NYE TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL

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Stillwater Mine

Nye Tailings Operations, Maintenance and Surveillance (TOMS) Manual

2022/12/23

CONFIDENTIALITY STATEMENT

COMMITMENT ACCOUNTABILITY RESPECT ENABLING SAFETY

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ABBREVIATIONS

CAP ..... Corrective Action Plan
CFR ..... Code of Federal Regulations
CORP ..... Consolidated Operations and Reclamation Plan
DEQ ..... Department of Environmental Quality
EDS ..... Environmental Design Storm
EOR ..... Engineer of Record
EPP ..... Emergency Preparedness Plan
FMEA ..... Failure Modes and Effects Analysis
GM ..... General Manager
GPS ..... Global Positioning System
IDF ..... Inflow Design Flood
ITRB ..... Independent Tailings Review Board
KP ..... Knight Piésold Ltd.
MCA ..... Montana Code Annotated
MDEQ ..... Montana Department of Environmental Quality
Mine Act ..... *Federal Mine Safety and Health Act*
MSHA ..... Mine Safety and Health Administration
MT ..... Montana
NavStar ..... NavStar Geomatics Ltd.
QPPs ..... Quantitative Performance Parameters
QRFG ..... Quick Reference Field Guide
ROD ..... Record of Decision
ROM ..... Run-of-Mine
RTFE ..... Responsible Tailings Facility Engineer
Stillwater ..... Sibanye Stillwater
SWM ..... Stillwater Mine
SWPPP ..... Storm Water Pollution Prevention Plan
TOMS ..... Tailings Operations, Maintenance and Surveillance
tpd ..... tons per day
TSF ..... Tailings Storage Facility
UAV ..... Unmanned aerial vehicles
USFS ..... United States Dept. of Agriculture, Forest Service
VP ..... Vice President
VWP ..... Vibrating Wire Piezometer

1.0 INTRODUCTION

1.1 SCOPE AND OBJECTIVES OF MANUAL

Sibanye Stillwater (Stillwater) owns and operates the Stillwater Mine (SWM), a platinum group metal mine located in south central Montana. The SWM consists of an underground mine, a concentrator, two tailings storage facilities (TSF): the Hertzler TSF and the Nye TSF, and ancillary facilities. This Tailings Operations, Maintenance and Surveillance (TOMS) Manual has been prepared for the Nye TSF and its associated facilities. A separate standalone TOMS Manual has been prepared for the Hertzler TSF (Stillwater, 2022a). This Nye TOMS Manual has been developed to conform with the requirements of the Montana State Law as defined in Montana Code Annotated (MCA) Title 82 Chapter 4 Part 3 (MCA 82-4-379) (MT, 2019).

The objectives of this TOMS Manual include:

- Define the roles and responsibilities of Stillwater site personnel, third-party consultants, and government (Section 1.2)
- Define the training requirements for those involved in the operation, maintenance and surveillance of the facility (Section 1.3)
- Outline the document control and revision procedures (Section 1.4)
- Provide an overview of the key components of the facility and operating, maintenance and surveillance requirements (Sections 2 and 3)
- Define the surveillance, inspection, reporting and review requirements (Section 4)
- Present the Emergency Preparedness Plan (Section 5)

Appendix A provides a Quick Reference Field Guide (QRFG) for the operation of the Nye TSF. The QRFG includes the Quantitative Performance Parameters (QPPs) and key information for the operation, monitoring and inspection of the TSF.

Appendix C includes the inspection schedules and the inspection log templates. These templates are to be utilized for daily data collection, and for information gathered during the routine inspections.

1.2 ROLES AND RESPONSIBILITIES

The following provides an overview of the responsibilities of Stillwater site personnel and third-party contractors, as well as the role of the Montana Department of Environmental Quality (MDEQ) and other government agencies.

1.2.1 STILLWATER SITE PERSONNEL

The General Manager (GM) & Vice President (VP) of SWM Operations has the ultimate responsibility for the safety of the Nye TSF. The Concentrator Manager has been designated as Safety Manager for the TSF and is the primary contact for all matters relating to the operation, maintenance and surveillance of the facility. The Concentrator Manager reports to the GM of EBM Operations and is responsible for the day-to-day operations of the Nye TSF.

In addition to the Concentrator Manager, other key Stillwater personnel have roles and responsibilities relating to the operation, maintenance, and surveillance of the Nye TSF. The organization and responsibilities chart is shown on Figure 1.1. A list of these key personnel and their responsibilities are provided on Table 1.1.

