Draft Directive 081 (released June 2019)
Stakeholder Feedback and AER Response

On June 20, 2019, the AER released, for public comment, draft *Directive 081* to reduce the amount of high-quality nonsaline make-up water used within the in situ sector.

During the public comment period, the AER received feedback from CAPP, four thermal in situ operators, and four First Nations. The AER considered and reviewed in detail each comment received. Many of the comments raised similar issues or concerns. What follows is a summary of the issues and concerns raised and responses, as well as changes made to the draft requirements.

Stakeholder Feedback – Issue	Stakeholder	AER Response
1. Overall comments		
Operators currently using alterative water types will operationally benefit from the disposal factors assigned to the alternative water types. The disposal factors assigned to the alternative water types provide incentive to in situ operators to use alternative water sources for future developments.	Husky	
The AER should be commended for advancing this pragmatic policy that maintains prudent oversight, yet provides flexibility and as importantly, offers a means to more accurately represent Industry's responsible stewardship of water resources.	CAPP	
Capitalize the words 'Section', 'Appendix' and 'Table' throughout the document.	CAPP	AER style is to lowercase these words in running text.

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2. Purpose of the Directive (Section 1.1)		
"Using alternative water sources where possible". The *Water Act* does not distinguish between alternative non-saline and high-quality non-saline water, so these sources are protected with the same rigour. Will there be any distinction when applying for a license for an alternative non-saline well vs. a high-quality non-saline well for industrial/steam generation? Include alternative non-saline aquifers to the hierarchy of preferred water sources when reviewing/approving Water Act license applications. Highlight how new Directive 081 categories will tie to the Water Act licensing process.	CAPP & Cenovus	This is outside of the purview of *Directive 081*. The AER requires operators to follow the *Water Conservation and Allocation Guideline for Oilfield Injection* (2006) and the *Guide to Groundwater Authorization* (2011) when applying for a *Water Act* licence to use nonsaline groundwater. There is no distinction for alternative nonsaline groundwater under these guidelines at this time.
3. What's New Section (Section 1.3)		
Refer to Section 2.1 as it provides a clear definition for "High Quality Non-saline Water" that includes depth and salinity.	CAPP & Cenovus	The "What's New in This Edition" section is intended to provide an overview of what is new in this edition using plain language. It is not intended to introduce regulatory jargon or a full definition of high-quality nonsaline water. High-quality nonsaline water is defined in section 2.1.
4. Inlet Water Types (Section 2.1)		
High-Quality Non-saline example of 'a well licenced under *Directive 056* drilled to a depth greater than 150m'. Source wells acquiring an AER Drilling Licence are typically >150m and meet the criteria of Alternative Type 1 (A_1).	CAPP	Under section 2.1, we state that high-quality nonsaline (HQN) water "does not include nonsaline water that falls under one of the three alternative types or any type of wastewater water." This means that water sources such as wells licensed under *Directive 056* that meet the definition of alternative type 1, specifically alternative nonsaline groundwater, will not be included as HQN. However, some wells licensed under *Directive 056* will still fall under the HQN category (i.e., wells >150 m completed in Quaternary- or Neogene-aged aquifers, wells >150 m where the top of the aquifer is <150 m).

