Tailings Fact Sheet

BACKGROUND

Tailings are created as mined ore is processed into particles of fine sand through crushing, grinding and milling. Mined ore rock is moved to the milling circuit where the rock is reduced into sand and silt sized particles and then mixed with water and moved as slurry through the gold, silver and copper recovery process. The valuable minerals are separated from the rest of the milled rock particles either through physical or chemical recovery processes. After removal of the valuable minerals, the remaining milled rock slurry, now referred to as tailings, is pumped or flows by gravity to an engineered impoundment area.

Tailings storage facility – Gold Quarry, Nevada

These engineered impoundments are carefully designed, constructed and operated to safely contain the tailings and water even during extreme climatic or seismic events. Depending on the chemical characteristics of the tailings and the surrounding environment, the engineered tailings impoundment will generally be lined with a composite liner system consisting of a low permeability soil liner overlain by a geosynthetic liner such as high density polyurethane (HDPE) to prevent impacts to surface and groundwater systems. As the tailings slurry is deposited in the impoundment, the water separates from the heavier sand and silt particles and collects to form a decant/reclaim pond on the surface of the impoundment.

The tailings pond water is then recycled back into the milling process for reuse. The tailings are contained within the impoundment facility and once it reaches capacity, the impoundment is reclaimed with a designed cover system used to minimize erosion and infiltration, while maintaining containment of the materials, protecting the environment and achieving post-mining designated land use.

CONSTRUCTION METHODS

Impoundments are designed and constructed to store both tailings and water. There are several types of impoundments: (1) water retention type dams and (2) raised impoundments. The main difference is that water retention dams are normally constructed at their full height before there is any storage upstream and a raised impoundment is built higher to store additional material over time.

Raised impoundments are the most common construction technique for tailings storage facilities (TSFs). The three principal design methods are downstream, upstream and centerline, which designate the direction in which the embankment crest moves in relation to the starter dam (dyke) and the base of the embankment. Modified centerline is a combination of upstream and centerline. (Source: http://www.tailings.info/disposal/conventional.htm)

Upstream

Construction of an upstream embankment begins with development of a starter dyke. The tailings are then discharged from the dam crest and form the foundation for future raises. Figure 1 shows an overview of the stages of construction.

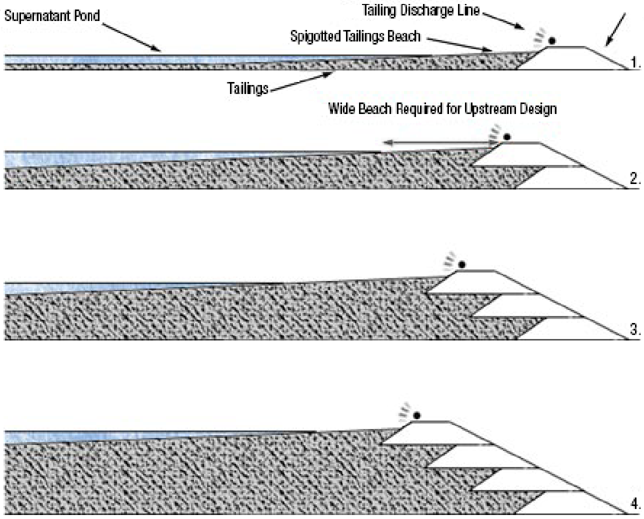

Figure 1:
Upstream construction method
(http://www.tailings.info/disposal/conventional.htm)

Downstream

Downstream methods start with an impervious starter dyke normally with an internal drainage system as shown on Figure 2. The tailings are first deposited behind the dyke and the embankment is raised overtime.

