

Thompson: Tailings Operations Procedure

1. Tailings Operations Procedure

1.1 Tailings Operations Procedure



1.2 Purpose

Purpose

To establish a tailings orientation for new employees, visitors, and contractors. This tailings-specific orientation is intended to complement the Surface Orientation.

Potential Hazards

Ergonomic / MSD					Toxicological				Environmental	
E	H	M	L	Risk for Injury	E	H	M	L	Risk for Injury	
			X	Awkward / Sustained Postures				X	Chemicals – General	
			X	Forceful Exertions				X	Chemicals – Acids	
			X	Repetitive Motions				X	Chemicals – Bases	
			X	Vibration				X	Chemicals – Gases : H2S	
			X	Skin Compression				X	Chemicals – Gases : CL2	
			X	Sharp Points / Edges				X	Chemicals – Gases : SO2	
			X	Pinch Points				X	Chemicals – Gases : Other	
			X	Material Falling				X	Biological Pathogens	
			X	Surfaces causing falls				X	Electrical	
			X	Working at Heights		X			Extreme Heat:	
			X	Moving machinery		X			Extreme Cold:	
			X	Noise				X	Combustibles / Flammables	
		X		Other : Driving on Narrow Roads / Variable Road Conditions						

1.3 Definitions

Definitions

- OMS – Operating, Maintenance and Surveillance
- EPRP – Emergency Preparedness & Response Plan
- TSF – Tailings Storage Facility
- JHA – Job Hazard Analysis
- VES – Vale Educational System

1.4 References

References

- All personnel should know the location of the OMS and tailings storage facility EPRP. These documents are located in VES.

Training and/or Qualification Requirements

- Surface orientation
- Site tour provided by trained site representative familiar with tailings area



1.5 Safety Considerations



✓ Safety Considerations

1.6 Tailings Management Area Roads

Safety Considerations

Tailings Storage Facility Roads

1. Obey the speed limit on tailings roads of 30 km/h unless otherwise posted.



1.7 Tailings Management Area Roads

Safety Considerations

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It is required that light vehicles (Vale, Visitor, or Contractor) have a beacon/strobe light when traveling on tailings storage facility roads, as per the attached figure.

Portable beacon lights for short-term (e.g. one week or less) visitors are available from the Tailings Coordinator.

Long term contractors are expected to supply their own beacon lights.



1.8 Tailings Management Area Roads

Safety Considerations

- 3 Always take care and watch roads for signs of subsidence (severe cracks, furrows, sink holes, etc).
 - a. Many of the tailings roads are built over previously deposited tailings. Mine waste overburden is transported by truck out to the tailings area and piled on top of the tailings to create a drivable road surface on which the tailings pipeline can lay. There is always a risk that the tailings material can settle once the fill is placed over it and road subsidence can occur over short periods of time.
 - b. If subsidence is noted, reverse off the road to land and contact the Mill Shift Supervisor for an assessment. If required, a hazard alert will be issued, and barricades placed until repairs can be performed.



1.9 Tailings Management Area Roads

Safety Considerations

- 4 Watch for sharp angles of large waste rocks on roads that could puncture tires or damage vehicles.
- 5 Drive with caution and stay alert for road hazards such as wildlife, washed out roads, potholes, heavy equipment, and snow cover. Road conditions change from time to time and from season to season. In winter, Vale's transportation group is mandated to maintain access around the basin. However, storms can roll in and severe wind can cause drifting. Continued assessment of safe road passage is required for all work. Where there is doubt regarding passability of roads, do not proceed.
- 6 Do not drive through flooded roads due to high water levels or beaver activity as the stability of the road may be compromised by the water.



1.10 Tailings Management Area Roads

Safety Considerations

- 7 Be careful when driving on snow- and ice-covered roads. When driving on narrow one lane roads, try to keep to the center of road way to avoid slipping off road. Along select sections of roadways, there are orange colored delineators to indicate the edge of the road.
- 8 Always stay in sight or out of range of machinery working in tailings area.
- 9 When crossing the railway crossing north of Railway Dam, look both ways at the stop sign to ensure that a train is not approaching.



1.11 Noise

Safety Considerations

Noise

1

At 48" sewer discharge point and at copper ponds #5 & #6, there is a propane cannon that sounds every three minutes during non-ice-covered months. If exiting vehicle at this location, ear protection is required.



1.12 Weather



1.13 Dams

Safety Considerations

Dams

- 1 Do not drive on Dams. There are barriers in place to indicate where it is not permitted, unless authorized, to drive. Maintain those barriers.
- 2 Personnel should be mindful that the slope angles of the dams vary and should take particular care when conducting work.