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Saline produced water is not considered as a category in the directive as an inlet water types. Add saline (>4,000 mg/L total dissolved solids [TDSs]) produced water to Alternative type 2 water (D_{A2} = 0.35)	CNRL	Produced water quality is not consistently monitored or reported by operators to the AER. However, it is our understanding that produced water freshens as high-quality steam is injected into the reservoir, and this issue is very rare. Recyclable produced water volumes are always significantly higher than any make-up water volumes, which is why we assign a low disposal factor of 10%. Increasing the disposal limit from 10% to 35% could lead to an increase in the amount of high-quality nonsaline water use within the sector, which would frustrate the goal of *Directive 081*. However, if an operator uses alternative type 2 water to make up for reduced recycling associated with high produced water salinity, the goal of *Directive 081* can still be achieved. We will increase the disposal factor for alternative type 2 water from 35% to 55% to allow more flexibility for projects facing this issue and to encourage the use of more alternative type 2 pretreatment options.
5. Alternative Nonsaline Groundwater (Section 2.1.1)		
The geological age of the aquifer is noted as one criteria in the Decision Tree; however, there is no explanation as to why this is important. Add a sentence or two to clarify why the age of the aquifer is important. For example, Neogene or Quaternary-aged aquifers are likely to host potable water (TDS <500mg/L) and on this basis are classified as high-quality non-saline.	CAPP & Cenovus	Section 2.1.1 was amended to include a sentence to explain why the age of the aquifer is important.
"Water-short" areas are designated by Alberta Environment and Parks in the *Water Conservation and Allocation Guideline for Oilfield Injection*. This document does not reference a publication year.	CAPP	The water-short areas map is in the *Water Conservation and Allocation Guideline for Oilfield Injection*, which was published in 2006. In the event that this document is revised, the latest revision will be used by the AER. The reference in the directive has been clarified.

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The 1st Sentence explains why a deep non-saline aquifer is an acceptable alternative. In Figure 1, 150m is shown as the criteria for a deep aquifer in the non-saline Decision Tree. Is a depth of 150m a firm value, or would a shallower depth for a well, not completed in a hydrocarbon zone or remediation well, be considered acceptable by AER if supported by local hydrogeological conditions?	Cenovus	Groundwater produced from aquifers confined by aquitards (aquifer tops) less than 150 m are more likely to interact with shallower aquifers or surface water. Also, drilling deeper than 150 m has significant cost implications that limit potential future nonindustrial use due to regulations in Alberta (i.e., well licensing [*Directive 056*], surface casing [*Directive 008*], cementing [*Directive 009*], wellbore design [*Directive 010*], blow-out-prevention [*Directive 036*], and logging [*Directive 080*] requirements, coupled with business associate code, petroleum and natural gas, and bitumen rights purchases). The decision tree is intended to be an objective, conservative, risk-based screening tool for determining which wells are high-quality nonsaline or alternative nonsaline groundwater for disposal limit calculation purposes. We recognize that there could be site-specific cases where local hydrogeological conditions could justify including shallower wells as "alternative," but this typically involves collecting additional field data that can increase the project's footprint and cost and increase the amount of time it takes us to review applications. At this time, the 150 m is a firm value. Section 2.1.1 was amended to include a sentence to explain why the depth of 150 m is important.
While "an aquifer top greater than 150m depth" should cover any deeper Quaternary channel incisions, it is not clear how the adjacent alternative non-saline zones created by the incision will be handled. Will it be up to the operator to demonstrate that there will be no impacts/interactions to channels? Will there be any set back distances to Quaternary channel incisions?	Cenovus	We will not add setback criteria at this time. The decision tree appears to work well for classifying the highest risk aquifers as high-quality nonsaline based on aquifer age and depth. If a well is installed too close to a channel incision, and site-specific information indicates that it is sourcing water from a Neogene- or Quaternary-aged aquifer, it will be reclassified as high-quality nonsaline. The decision tree in section 2.1.1 was modified to add wording to the second diamond as follows: Is well completed in <u>or sourcing water from</u> a Neogene- or Quaternary-aged aquifer?

