Natural

expanded the scope of its participant involvement program beyond the minimum *Directive 056* requirements to include other nearby residents. This resulted in one additional request to participate in the hearing from the Charltons.

[20] We find that Canadian Natural's participant involvement program satisfied the requirements of *Directive 056* and that Canadian Natural was responsive to requests to expand the program.

Surface Lease Area

[21] The surface lease for the 15-18 well site was established in 1985 when the existing gas well was drilled.

[22] The landowners expressed concern about whether Canadian Natural intends to expand the boundaries of the surface lease area and access road beyond what was established in the original 1985 survey. They identified inconsistencies in the size of the lease area on several of the maps Canadian Natural prepared from the time it began planning the project through to the hearing, noting that some maps submitted in the application show an expanded lease area. They were particularly concerned that approval of the application would grant an implicit approval to Canadian Natural to expand its operations beyond the current surface lease.

[23] Canadian Natural explained that the discrepancies in the maps arose because it originally planned to negotiate an expanded lease. It confirmed that it abandoned its plans to expand the lease and that all planned construction and operation activities for the project can be carried out within the current surface lease area, established in 1985.

[24] We have noted the discrepancies in the lease area on the maps submitted by Canadian Natural but accept its explanation that the discrepancies do not represent an attempt to secure access to a larger surface lease area. Canadian Natural was clear that it is not seeking to expand the lease area and can complete the project within the boundaries of the current surface lease. Finally, we note that we would not have any jurisdiction to grant an expanded surface lease area to Canadian Natural in this proceeding.

Infrastructure Spacing Requirements

[25] *Directive 056* contains requirements for spacing between oil and gas infrastructure set out in the *OGCR*. This includes the requirement in section 8.030(4) of the *OGCR* that a tank containing fluids other than fresh water be located at least 60 m from surface improvements, subject to a lesser distance permitted by the AER. Husky currently owns a gas pipeline on the well site. The dike for the proposed bitumen storage tank will be located only 20 m from Husky's pipeline right-of-way. Because the pipeline is considered a surface improvement under the *OGCR*, Canadian Natural has requested a variance from the requirement that the bitumen storage tank be located at least 60 m from the pipeline.

[26] The Charltons did not identify any concerns about the spacing relaxation request, and the landowners' primary concern about the request was related to whether the project could be accommodated within the current lease area. We find that Canadian Natural's request can be accommodated within the current lease area. We also find that the storage tank will comply with requirements in *Directive 055: Storage Requirements for the Upstream Petroleum Industry* for integrity verification, secondary containment, and weather protection, so granting the spacing relaxation request will not create any safety concerns. Furthermore, Husky has consented to allow Canadian Natural to construct the facility 20 m from its pipeline right-of-way.

[27] We grant the spacing relaxation request sought by Canadian Natural and permit the lesser spacing distance of 20 m between the pipeline right-of-way and the bitumen storage tank.

[28] No other surface improvements are located within 60 m of the tank. This application satisfies other spacing requirements for heavy oil projects.

Project Need and Location

[29] Canadian Natural has proposed this project in order to test the commercial viability of bitumen production in the Waseca Formation. It holds the mineral rights at this location and has acquired the surface lease and existing gas well. If the recompleted well successfully produces bitumen, Canadian Natural argues that the project will contribute to the efficient and orderly development of Alberta's energy resources.

[30] Canadian Natural indicated that it is uncertain about the well's potential to become a producing bitumen well, so it has no plans at this time to expand production by constructing additional wells or a pipeline in the area. If the test is successful, and the economic analysis supports increased development, then it might apply to construct and operate additional wells in the area in the future.

[31] The landowners and the Charltons were of the view that this project is not needed because Canadian Natural already has many other producing wells in the area. Their view was that this one well will not significantly increase Canadian Natural's overall revenue or profits. If Canadian Natural needs to test the formation and produce bitumen in the area, they would prefer that the company select a different surface location in a less populated area to the north of the proposed site.

[32] The landowners and the Charltons also expressed concern that if the well is successful, it is likely to lead to more oil wells being developed in the immediate area. They noted that the area in which they live has a lower level of oil and gas development than nearby areas, and residents have chosen to live there for this reason. They also noted that the *Municipal District of Bonnyville Highway 55 Area Structure Plan* (*ASP*) identifies this area as one intended for a lower level of industrial development.

[33] Canadian Natural noted that recompleting an existing well has several advantages compared with drilling a new well in a different location. These advantages include a reduced surface footprint and reduced risk of environmental impacts because the existing well site has already been disturbed, and a reduced risk of geotechnical issues with the well because it operated with no apparent issues for over 20 years. Canadian Natural recompleted about 650 such wells in the Bonnyville area in 2017 and is not aware of any issues (operational, safety, or environmental) arising from any of those projects.