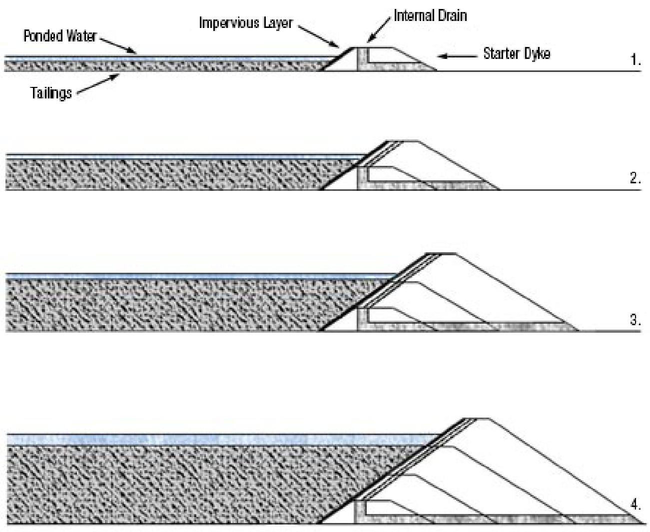

Figure 2:
Downstream construction method
(http://www.tailings.info/disposal/conventional.htm)

Centerline

The centerline method combines both upstream and downstream designs. Unlike the upstream method, where tailings are normally deposited from the crest when raises are required, material is placed on both the tailings and the existing impoundment. The embankment is raised vertically and does not move in relation to the upstream and downstream directions of raises as shown on Figure 3.

This design method often also incorporates internal drainage. Modified centerline is a combination of upstream and centerline methods and is done to reduce the volume of construction material that is required to be placed downstream from the embankment.

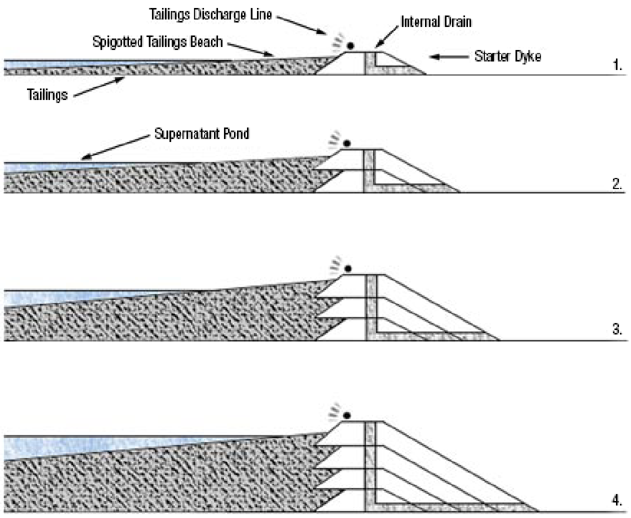

Figure 3:
Centerline construction method
(http://www.tailings.info/disposal/conventional.htm)

DEPOSITION

Tailings can be discharged using subaqueous (below water) or subaerial techniques. Subaerial deposition is more common than subaqueous as it forms a sloping beach toward the reclaim/decant pond. Subaerial can be done from single or multiple discharge points and can be rotated around the facility. Subaqueous deposition is normally completed when there is a potential for oxidation that could result in mobilized acid mine drainage. Subaqueous deposition can be completed in conventional impoundments, as well as offshore.

Tailings can be dewatered or modified in other ways prior to deposition. The current methods include:

- Thickened tailings (which involves a process of dewatering to form a low solids content slurry);
- Paste (which includes dewatering until the tailings do not segregate as they are deposited and have minimal excess water);
- Dry stack (includes dewatering to a filtered wet and dry cake that cannot be transported via a pipeline); and
- Co-disposal which includes mixing mine waste with tailings (other terminology includes co-mingling, co-placement or co-deposition whereby each has slightly different methods of mixing material).

NEWMONT'S TAILINGS STORAGE FACILITIES

Newmont's engineering, construction and operating standards and technical guidance explicitly cover tailings management and establish requirements to ensure safe and stable facilities throughout their operating and post-mine closure life. The design, construction and operation of all tailings impoundment facilities are scrutinized through our Investment System process, supported by inspections and audits, critical controls and strict application of annual inspections by independent qualified geotechnical engineers. Newmont's Environmental Standard for Closure and Reclamation Management covers the long-term management of tailings impoundment facilities to ensure safe and stable conditions.