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Despite the AER's stated intent of "minimizing the use of high-quality non-saline make-up water at thermal in situ operations," the proposed changes actually make it easier to access certain high-quality non-saline aquifers.	Athabasca Region First Nations	The goal of the changes made in this edition of *Directive 081* is to reduce the amount of high-quality nonsaline water use, including (1) groundwater used from shallow aquifers, (2) groundwater used from deeper aquifers that has potential to interact with shallower groundwater and surface water bodies, and (3) groundwater identified as having potential for future nonindustrial use. Historically, the AER and previous regulators treated all nonsaline groundwater the same. This did not encourage operators to drill deeper wells into aquifers with lower potential for future nonindustrial use. The changes in this edition will encourage operators to seek deeper, low-quality groundwater sources that are less likely to impact the aquatic environment or groundwater discharge features at surface. One way this will be done under the changes made in this edition of *Directive 081* is by imposing restrictive disposal limits of 3% when high-quality nonsaline water is used for make-up and increasing the disposal factor to 10% when alternative nonsaline groundwater is used for make-up. While the use of nonsaline groundwater could increase as a result of changes made in this directive, particularly due to the inclusion of alternative nonsaline groundwater under the alternative type 1 inlet water category, the AER determined that this will be offset by reductions of high-quality nonsaline water. We are also recognizing more alternative sources that were previously overlooked under the previous version of *Directive 081*, which will also encourage operators to reduce their high-quality nonsaline water use.
The criterion that a water source has limited potential for future agricultural, domestic (or ecological) use is subjective, and the proposed definition for Alternative Non-saline Groundwater does not consider the potential ecological role some of these deeper but non-saline groundwaters may play in the overall water balance of a watershed, nor the implications that developing them may have on groundwater discharge as base flow to surface water streams and water.	Athabasca Region First Nations	The criterion for defining alternative nonsaline groundwater is intended to be a simple, objective screening tool for placing a stricter limit of 3% on disposal for high-quality nonsaline groundwater use that has higher potential to interact with shallow groundwater or surface water bodies and has higher potential for future nonindustrial use. Shallower groundwater and deeper groundwater sourced from Quaternary and Neogene aquifers, as well as aquifers with tops less than 150 m, have higher potential ecological roles and have higher potential to alter baseflow to streams and lakes. The *Water Act* licensing process provides additional controls for managing risks associated with developing all nonsaline groundwater resources, regardless of the *Directive 081* classification. See below for additional detail.

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The proposed Directive does not have any mechanism to consider whether a particular aquifer is important to support the exercise of rights.	Athabasca Region First Nations	When we developed the definition of alternative nonsaline groundwater for *Directive 081*, we did consider the ecological and traditional use role of aquifers. In doing so, we excluded groundwater sources that have higher potential to interact with the surface and shallower zones. We have amended section 2.1.1 to clarify this by explaining the rationale of the latter two diamonds in the decision tree as follows: > Regardless of its depth, groundwater sourced from Neogene- or Quaternary-aged aquifers will be categorized as high-quality nonsaline because it has higher potential to interact with shallower aquifers and surface water and also has higher potential for future nonindustrial use. Conversely, groundwater sourced from wells completed in bedrock aquifers where the base of the overlying aquitard (aquifer top) is deeper than 150 m will be categorized as alternative because it is less likely to interact with shallower aquifers or surface water and has less potential for future nonindustrial use due to the high cost of meeting regulatory requirements associated with drilling deeper in Alberta. We also note that application requirements under the *Environmental Protection and Enhancement Act* (*EPEA*)—including the environmental impact assessment— the *Oil Sands Conservation Act* (*OSCA*), *Draft Directive 023*, and the *Public Lands Act* include assessing the effects an in situ project may have on the environment, water users, and stakeholders in the area. In addition, authorization to use nonsaline groundwater from an aquifer, regardless of whether it is high quality or alternative, is required under the *Water Act*, separate from *Directive 081*. The property in and the right to the diversion and use of all water in the province is vested in the Crown (section 3(2) of the *Water Act*), and the diversion and use of water must be authorized under the *Water Act*. When operators apply for *Water Act* licences, the AER requires them to submit their applications in accordance with the *Guide to Groundwater Authorization* (*GGA*). The *GGA* includes requirements for assessing whether or not groundwater use will impact surface water. There are additional requirements that in situ operators have to assess that are included in the *Water Conservation and Allocation Guideline for*