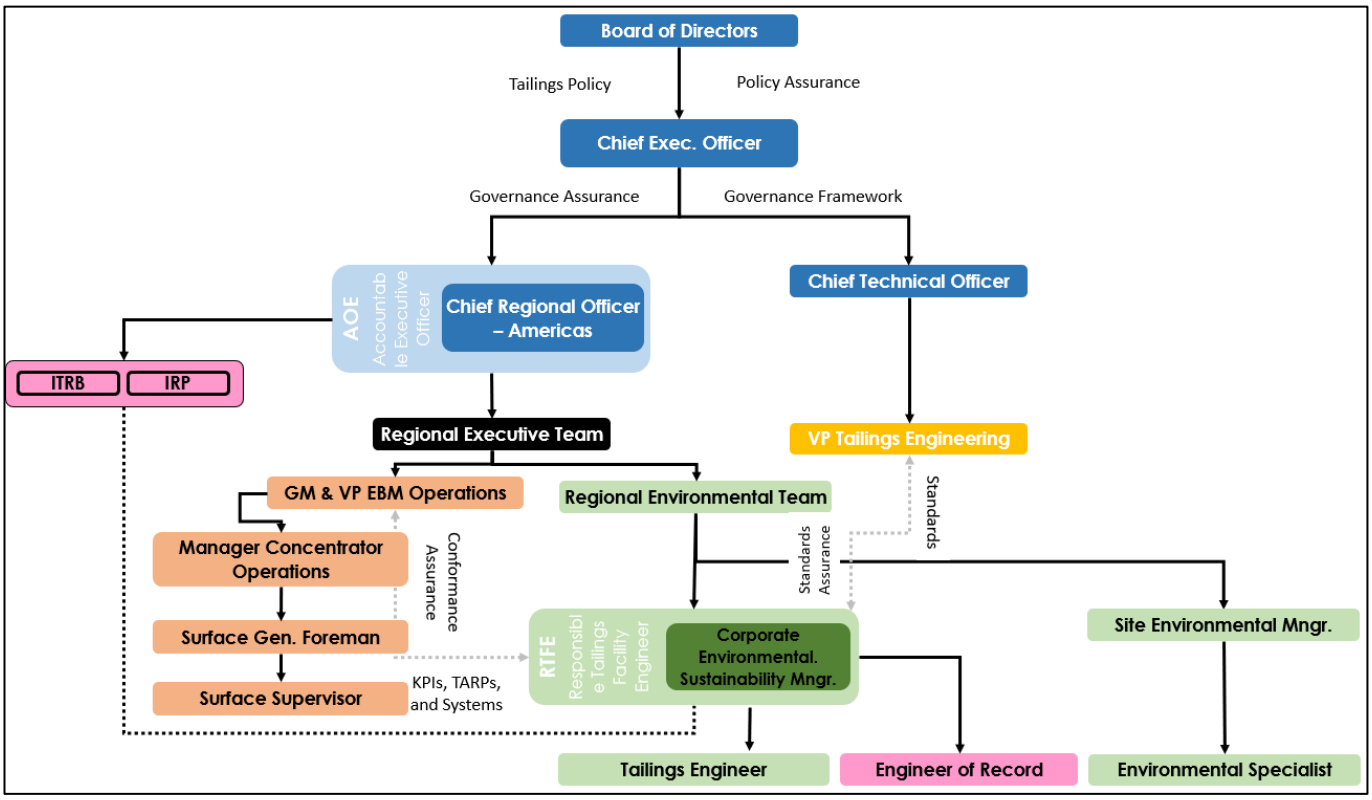


Figure 1.1 Organization and Responsibilities Chart

Table 1.1 Roles and Responsibilities

Position	Responsibilities
GM of SWM Operations	• Provide oversight and leadership of all activities required for the safe and socially responsible operation of the mine site. Overall project review and implementation, and budget allocation
Corporate Environmental Manager	• Provide oversight and leadership of all activities required for the socially and environmentally responsible operation of the mine site • Communications with Government Agencies and Stakeholders
Environmental Sustainability Manager (Responsible Tailings Facility Engineer (RTFE))	• Accountable for the integrity of the tailings facility (Requirement 8.5) • Responsible for liaising with EOR, operations, planning, regulatory • affairs, social performance and environment teams (Requirement 8.5) • Responsible for implementation of the design • Accountable for the establishment of a change management system (Requirement 6.5) • Responsible for the monitoring system and communication of the results to the EOR, including performance reviews (Requirements 7.2, 7.3) • Responsible, with the EOR, for the Construction Records Report (Requirement 6.3) • Responsible for the OMS Manual (Requirement 6.4)