Newmont has both operational and closed tailings impoundments in a variety of climatic and topographic settings. Newmont conducts extensive siting, engineering, environmental and social studies to support the specific selection and design of each facility. Annually, Newmont safely manages and disposes more than 100 million tonnes of tailings that are placed within engineered, surface containment facilities; used to backfill former mining pits; or placed as structural backfill paste in underground mines.

Appendix 1 includes an inventory of existing tailings storage facilities at operating sites outlining the construction method, maximum height and volume of material.

NEWMONT STANDARDS AND GUIDELINES

Newmont's Environmental Standard for Tailings and Heap Leach Facility Management sets the minimum requirements for the design and management of tailings storage facilities (TSFs) to protect human health, wildlife, flora, groundwater and/or surface water, prevent uncontrolled release to the environment, manage process fluids, and identifies requirements for closure and reclamation.

The standard works in conjunction with other standards and incorporates the International Council on Mining and Metals' position statement on 'Preventing Catastrophic Failure of Tailings Storage Facilities.' All Newmont sites identify, assess and comply with laws, regulations, permits, licenses, external standards and other relevant or appropriate requirements.

Planning and Design

- Sites complete a baseline of conditions prior to design of the TSF, including evaluation of land use, hydrology/hydrogeology, geochemistry, biodiversity, cultural resources geology, seismicity, soil and visual aesthetics.
- Management plans must be developed to restrict potential releases to the environment.
- Management plans are expected to include: design and operating criteria, schedules for inspections, monitoring and maintenance, applicable regulatory, legal or other requirements, management methods, risks assessments, overview of instrumentation including KPIs/critical controls, organization structure (roles and responsibilities), training requirements, emergency response plans (inundation mapping and analysis) and concurrent reclamation.
- Fluid management plans that describe management of solution levels based on the site-wide water balance. The plan will also identify trigger alert levels and contingency plans during operations, closure and reclamation phases.
- Characterization and specifications for geochemical and physical properties of the construction and tailings materials.
- Engineering requirements for seepage control, liners, and leak collection recovery systems. With excess solutions that may require discharge complying with applicable quality and quantity discharge limits based on downstream beneficial use.
- Engineering requirements for geotechnical stability including systems for storm containment and runoff that reduce erosion potential and impact to the containment.
- Requirements for piezometers to monitor solution pressure in the embankments and tailings. Groundwater monitoring wells to establish baseline and monitor potential seepage.
- Risk-based assessments determine whether the design criteria ensure adequate levels of protection.
- Quality control and quality assurance protocols are required to document the construction complies with engineering design.

Implementation and Management

- All facilities will have critical controls to mitigate significant risks with risk assessments conducted annually or at major milestones.
- TSF and fluid management plans must be reviewed and updated annually.
- Site-wide water balances are updated over the life of the operations to reflect changes in mine plans, processing and operations.
- The tailings facilities must be operated within design specifications including piezometer head in embankments and tailings and the management of the pond with design and operational criteria.
- A closure and reclamation plan shall incorporate the requirements of the fluid management plan and support stormwater and erosion management while achieving post-mining land use.
- The TSF is managed to be protective of the environment and adheres to the requirements of the International Cyanide Management Code, and permit/license/regulatory requirements as any other legal obligations or voluntary commitments.

Performance Monitoring

- Tailings impoundments shall be inspected for erosional and geotechnical stability, material characterization (geochemistry and ARD potential), trigger limits and critical controls.

- Annual geotechnical reviews are required by a qualified independent senior geotechnical engineer. Independent tailings review boards (ITRB) have been identified based on technical, social and political risks identified by Newmont leadership and are conducted as a portion of the TSFs on an annual basis.