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		Oilfield Injection (*WCAGOI*) when they apply to use nonsaline water for making steam (i.e., environmental net effects evaluation, alternative water source assessment, etc.). This information is submitted to the AER separately from *Directive 081*. When a decision under the *Water Act*, *EPEA*, or the *Public Lands Act* has the potential to adversely impact First Nations' treaty rights or traditional uses or Métis settlement members' harvesting or traditional use activities, *The Government of Alberta's Policy on Consultation with First Nations on Land and Natural Resource Management, 2013* or *The Government of Alberta's Policy on Consultation with Metis Settlements on Land and Natural Resource Management, 2015* is applied. The Aboriginal Consultation Office (ACO) oversees consultation on treaty rights and traditional uses and determines adequacy of consultation and may suggest mitigation measures based on the consultation process. The AER oversees applications under the energy resource enactments (e.g., *OSCA*) and, in respect of energy resource activities, the specified enactments (e.g., *Water Act*, *EPEA*, and the *Public Lands Act*). In reviewing applications, the AER considers any mitigation brought forward by the ACO and statements of concern (SOCs) that may be submitted by a person who believes that they may be directly and adversely affected by an application.
The ecological effects of groundwater alteration on surface waters needs more consideration than is outline in this proposed Directive.	Athabasca Region First Nations	As is noted above, the AER requires additional consideration of whether or not groundwater use will impact surface water in accordance with the *Water Act*, *EPEA*, and *OSCA* application requirements, which are submitted separately from *Directive 081*.

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We recommend that the Directive be updated to stipulate the level of detail needed to adequately demonstrate that a proposed water source meets the definition of being classified as an Alternative Non-Saline Water Source. The adopted criteria must include actual field data from well drilling, testing, and monitoring of sufficient rigour to prove lack of connectivity to surface.	Athabasca Region First Nations	The decision tree included in this edition of *Directive 081* is for determining if nonsaline groundwater should be treated as "high quality" or "alternative" it is intended to be a simple, objective screening tool to encourage operators to install deeper wells in aquifers that are less likely to interact with shallow groundwater or surface water and in aquifers that are less likely to be used for nonindustrial purposes. During the *Water Act* licensing process, the impact of groundwater use on surface water is considered. For example, the *GGA* and the *WCAGOI* provide requirements for what field data from well drilling, testing, and monitoring is required, and they also provide requirements for assessing wells that are hydraulically connected to surface water bodies.
We also recommend that classifying aquifers consider the ecological role of the aquifer and include the opportunity for Indigenous communities to comment on whether they have limited potential for future agricultural or domestic use, including traditional use.	Athabasca Region First Nations	The current decision tree for determining if nonsaline groundwater should be treated as "high-quality" or "alternative" will not be changed because adding more criteria will make it more subjective and difficult to implement consistently and fairly. For instance, we acknowledge that there likely are some groundwater sources within Quaternary or Neogene aquifers or within aquifers that have tops shallower than 150 m that may also have limited to no potential to impact the ecological role groundwater provides at the surface and that some operators could collect site-specific information to prove this. However, the decision tree does not provide a means for recognizing such sources as "alternative." Conversely, if we added additional criteria for deeper wells that meet our criteria for "alternative," we anticipate that it would result in larger project footprints as operators would be required to install more observation wells and collect more field data from deep aquifers that are unlikely to interact with shallower zones or the surface. In this regard, the decision tree is considered to be effective and is a conservative screening tool for placing stricter disposal limits on nonsaline groundwater that has higher potential to impact the ecological role of groundwater at surface.