[34] The parties have opposing views about the economic benefits of the project. Canadian Natural submits that the project will have several economic benefits, including local employment associated with well recompletion and servicing, municipal tax payments, and provincial royalty payments that are expected to total about $250 000 over the seven- to ten-year life of the well. The landowners and Charltons suggested that this is not a significant amount of revenue for the provincial government when compared with its overall budget.

[35] We agree that it is generally preferable to use existing infrastructure and existing disturbances, where possible, to limit environmental impacts. We also note that there was no specific evidence submitted to demonstrate that any particular alternative location for the project (either drilling a new well or recompleting a different existing well) would be better than the proposed location.

[36] Although the landowners have suggested the proposed project is inconsistent with the *ASP*, it is not clear to us that a conflict exists. The *ASP* identifies the southern portion of the north half of Section 18, near the break in slope for the Beaver River escarpment, as being a potential area for future country residential development. However, the project is not located in this area. The *ASP* also states that most lands in the *ASP* area are farmland and that resource extraction may continue to be a discretionary use in agricultural areas. Finally, we note that the Municipal District of Bonnyville has confirmed that it has no objections to the project and did not request to participate in the hearing. For these reasons, we do not believe the project is inconsistent with the *ASP*.

[37] We note that Canadian Natural owns the mineral rights in this area. The proposed project would allow Canadian Natural to test the Waseca Formation and potentially extract bitumen, in an efficient manner, while limiting potential impacts on the environment and landowners by using an existing lease and well. The potential revenue for Canadian Natural and fiscal benefits to governments and the local economy represent positive economic impacts of the project. As to the landowners' concern that the project could lead to further well applications in the area, speculation about future activities is not within the scope of this proceeding. We note that future energy development projects in the area would require new applications to the AER.

[38] We note that we are required under section 20 of *REDA* to ensure that decisions about energy development are consistent with any applicable regional plans under *ALSA*, which for this project is *LARP*. The parties raised no issues in relation to *LARP*. Given the relatively small scale of the project, and

its location on private land and outside of a conservation, tourism, or recreation area, there is no evidence to indicate that its approval would be inconsistent with *LARP*.

[39] We find that the evidence supports the need for the project. The project, if successful, will have economic benefits and is consistent with the safe, orderly, efficient, and environmentally responsible development of Alberta's energy resources.

Potential Impacts on the Leaning Tree

[40] The landowners and the Charltons both expressed concern that Canadian Natural's activities could negatively affect the leaning tree, a jackpine estimated to be about 100 years old, located on the lease site. The tree has been gradually leaning closer to the ground for many years. It has appeared in a book of heritage trees of Alberta due to its age and distinctive appearance.

[41] The landowners and the Charltons told us a lot about this tree and its importance to them and the community. Ms. Naubert said that it has a great deal of emotional significance to her, and she considers it as the memorial tree for her grandmother, who previously owned the land. The landowners submitted a survey that they conducted via social media, which they said demonstrated that there is community recognition for the tree as a heritage landmark.

[42] The landowners are concerned that ground vibrations during project construction or operation, or perhaps air emissions associated with the project, could hasten the demise of the leaning tree and shorten its "natural journey." They acknowledged that the tree does not appear to be in good health and might not live much longer; it has leaned closer to the ground by a few feet in the past couple of years.

[43] Immediately before the hearing, the landowners contacted Alberta Culture and Tourism (Alberta Culture) in an effort to have the leaning tree designated as a provincial historical resource. At the time of the hearing, Alberta Culture had not made a decision. Alberta Culture provided the landowners with a copy of the current listing of historical resources for NE-18-063-03W4M, identifying several areas on the landowners' property as having high potential for archaeological or paleontological significance, but not the area where the leaning tree is located. Alberta Culture communicated to the landowners that a single tree would be unlikely to be designated as a provincial historical resource and doing so would be "somewhat unorthodox."

[44] Canadian Natural did not accept the results of the social media survey as demonstrating broad community opposition to its proposed project due to the survey methodology used. However, Canadian Natural acknowledged the significance of the tree to the landowners and some members of the community and proposed measures to mitigate potential impacts on the leaning tree during construction and operation. These mitigation measures include the following:

- It will leave a 19 m no-construction zone along the east edge of the lease area, plus a 10 m radial buffer from the base of the tree; this will leave a minimum 13 m buffer between the tree and operations.
- If the tree is still alive when construction begins, rather than stripping the topsoil and levelling the site, it will install a permeable geotextile liner and clay over the grass and topsoil to reduce ground vibrations and avoid topsoil disturbance, and contour the site so water flows away from the tree.
- It might install concrete barriers between the tree and project infrastructure as extra protection.

