

Draft Directive 089: Requirements for Geothermal Resource Development (released August 2021)



What We Heard – And Our Response

On August 4, 2021, the Alberta Energy Regulator (AER) released for public comment a draft of *Directive 089: Geothermal Resource Development*.

We reviewed the 85 or so comments received and consolidated them into themes. Comments on grammar, punctuation, and cross-referencing have not been summarized, but changes were made where needed. What follows is a summary of the issues raised and our responses.

We would like to thank all those who provided comments, and a list of the respondents is provided at the end of this document.

Stakeholder Feedback – Issue	AER Response
1. Red Tape Reduction	
Several comments were received concerning the existence of regulatory overlap (referred to as red tape).	Where possible, the directive attempts to reduce regulatory overlap by referencing pre-existing applicable oil and gas regulations. <i>Directive 089: Geothermal Resource Development</i> sets out additional requirements specific to geothermal developments or requirements not covered by existing oil and gas regulations.
Is there a need to provide additional monitoring information?	We removed the requirement for a summary of monitoring data.
Will the Alberta Utilities Commission and the AER work together to license power-generating facilities?	No. The Alberta Utilities Commission and AER processes are separate but may have similar requirements.
The existing directive requirements regarding injection and disposal have limited applicability for geothermal injection. For oil and gas wells, disposal or injection of fluids leads to changes in reservoir fluid mix, whereas geothermal well circulation maintains the fluid mix while removing heat.	The injection or disposal scheme requirements in <i>Directive 065: Resources Applications for Oil and Gas Reservoirs</i> apply to open-loop geothermal development because the fluids circulated will be exchanged with the reservoir.

Stakeholder Feedback – Issue	AER Response
2. Applications and Submissions	
There is a need for submitted information (e.g., technology, financial) to be protected as proprietary.	<p>Section 49 of the <i>Alberta Energy Regulator Rules of Practice</i> states that documents filed in an application must be placed on the public record unless confidentiality is requested and granted before submission. The applicant must demonstrate how making information public would cause harm to the company.</p> <p>If financial information is provided to us as per section 94 of the <i>Geothermal Resource Development Rules</i>, we will hold this information in confidence for the specified period.</p> <p>Any Freedom of Information and Protection of Privacy requests received will be considered on a case-by-case basis, and any financial information will be managed as per section 94 of the <i>Geothermal Resource Development Rules</i>.</p>
3. Rights and Consent	
The AER requires that applicants hold geothermal subsurface rights but does not state what additional rights (e.g., coal, oil sands, water) and consents are required.	The Ministry of Energy will determine what rights and consents are required to produce geothermal. We will confirm the proof of rights and consents.
<p>What are the mineral rights requirements for an inactive oil and gas well being converted to a geothermal well?</p> <p>Mineral rights should not be required for closed-loop operations or open-loop operations that conserve and use Class II fluids.</p>	The Ministry of Energy is responsible for establishing mineral rights requirements. The rights to geothermal energy are required to develop a geothermal resource.
Is written consent required for proposed activities on public lands?	If the application involves public lands, the applicant must obtain consents from occupants as per section 9(1)(e) of the <i>Public Lands Administration Regulation</i> . Before applying for a geothermal licence, the applicant must have already applied for or hold a public land disposition. For public lands, the proof of consent is either a disposition or an application for a disposition. In addition to the disposition requirements, other requirements must be met as set out in <i>Directive 056: Energy Development Applications and Schedules</i> .
If an applicant holds the geothermal rights, but the mineral or hydrocarbon rights are also leased, does the applicant need the consent of the other rights holders to apply for a <i>Directive 065: Resources Applications for Oil and Gas Reservoirs</i> disposal approval?	As per <i>Directive 065</i> , for disposal schemes, offsetting mineral rights holders within 1.6 kilometres from the injection well must be notified. An applicant must disclose any statements of concern that arise from the notification. Notification is necessary but not consent.