- Routine inspections to verify integrity and to support maintenance and repair programs as defined in the monitoring plans. This includes all instrumentation including piezometers, inclinometers, etc., as defined in the monitoring plans. Inspection and maintenance activities are also completing following events (rainfall, seismic etc.).

TECHNICAL GUIDELINES AND STANDARD OPERATING PROCEDURES (SOPS)

Newmont's Technical Services team has developed Tailings Facility Geotechnical Guidelines that define minimum requirements for tailings impoundments:

- Definitions for tailings embankments
- Responsibilities of engineering and management staff
- Geotechnical input design criteria guidelines for:
  - Foundation settlement and consolidation
  - Seismic loading
  - Liquefaction
  - Hydraulic properties of the foundation, soil liners and drainage layers
  - Water management systems
  - Tailings rheology and characteristics
- Geotechnical process design for:
  - Geotechnical field investigations
  - Laboratory testing
  - Engineering design
- Geotechnical design requirements for each level of Project Design
- Risk analysis
- Quality assurance/quality control

Newmont's Technical Services team has also developed Seismic Design Criteria Guidelines that define minimum requirements for design, construction and operation of tailings impoundments to ensure safe and stable operations for region-specific seismic events. Each operation develops and implements site-specific Standard Operating Procedures (SOPs) and manuals based the tailings impoundment design. Site-specific SOPs consist of per shift activities including inspections of pipelines, open liner, embankments, pond levels and leak detection systems.

EMERGENCY RESPONSE PLANNING AND COMMUNICATIONS

All Newmont operations have Emergency Response Plans that define chain of command and communications and actions to take during emergencies. Additionally, Newmont operations have developed site-specific dam break inundation analysis plans to support emergency planning including communications and evacuation notification.

In most jurisdictions, Newmont operations also do joint drills and exercises with local emergency response teams to prepare for emergencies. It should be noted that Newmont has contingency plans in place at every operation that describe trigger levels and detailed actions required to prevent overtopping of tailings impoundments. This includes reporting that is completed on a monthly basis associated with critical controls.

AUDITS, INSPECTIONS AND REPORTING

Newmont has a number of programs through the Sustainability & External Relations and Technical Services teams for auditing, inspecting and reporting on the stability of our tailings facilities. The Technical Services team routinely conducts geotechnical reviews with the internal engineering team and reviews annual inspection reports prepared by independent qualified geotechnical engineers and Independent Technical Review Boards. Reporting on tailings management systems at the corporate level can be found at: https://sustainabilityreport.newmont.com/2017/environmental-stewardship/tailings-waste-and-emissions

To improve understanding of the potential risks associated with tailings storage facility management, potential catastrophic failure was added as an enterprise risk in 2017 at the corporate, regional and site levels. Critical controls are reviewed and reported on a monthly basis at each operation as part of Newmont's Enterprise Risk Management program.

TAILINGS DAM INVENTORY (OPERATING FACILITIES)

The tables below include an inventory of the location and size of Newmont's tailings storage facilities.