[45] Canadian Natural noted that the leaning tree has survived within the lease area since the existing well was drilled more than 30 years ago, including during the well's over 20 years of operation. Further, Canadian Natural added that it is not aware of any damage to vegetation at any of its operating well or battery sites as a result of air emissions from its facilities. If the provincial government declares the tree a historical resource, Canadian Natural said it would respect any regulatory requirements resulting from this designation.

[46] We acknowledge the importance of the leaning tree to the landowners and the Charltons, and appreciate Ms. Naubert sharing her story of the significance it has played in her life. All parties acknowledged that the tree is a community landmark and might be nearing the end of its natural life. Although the landowners had numerous concerns about how project construction and operation could damage the tree and hasten its demise, they did not submit any technical evidence or scientific studies to support the assertion that ground vibrations or air emissions from the project could damage the leaning tree.

[47] We find that there is no clear evidence that the project could damage the leaning tree, but we also acknowledge that the tree is old and leans very close to the ground. From a precautionary perspective, we see merit in Canadian Natural's proposed measures to mitigate potential adverse impacts on the tree and have made some of them conditions of the approval. While there is no guarantee that these measures will prevent all potential damage to the tree, they appear to be sensible precautions that will protect the tree to the extent possible.

[48] Given the apparent state of declining health of the tree and the possibility that it may not be alive at the time of construction, we have included a condition on our approval to have an arborist assess the status of the tree before the start of construction. This condition will help resolve any potential uncertainty around whether the tree is still alive and whether these mitigation measures will be required. Finally, it is unclear whether Alberta Culture will designate the tree as a historical resource or what effects this designation could have on the project, but Canadian Natural would have to follow any requirements resulting from such a designation.

[49] We find that by implementing the mitigation measures set out in the condition below, Canadian Natural is taking reasonable steps to mitigate potential impacts on the leaning tree.

[50] **Condition:** To reduce risks to the leaning tree, the following mitigation measures must be implemented:

- Canadian Natural must leave a 19 m no-construction zone along the east edge of the lease area, plus a 10 m radial buffer from the base of the leaning tree, in order to leave a minimum 13 m buffer between the tree and construction and operation activities.
- Before starting construction, Canadian Natural must hire a professional arborist to assess whether the leaning tree is still alive and share the arborist's findings with the landowners. If the arborist recommends more mitigation measures to protect the tree during construction, such as temporary supports for the tree, Canadian Natural can consider those recommendations before starting construction, but it will not be required to implement them to satisfy this condition.
- If the tree is still alive when construction begins, rather than stripping the topsoil and levelling the site, Canadian Natural must install a permeable geotextile liner and clay over the grass and topsoil to limit ground vibrations and avoid topsoil disturbance, and contour the site so water flows away from the tree. If the landowners do not want the liner and clay to be installed or the site to be contoured, as proposed, Canadian Natural will not be required to implement these measures.

Potential Impacts of Air Emissions, Dust, and Odours on Human Health

[51] There are several potential sources of air emissions, odours, or dust associated with the proposed project that could adversely affect air quality. These sources include the tank heater, and engines for the well drive head and compressor on site; fugitive emissions; venting, including venting from surface casing, the storage tank, or servicing operations; and traffic on site and on the access road.

[52] During the hearing, the landowners did not raise specific human health concerns about the emissions sources above. However, in their written submissions before the hearing, they did raise concerns about the possibility of inhaling "toxic fumes" if there were a fire or other incident at the site.

[53] The Charltons expressed concern that air emissions, dust, and odours from the project could adversely affect their health. Ms. Charlton submitted a letter from her doctor verifying that she has asthma and stating the doctor's opinion that the project could negatively affect her health. The doctor, however, did not attend the hearing to help us understand and examine this reasoning. The Charltons are concerned that they might be regularly exposed to any air pollutants from the project because they are very active outdoors. They are also worried that Canadian Natural may flare gas at the site and that project emissions would linger in the air and be trapped nearby during cold weather.

[54] Canadian Natural stated that air emissions from the project will be minimal and will not adversely impact local air quality or trigger any exceedances of Alberta ambient air quality objectives. Canadian Natural does not expect any flaring will be required at the site. Venting of gas will occur, at least initially, but Canadian Natural said that venting will comply with *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*. Canadian Natural will monitor vented volumes, and if sufficient volumes of solution gas are available, the gas will be captured and used on site, or will be transported to market in the existing pipeline. Any vented gas is not likely to contain reduced sulphur compounds.