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The process of developing and reviewing this Directive falls short of the level of consultation required for regulatory development. The possibility of use of deep water impacting shallow aquifers and surface waters on which the exercise of our community members' rights depend requires meaningful consultation, more than a 30-day opportunity to respond.	Athabasca Region First Nations	We carefully consider engagement and have engaged with stakeholders and rights holders when the content of a proposed directive is technically complex and when a review of previous interactions has determined that there is considerable interest. Historical data indicates that indigenous communities have not submitted SOCs for amendment applications related to *Directive 081*, nor were any comments submitted when *Directive 081* was initially released. Given this, the AER decided that a 30-day comment period was appropriate.
[Our professional hydrogeological consultant] concludes that the draft Directive has the potential to increase use of non-saline water for in situ development, which is directly contrary to the intention of the Directive to "encourage the use of alternative water sources, with the goal of minimizing the use of high-quality nonsaline make-up water at thermal in situ operations.	Fort McKay First Nation	The goal of the changes made in this edition of *Directive 081* is to reduce the amount of high-quality nonsaline water use, including (1) groundwater used from shallow aquifers, (2) groundwater used from deeper aquifers that has potential to interact with shallower groundwater and surface water bodies, and (3) groundwater identified as having potential for future nonindustrial use. Historically, the AER and previous regulators treated all nonsaline groundwater the same. This did not encourage operators to drill deeper wells into aquifers with lower potential for future nonindustrial use. The changes in this edition will encourage operators to seek deeper, lower-quality groundwater sources that are less likely to impact the aquatic environment or groundwater discharge features at surface. One way this will be done under the changes made in this edition of *Directive 081* is by imposing restrictive disposal limits of 3% when high-quality nonsaline water is used for make-up and increasing the disposal factor to 10% when alternative nonsaline groundwater is used for make-up. While the use of nonsaline groundwater could increase as a result of changes made in this directive, particularly due to the inclusion of alternative nonsaline groundwater under the alternative type 1 inlet water category, the AER determined that this will be offset by reductions of high-quality nonsaline water. We are also recognizing more alternative sources that were previously overlooked under the previous version of *Directive 081*, which will also encourage operators to reduce their high-quality nonsaline water use.
The Directive does not consider the ecological or traditional use role of these aquifers in its classification of Alternative Non-saline Groundwater.	Fort McKay First Nation	When we developed the definition of alternative nonsaline groundwater for *Directive 081*, we did consider the ecological and traditional use role of aquifers. In doing so, we excluded groundwater sources that have higher potential to interact with the surface and shallower zones. We

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		have amended section 2.1.1 to clarify this by explaining the rationale of the latter two diamonds in the decision tree as follows: > Regardless of its depth, groundwater sourced from Neogene- or Quaternary-aged aquifers will be categorized as high-quality nonsaline because it has higher potential to interact with shallower aquifers and surface water and also has higher potential for future nonindustrial use. Conversely, groundwater sourced from wells completed in bedrock aquifers where the base of the overlying aquitard (aquifer top) is deeper than 150 m will be categorized as alternative because it is less likely to interact with shallower aquifers or surface water and has less potential for future nonindustrial use due to the high cost of meeting regulatory requirements associated with drilling deeper in Alberta. We also note that application requirements under the *Environmental Protection and Enhancement Act* (*EPEA*)—including the environmental impact assessment— the *Oil Sands Conservation Act* (*OSCA*), *Draft Directive 023*, and the *Public Lands Act* include assessing the effects an in situ project may have on the environment, water users, and stakeholders in the area. In addition, authorization to use nonsaline groundwater from an aquifer, regardless of whether it is high quality or alternative, is required under the *Water Act*, separate from *Directive 081*. The property in and the right to the diversion and use of all water in the province is vested in the Crown (section 3(2) of the *Water Act*), and the diversion and use of water must be authorized under the *Water Act*. When operators apply for *Water Act* licences, the AER requires them to submit their applications in accordance with the *Guide to Groundwater Authorization* (*GGA*). The *GGA* includes requirements for assessing whether or not groundwater use will impact surface water. There are additional requirements that in situ operators have to assess that are included in the *Water Conservation and Allocation Guideline for Oilfield Injection* (*WCAGOI*) when they apply to use nonsaline water for making steam (i.e., environmental net effects evaluation, alternative water source assessment, etc.). This information is submitted to the