Mine Site and Location	Facility	Construction Method*	Area/Storage Capacity/Max Height	Most Recent Inspection	Facility Life	Status	Nearest Town or Body of Water
Boddington *WA, Australia*	Residue Disposal Area	Upstream/ Modified Centerline	· Area – 1,200 hectares · Volume – 600 Mt · Max. Height – 68 m	July 2018	2025	Active	· 20.00 km from the Hotham River · 80.00 km from the North Dandalup Dam (WA Reservoir)
KCGM *WA ,Australia*	Fimiston 1 TSF	Upstream	· Area – 110 hectares · Volume – 50 Mt · Max. Height – 60 m	July 2018	2028	Active	· 10 km to Hannans Lake · 3 km to Kalgoorlie
	Fimiston II TSF	Upstream	· Area – 350 hectares · Volume – 157 Mt · Max. Height – 60 m	July 2018	2028	Inactive	· 9 km to Hannans Lake · 5.5 km to Kalgoorlie
	Kaltails TSF	Upstream	· Area – 240 hectares · Volume – 124 Mt · Max. Height – 60 m	July 2018	2028	Active	· 4 km to Hannans Lake · 8 km to Kalgoorlie
	Gidji I TSF	Downstream	· Volume – 2.7 Mt · Max. Height – 30 m	July 2018	2021	Active	· 16 km to Kalgoorlie
	Gidji II TSF	Downstream	· Volume – 1 Mt · Max. Height – 15 m	July 2018	2021	Active	· 16 km to Kalgoorlie
Tanami *NT, Australia*	GTD08 TSF	Upstream	· Area – 60 hectares · Volume – 14 Mt · Max. Height – 15 m	August 2018	2025	Active	· 260 km to Lake Mackay
	GTD03 TSF	Upstream	· Area – 20 hectares · Volume – N/A (Currently mined for paste backfill) · Max. Height – 15 m	August 2018	Currently mined for paste backfill	Active	· 260 km to Lake Mackay
Carlin *Nevada, USA*	Mill1	Downstream	· Area – 52 hectares · Volume – 22Mt	Inspected as part of operation activities	n/a	Closed	· Proximity to the Mill 1 site and the North Area Offices
	Mill 4/2	Downstream	· Areas – 20 hectares · Volume – N/A (Currently mined for paste backfill)	Inspected as part of operation activities	Currently mined for paste backfill	Inactive	· 1.75 miles to Betze-Post Pit (onsite) · 1.10 miles to North Area Offices (onsite)
	Mill 3 (Rain)	Downstream	· Area – 37 hectares · Volume – 5.4Mt · Max. Height – 15 m	Inspected as part of operation activities	n/a	Closed	· 7.50 miles from Pine Valley Creek · 0.01 miles from Ferdelford Creek
	Mill 5/6	Downstream	· Area – 200 hectares · Volume – 150 Mt · Max. Height – 90m	September 2018	2025	Active	· 6.00 miles from Carlin, NV · 0.50 miles from Maggie Creek
	Mill 5/6 West	Downstream	· Area – 90 hectares · Volume – 60 Mt · Max. Height – 64 m	September 2018	2025	Active	· 7.00 miles to Carlin, NV · 0.75 miles to Maggie Creek
	Mill 5/6 East	Downstream	· Area – 210 hectares · Volume – 115 Mt · Max. Height – 70 m	September 2018	2025	Active	· 6.00 miles to Carlin, NV · 0.40 miles to Maggie Creek