[55] Canadian Natural presented Dr. D. Davies, an independent toxicologist with experience in air quality and human health risk assessment, as a witness at the hearing to speak about potential health impacts of air emissions from the project. Canadian Natural did not submit either a written report about air emissions from Dr. Davies before the hearing or a site-specific analysis including dispersion modelling to support his conclusions. The landowners and the Charltons did not object to Dr. Davies being part of Canadian Natural's witness panel. Dr. Davies compared the proposed project to similar oil batteries with which he was familiar. His assessment suggested that given the distance between the tank and the Charltons' residence, any air pollutants from the project near the Charltons' residence would be found only at trace levels, and the risk of project impacts on human health would be remote.

[56] Canadian Natural does not anticipate that there will be noticeable odours or dust issues for nearby residents, but if they do occur, it is committed to working with the residents to resolve any complaints. Dust from the access road should be minimal because the road is short and vehicles will follow a posted speed limit of 50 kilometres per hour (km/hr). If there are dust complaints, Canadian Natural said that it can manage the dust by applying water or a polymer-based solution on the road. As for odours, Canadian Natural said that it has been successful at managing odours from oil batteries by adjusting tank temperatures. Further, Canadian Natural indicated that it has not received odour complaints at other similar facilities in the area.

[57] We find that Dr. Davies' evidence on air pollution from similar facilities in the area was of some relevance, but we gave his testimony limited weight because he did not conduct a site-specific analysis, including dispersion modelling, to support his conclusions. Although Ms. Charlton submitted a letter from her doctor indicating that project emissions could adversely affect her health, she did not present any scientific evidence to support this assertion.

[58] Canadian Natural does not expect flaring will be required at the site, and venting of gas at the site will comply with *Directive 060*. If the amount of vented gas is sufficient, Canadian Natural will capture and use this gas on site, or ship it to market by pipeline.

[59] Air emissions from this project would be relatively limited (single well, single storage tank, two small engines, tank heater). No evidence was presented to indicate that project emissions would result in

exceedances of Alberta's ambient air quality objectives, which are intended to protect the environment and human health. We also note that the Charltons' residence is several hundred metres from the site.

[60] We therefore conclude that the project will have minimal effects on air quality and is not likely to cause adverse health impacts under normal operating conditions.

[61] *Directive 060* prohibits hydrocarbon odours from leaving the lease boundaries of energy sites. This project is not expected to release H_2S, which can contribute to odours, and Canadian Natural has not received odour complaints for its other projects in the area.

[62] The speed limit of 50 km/hr on the access road should limit dust.

[63] We find that by implementing the proposed mitigation measures, Canadian Natural is taking reasonable steps to mitigate potential impacts of air emissions, odours, and dust from the project. As a result, these factors are even more unlikely to negatively affect the health of area residents. We also note that Canadian Natural is willing to work with nearby residents to address odour or dust complaints.

Noise

[64] *Directive 038: Noise Control* sets limits for noise levels during energy project operations.

[65] Canadian Natural hired a consultant (FDI Acoustics) to conduct a noise impact assessment (NIA) for the project. Noise models used in the NIA predicted that daytime and nighttime sound levels at all nearby existing and planned residences will be at or below permissible sound levels during project operations, satisfying the noise level requirements in *Directive 038*. Before the hearing, Canadian Natural committed to implementing several measures to control noise during project operations, including using a quiet-style drive for the well pump and encasing all motors and engines on site in noise-attenuation buildings. The NIA considered these measures. During the hearing, Canadian Natural also committed to implementing the recommendations contained in the NIA report to further reduce noise levels, and to addressing any noise complaints during operations.

[66] The landowners and Charltons expressed several concerns about noise from the project. They noted potential discrepancies in the distances between the project and nearby residences provided on maps submitted by Canadian Natural and questioned whether the correct distances were used in the NIA; they argued that the NIA did not account for vehicles and activities on site, and they questioned whether Canadian Natural's operators would genuinely try to limit noise on site. They also expressed concerns that noise impacts will increase if production increases or more wells and batteries are constructed in the area in the future.

[67] We find that modelling conducted for the NIA satisfies the requirements of *Directive 038*. The models in the NIA used appropriate noise sources and receptors, and the distances were measured with a Global Positioning System (GPS), which addresses the concern about potential discrepancies in distance

measurements on maps presented during the hearing. Noise levels at all existing and potential future residences on the Charltons' and the landowners' lands are predicted to be lower than the permissible sound levels in *Directive 038* during operations. The additional mitigation measures recommended in the NIA would further reduce the potential for noise impacts. During the hearing, Canadian Natural committed to implementing these measures, and we have set this as a condition of our approval.

