

# **AER Dam Safety Program 2020 Report**

**May 2021**

**Alberta Energy Regulator**

AER Dam Safety Program: 2020 Report

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## 1 Introduction

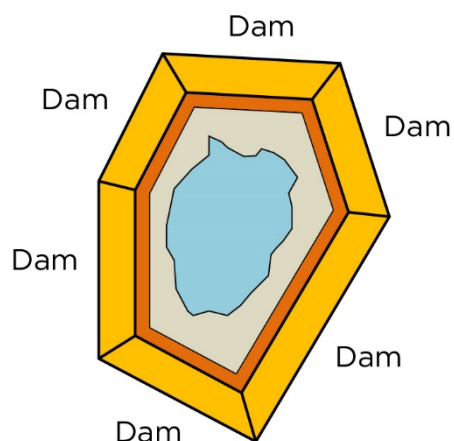
The AER is responsible for regulating energy resource development under specified enactments. Dams related to energy resource development are regulated under Part 6 of the *Water (Ministerial) Regulation* and the *Alberta Dam and Canal Safety Directive*. These regulatory documents set the requirements dam owners must fulfil to design, construct, operate, manage, decommission, or close, and abandon a dam.

The purpose of the AER dam safety program is to ensure energy dams are in compliance throughout their life cycle. This report summarizes the activities and outcomes of the program for the calendar year 2020. Our outcomes include the release of *Manual 019: Decommissioning, Closure, and Abandonment of Dams at Energy Projects*, and the successful implementation of recommendations from the 2015 audit by Auditor General of Alberta.

## 2 Background

A dam is defined in section 1(1)(h) of the regulation as “a barrier that is designed and is or is to be constructed for the purpose of retaining, storing or diverting water, including water containing another substance, fluid waste or flowable tailings...and includes all other works associated with such a barrier.” Section 27(1) of the regulation defines the criteria for which dams are subject to the dam safety requirements in the regulation.

In the context of the AER’s dam safety program, a pond is a storage facility contained by one or more regulated dams, as per section 27(1) of the regulation, and as illustrated in figure 1.



**Figure 1. Storage facility (referred to as a pond) and its dams**

Dam safety regulatory requirements are based on the consequence of failure classification of the dams, which is determined by a qualified professional. This consequence classification must be accepted by the AER.

The directive specifies five consequence classes and three categories for incremental consequence, namely (i) loss of life; (ii) environmental and cultural values; (iii) infrastructure, economics, and other property. Dams could be classified as low, significant, high, very high, and extreme consequence based on the most severe potential consequence among these three categories.

### 3 Ponds and Dams in Alberta

As of December 2020, we regulate 224 dams that form 158 active ponds (table 1 and figure 3 at the end of the report). Lower consequence dams are associated with coal mines and oil and gas development and are mostly located in western Alberta. The majority of the very-high- and extreme-consequence dams are associated with oil sands development and are in the Fort McMurray area. Additional information for each pond is available on the AER's interactive [Dam and Pond Map Viewer](#).

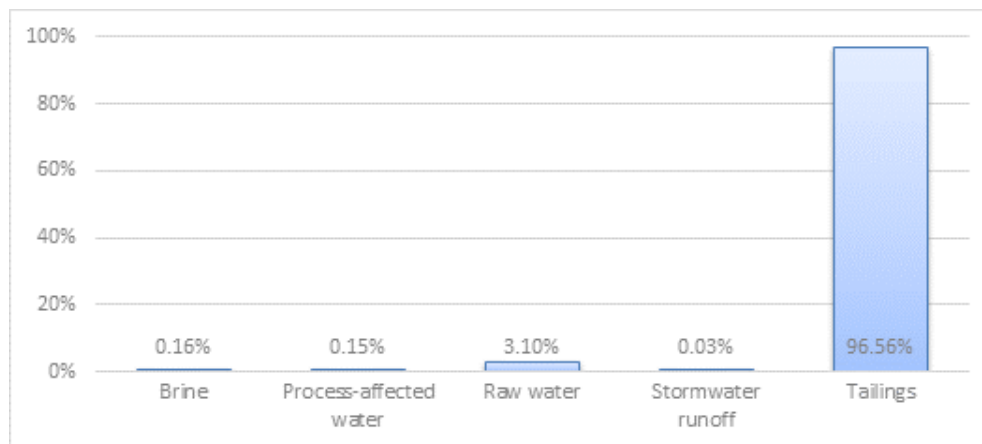
A breakdown of Alberta ponds and dams by consequence classification and energy sector are provided in tables 1 and 2. Figure 2 shows types of fluids impounded by these dams. In 2020, no dams were moved from operating to inactive status.