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		AER separately from *Directive 081*. When a decision under the *Water Act*, *EPEA*, or the *Public Lands Act* has the potential to adversely impact First Nations' treaty rights or traditional uses or Métis settlement members' harvesting or traditional use activities, *The Government of Alberta's Policy on Consultation with First Nations on Land and Natural Resource Management, 2013* or *The Government of Alberta's Policy on Consultation with Metis Settlements on Land and Natural Resource Management, 2015* is applied. The Aboriginal Consultation Office (ACO) oversees consultation on treaty rights and traditional uses and determines adequacy of consultation and may suggest mitigation measures based on the consultation process. The AER oversees applications under the energy resource enactments (e.g., *OSCA*) and, in respect of energy resource activities, the specified enactments (e.g., *Water Act*, *EPEA*, and the *Public Lands Act*). In reviewing applications, the AER considers any mitigation brought forward by the ACO and statements of concern (SOCs) that may be submitted by a person who believes that they may be directly and adversely affected by an application.
We are particularly concerned about aquifers that are hydraulically connected to shallow groundwater and that support Fort McKay's drinking water at the Ells River, wetlands, and traditionally used plants.	Fort McKay First Nation	The appropriate place to address concerns related to aquifers that are hydraulically connected to shallow groundwater and that support Fort McKay's drinking water at the Ells River, wetlands, and traditionally used plants, is through the above-noted consultation process overseen by the ACO when *Water Act* or *EPEA* applications are submitted, and through the SOC process when *Water Act*, *EPEA*, and *OSCA* applications are submitted. We share all *Water Act*, *EPEA*, and *OSCA* applications on our Public Notice of Application website at AER.ca, and if you believe that you may be directly or adversely affected by a proposed project, you can submit an SOC. In reviewing applications, the AER considers any mitigation brought forward by the ACO and SOCs that may be submitted by a person who believes that they may be directly and adversely affected by an application.

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We strongly recommend that AER remove the option for operators to classify and use certain nonsaline aquifers as Alternative Nonsaline Groundwater (Section 2.1.1, page 4 and 5) and to have the option for relaxation of the disposal factors.	Fort McKay First Nation	Historically, the AER and previous regulators treated all nonsaline groundwater the same. This did not encourage operators to drill deeper wells into aquifers that have lower potential to interact with shallower aquifers or surface water and have limited potential for future nonindustrial use. Providing the disposal factor of 10% for alternative nonsaline groundwater should encourage many in situ projects, particularly new projects, to source alternative nonsaline groundwater from within their project footprints and minimize interaction with the surface and shallower zones. Similarly, if suitable saline groundwater is available at a new project, operators will be encouraged to use it over alternative nonsaline groundwater because it has a much higher disposal factor.
If the Alternative Nonsaline Groundwater option is not removed, at minimum, the Directive (page 4) should be amended to: (1) - Stipulate the level of detail needed to adequately demonstrate that a proposed water source meets the definition of being classified as an Alternative Non-Saline Water Source; (2) - Require that the operator must include actual field data from well drilling, testing, monitoring etc. of sufficient rigor to prove lack of connectivity to surface; (3) - In the sentence "has limited potential for future agricultural or domestic use" add "ecological and traditional use" and add "operators are required to consult with indigenous communities about the existing and potential, agricultural, domestic, ecological and traditional use of the aquifer.	Fort McKay First Nation	We intend to keep the alternative nonsaline groundwater classification within the alternative type 1 inlet water category. Responses to the recommended amendments (1 to 3) are as follows: (1) The level of detail required for adequately demonstrating that a nonsaline water source should be classified as an alternative nonsaline groundwater source has been intentionally simplified for the purpose of limiting disposal. Detailed information such as cross-sections, downhole logs, water level measurements, chemical analyses, and pump tests are required pursuant to the *GGA* for newly drilled wells when operators apply for *Water Act* licences. Additional environmental net effects and alternative water source assessments are also required for water wells used for making steam pursuant to the *WCAGOI*. Existing wells that have been licensed under the *Water Act* are required to provide annual monitoring reports that include long-term records of water level measurements, chemical analyses, and volumes of water used. Monthly records are also required to be submitted electronically to the Water Use Reporting System. A summary and a professional interpretation of long-term monitoring results are submitted when an operator applies to renew a *Water Act* licence. (2) As is noted above, we require operators to submit field data in their *Water Act* applications pursuant to the guidance documents. Additional