[68] *Directive 038* does not establish permissible sound levels for construction and recompletion activities. While noise is expected to be higher during these activities, it is anticipated to be short term in duration (two to four weeks). Noise levels will be below permissible levels during operations. We note that potential noise impacts of future energy development are not within the scope of the application or this hearing.

[69] We find that the noise impacts of the project can be mitigated, and *Directive 038* requirements can be met, by Canadian Natural implementing the proposed mitigation measures, including those in the condition below.

[70] **Condition:** Canadian Natural must install a quiet-style hydraulic drive head on the well and noise-attenuation buildings over all engines on site. In addition, if Canadian Natural installs a compressor, it must implement the noise control recommendations identified in the NIA report, which include keeping the door closed on the compressor building, installing an acoustic silencer on the engine radiator ventilation opening on the compressor building, and installing a noise-attenuation building ventilation system on the compressor building.

Traffic and Safety Concerns

[71] During operations, the site will be visited by between four to ten heavy trucks per week, which will travel along Highway 55 and access the site via an existing access road at the site. As well, daily light truck traffic will visit the site.

[72] Both the landowners and the Charltons expressed concern that safety issues could arise from increased traffic at the site. They argued that the additional heavy truck traffic could cause aggressive drivers to try to pass the trucks as they slow down to enter or as they speed up to leave the site. They also told us that there have been accidents on Highway 55 near this site.

[73] Canadian Natural noted that Highway 55 is a busy highway, used by about 3000 to 4000 vehicles per day, including many heavy vehicles heading to and from oil production areas and turning onto or entering from access roads. However, the increase in traffic due to the project will be marginal. Canadian Natural asked Alberta Transportation to assess the lines-of-sight in both directions from the point where the access road at the site joins Highway 55. Alberta Transportation's assessment verified that the sight lines in each direction are sufficient for safety purposes. As standard practice, Canadian Natural expects its operators to drive in a safe and courteous manner and follow posted speed limits. Canadian

Natural also committed to responding to and investigating any complaints related to driving by their operators.

[74] The AER does not have jurisdiction over highway traffic or safety matters; the AER's jurisdiction is limited to the clean up of spills of oil, water, or unrefined products that occur during transportation associated with the project; the location of the access road and conditions relating to its construction; and to operational, environmental, and safety issues associated with vehicles on the lease site.

[75] We acknowledge that Highway 55 is a busy road that is shared by commercial traffic, private vehicles, and heavy trucks. Heavy trucks frequently turn off or onto Highway 55 as they travel to commercial sites on access roads. Based on Canadian Natural's evidence that Alberta Transportation confirmed the adequacy of the sight lines in both directions from the well site's access road, and on Canadian Natural's requirement for its drivers to respect the speed limits and drive in a courteous manner, we do not expect any safety concerns related to the marginal increase in traffic at the well site.

Pasturing of Horses on Adjacent Lands

[76] The Charltons pasture their horses on the lands adjacent to and including the 15-18 well site. They were concerned that an operator could leave the gate open in error and allow their horses to escape and run onto Highway 55.

[77] Canadian Natural offered to install new fencing to isolate the facility from the land used for pasturing the horses. It also offered to construct a new gate off the access road at a location to be discussed with the Charltons. The Charltons can use this gate to access the pasture land for their horses, and it won't be used by Canadian Natural.

[78] Another concern raised by the Charltons is that the horses might react to intermittent clanging and ground vibrations during construction and regular servicing of the battery. This could lead to a "spooking" reaction, possibly resulting in the horses running into a fence or to exhaustion. In response, Canadian Natural committed to notifying the Charltons before construction begins to give them an opportunity to manage their horses during construction. Canadian Natural indicated, however, that it is possible that clanging or other noises could occur occasionally during routine operations (such as during truck loading), and it would be impractical to notify them every time this might occur.

[79] We note that the initial concern raised about accidental release of the horses has been resolved by Canadian Natural committing to fence the well site and production pad, and build a separate access gate for the exclusive use of the Charltons and their horses. Canadian Natural will permit the Charltons to use the lease road to access the gate and will consult with them about the gate's location. To limit disturbance to the horses, Canadian Natural has agreed to notify the Charltons about construction activities so that they can manage their horses during construction. In addition, the speed limit on site will be limited to 50 km/hr, which will also help reduce disturbance to the horses.

[80] We find that the project will not have a significant impact on the ability of the Charltons to pasture horses on the lands adjacent to the 15-18 well site.

Future Subdivisions, Land Use, and Land Sales

[81] The landowners and the Charltons both indicated that they have plans to subdivide portions of their lands and sell some of the lots in the future.

