

Tailings Safety and Security at Teck

Overview

Tailings are a common by-product of the mining process. They are typically created as mined ore is crushed, ground and processed to separate the valuable minerals and create a saleable concentrate product. The waste from this process is called tailings. Due to the nature of the ore separation processes, tailings are commonly in the form of a slurry of fine mineral particles and water. Management of tailings involves storage in a specially-designed impoundment called a tailings facility.

Tailings facilities are historically well-managed with very few incidents; however, there have been incidents and from these we know that a tailings incident has the potential to have a significant impact on communities, local economies and the surrounding environment. As such, we take extensive measures during planning, design, construction, operation and decommissioning of our tailings facilities to confirm that:

- Structures are stable
- Solids and water are managed within designated/approved areas
- Facilities comply with regulatory requirements
- Facilities conform to applicable standards, internal policies, industry best practices and the technical guidelines of the jurisdictions in which we operate

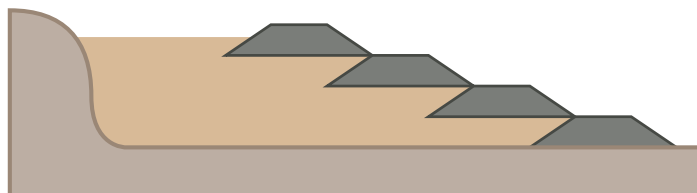
Tailings Facility Construction

Tailings facilities can follow a number of designs, based on factors including the composition of the tailings being stored, geotechnical considerations, precipitation, seismic activity, community preference, and environmental protection. Across Teck's operations are examples of numerous types of tailings facilities, including facilities for storing dewatered "dry stack" tailings at our steelmaking coal operations and in-pit storage utilizing existing mined-out pits. The most common form of tailings impoundment at Teck and across the mining industry is created by constructing a dam (or dams) in conjunction with natural topography to create a tailings storage facility.

There are several primary methods of constructing tailings dams. The specific construction method, or combination of methods, for each of our tailings facility is chosen based on the factors above, with the first priority being the safety and security of communities, employees and the environment. Within these methods are three basic geometries defined by how the crest of the dam moves relative to the original "starter dam" at the outset of the tailings facility's development.

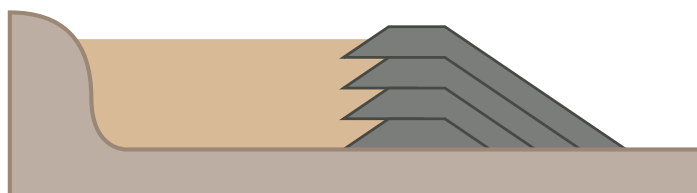
Upstream

Upstream construction begins with a starter dam constructed at the toe of the facility. The tailings are then discharged into the facility where they form a tailings beach. This tailings beach, which can be compacted/controlled, is then used to form the foundation for subsequent levels of the wall as the dam is raised. As such, the crest of the dam moves upstream with each raise.



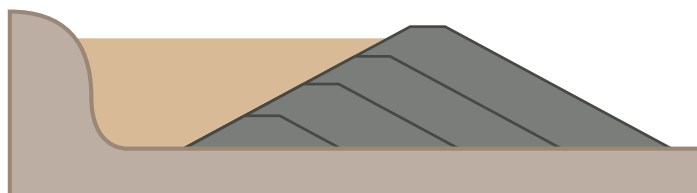
Centreline

In Centreline construction, the dam is raised vertically from the starter dam. The dam crest therefore remains fixed relative to upstream and downstream directions as the dam is sequentially raised. Unlike the upstream geometry, the dam wall does not use beached tailings for foundation support.



Downstream

Downstream designs start with a starter dam similar to the other two construction methods. Tailings are then discharged into the dam and as the embankment is raised, each new wall is constructed and supported on top of the downstream slope of the previous section, so the dam crest moves downstream with each raise. Like the Centerline construction, the dam wall does not rely upon beached tailings for wall support.



Single Stage

A single stage dam is built to full height in one stage with no further raises. This design is most commonly used for smaller tailings facilities.

Teck's Tailings Facilities

Teck actively manages 55 tailings facilities across our active and legacy mine sites. Of these Teck managed facilities, 16 are active and 39 are closed and no longer receiving material. We have one active upstream tailings facility and eight closed upstream facilities. 16 are unsaturated/dry stack facilities at our steelmaking coal operations, and 20 are closed facilities at legacy mine sites in various stages of reclamation.

We also have non-operated joint venture interests with tailings dams at Antamina in Peru and Fort Hills in Alberta.