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		field data is collected throughout the term of all *Water Act* licences. (3) We will modify the definition of alternative nonsaline groundwater to say "has limited potential for future nonindustrial use." We will add a definition of "nonindustrial use" that refers to nonindustrial uses authorized under the *Water Act* as follows: "nonindustrial water use includes water use for agricultural, domestic, municipal, and other purposes authorized under the *Water Act*." Consultation on treaty rights and traditional uses occurs through the ACO when *Water Act*, *EPEA*, and *Public Lands Act* applications are submitted. Concerns can also be raised through the AER's SOC process during the 30-day public notice of application period for *Water Act*, *EPEA*, *Public Lands Act*, and *OSCA* applications. In addition to the above-noted *Draft Directive 023 OSCA* applications, *OSCA* applications also include *Directive 081* amendment applications pursuant to section 3.2, which are submitted as category 2 amendments under *Directive 078*.
Amend the decision tree in Figure 1 (p.5) to include consultation with Indigenous communities regarding whether an aquifer should be classified as an alternative nonsaline groundwater or high-quality nonsaline aquifer.	Fort McKay First Nation	We have considered this request and have determined that it is not appropriate to amend the decision tree to include consultation requirements because this is outside of the scope of *Directive 081*. Also, the AER will not receive any applications when we implement the decision tree within the directive. The decision tree is to be used consistently and objectively to determine if a nonsaline groundwater source is high quality or alternative for the purpose of limiting disposal under *Directive 081*. Once the new edition of *Directive 081* is published, indigenous communities can refer to the Thermal In Situ Water Publication to see which water wells have been classified as alternative nonsaline groundwater and high-quality nonsaline groundwater for each in situ scheme. As is noted above, consultation with indigenous communities occurs separately from *Directive 081*, through the ACO when *Water Act*, *EPEA*, and *Public Lands Act* applications are submitted.

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AER seek input from Fort McKay for the Directive regarding criteria for defining "limited potential for ecological and traditional use".	Fort McKay First Nation	We cannot include criteria for defining "limited potential for ecological and traditional use" in *Directive 081*. However, as noted above, the definition of "nonindustrial use" has been modified to include water use for "agricultural, domestic, municipal, and other purposes authorized under the *Water Act*."
6. Produced Water – Recyclable and Excess		
Does 'water produced' refer to produced water from wells or produced water to injection facility?	CAPP& Suncor	It is water produced from wells linked to the scheme. In Petrinex, the "activity code" is "PROD," and the "product" is "WATER" (as per table 3 in appendix 2, and *Manual 011*). A definition for produced water has been added to appendix 1, and table 3 in appendix 2 was amended to clarify that produced water is water produced from wells.
In this section we are seeking clarification around the term calendar year? Will this be a rolling calculation?	Suncor	The term calendar year refers to January 1st to December 31st. A definition has been added to appendix 1.
7. Saline Water Balance Credit (Section 2.1.3)		
Disposal in the same aquifer as source qualifies for a saline water balance credit. However, D51 approval has typically only been for produced water in zones without any presence of alternative non saline groundwater.	Cenovus	The AER authorizes disposal schemes under *Directive 065* and *Directive 051*. The AER does not authorize disposal into zones above the base of groundwater protection (i.e., shallower than the depth where groundwater has TDS ≤4000 mg/L).