Mine Site and Location	Facility	Construction Method*	Area/Storage Capacity/Max Height	Most Recent Inspection	Facility Life	Status	Nearest Town or Body of Water
Carlin *Nevada, USA*	James Creek	Downstream	· Area – 32 hectares · Volume – N/A (majority removed as part of Gold Quarry layback)	Inspected as part of operation activities	n/a	Closed	· Near James Creek
Phoenix *Nevada, USA*	Phoenix TSF	Downstream/ Modified Centerline	· Area – 82 hectares · Volume – 260 Mt · Max. Height – 48 m	September 2018	2028	Active	· 15.00 miles from Battle Mountain · 1.30 miles from Willow Creek
	Lone Tree Mine Section 23 Tailings	Downstream	· Area – 125 hectares · Volume – 25 Mt	Inspected as part of operation activities	n/a	Closed	· > 15 miles from Battle Mountain
Twin Creeks *Nevada, USA*	Juniper TSF	Modified Centerline	· Area – 340 hectares · Volume – 300 Mt · Max. Height – 73 m	September 2018	2032	Active	· 40.00 miles from Golconda, NV · 4.00 miles from Rabbit Creek
	Pinon Tailings Facility	Downstream	· Area – 58 hectares · Volume – 8.2Mt	Inspected as part of operation activities	n/a	Closed	· Located near Pinion oxide ore mill greater than 40 miles from Golconda, NV
Merian *Suriname, South America*	Merian TSF	Downstream	· Area – 710 hectares · Volume – 135 Mt · Max. Height – 47 m	August 2018	2029	Active	· 34 km from Java, Suriname
Yanacocha *Peru, South America*	LQ Mill Sands Facility South	Downstream	· Area – 60 hectares · Volume – 72 Mt · Max. Height – 80 m	October 2018	2019	Active	· 5.6 km to Rio Grande Dam · 2.3 km to Rio Rejo Dam
	LQ Mill Sands Facility North	Downstream	· Area – 40 hectares · Volume – 29 Mt · Max. Height – 80 m	October 2018	2024	Active	· 5.6 km to Rio Grande Dam · 2.3 km to Rio Rejo Dam
Akyem *Ghana, Africa*	TSF Cell 1	Downstream	· Area – 160 hectares · Volume – 43 Mt · Max. Height – 20 m	May 2018	2019	Active	· Mamang River Forest Reserve
	TSF Cell 2	Downstream/ Modified Centerline	· Area – 100 hectares · Volume – 43 Mt · Max. Height – 30 m	Under construction	2024	Under construc-tion	· Adjacent to Cell 1
Ahafo *Ghana, Africa*	Ahafo TSF	Downstream/ Modified Centerline	· Area – 573 hectares · Volume – 40 Mt · Max. Height – 40 m	May 2018	2038	Active	· 4.40 km to Kenyasi Resettlement · 1.30 km to Dokyikrom Village

Note:
1) This table does not include the two facilities that use filtered tailings. Currently filtered tailings are mixed with waste rock into the heap leach facility at CC&V and uses as paste backfill for our underground operations at Carlin (Nevada) and Tanami (Australia).

TAILINGS DAM INVENTORY (LEGACY FACILITIES)

Mine Site and Location	Status	Number of Dams/Area	Most Recent Inspection
Mt. Leyshon *Queensland, Australia*	Reclaimed and closed	· 3 tailings dams · Tailings area – 200 hectares	Inspections as part of normal operations – no formalized external inspections
Miramar-Con Mine *North West Territories, Canada*	Reclaimed and closed (2 dams with water covers)	· 21 tailings dams · Tailings area – 80 hectares	June 2018
Golden Giant *Ontario, Canada*	Inactive with water cover	· 4 tailings dams · Tailings area – 80 hectares	May 2018
Empire Mine State Historic Park *California, USA*	In discussions on reclamation requirements; currently area has regrown with forest. Facilities are inactive.	· 2 tailings dam · Tailings area – 61 hectares · One dam is owned by California State Parks	July 2017
Battle Mountain Resources – San Luis Mine *Colorado, USA*	Facility has been left partially open for brine disposal (treatment facility) and for management of water during plant upset conditions. Facility is inactive.	· 1 tailings dam · Tailings area – 60 hectares	2018
Idarado Mining Co *Colorado, USA*	Reclaimed and closed	· 10 tailings dams · Tailings area – 40 hectares	September 2018
Resurrection Mining Co – California Gulch *Colorado, USA*	Reclaimed and closed	· 4 tailings dam · Tailings area – 14 hectares	September 2018
Resurrection Mining Co – Black Cloud Mine *Colorado, USA*	Reclaimed and closed	· 1 tailings dam · Tailings area – 54 hectares	September 2018
Dawn Mill/Midnite Mine *Washington, USA*	Reclaimed and closed	· Tailings disposal was below grade. There are no constructed dams. · Tailings area – 73 hectares	Inspections as part of ongoing construction activities

Note:
1) For legacy facilities defined as inactive, there are no longer deposition activities. Reclaimed and closed refers to an inactive dam where there has been placement of a soil cover, revegetation and construction of water management structures. The facilities identified with water covers refer to dams with water covering the tailings that have been designed for closure to manage acid rock drainage.