1.14 Weather



1.15 Weather

Safety Considerations

Weather

1. Before going out, always check Environment Canada's Weather Services Forecast.
2. **Thunderstorms:** Do not go out to work on the tailings basin during severe wind or thunderstorms.
 - a. Severe Thunderstorms: High winds, hail, and cloud-to-ground lightning.
 - b. Severe Thunderstorm Watch: Indicates that conditions are favorable for the development of a severe thunderstorm in your area.
 - c. Severe Thunderstorm Warning: Indicates that a severe thunderstorm has been reported or detected by radar in your area.



1.16 Weather

Safety Considerations

Weather

- d. If you become caught in a severe thunderstorm, employ the "30-30 rule". If the time between seeing a lightning flash to hearing the thunder is 30 seconds or less, take shelter in the nearest building or vehicle. Stay there until 30 minutes have passed since the last flash.
- e. Stay away from water and tall objects (poles, lone trees, fences, pipes, and metal).



1.17 Weather

Safety Considerations

Weather

3 Severe Winds and Dust

- a. Dust Storms are natural occurrences, but the amount and nature of the sediment load the winds are carrying are influenced by human activities. The tailings dust and slag pile are prone to wind erosion. These materials are hazardous. Wind born particles with grain sizes less than 10 μ m and salts are known hazards to human respiratory health.
- b. In the event of strong winds, where a dust storm could develop, take shelter inside a building or vehicle.



1.18 Weather

Safety Considerations

Weather

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Variations in Temperature

- a. Spring temperatures can vary in a short period of time from cool and damp near 0°C with north winds to very hot temperatures near or exceeding 30°C.
- b) Appropriate layering of clothing is recommended.



1.19 Weather

Safety Considerations

Weather

5 UV light Exposure

- a. Ultraviolet light can cause irritation of the eyes (*photokeratitis*) and burns of the skin (*erythema*) while increasing your risk of skin cancer.
- b. Wear sun block (minimum SPF 15) and CSA approved tinted safety eye protection to protect you from UV rays on days with a high UV index rating.



1.20 Weather

Safety Considerations

Weather

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Heat Related Hazards

- a. To avoid heat stress, drink plenty of water, maintain salt balance in your body, and avoid protein rich foods while working in the heat. Wear lightweight, light-coloured clothing where appropriate.
- b. Heat Rash (prickly heat) is caused by blocked sweat glands, which become inflamed, resulting in a rash. This condition further reduces the body's ability to sweat and self-cool.



1.21 Weather

Safety Considerations

Weather

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Heat Related Hazards

- c. Heat Exhaustion is caused by significant loss of fluids due to sweating while working in a hot environment. Symptoms are cool, clammy skin, heavy sweating, weakness, dizziness, nausea, and headache. Move to a cool shaded area, drink salted water, and be sure to rest until fully recovered.
- d. Heatstroke results from prolonged heat exhaustion to the point where the body can no longer sweat to self-cool, body temperature increases often $>41^{\circ}\text{C}$. This condition warrants immediate medical attention. Symptoms are similar to heat exhaustion except that the skin is hot and dry (*no sweat*). Heatstroke can cause delirium, convulsions, coma, and death if left untreated. Seek immediate medical attention.



1.22 Safety Considerations

Safety Considerations

Weather

7 Extreme Cold Hazards

- a. Adequate cold weather clothing is required for extreme winter temperatures experienced in Northern Manitoba.
- b. In the event of an Environment Canada weather warning or watch related to extreme cold / frostbite, inspection work in the tailings basin shall be suspended and limited to vehicle drive around until the warning / watch has ended.



1.23 Weather

Safety Considerations

Weather

7 Extreme Cold Hazards

- c. Where inspection and monitoring are mandated during winter months, for example, months outside OMS-prescribed monitoring timeframe), a minimum of two site personnel shall be present where work activities require work outside of a vehicle.
- d. Monitoring of dam instrumentation (with the exception of vibrating wires) shall not be conducted where ambient conditions are below -15°C .



1.24 Weather

Safety Considerations

Weather

7

Extreme Cold Hazards

- e. Where ambient or windchill temperatures are below -25°C , inspection and/or maintenance work in the tailings basin shall be suspended. Employees should contact immediate supervisor to develop a strategy for safely executing work. If necessary, make arrangements for alternate timing of work.
- f. Conditions can vary considerably around the basin and change without notice. While inspection and monitoring of the basin is a critical control of its management, worker safety is paramount. Winds across the crests of the dams can be extremely harsh. Irrespective of government alerts and warnings, at the discretion of site personnel conducting inspection / monitoring, work can be suspended / deferred / cancelled. In these instances, site personnel should provide a short log of conditions (general weather condition, wind speed, windchill, ambient temperature, road conditions, etc.) in the inspection report/ work orders.