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8. Actual Disposal Formula (Section 3.1)		
'Annual volume of scheme water disposition delivered out of scheme' as part of the Actual Disposal formula in the current Directive 081 creates potential unintended consequences for some facilities. Water being disposed from some facilities is not disposal quality water (closer to boiler feed water quality), and is being used by another facility for their operation. Including 'Annual volume of scheme water disposition delivered out of scheme' in the Actual Disposal formula reduces the incentive for the operating facility to better utilize disposal water (i.e., treat the water and send to external facility) as this ends up penalizing the facility.	CAPP & Suncor	The annual volume of water dispositioned out of the scheme needs to be included. A lot of schemes send 100% of their disposal fluids to third-party waste plants, custom treaters, or other operators for disposal. Typically, projects that send disposal fluids offsite maximize recycling and are always below the disposal limit. With the introduction of alternative type 3 water, we are trying to make it easier for schemes with excess produced water to send it to external schemes. Alternative type 3 will also make it easier for receiving schemes to accept water from an external scheme.

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9. Disposal Limit Formula (Section 3.2)		
Reverse osmosis (RO) discharge (reject stream) cannot be recycled due to its high hardness and TDS (50,000-60,000 ppm). Assign RO discharge a disposal factor of 1.0.	CAPP & CNRL	The goal of *Directive 081* is that operators minimize the use of high-quality nonsaline make-up water by recycling produced water efficiently and using alternative water sources where possible. RO reject streams can be as high as 30 to 50% of the raw water diverted. Giving RO reject streams a disposal factor of 100% could increase high-quality nonsaline water use if RO systems are used for this kind of make-up. We have observed RO reject streams from high-quality nonsaline (potable) supplies for camps and plants being recycled at existing in situ facilities. Moving forward, any wastewater streams from potable water supply systems will fall under alternative type 1, and operators will be required to manage these volumes within their disposal limit. Using RO systems to pretreat cold saline groundwater, or any other alternative type 2 water, would not impact the goal of *Directive 081*. RO water treatment units also tend to have smaller footprints than other water treatment facilities. To encourage the use of RO for pretreating poor-quality alternative make-up water sources, we will increase the disposal factor for alternative type 2 water in section 3.2 from 35% to 55% so operators can manage higher RO reject streams within their disposal limit. Section 2.1 was adjusted to include "wastewater from processing facilities" in the definition of alternative type 1. Table 2 in section 3.2 was adjusted to increase the disposal factor for alternative type 2 water to 0.55.

Stakeholder Feedback – Issue	Stakeholder	AER Response
10. Exemptions (Section 3.3)		
The requirement for produced water recycling is economically prohibitive for the development of small thermal projects in Alberta.	CAPP, CNRL, Cenovus & Husky	By requiring produced water recycling through *Directive 081*, the AER does not want to restrict the development of small thermal projects. However, changing the exemption criteria from an annual make-up water volume to an average daily bitumen production volume of 2000 m^3/d could increase high-quality nonsaline make-up water use by two million cubic metres a year or more per small project exempted, depending on the steam-to-oil ratio. The goals of *Directive 081* are to "minimize the use of high-quality nonsaline make-up water by recycling produced water efficiently and using alternative water sources where possible" and to "optimize overall water use and energy efficiency." To better align with these goals and to give operators that use alternative water sources more flexibility on when they implement produced water recycling at their projects, regardless of their size, we will change the exemption criteria to limit high-quality nonsaline make-up water use and increase the total make-up water use. Section 3.3 was amended to read as follows: The disposal limit does not apply to thermal in situ oil sands schemes that, in the absence of produced water recycle, have an annual volume of high-quality nonsaline make-up water less than 500 000 m^3 and a total annual make-up water volume less than 2 000 000 m^3.
The Disposal Limit does not consider the potential impact of bitumen curtailment on variations to the inlet water type.	Cenovus	The AER does not base its directives on short-term circumstances such as curtailment. In the event of an unforeseen short-term circumstance that warrants a short-term variation to a disposal factor, section 3.2 of *Directive 081* allows companies to apply for an amendment. The amendment application occurs in accordance with *Directive 078* processes.