Position	Responsibilities
Concentrator Manager	• Person responsible for the safe operation of the TSF including overall operations, maintenance and surveillance and TOMS Manual updates and review • Plan, coordinate, supervise, direct and review all activities related to the TSF construction and operation, tailings delivery and water reclaim, TSF water balance, and Emergency Preparedness Plan (EPP) • Overall operations of the concentrator and supervision of concentrator personnel • Overall concentrator operations contact responsible for Tailings Delivery System and Water Reclaim System • Person responsible for inspection, maintenance, review and oversight of all areas of the tailings management and water reclaim operations, including tailings deposition, Tailings Delivery System, Water Reclaim System and Basin Underdrains • Quarterly Dam Safety Inspections for the TSF • Responsible for TSF water management • Unusual Event inspections • Implementation of EPP • Coordinate supernatant pond surveys and soundings • Responsible for task training of all tailings personnel
Tailings Engineer	• Plan, coordinate, advise, and review all operational activities related to environmental compliance functions (quarterly inspections, leak detection, water quality, TSF water balance). Ensure Stillwater remains in compliance with all applicable permits, rules and regulations related to these areas. • Review and update TOMS Manual and EPP • Coordinate supernatant pond surveys and soundings • Quarterly TSF Inspections • Monthly TSF and instrumentation inspections • Implementation of EPP • Instrumentation monitoring and review
Environmental Compliance Manager	• Plan, coordinate, advise, and review all operational activities related to environmental compliance functions (quarterly inspections, leak detection, water quality, TSF water balance). Ensure Stillwater remains in compliance with all applicable permits, rules and regulations related to these areas. • Implementation of EPP • Communications with Government Agencies and Stakeholders
Surface General Foreman	• Monthly TSF inspections • Weekly TSF inspections
Surface Supervisor	• Routine inspections of the Tailings Delivery System and Water Reclaim System during dayshift • Weekly TSF inspections • Annual Tailings Delivery System Inspection and Planned Maintenance
Surface Crew	• Efficiently operate the TSF within SMC standards, occasional supervision to ensure regulatory compliance • Responsible for day shift inspections, report any unusual observations to Surface Supervisor Maintaining tailings operations within the SMC standards and at the highest level of safety. Responsible for day shift inspections

Position	Responsibilities
Environmental Specialist(s)	• Operation of LAD System • Quarterly TSF inspections • Unusual Event inspections • Maintaining environmental systems, wildlife protection and annual permit reporting • Implementation of EPP • Maintain TSF water balance tracking spreadsheet • Geotechnical instrument monitoring and review (survey monuments, inclinometers, piezometers) • Geotechnical instrument support, maintenance, and installation • Monitoring and sampling of groundwater monitoring wells • Organizing and reporting on all reclamation activities • Maintaining environmental systems, wildlife protection and annual permit reporting • Implementation of EPP • Monitoring and sampling of groundwater monitoring wells • Coordinating and reporting on all reclamation activities • Annual maintenance activities: Grading of embankment crest, installation and removal of tailings discharge pipelines, wildlife fence repairs, seasonal installation and removal of evaporators
Chief Engineer	• Technical support
Projects Engineer	• Coordinate TSF embankment raises • Coordinate supernatant pond surveys and soundings
Safety Manager	• Emergency Response Team; Emergency Action Plan; Emergency response planning; Emergency Response Binder; Training and ensure job hazard analyses are completed as required

1.2.2 Engineer of Record (EOR) and Third-Party Consultants

A number of third-party consultants are involved in the operation and inspection of the Nye TSF. The roles and responsibilities of the various third-party consultants and the Engineer of Record (EOR) are summarized in Table 1.2.

Table 1.2 EOR and Third-Party Consultants

Role and Name	Responsibilities	SMC Contact
Knight Piésold Ltd., EOR - Ken Brouwer, P.E. Deputy EOR - Craig Hall, P.Eng.	• Provide operational support to Stillwater • Preparation of construction specifications and drawings and contract documentation, prescribe and oversee QA/QC activities, provide on-site personnel for construction monitoring activities and practices • Review of instrumentation records, complete annual inspections and reporting	Environmental Sustainability Manager Environmental Specialist(s) Corporate Environmental Manager Tailings Engineer
Independent Review Engineer(s)	• Periodic independent reviews of the TSF including operation of the facility, engineering, and geotechnical reviews	Environmental Sustainability Manager Corporate Environmental Manager
Hydrogeology Consultant	• Provide hydrogeological support to SMC	Environmental Sustainability Manager Corporate Environmental Manager

Role and Name	Responsibilities	SMC Contact
Specialist Lining Contractor	• Qualified manufacturers and installers are used to supply and install the geosynthetics lining materials required for the TSF construction • Complete detailed inspections and make repairs to the HDPE geomembrane on a semi-annual basis	Environmental Specialist Concentrator Manager
Earthworks Contractor	• Local contractor with heavy equipment • Qualified to construct engineered embankments, random fills, surface preparation and assistance for liner installation, reclamation earthworks, and other earthmoving activities	Environmental Specialist Concentrator Manager
Reclamation Contractor	• Reclamation work	Environmental Specialist

1.2.3 Regulatory Agencies

The jurisdiction for regulation of TSFs resides with the Montana Department of Environmental Quality (MDEQ). Embankments for TSFs water reservoirs subject to permits issued by MDEQ are specifically exempt from certain provisions of the *Montana Dam Safety Act* (MCA 85-15-107), and therefore are not subject to embankment hazard potential classification within the State (MCA 85-15-209). The MDEQ is the regulatory agency responsible for ensuring the applicable legislative requirements outlined in MCA 82-4 -379, relating to this TOMS Manual, are met by SMC.

The Mine Safety and Health Administration (MSHA) is responsible for administering the provisions of the *Federal Mine Safety and Health Act* of 1977 (*Mine Act*) and enforcing compliance with mandatory safety and health standards. Title 30 Code of Federal Regulations (CFR) part 56.20010 requires that '*if failure of a water or silt retaining dam at a mine will create a hazard, it shall be of substantial construction and inspected at regular intervals*'. The *Mine Act* requires the MSHA inspect surface mines at least twice per year.