Stakeholder Feedback – Issue	AER Response
4. General Licensing Considerations	
Concerns were raised regarding geothermal activity on oil and gas sites.	If heat or power from a geothermal development is sold (e.g., exported to the grid or a third party), the <i>Geothermal Resource Development Act</i> applies, and a facility licence and a separate lease are required. However, if any heat or power is used solely for oil and gas development, the activity continues to be regulated under the <i>Oil and Gas Conservation Act</i> .
The separation of existing oil and gas operations from geothermal facilities is oddly restrictive.	Like renewables such as solar and wind, the <i>Surface Rights Act</i> does not apply to geothermal. Also, the liability management framework for geothermal is different from that of oil and gas. For these reasons, the AER has chosen to have two separate licences.
5. Participant Involvement	
Should municipalities have a more clearly defined role in the AER project approval process? For example, municipal plans should be considered.	As per the <i>Municipal Government Act</i> , the AER makes the final decision regarding project approvals. Municipalities may participate in consultation during the processing of an application and should raise concerns using the statement of concern process.
Why are well information updates needed every five years?	We received significant stakeholder feedback indicating that this expectation would be beneficial.
It was suggested that issuing a variance for an applicant that does not meet participant involvement requirements may raise concerns for participants and create uncertainty regarding participant involvement requirements.	Applicants must make every effort to meet the participant involvement requirements. If the applicant can demonstrate that a requirement cannot be met, then the applicant must apply for a variance for us to evaluate and make a decision. Section 3.4.3 of the directive has been renamed "Prelicensing Approvals, Variances, and Disclosures." The list at the start of the section indicates when a variance is required, including not meeting participant involvement requirements.
Can a licence application be submitted before having surface access consent?	An application submitted without the requisite consents will be evaluated to determine the potential for a solution using alternative dispute resolution. The application will be returned if it is considered not processable.
Oil and gas operators active in an area where geothermal activities are proposed may not receive notification of the activity.	Notice is given on the AER website for all applications. Open-loop geothermal injection wells have additional notification requirements as per <i>Directive 065: Resources Applications for Oil and Gas Reservoirs</i> .

Stakeholder Feedback – Issue	AER Response
6. Liability Management	
<p>Albertans should not pay for geothermal development end-of-life liabilities and obligations (e.g., orphan wells).</p> <p>It was suggested that the requirement of a security deposit may be cost prohibitive for new entrants into an emerging industry.</p>	<p>The Government of Alberta has directed the AER to establish a financial backstop for geothermal development. However, the development of this backstop requires amendments to the <i>Geothermal Resource Development Act (GRDA)</i>. Until a backstop is developed and in place, we will manage liability risk through other regulatory tools (e.g., security deposits and life-cycle management).</p>
<p>Can a separate section be added detailing the differences between the <i>Oil and Gas Conservation Act (OGCA)</i> orphan well program and the new backstop program?</p> <p>Will it be possible to transfer funds from the <i>OGCA</i> orphan well program to the geothermal backstop program?</p>	<p>The Orphan Fund established under the <i>OGCA</i> and administered by the Orphan Well Association only applies to oil and gas wells, facilities, pipelines, and sites. Its use is limited by legislation. It cannot be used for geothermal wells, facilities, pipelines, or sites regulated under the <i>GRDA</i>.</p> <p>The Government of Alberta has directed the AER to establish a financial backstop for geothermal development. However, the development of this backstop requires amendments to the <i>GRDA</i>. Until a backstop is developed and in place, we will manage liability risk through other regulatory tools (e.g., security deposits and life-cycle management).</p>
<p>Will there be a positive effect on asset retirement obligations when converting an oil and gas well to a geothermal well?</p>	<p>The holistic licensee assessment we use to evaluate geothermal licence holders shifts liability assessments away from the single-score liability management rating, as part of the licensee liability rating program, to a more robust and comprehensive assessment of a licensee's ability to meet their regulatory and liability obligations.</p>
<p>Using “any factor the AER considers appropriate” is an unnecessarily broad and vague use of regulatory authority.</p> <p>The use of benchmarks to enforce compliance and accountability needs to be clarified.</p>	<p>We assess the capabilities of licensees to meet their regulatory and liability obligations within the context of our mandate and the acts that we administer. Section 2.9 of <i>Directive 089</i> outlines the key factors that are considered when conducting a holistic licensee assessment. Depending on the circumstances, and in addition to the key factors, other factors may also be considered when conducting a holistic licensee assessment.</p> <p>As described in section 2.9 of <i>Directive 089</i>, the holistic licensee assessment will reoccur at various times as the licensee moves through the energy development life cycle. This assessment will help the AER proactively monitor the licensees capability to meet their regulatory and liability obligations throughout the geothermal development life cycle. Please refer to the AER’s compliance assurance program, the <i>Integrated Compliance Assurance Framework</i>, and <i>Manual 013: Compliance and Enforcement Program</i> for information on how the AER ensures compliance with the requirements under its mandate.</p>