[82] The landowners have conditional approval from the Municipal District of Bonnyville to subdivide land in NE-18-063-03W4M into three lots (9.96, 3.43, and 3.41 acres). The lots are located on the east side of the quarter section along Range Road 35. The landowners' current residence is located about 580 m from the proposed project on the largest and southernmost lot. The landowners plan to sell the lots and eventually build their retirement home elsewhere on their property. They have also been pursuing plans to develop a campground on the southern portion of their land.

[83] The Charltons have subdivided their 10 acres into three lots (acreages). They currently live in a residence on the middle lot (Lot 2), which is located about 360 m from the 15-18 well site. They plan to move a prebuilt home onto Lot 3, move into this home, and sell their current residence. Lot 3 is the westernmost of the lots and closest to the project. While the distance between the proposed new residence on Lot 3 and the 15-18 well site was not provided, it appears to be about 300 m.

[84] Both the landowners and Charltons expressed strong concern about the project's potential to reduce the value of their lands and to limit their ability to subdivide and sell their lots. The Charltons provided a letter from a local realtor that suggested a negative correlation exists between land prices and oil and gas infrastructure. The realtor, however, did not attend the hearing to help us understand and examine this assertion. The Charltons also submitted a published economic study (Boxall et al. 2005[1]), which they suggested supports their position that their land values would be negatively affected by the project. Another concern for the Charltons, whose property directly faces the lease site, was the visual impact of the tank on their property value, which they suggested cannot be mitigated.

[85] Canadian Natural challenged the assertion that the project would reduce the value of the landowners' or Charltons' land or limit their ability to subdivide the land or sell properties on the land in the future. It suggested that there is no clear evidence linking oil and gas infrastructure to a decrease in rural property values. In support of this, Canadian Natural retained an experienced local appraiser, Mr. P. Vallee, to appraise the lots under the assumption that the project will proceed. In Mr. Vallee's appraisals, the value of the properties was not reduced because of the proposed battery. He said that too many factors contribute to rural land values to attribute valuations to the presence of a single battery. He suggested that the presence of the oil and gas industry provides an overall positive impact on the value of

[1] Boxall, Peter C., Wing H. Chan, and Melville L. McMillian. 2005. "The Impact of Oil and Natural Gas Facilities on Rural Residential Property Values: A Spatial Hedonic Analysis." *Resource and Energy Economics* 27: 248–269.

rural properties. Canadian Natural also noted that the study by Boxall et al. (2005) only identified a negative correlation between rural property values and proximity to sour gas wells and flaring oil batteries, neither of which is an element of this project.

[86] During the hearing, the landowners confirmed that the preferred location for their future retirement home would be on the southern portions of their lands, below the break in slope for the Beaver River valley, and the proposed battery would not be visible from this area. They also confirmed that the battery would not be visible from their current residence.

[87] We note that in the study by Boxall et al. (2005), the most statistically significant negative correlation between rural property values and proximity to sour gas wells or flaring oil batteries was observed in select areas around the city of Calgary. In view of the differences in energy developments between this application and the Boxall et al. (2005) study, we find that the results of this study are not relevant to this proceeding.

[88] We find that the letter submitted by the Charltons' realtor used broad and ambiguous language to indicate that real estate values have been observed to decline in areas with increasing oil and gas development, and provided no specific information to support this claim. The letter also does not say how or to what extent the project will affect the Charltons' property value. Further, the realtor did not testify at the hearing, so we could not question her about this evidence, and thus we assigned little weight to it.

[89] Mr. Vallee testified on behalf of Canadian Natural and was cross-examined. We find that his evidence was more persuasive than that in the realtor's letter submitted by the Charltons. Mr. Vallee indicated that a number of factors influence property values and that it is therefore difficult to quantify the effects of a single project on land value. We accept Mr. Vallee's evidence, and therefore we find that there is no evidence that the project will have a negative impact on the landowners' or Charltons' property values.

[90] We note that during the hearing the landowners indicated that they are no longer pursuing their plans to construct a campground on their property. The proposed battery would not be visible from their current residence or planned retirement home. It may be visible from one or more of the landowners' proposed subdivided lots, but the distance and the trees between the project and the lots will reduce the visual impact.

[91] The project will have some visual impacts because the Charltons will be able to see the battery from their property. However, their sightline is partly blocked by a stand of trees, and the project is across a busy highway that already has a visual impact for the Charltons. We note that oil and gas facilities are a common sight in this area, and many landowners have views that include tanks and wells. There are no regulatory requirements related to visual impacts of energy projects, and it is not possible to mitigate all visual effects of energy development.