1.3 Training

Training programs are required for any personnel involved in the operation, maintenance, surveillance and inspection of the TSF. Training must be conducted by the Concentrator Manager, Concentrator General Foreman or a suitably qualified individual familiar with the design, operation, maintenance and inspection of all civil and mechanical works associated with the facility. Training sessions will be documented, and a record kept on file on Stillwater's electronic filing system.

The GM of SWM Operations, Environmental Sustainability Manager, Concentrator Manager, Tailings Engineer and Surface Supervisor must fully understand and be able to implement the TOMS Manual requirements and also ensure that all applicable mine personnel and contractors understand the requirements presented in the TOMS Manual.

Appropriate site personnel are responsible for being continually observant of the visual indications of the TSF performance. Anything observed that is outside of normal operating parameters, as outlined in this TOMS Manual, must be reported to the Concentrator Manager and/or Environmental Sustainability Manager immediately.

1.4 Control and Revisions to the Manual

This TOMS Manual is a controlled document and specific procedures have been defined for the distribution, revision, and review as outlined below.

1.4.1 DISTRIBUTION

The TOMS Manual will be controlled by the Environmental Supervisor. The Environmental Sustainability Manager will be responsible for maintaining the latest version of the TOMS Manual on Stillwater's electronic file management system. The latest version of the TOMS Manual is also available on Knight Piésold Ltd.'s (KP) FULCRUM data management site. The TOMS Manual location on FULCRUM is shown in Figure 1.2.

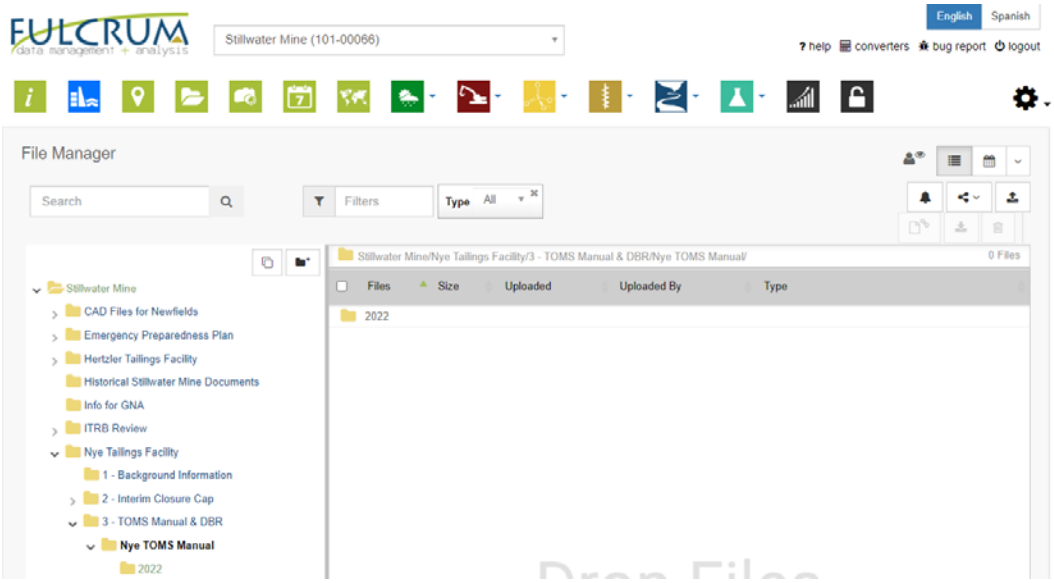


Figure 1.2 TOMS Manual Location on FULCRUM

1.4.2 REVISIONS

The TOMS Manual is required to be reviewed on an annual basis to ensure that it reflects the current operating conditions. The TOMS Manual will be reviewed in conjunction with the annual inspections and third-party reviews outlined in Section 4.

The EOR shall certify any revisions made to the TOMS Manual. The Environmental Sustainability Manager shall notify SMC's responsible personnel when revisions to the TOMS Manual are made.

1.5 REFERENCE DOCUMENTS

Pertinent references for the Nye TSF and associated infrastructure are included in Appendix B. Electronic copies are available from Stillwater's electronic file management system.

1.6 REGULATORY REQUIREMENTS

The regulatory requirements and commitments that pertain to the construction, operation, and closure of the Nye TSF are summarized in the Stillwater Mine Consolidated Operations and Reclamation Plan (CORP). The CORP includes all Environmental Impact Statements, associated Records of Decision (RODs), stipulations for the SWM and its facilities, and a list of applicable statutes and regulations.

1.7 INDEPENDENT TAILINGS REVIEW BOARD

Stillwater's Corporate Tailings Management Framework requires the appointment of an Independent Tailings Review Board (ITRB) to fulfill an oversight role of the operation of the Nye TSF.