Many sites include multiple tailings facilities, which are often a mix of active and inactive facilities. A full list of the tailings facilities Teck manages, including information on construction type and location, can be found in the table below.

Safe and Secure Management of Tailings Facilities

Teck operates and maintains our tailings facilities to meet global best practices for safety including industry leading protocols established by the Mining Association of Canada and best practice technical guidance from the Canadian Dam Association and the International Commission on Large Dams.

Six Levels of Protection

We have comprehensive systems and procedures in place, organized around six levels of protection:



1. Surveillance Technology

Sites employ surveillance systems such as GPS hubs, piezometers, inclinometers, pressure gauges, remote sensing and other technologies to monitor tailings dams, abutments, natural slopes and water levels.



2. Staff Inspections

Tailings dams are inspected by trained operators and expert technical staff as frequently as several times daily, with formal staff inspections at our operations at least once per month



3. Annual Dam Safety Inspections

Formal dam safety inspections are conducted annually by an external Engineer of Record. Recent annual Dam Safety Inspections for our facilities are publicly available at www.teck.com/tailings.



4. Detailed Third-Party Reviews

Comprehensive third-party dam safety reviews are conducted by a qualified independent tailings reviewer as frequently as every three years, based upon the consequence classification for each facility.



5. Internal Governance Reviews

Teck's Tailings Working Group conducts internal management reviews of our tailings facilities as well as our major tailings projects on a regular basis.



6. Independent Tailings Review Boards

Our operations, higher consequence legacy facilities and major development projects have Tailings Review Boards made up of independent experts who meet regularly, at least annually, to conduct a third-party review of design, operation, surveillance and maintenance.



Highland tailings facility at Highland Valley Copper Operations

Emergency Preparedness

All Teck facilities have a detailed Operations, Maintenance and Surveillance manual and Emergency Preparedness and Response Plan, which are both regularly reviewed and updated. We also review Emergency Response plans with our local communities and stakeholders and undertake community meetings and emergency drills to work through these plans and discuss our approach to tailings management.

For all high-consequence facilities, a formal inundation study is conducted to identify any potentially impacted communities and waterbodies in the extremely unlikely event of a tailings incident, in order to evaluate design/mitigation strategies and to assist with emergency planning and response.

Teck follows the Canadian Dam Association Consequence Classification system that assigns a consequence ranking from Low to Extreme based upon the potential environmental, safety and economic effects of a failure. This ranking does not reflect likelihood of failure, but rather provides a tool to assist with facility design and emergency planning.

Transparency on Tailings

Teck is committed to being open and transparent with communities and other stakeholders regarding the construction and management of our tailings facilities. One of the most important pieces of information for each tailings facility is the annual Dam Safety Inspection (DSI). A DSI is conducted annually for each tailings facility by the third-party Engineer of Record. The DSI is a detailed examination of the facility and related infrastructure with the purpose of identifying any conditions or changes that might impact the safety and reliability of the structure and to make recommendations where any issues warranting attention are noted. Teck tracks the recommendations and works with the Engineer of Record to address each item in a timely manner.

In most jurisdictions, DSIs are provided to the government on an annual basis but have not often been made publicly available. Following the Mount Polley tailings dam failure in 2014, the Government of British Columbia, Canada, made DSIs for mines in B.C. publicly available. We support this transparency and have built on this disclosure by making the DSIs for our tailings facilities in all jurisdictions publicly available at www.teck.com/tailings.

Focused on Continual Improvement

While we are confident in the safety and security of our tailings facilities, we are committed to continually reviewing our facilities and procedures to maintain the highest standard of safety at our operations. As such, following the tailings failure at Vale's Feijão Mine in Brazil, we initiated a special review of our tailings facilities and procedures. This review will include external experts who will be independent to any aspect of the design or operation of any of our facilities.

We also work in partnership with numerous local, national and international organizations to support improvements in tailings and mine waste management across our industry, including:

- **International Council on Mining and Metals (ICMM):** A global industry association that represents leading international mining and metals companies.
- **Mining Association of Canada (MAC):** A national association that promotes the development of Canada's mining and mineral processing industry. Through MAC, we implement the Towards Sustainable Mining (TSM) program, which aids in improving industry performance.
- **Canada's Oil Sands Innovation Alliance (COSIA):** An alliance of oil sands producers focused on accelerating improvement in environmental performance in Canada's oil sands through collaborative action and innovation.
- **Association of Professional Engineers and Geoscientists of British Columbia:** As a member company, Teck was a reviewer for the guideline for the requirements of foundation investigations for dams that was issued in 2016.
- **Australian Research Council:** In 2017, Teck became part of an initial three-year applied research program, along with four universities in Australia and several other mining companies, focused on finding more effective tools for predicting and avoiding tailings facility failures.
- **Canadian Dam Association:** As a member of the Association, Teck's senior technical leaders have provided input to industry guidance on best practices.