**Table 1. Number of ponds and dams by consequence classification**

Consequence classification	Ponds	Dams
Extreme	24	68
Very high	9	18
High	31	37
Significant	50	53
Low	44	48
Total	158	224

**Table 2. Number of ponds and dams by energy sector**

Energy sector	Ponds	Dams
Oil sands, mining	72	135
Oil sands, in situ	6	6
Oil and gas	42	44
Coal	38	39



**Figure 2. Per cent distribution of volumes impounded by dams regulated by the AER**

## 4 Compliance Activities

The dam safety program compliance activities include field inspections, review of compliance submissions, identification and tracking of deficiencies and nonconformances in an internal registry, and reporting. These activities are conducted, and overseen, by dam safety engineers and inspectors at the AER.

### 4.1 Field Inspections

Each year, a surveillance plan is developed to prioritize inspections. The surveillance plan includes scheduled inspections (table 3) and other inspections identified as priorities by the dam safety team. The plan reflects the Alberta Environment and Parks Ministerial Order 10/2019, which sets a minimum annual inspection frequency for ponds containing tailings. Inspection priorities may change throughout the year based on incident notifications or review of compliance submissions.

**Table 3. Inspection frequency for all dams by consequence classification and fluid type**

Consequence classification	Inspection frequency	
	Tailings ponds	All other ponds
Extreme and very high	Every year	Every year
High	Every year	Every 3 years
Significant and low	Every year	Every 5 years

In 2020, the AER completed 82 field inspections, which included all extreme- and high-consequence ponds and all ponds containing tailings. The results of all field inspections were communicated to dam owners and, if required, discussions were initiated for follow-up actions or response.

The number of planned and completed inspections by energy sector is provided in table 4. The COVID-19 pandemic created challenges for the inspection of two low-consequence water ponds in the oil

sands sector, and as a result these were postponed to 2021. In the oil and gas sector, four additional dams were inspected after they were identified as regulated dams.

**Table 4. Planned and completed pond and dam inspections by energy sector for 2020**

Energy sector	Planned	Completed
Oil sands, mining	52	50
Oil sands, in situ	1	1
Oil and gas	9	13
Coal	18	18

#### 4.2 Compliance Submissions

In 2020, we received 170 dam safety compliance submissions (table 5). AER dam safety engineers review these compliance reports to identify dam safety deficiencies and critical safety deficiencies.

**Table 5. 2020 dam safety compliance submissions, by energy sector**

Submission	Oil sands, mining	Oil sands, in situ	Oil and gas	Coal	Total
Dam safety management plan	11	1	12	2	26
Operations, maintenance, and surveillance manual	0	0	4	2	6
Emergency management plan	3	0	4	2	9
Annual performance review report	59	3	14	7	83
Dam safety review report	6	0	1	1	8
Regulatory notifications	26	3	3	6	38

#### 4.3 Safety Deficiencies

A safety deficiency is a hazardous condition that has the potential to contribute to or develop into a critical safety deficiency over time. A critical safety deficiency has the potential to lead to an imminent failure. Safety deficiencies and critical safety deficiencies are identified during our review of a compliance submission or an AER inspection and are tracked in an internal registry and monitored by staff until addressed by the dam owner. Safety deficiencies may result in a notice of noncompliance (see *Manual 013: Compliance and Enforcement Program*), depending on their nature and how they are addressed by the owner.

Safety deficiencies were identified during our inspections and reviews of compliance submissions. The risks associated with the hazardous conditions that resulted in safety deficiencies were assessed by both the operator and the AER and managed by the operator per an accepted plan.