The ITRB's overall responsibility includes completing a review of the full TSF life cycle from design though closure planning. The ITRB reports directly to the Accountable Executive. Independent Tailings Review Board (ITRB) responsibilities include the following as per the Sibanye Global Tailings Management System:

- Review Corporate Tailings Mgmt. documents (Global Tailings Management System, Terms of Ref, etc.) against local legislation, the GISTM, ICMM Guidelines, and international best practice
- Review Tailings Roles (RTFE, EOR, etc.) regarding responsibilities and competency
- Site Review
- Documents - Tailings Operations, Surveillance, and Maintenance manual (i.e. TOMS)
- Compliance - with the Corporate and Site specific documentation
- Review TSF Design and Engineering Documents – Design Reports, Design Criteria, Investigation Reports, etc.
- Understand the current TSF performance

Reporting on any deviances and risks posed by the TSF to the Accountable Executive

2.0 DESCRIPTION OF THE TAILINGS STORAGE FACILITY

2.1 GENERAL

The following sections provide a brief summary of the design and management of the Nye TSF and associated facilities. Additional information is available in the cited references listed in Appendix B.

2.2 PROJECT DESCRIPTION

2.2.1 SITE LOCATION

The SWM and Nye TSF are located in south central Montana, approximately 5 miles south of Nye, Montana. The Hertzler TSF is located approximately 7 miles northeast of the mine site adjacent to Stillwater County Road 420. The locations of the SWM and Nye TSF are shown on Figure 2.1. The overall site plan for the Nye TSF is shown on Figure 2.2.

2.2.2 PROJECT HISTORY

Stillwater has operated the SWM, an underground platinum and palladium mine, within Stillwater County since 1986. Ore is sent to an on-site concentrator with a designed production rate of approximately 3,000 tons per day (tpd). The concentrate is shipped to SMC's Smelter and Base Metals Refinery located in Columbus, Montana for further processing. The mine has been developed and expanded since initial construction was completed in 1986. The SWM workings extend laterally approximately six miles east to west and vertically more than one mile.

The Nye TSF was part of the original 1984 operating plan. The Hertzler TSF was proposed in SMC's 1996 Mine Waste Management Plan. The management of water during closure along with additional reclamation details for both tailings facilities were proposed under a revised plan. The plans were subsequently approved by the Montana Department of Environmental Quality and United States Dept. of Agriculture, Forest Service (DEQ and USFS, 2012).

Stillwater initiated construction of the Nye TSF Interim Cap at the south end of the TSF towards the end of 2018. The Interim Cap has been periodically advanced since 2018. The progressive advance of the Interim Cap allows use of the remaining storage capacity within the existing facility. During this same period, Stillwater has expanded the Mill. A Mill Make-up Water Tank has been installed and a separate Tailings Solids Containment Basin is being evaluated with the Mill expansion. The Mill Make-up Water Tank will provide process water storage for the Mill and the Tailings Solids Containment Basin will provide temporary storage of tailings or solids from the Sand Plant or Paste Plant during maintenance periods or during upset operating conditions. This TOMS Manual will be updated to reflect the revised operating conditions at the closure of the TSF.

2.2.3 PROCESS DESCRIPTION

Ore is delivered from the underground workings to the concentrator where it is crushed and upgraded to a concentrate that is shipped offsite to SMC's smelter and base metal refinery in Columbus, Montana for further upgrading. Milling involves a combination of crushing, grinding, flotation and filtration processes to produce the concentrate. The tailings consist of sand and silt sized rock fragments left over from the milling process. The tailings are pumped as slurry from the concentrator to the underground Sand Plant or the Paste Plant located adjacent to the Nye TSF. The tailings pumped to the Sand Plant are separated into coarse sand and slimes fractions. The coarse sand fraction is dewatered and utilized as backfill in the underground mine. The remaining tailings (predominantly slimes fraction) are pumped to the Hertzler TSF as slurry. Tailings are occasionally sent to the Nye TSF from the concentrator, Sand Plant or Paste Plant during maintenance periods or during upset operating conditions. The process flow sheet is illustrated on Figure 2.3.