Teck Tailings Facility Inventory

The below table provides additional detail on each tailings facility with dam(s) managed by Teck at both our active operations and legacy sites. Not included below are 16 unsaturated/dry-stack tailings facilities and two in-pit tailings facilities located at our steelmaking coal operations.

Mine Operation	Tailings Facility	Construction Method	Consequence Classification	Status	Number of Tailings Dams Structures	Most Recent Dam Safety Inspection	Independent Review Board
Active operations							
Carmen de Andacollo Chile	Embalse de Relaves Carmen de Andacollo	Downstream	Very High	Active	5	2018	Yes
Duck Pond Canada	Duck Pond Tailings Management Facility	Single Stage	Low	Closed	2	2018	No
Elkview Canada	Lagoon A	Single Stage	Low	Closed	1	2018	Yes
	Lagoon B	Single Stage	Low	Closed	1	2018	Yes
	Lagoon C	Upstream/Downstream	High	Closed	1	2018	Yes
	Lagoon D	Upstream	Very High	Active	1	2018	Yes
	West Fork Tailings Facility	Single Stage	Low	Active	1	2018	Yes
Fording River Canada	North Tailings Pond	Downstream	Very High	Closed	1	2018	Yes
	South Tailings Pond	Downstream	Very High	Active	2	2018	Yes
	Turnbull Pit South Tailings Storage Facility	N/A	High	Active	1	2018	Yes
	2 Pit - 3 Pit Tailings Disposal Area	Centreline	Low	Closed	2	2018	Yes
Greenhills Canada	Tailings Storage Facility	Downstream	High	Active	2	2018	Yes
Highland Valley Copper Canada	Highmont	Centreline	High	Closed	3	2018	Yes
	Bethlehem	Upstream/ Centreline & Centreline/ Downstream	Very High	Closed	2	2018	Yes
	Trojan	Centreline / Upstream	Very High	Closed	1	2018	Yes
	Highland	Centreline	Extreme	Active	2	2018	Yes
Pend Oreille United States	Tailings Pond 1	Upstream	High	Closed (reclaimed landform)	1	Not Required	No
	Tailings Pond 2	Upstream	High	Closed (reclaimed landform)	1	Not Required	No
	Tailings Pond 3	Downstream	High	Active	1	2018	No
Red Dog United States	Tailings Storage Facility	Downstream/ Centreline	High	Active	2	2018	Yes

Legacy properties

Beaverdell Canada	North Tailings Storage Facility	Downstream	Significant	Closed	1	2018	Yes
	South Tailings Storage Facility	Downstream	Significant	Closed	1	2018	Yes
Bullmoose Canada	Bullmoose Tailings Storage Facility	Downstream	High	Closed	1	2018	Yes
Fisherman Road Canada	Tailings Impoundment Area	Single Stage	Significant	Closed	1	2018	No
Louvicourt Canada	Tailings Storage Facility	Single Stage	Very High	Closed	4	2018	Yes
Magmont United States	Magmont Tailings Dam	Downstream	High	Closed	1	2018	No
Pinchi Lake Canada	Tailings Storage Facility	Downstream	Significant	Closed	1	2018	Yes
Pine Point Canada	Tailings Impoundment Area	Downstream	Low/Significant	Closed	4	2018	No
Quintette Canada	Plantsite TSF	Downstream	High	Closed	1	2018	No
	Shikano TSF	Single Stage	Significant	Closed	1		
Sa Dena Hes Canada	North Tailings Pond	Downstream	Significant	Closed	1	2018	No
Sullivan Canada	Iron pond	Upstream	High	Closed	1	2018	Yes
	Old Iron Pond	Upstream	Low	Closed	2	2018	Yes
	No 1,2,3 Siliceous Pond	Upstream	Low	Closed	3	2018	Yes
	East and West Gypsum Ponds	Upstream / Single Stage	High/Low	Closed	4	2018	Yes
	Calcine Pond	Upstream	Low	Closed	1	2018	Yes
Warm Springs - Douglas Mine United States	Douglas Mine	Single Stage	Low	Closed		2018	No

For more information:

www.teck.com/tailings

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