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The licensee capability assessment should be implemented and enforced for geothermal developments.	The licensee capability assessment is currently designed for the oil and gas sector as part of the holistic licensee assessment and does not apply to the geothermal sector.
Can the control of spills covered in the oil and gas regulations be included in the geothermal regulations? This could include the types and volumes of product released that are reportable to the AER and under which situations (i.e., on site versus off site).	Spill control is found in the geothermal rules and mirrors the oil and gas rules.
Because working interest participants (WIPs) will be tracked but not evaluated, the AER should consider holding the WIP transferor liable if the WIP transferee goes bankrupt. Also, consider allowing WIPs to make deposits on their interest, even if the licensee is low risk and normally not required to make a deposit.	WIPs are liable for their proportionate share of suspension, abandonment, reclamation, and remediation costs.
The responsibility for future liabilities should reside with the licensee with the best licensee capability assessment score.	Licensees are responsible for their current and future liabilities. The licensee capability assessment is currently designed for the oil and gas sector as part of the holistic licensee assessment and does not apply to the geothermal sector.
An inventory reduction program for geothermal, like the program for oil and gas, should be set up, setting spending targets for the reclamation of inactive geothermal wells.	The <i>Geothermal Resource Development Rules</i> outline our authority as the regulator to establish closure quotas. Over time, we plan to phase in a geothermal inventory reduction program like that being introduced in the oil and gas liability management framework.
Why do geothermal projects require site-specific liability assessment?	Liability assessments must be completed as per section 2.11 of the directive. Geothermal facilities, in many cases, are different from oil and gas facilities. Conversion of existing oil and gas sites to geothermal use may have liabilities not considered in a standard liability assessment. In some cases, a site-specific liability assessment will be required to ensure liability estimates are as accurate as possible.
7. Geothermal Wells	
The definitions of open- and closed-loop systems are vague.	We have revised the directive and added definitions for open- and closed-loop geothermal wells.

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A geothermal observation well is just an observation well. This well status designation is used for various types of operations without issue and does not require additional regulation, which could cause confusion.	Observation wells that are part of a geothermal operation must be licensed and operated under the <i>Geothermal Resource Development Rules</i> .
The AER’s authority to determine what work requires the services of a qualified, licensed professional able to practice in Alberta was questioned.	We have stated the need for qualified, licensed professionals as an expectation and not a requirement.
The collection of drill cuttings is highly prescriptive and appears to be a data collection exercise for the AER.	The handling of drill cuttings for geothermal is structured similarly to the approach described in the <i>Oil and Gas Conservation Rules</i> . Applicants can, based on adequate coverage in an area, request a variance preapplication or in the application to either reduce (change sampling intervals) or eliminate sampling. This approach was adopted due to limited provincial data at geothermal depths. We will consider variances on a case-by-case basis.
The requirements for the use of thermal cement are unclear.	We have revised the directive to clarify the thermal cement requirements.
The surface casing requirements require clarification. Why are there different requirements between open- and closed-loop surface casing depths? Does this requirement sidestep the 600 metre (m) maximum? Will the Alberta Geological Survey review groundwater depths greater than 600 m?	For open-loop wells, the packer and tubing setup allows double-wall barriers. For closed-loop wells, as there is no packer and tubing setup, surface casing down to the base of groundwater protection is required to satisfy the need for double-wall barriers. Despite the above, open-loop and closed-loop geothermal wells must still meet the requirements set out in <i>Directive 008: Surface Casing Depth Requirements</i> . However, the exemptions of <i>Directive 008</i> do not apply to closed-loop wells. The base of groundwater protection will not be calculated to exceed 600 m below ground level.
Under what conditions can fluid be run against the casing in a closed-loop system?	We will allow fluid to be run against the casing in closed-loop systems if surface casing protection is in place down to the base of groundwater protection, and fluid volume and pressure are continuously metered and monitored.
Why are all inactive geothermal wells classified as medium risk?	Inactive geothermal wells are considered a medium risk due to their greater depths, elevated temperatures, use of heat recovery chemicals, and overall longer life expectancy compared with oil and gas wells. We may review this requirement once we have gathered more data on geothermal project risk.