A summary of the hazardous conditions and the actions taken are listed in table 6. No critical safety deficiencies were identified in 2020.



**Table 6. Summary of identified hazardous conditions from 2020**

<b>Hazardous condition</b>	<b>Description</b>
Sand boils	Sand boils were observed in a water collection ditch. A monitoring program was established and the pore-water pressure conditions in the area have been managed appropriately.
Freeboard encroachment	Pond exceeded normal operating levels for a short period of time. Pond levels remained within design considerations and operational parameters.
Short beach	Beach development did not achieve the total length required in a limited area. Actions were taken to correct the shortened beach.
Erosion	Multiple erosion features (some significant in size) were identified at dams. Erosion is common and these features are managed as part of the regular operations and maintenance.
Sloughing	Sloughing occurred at the downstream of a dam toe where seepage was identified and surface water runoff was poorly managed. The sloughed area was repaired, the area was regraded, and additional erosion protections were installed.
Blocked outlet channel	We found an outlet channel that was partially blocked. This was managed as part of the operator's regular operation and maintenance schedule.
Crest settlement	A crest of a dam experienced significant crest settlement and is being monitored or remediated.
Excessive vegetation	We found excessive vegetation on multiple dams impeding visual inspections. The vegetation is being managed as part of the regular operations and maintenance.

## 5 Assessment by the Auditor General of Alberta

In 2020, the Auditor General of Alberta completed an [assessment](#) of the AER's implementation of the recommendations from the auditor's [2015 audit](#) of systems to regulate dam safety. The implementation was completed over five years, during which time the AER dam safety program was created.

The assessment confirmed that the recommendations, listed below, were successfully implemented:

- Develop a plan to regulate dams and report on the results of its regulatory activities.
- Improve dam safety regulatory activities by
  - maintaining a reliable registry of dams,
  - obtaining sufficient information to assess the risk and consequence of dam failure,
  - retaining evidence of regulatory activities performed, and
  - following up to ensure that owners correct deficiencies or manage them until they are corrected.

The 2020 assessment also found that, since 2015, the AER has

- developed strategic and operational plans to guide the dam safety program,
- reported to executive management with key information needed for oversight,
- improved public reporting on the program's activities and results, including maps of dams and tailings ponds in Alberta, and
- implemented processes to ensure the registry of dams is complete.

## 6 Communication and Engagement

Our program includes strategies for communicating and engaging with stakeholders, including the public, dam owners, and the Government of Alberta. We host awareness and information sessions on dam safety regulation, develop manuals and guidelines, provide information through our webpage, and report on our program activities. We also participate in associations and committees that focus on dam safety.

### 6.1 Release of *Manual 019*

In January 2020, we released [\*Manual 019: Decommissioning, Closure, and Abandonment of Dams at Energy Projects\*](#). The manual guides dam owners through the regulatory process and outlines how we assess and process applications. The manual focuses exclusively on the decommissioning, closure, abandonment section of the directive and is intended to provide supplemental guidance.

### 6.2 Engagement with Dam Owners

Routine communications with industry regarding the regulation of dams is ongoing. In addition, in April 2020 the AER hosted a virtual industry information session for oil and gas industry dam owners. The session focused on the *Alberta Dam and Canal Safety Directive* and ongoing developments of the dam decommissioning, closure, and abandonment framework.

### 6.3 Engagement with Dam Safety Organizations

Our dam safety team is involved with committees and working groups under the [Canadian Dam Association](#) (CDA). The CDA publishes technical guidelines on best practices for dam safety. The team also participates in meetings hosted by the Dam Integrity Advisory Committee (DIAC) of the [Alberta Chamber of Resources](#). DIAC is focused on best practices for dams (hydroelectric, tailings, and smaller water dams) in Alberta.

### 6.4 Dam Safety Webpage

The AER dam safety [webpage](#) provides relevant and timely data and information for stakeholders. Information on dams, the regulation of dams, and AER activities are available. In addition, the AER maintains an interactive [Dam and Pond Map Viewer](#), which provides information about ponds, including dam heights, fluid storage volumes, fluid types, and authorization documents.