1.25 Wild Life



1.26 Wild Life

Safety Considerations

Wildlife

1. Large wildlife: wolves, coyotes, moose, or bears
 - a. Sound the horn when arriving to areas where there is no one else present to help ward off any wildlife that may be in the area.
 - b. Scan area for large wildlife before exiting vehicle and continue to watch for them when outside of vehicle.
 - c. If any large wildlife is sighted, retreat slowly to the truck and wait until it leaves the area.



1.27 Wildlife

Safety Considerations

Wildlife

1. Large wildlife: wolves, coyotes, moose, or bears

- d) Report any bear sightings to the Environmental Coordinator and the Tailings Coordinator (or designate).
- e) If repeated bear sightings are noted, a hazard alert will be issued.



1.28 Wildlife

Safety Considerations

Wildlife

2 Insects: Mosquitoes, black flies, and horse flies

- a. Wear bug repellent in the summer.
- b. Both black fly and mosquito bites can cause allergic reactions. Report possible reaction symptoms such as unusual swelling of the bite sites and/or dizziness to First Aid.



1.29 Ice, Water and Deposited Tailings

Ice, Water and Deposited Tailings

1.30 Ice

Safety Considerations

Ice

1. There is risk associated with thickness of the ice layer during winter at various points in the tailings basin. Due to warm water flows from various inputs into the area and faster water flows through several channels, it is not permitted to venture onto the ice at any time.
2. If it is deemed necessary to venture onto the ice to complete work, a formal JHA and management approval would be required.



1.31 Water

Safety Considerations

Water

1. Be aware of the many waterways in the tailings basin. Some areas have fast moving or deep water. Wear a life jacket when working by open water.
2. If it is necessary to enter the water, always wear a life jacket and always have a spotter on shore.



1.32 Deposited Tailings

Safety Considerations

Deposited Tailings

- 1 Do not walk on any deposited tailings. Tailings may look solid but could change into a soft, quicksand like substance.



1.33 Plant Entry/Exit and Emergency Procedure



Plant Entry/Exit and Emergency Procedure

1.34 PPE

Required Tools

PPE

- 1 Hard Hat (whenever working around equipment or where job-specific JHA identifies need)
- 2 Safety Glasses / Eye Protection
- 3 Steel-toed boots with metatarsal guards (exceptions may be granted in winter due to cold, or where alternate boot provides better protection based on work activities – subject to the approval of the department manager)



1.35 PPE

Required Tools

PPE

- 4 Proper approved reflective clothing
- 5 Respirator and goggles: During windy days with dusty conditions
- 6 Life Jacket: When working by open water
- 7 Gloves appropriate for task being performed



1.36 Two-way Radio

Required Tools

Two-way Radio

- 1 Personnel accessing the tailings storage facility must be equipped with two-way radios (Mill Channel – Channel 1) with the volume turned on high in case of evacuation.
 - 2 Cell phones are also permitted as a second means of site communication, but some areas have low to no reception. Therefore, two-way radios are mandatory.
- Roadside assistance kit;
 - Beacon light for light vehicles (must remain on at all times while driving through TSF).



1.37 Check In and Check Out

Job Step Description

Check In and Check Out of Tailings Storage Facility

1. **Signing into Tailings Storage Facility**
 - a. Sign the Mill Tailings Visitor's Log book located at the concentrator shift office. (Door 2)
 - i. Enter Date, Name, Company (enter cell phone number if carrying one), Time In, and Area/person visited.
 - b. Personnel, working alone at the tailings management area, will comply with their departments working alone policy or SPI 34-49.



1.38 Check In and Check Out

Job Step Description

Check In and Check Out of Tailings Management Area

2

Signing out of Tailings Storage Facility

- a. When returning from tailings, sign out of the tailings book by entering "Time out". If remaining at the Mill, transfer tag to IN position or sign into Visitor's Sign in Log Book.



1.39 Plant wide Level II Alarm

Safety Considerations

Plant wide Level II Alarm

1. In the event of a plant wide emergency the Mill Operations Supervisor will identify people working in the Tailings area using the Tailings Area log book and will be contacted via radio / cell phone. All personnel working in the tailings area will monitor radio and phones and await further instruction.