[92] We did not receive any conclusive evidence that the project will reduce the landowners' or Charltons' property values or adversely affect their future land-use plans.

Emergency Response

[93] Canadian Natural considers the risk of a serious incident at this site, requiring evacuations from the facility or nearby residences, to be very low. It has a corporate emergency response plan (ERP), which sets out the procedures that will be followed in the event of an emergency situation, such as a spill, truck rollover, or fire. This corporate ERP meets the requirements of *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry*. The AER does not require a site-specific ERP for a single-well battery producing and storing bitumen with no H_2S.

[94] Canadian Natural conducts emergency response drills, including drills with municipal authorities, and its drivers and staff have procedures with them on site describing how to respond to emergency events. Canadian Natural expects that the average response time for an incident would be two hours, but response time would be faster during daytime operating hours when response personnel would be in the area. Canadian Natural noted that in the event of a catastrophic failure of the storage tank on site, secondary containment is designed to capture 110 per cent of the tank volume. For smaller spills occurring during regular operations, operators would immediately carry out spill response procedures in the corporate ERP. Canadian Natural is willing to meet with local residents to discuss its corporate ERP and response procedures, including its fire evacuation procedures.

[95] The landowners and the Charltons expressed concern that serious emergency situations could trigger the need for evacuations. They noted that there are many nearby residents who live on dead-end roads near the project and indicated that Canadian Natural should develop a fire evacuation plan in order to ensure the safety of these residents in the event of a fire on site that would produce thick black smoke. They also argued that a two-hour response time is inadequate because a lot of damage could occur during this time. Further, they noted that vandalism at the site (e.g., someone turning up the temperature on a tank) could also result in an emergency situation, perhaps even an explosion.

[96] We agree with Canadian Natural that the likelihood of a high-impact emergency situation requiring evacuation of nearby residents is exceedingly small for this type of facility. We find that Canadian Natural's corporate ERP satisfies requirements of *Directive 071*; that its average emergency response time of two hours or less is reasonable; that the containment ring around the storage tank will capture any large spills from a tank failure; and that operators will be able to contain any small spills on the lease site by immediately implementing the ERP. Therefore, we find that Canadian Natural's plan for emergency response is reasonable and meets all AER requirements.

Potential Impacts on Water Wells, Groundwater, and Aquifers

[97] The landowners and the Charltons were concerned about potential surface leaks and spills that could result in hydrocarbons contaminating aquifers or the Beaver River. They were also concerned about potential casing failures in the well or caprock fissures, which could lead to groundwater contamination and jeopardize their water wells. They noted that bitumen has contaminated groundwater at other Canadian Natural operations, such as at its Primrose operation.

[98] Canadian Natural noted that the bitumen storage tank will have a secondary containment design of 110 per cent of tank capacity, and an impermeable liner, so the risk of the tank failing and bitumen contaminating groundwater is very small. Operators will conduct daily checks for leaks and spills and will immediately activate the corporate ERP if one is detected. Response time for larger leaks or spills is expected to be less than the two-hour average response time.

[99] Canadian Natural also noted that the well's surface casing extends 101 m below the surface, into the bedrock, which is below the AER's required level for groundwater protection in this area. The well's production casing extends down to the well's total depth of 486 m, whereas the water wells are only about 30 to 40 m deep. These water wells are therefore separated from the target bitumen-bearing zone (Waseca Formation) by hundreds of metres of overburden.

[100] Canadian Natural noted that the well casing complied with *Directive 008: Surface Casing Depth Requirements* and *Directive 009: Casing Cementing Minimum Requirements* when it was installed. Furthermore, it set out the procedures it will follow to ensure the integrity of the well casing. During the hearing, Canadian Natural committed to pressure-testing the well casing before recompletion activities begin to meet the requirements for a medium-risk well, even though the well is classified as low risk under *Directive 013: Suspension Requirements for Wells*, and we have set this as a condition of our approval. A shut-in well inspection and a gas migration test were also recently completed by Canadian Natural and revealed no issues.

[101] We note that the well has been previously drilled and cased in compliance with applicable AER directives, and no evidence was provided to indicate that there are casing integrity problems. Inspections to date have not identified any concerns, and pressure testing will confirm the integrity of the well casing before the project proceeds. If the pressure test identifies potential concerns, remedial measures will be implemented to repair any leaks or other issues before recompletion activities occur, as required by *Directive 013*. Similarly, no evidence was submitted to suggest there are local fractures in the caprock, and we note that this project will not use hydraulic fracturing or high-pressure steam injection, so there is no potential for the project to create fractures. Planned secondary containment measures satisfy *Directive 055* requirements and will adequately address potential spills from the tank; the corporate ERP measures are in place to respond to any other spills.