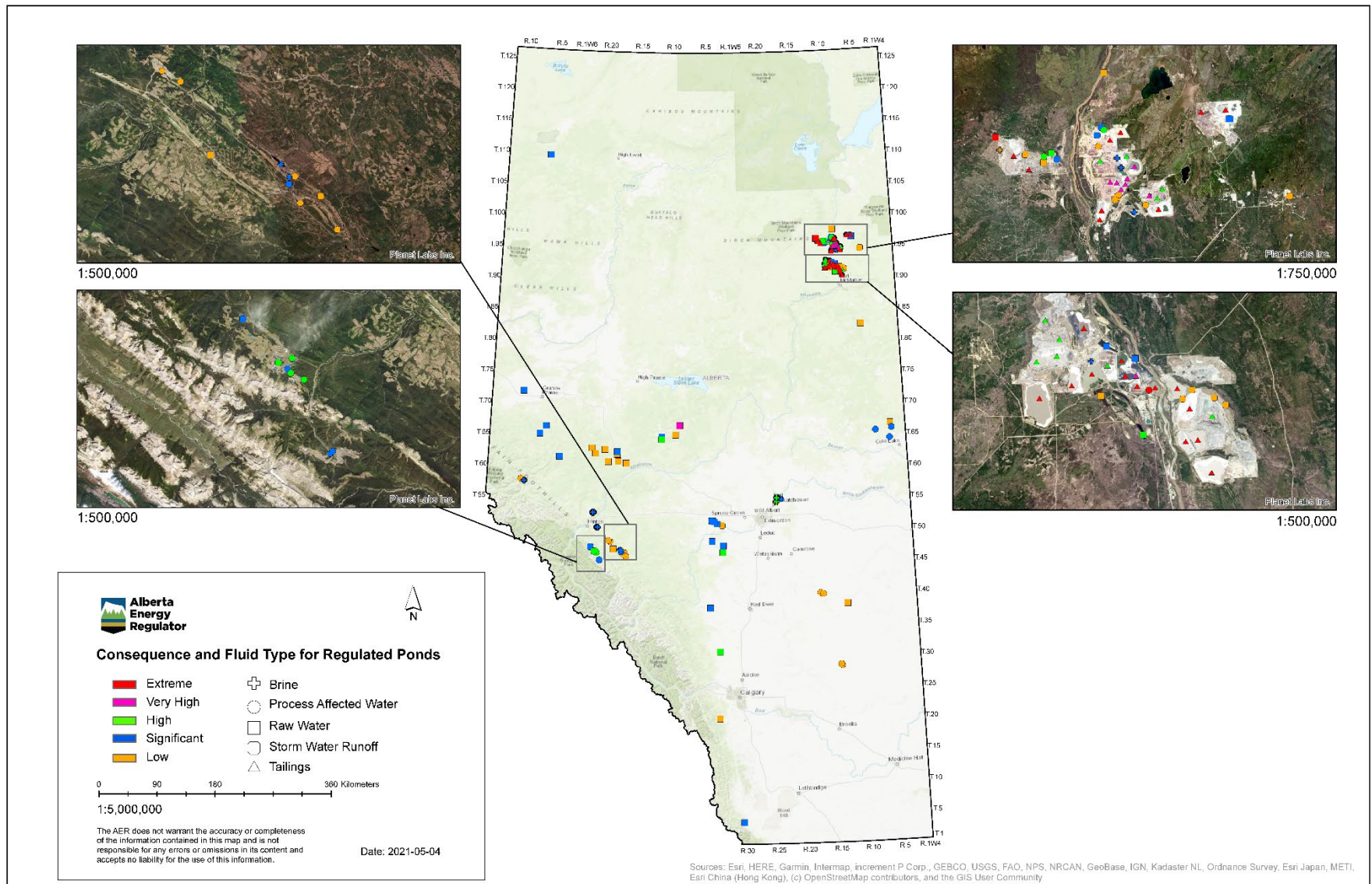


Figure 3. Map showing the location of ponds and dams in Alberta by consequence classification