Stakeholder Feedback – Issue	AER Response
<p>The application requirements for a geothermal reclamation certificate may not match what is required for upstream oil and gas. This may be of concern when a former oil and gas well is to be repurposed for geothermal use.</p>	<p>The reclamation requirements for geothermal well sites are the same as oil and gas well sites (see the <i>Conservation & Reclamation Regulation</i>). We intend to mirror the <i>Specified Enactment Direction 002</i> application requirements using the OneStop submission process. Until the requirements are in OneStop, applications for a reclamation certificate must be submitted manually.</p>
<p>Should all wells drilled in Alberta require surface casing completed to the base of groundwater protection as it is for closed-loop geothermal wells?</p>	<p>In rare cases, exemptions in <i>Directive 008</i> may apply to open-loop geothermal wells. Because closed-loop geothermal wells will be allowed to have fluids running against production/intermediate casings, surface casings must be installed to ensure a double barrier.</p>
<p>The induced seismicity requirements match those found in the Duvernay subsurface order, but this does not consider the design of the geothermal loop. Cycling fluid within the same reservoir should not increase pressure; therefore, seismicity should not occur. This is related to the definition of closed and open loops; reservoirs are not being considered, just wells.</p>	<p>For all geothermal systems, the applicants must consider all hazards that may be present. If a hazard is not present, then some requirements may not apply.</p>
<p>The regulatory requirements for seismicity apply to the entire province rather than being area and risk based. Area-based requirements using subsurface orders, where magnitude thresholds are specific to an area’s risk profile, are flexible and effective. Oil and gas operators are concerned a province-wide approach may eventually be applied to their operations.</p>	<p>Many geothermal wells are very deep. Although the magnitude thresholds for induced seismicity in the directive are province wide, they are meant to be initial thresholds. As operational data is acquired, the licensee must review the data and make the necessary adjustments to the seismic magnitude thresholds.</p>
<p>Only faults ± 30 degrees from H_{max} are critical and require additional review.</p>	<p>We have revised the directive from “± 30 degrees” to “approximately ± 15 degrees.” Other than 3-D seismic data, there are other ways to detect these features (e.g., academic papers, government maps, etc.).</p>
<p>Mandated seismicity monitoring equipment may be burdensome. The real-time data submission requirement needs clarification.</p>	<p>As per the directive, seismic monitoring will only apply “if induced seismicity is identified as a risk by the applicant, licensee, or the AER, or if a seismic event is induced or triggered by the geothermal well operations.” Seismic monitoring equipment is necessary for understanding the ongoing risk and risk mitigation of induced seismicity for the operation. The monitoring equipment would collect data to report to the AER/AGS in real time.</p> <p>See the AER’s <i>Open File Report 2019-09: The Scientific Induced Seismicity Monitoring Network</i> for details on how to provide seismic information to the AER.</p>

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For suspension requirements, a safe state for the well may not mean suspension but a controlled reduction in pressure, in line with current seismicity research. In addition, have operators submit a plan to the AER as part of the request to resume injection activities.	We agree with this comment; refer to section 3.3.1 of the revised directive.
Table 1 of the directive includes “additional wells.” However, it may be unclear if this applies to an initial well for geothermal resource development.	We agree with this comment and will modify table 1 as recommended. Like other energy development classifications, we expect initial wells under this directive will use the “Exploratory” category when drilling, at least for the first well drilled into a new formation.
The variances from <i>Directive 056: Energy Development Applications and Schedules</i> for hydrogen sulphide (H ₂ S) release rates are available. There should be no possible scenario where a well is exempt from conducting a H ₂ S release rate. Concerned proponents can follow H ₂ S preapplication processes.	We agree with this comment. This is now properly labelled and will be managed preapplication.
8. Geothermal Facilities	
Clarify the need for an applicant to contact the AER at GeothermalApplications@aer.ca to determine if a geothermal facility licence is required for closed-loop wells that produce heat.	We must assess each case to determine if the design creates any public safety hazards. As the industry develops and more knowledge is gathered, we will look to improve the regulatory framework.
Clarification is needed regarding classifying well drilling and noise impact.	Drilling and servicing rigs fall into the “temporary” category as per <i>Directive 038: Noise Control</i> , even if drilling extends beyond 60 days. Temporary activities generally do not require a noise impact assessment typically required for a facility. The licensee is responsible for noise control. Public complaints related to drilling should be directed to our field centres.
Stakeholders near a suspended facility may not know what will happen to the site 24 months after its suspension date.	We have removed the requirement to abandon a facility after being suspended for more than 24 months. Regardless of the time suspended, closure requirements for suspended geothermal facilities will be as per requirements of the future inventory reduction program to be phased in. Licensees are strongly encouraged to progressively close their assets and sites when no longer in use. As per section 100 of the <i>Geothermal Resource Development Rules</i> , we can direct the timing and priority concerning the closure of facilities. If an inactive or suspended facility is being reactivated, facility integrity will need to be confirmed before reactivation.