[102] We find that with the condition set out below, the project is unlikely to negatively affect groundwater, water wells, aquifers, or surface water bodies, such as the Beaver River.

[103] **Condition:** Canadian Natural must pressure test the well casing at the level set out in *Directive 013* for medium-risk wells before recompletion activities begin.

Conclusion

[104] In our review of Canadian Natural's application to construct and operate a single-well bitumen battery, we considered the relevant legislation and regulations, the design and construction plans for the project, the need for the project, the social and economic effects of the project, and the potential impacts of the project on landowners, nearby residents, and the environment. Based on this review, we have concluded that the project meets or exceeds all applicable AER regulatory requirements, can be constructed and operated safely, and is consistent with the efficient, safe, orderly, and environmentally responsible development of Alberta's energy resources.

[105] We recognize the potential for project impacts on the landowners, the Charltons, and the environment, including on the leaning tree, but we are satisfied that any impacts can be effectively mitigated by Canadian Natural's project design and proposed mitigation measures, and by the conditions we have imposed.

[106] We therefore approve Canadian Natural's single-well bitumen battery, with three conditions listed in appendix 2. We also approve Canadian Natural's request for a two-year licence and its spacing variance request.

Dated in Calgary, Alberta, on June 4, 2018.

Alberta Energy Regulator

<*original signed by*>

A. Bolton, P.Geo.
Presiding Hearing Commissioner

<*original signed by*>

C. McKinnon, LL.B.
Hearing Commissioner

<*original signed by*>

D. O'Gorman, M.Sc.
Hearing Commissioner

Appendix 1 Hearing Participants

Principals and Representatives	Witnesses
Canadian Natural Resources Limited (Canadian Natural) J. P. Jamieson, counsel	R. Bretzlaff A. Campeau D. Edwards B. Parker J. Urdaneta D. Zarowny D. Davies J. Farqharson P. Vallee
M. Naubert C. Trotter C. Charlton S. Charlton	R. Flathers
Alberta Energy Regulator staff S. Sexton, AER Counsel E. Arruda D. Campbell T. Turner J. Cao S. Humphreys V. Silva	

Appendix 2 Summary of Conditions and Commitments

Conditions generally are requirements in addition to or otherwise expanding upon existing regulations and guidelines. An applicant must comply with conditions or it is in breach of its approval and subject to enforcement action by the AER. Enforcement of an approval includes enforcement of the conditions attached to that approval. Sanctions imposed for the breach of such conditions may include the suspension of the approval, resulting in the shut-in of a facility. The conditions imposed on the approval are summarized below.

Canadian Natural has made certain undertakings, promises, and commitments (collectively referred to as commitments) to parties that are not strictly required by the AER or may go beyond what is required by the AER. These commitments do not constitute conditions of the AER's approval of the application.

The AER expects the applicant to comply with commitments made to all parties. However, while the AER may have considered certain commitments in arriving at its decision, the AER cannot necessarily enforce any particular commitment.

Conditions

Condition 1

To reduce risks to the leaning tree, the following mitigation measures must be implemented:

- Canadian Natural must leave a 19 m no-construction zone along the east edge of the lease area, plus a 10 m radial buffer from the base of the leaning tree, in order to leave a minimum 13 m buffer between the tree and construction and operation activities.
- Before starting construction, Canadian Natural must hire a professional arborist to assess whether the leaning tree is still alive and share the arborist's findings with the landowners. If the arborist recommends more mitigation measures to protect the tree during construction, such as temporary supports for the tree, Canadian Natural can consider those recommendations before starting construction, but it will not be required to implement them to satisfy this condition.
- If the tree is still alive when construction begins, rather than stripping the topsoil and levelling the site, Canadian Natural must install a permeable geotextile liner and clay over the grass and topsoil to limit ground vibrations and avoid topsoil disturbance, and contour the site so water flows away from the tree. If the landowners do not want the liner and clay to be installed or the site to be contoured, as proposed, Canadian Natural will not be required to implement these measures.

Condition 2

Canadian Natural must install a quiet-style hydraulic drive head on the well and noise-attenuation buildings over all engines on site. In addition, if Canadian Natural installs a compressor, it must implement the noise control recommendations identified in the NIA report, which include keeping the door closed on the compressor building, installing an acoustic silencer on the engine radiator ventilation opening on the compressor building, and installing a noise-attenuation building ventilation system on the compressor building.

Condition 3

Canadian Natural must pressure test the well casing at the level set out in *Directive 013* for medium-risk wells before recompletion activities begin.