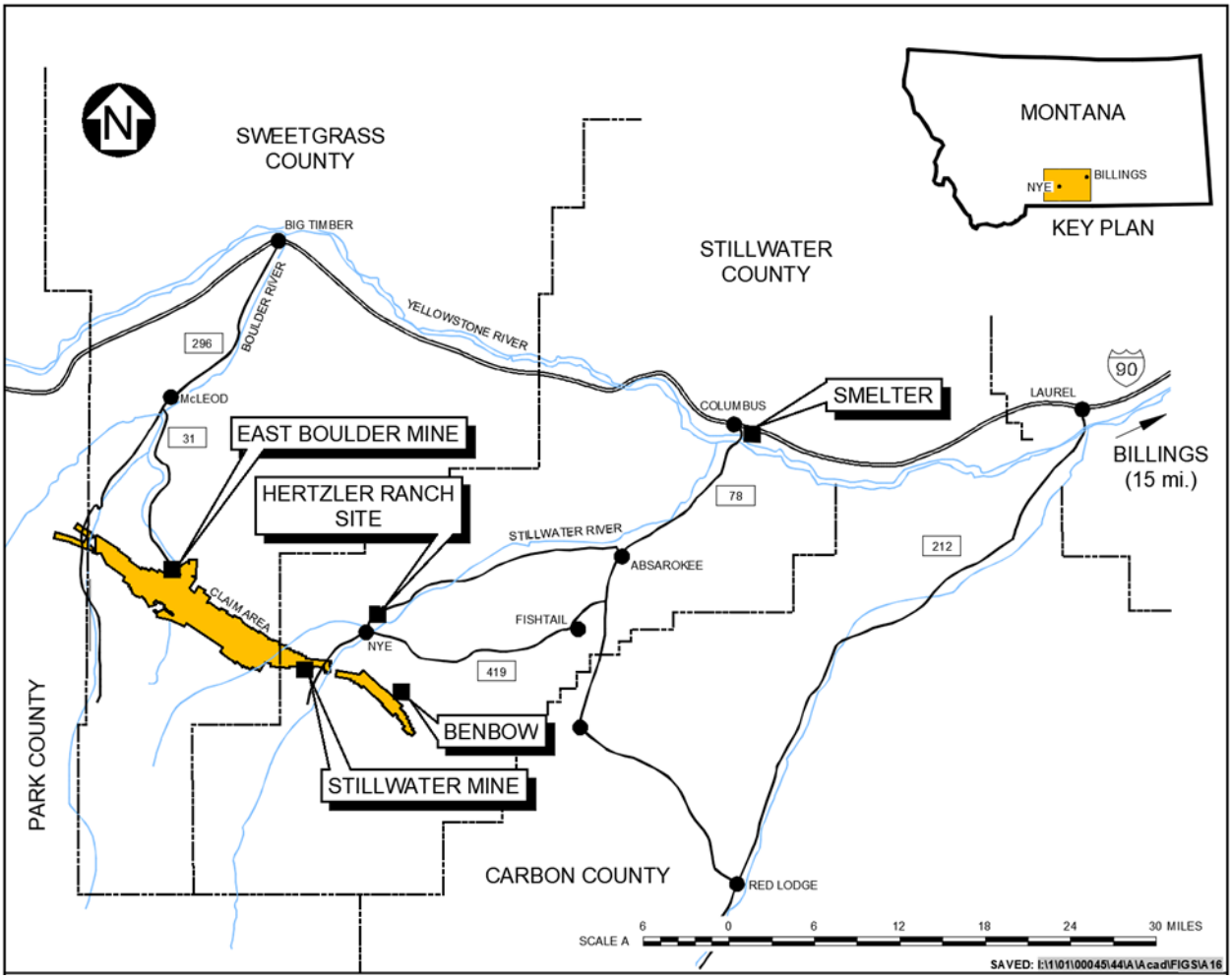
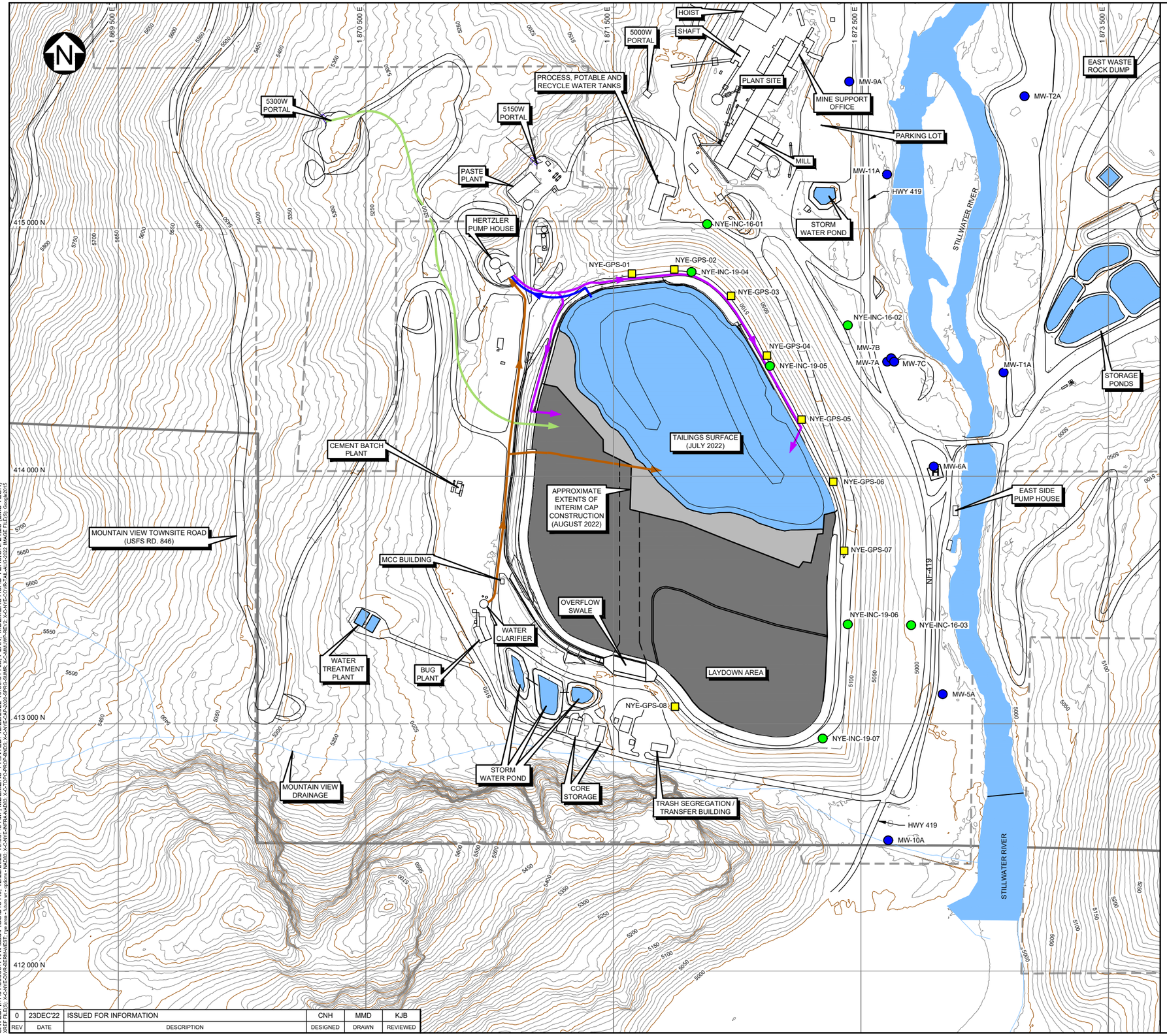