Stakeholder Feedback – Issue	AER Response
9. Geothermal Pipelines	
<p>Clarify the requirements for a reclamation certificate application, suggesting the requirements for upstream oil and gas pipelines are different.</p>	<p>The process for reclamation certification is the same for geothermal pipelines as it is for any other pipeline we regulate.</p>
10. Transfer of Well, Facility, or Pipeline Licences	
<p>Consistent with the Canadian Association of Petroleum Producers’ feedback regarding the draft life-cycle management directive, reclamation-certified and reclamation-exempt sites should be outside of the scope of licence transfer adjudication.</p>	<p>Section 6 of the directive has been updated to align with section 5 of <i>Directive 088: Licensee Life-Cycle Management</i>. We may apply discretion to permit the transfer of reclamation-certified and reclamation-exempt licence types in a transfer application.</p> <p>Please contact us for a preapplication meeting to discuss the circumstances of your transaction.</p> <p>We will seek to understand the context of a transfer application and may request additional information from a company during a transfer application review. If a company is doing a “white map sale” or “corporate clean out” (i.e., selling assets), we want to enable the transfer of reclaimed-certified and reclaimed-exempt licences to an eligible licensee who can address any future issues that may arise with these licences.</p>
<p>Clarification is needed regarding the effect of unpaid taxes on the ability to transfer licences (well, facility, or pipeline).</p>	<p>When requested by the AER, companies must disclose the amount of any unpaid municipal taxes or surface lease payments. This information may be a factor in the holistic licensee assessment that the AER considers when determining if companies are eligible to hold a licence or for a transfer application.</p> <p>We are not involved in collecting unpaid municipal taxes and have no jurisdiction to impose terms and conditions on approvals regarding payment of municipal taxes or undertake compliance or enforcement actions related to municipal taxes. Municipalities remain responsible for the collection and enforcement of their municipal taxes.</p>
11. Geothermal Data Filing, Measurement, and Reporting Requirements	
<p>Confirm that sampling is for reservoir fluids only and “constant” monitoring is not required.</p>	<p>We have revised the directive. Sampling is required for reservoir fluids only. Sampling is required initially and then annually.</p>

Stakeholder Feedback – Issue	AER Response
The directive does not have exceptions for existing analyses, such as the use of offset water analyses or buffer distance.	We would like to better understand the chemical and physical properties of deep subsurface water. Also, we do not currently have enough information to determine appropriate buffer distances. Once a licensee develops a greater understanding of their site, a variance may be requested.
Requirement 102 of the directive incorrectly references section 3.8 of <i>Directive 040: Pressure and Deliverability Testing Oil and Gas Wells</i> .	The updated directive correctly reflects the recent changes made to <i>Directive 040</i> .
Is the AER considering more flexibility when making choices in the following table columns? <ul style="list-style-type: none"> • table 2 – well status codes: Fluid • table 3 – linked well types • table 3 – product codes 	We plan to make changes to Petrinex, providing other options to be selected in the columns highlighted by respondents.
How is it determined that surface deformation is an issue?	For open-loop wells, if an applicant proposes to inject into and produce from the same formation, surface deformation is not expected to be an issue. If the formations differ, then surface deformation will need to be addressed. Deformation-monitoring techniques include interferometric synthetic aperture radar and the use of surface heave monuments. We have access to satellite data and may collaboratively share data with operators.
A reduction in reporting frequency and clarification on which parameters to report was requested.	We have revised the directive. Reporting has been changed from monthly to annually, and reporting parameters are better defined.
Measuring bottomhole temperature on an annual basis while the well is operating would be a significant cost increase.	We have revised the directive. If bottomhole temperatures are collected, they must be reported.

Stakeholders Who Submitted Feedback (in alphabetical order)

Alberta No.1

ARC Resources Ltd.

CAPP

CNRL

Eavor

Environmental Law Centre

EPAC

GeoGen

Obsidian Energy Ltd.

Patching Associates Acoustical Engineering

Rural Municipalities of Alberta