Figure 2.1 Site Location

2.2.4 TAILINGS MANAGEMENT

Historically, flotation tailings were pumped from the concentrator to the underground Sand Plant where they were separated by cyclones into a coarse fraction (sand) and a fine fraction (slimes). The sand material was used underground as backfill and the slimes were pumped to the Nye TSF for disposal. At times, the entire bulk tailings stream reported to the Nye TSF. In early 1999 Stillwater commissioned a paste tailings mine backfill system. The Paste Plant dewaters the whole tailings product and cement is added to generate high strength backfill. The current operations primarily utilize the underground Sand Plant for backfilling and the tailings slimes are pumped to the Hertzler TSF.

Stillwater currently utilizes both the Hertzler TSF and Nye TSF to maintain operational flexibility and manage process water. This arrangement eliminates potential problems associated with fluctuating production schedules and concentrator throughput. The ability to discharge tailings into either TSF provides a high level of operational flexibility to accommodate adverse weather conditions and/or maintenance of the tailings slurry transport systems.



LEGEND:

- WATER
- TAILINGS
- INTERIM CAP (EL. 5,106 ft. MIN)
- ROAD
- RIVER/STREAM/DRAINAGE
- STILLWATER MINE OPERATING PERMIT BOUNDARY
- U.S FOREST SERVICE BOUNDARY
- TAILINGS DELIVERY PIPELINE
- RECLAIM WATER PIPELINE
- 5300W PORTAL DRAINAGE PIPELINE
- CLARIFIER UNDERFLOW PIPELINE
- BUILDING / TANK / PAD
- SLOPE INCLINOMETER LOCATION
- MONITORING WELL
- SURVEY MONUMENTS

NOTES:

1. HORIZONTAL DATUM IS MONTANA COORDINATE SYSTEM, SINGLE ZONE, NAD83. UNITS ARE IN INTERNATIONAL SURVEY FEET.
2. CONTOURS ARE IN FEET. CONTOUR INTERVAL IS 10 FEET.
3. MONITORING WELL LOCATIONS PROVIDED BY SIBANYE STILLWATER.
4. DETAILED TOPOGRAPHICAL DATA BASED ON USGS LIDAR COMBINED WITH LOCAL DRONE SURVEYS PROVIDED BY SIBANYE STILLWATER (2015-2022).
5. JULY 2022 BATHYMETRIC SURVEY PROVIDED BY SIBANYE STILLWATER.

SCALE A: 200 0 200 400 600 800 1000 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	23DEC'22	ISSUED FOR INFORMATION	CNH	MMD	KJB

SIBANYE STILLWATER

STILLWATER MINE

NYE TSF
GENERAL ARRANGEMENT

Knight Piésold CONSULTING

P/A NO. NB101-66/44 | REF NO. NB22-01398

FIGURE 2.2 | REV 0

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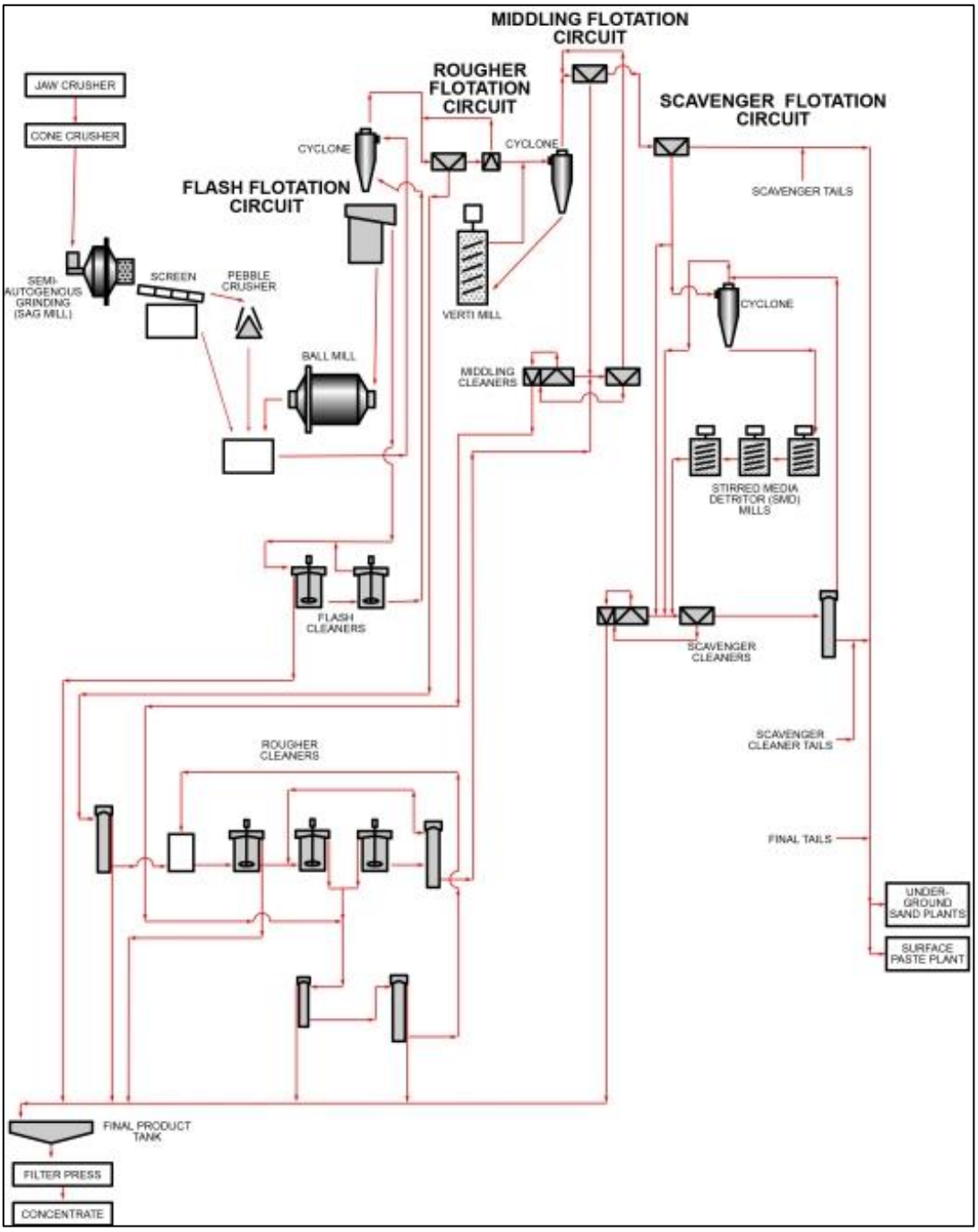

Figure 2.3 Process Flow Sheet

2.3 Design Basis and Operating Criteria

2.3.1 Overview

The principal objectives for the design and operation of the Nye TSF are to safely and securely manage tailings materials and to ensure complete protection of the regional groundwater and surface water flows (both during operations and in the long term) and to achieve effective reclamation at mine closure. The principal design features are as follows:

- Permanent, secure and total confinement of all solid waste materials within an engineered TSF
- Control, collection and removal of free-draining liquids from the tailings during operations and to the maximum practical extent, the prevention of uncontrolled leakage from the TSF
- The inclusion of monitoring features for all aspects of the TSF to ensure performance goals are achieved

The design basis and operating parameters for the Nye TSF and associated facilities are provided in detail within the various design and construction reports listed in Appendix B. The main components of the Nye TSF include the tailings embankment, tailings basin which includes a geosynthetic lining system, tailings delivery system, and water reclaim system. The key design and operating parameters are summarized in Table 2.1. The TSF components are briefly described below.

2.3.2 Tailings Embankment

The tailings embankment was constructed with a finer upstream zone and coarser downstream zone. The upstream zone was constructed with sandy gravel excavated from within the tailings basin. The downstream zone was constructed of Run-of-Mine (ROM) rockfill. The confining embankment defines the north, east and south sides of the TSF and ties into the hillside on the west side of the TSF. The embankment was constructed in four stages using the downstream construction method.

The embankment crest was constructed to El. 5,111 ft. The downstream slope ranges from approximately 1.7H:1V to 2.0H:1V and will be flattened to 2.0H:1V at closure. The upstream slopes range from 2.0H:1V to 3.0H:1V.

2.3.3 Tailings Basin

The Nye tailings basin is operated close to its design capacity. The total design capacity of the Nye TSF is approximately 4.1 million cubic yards.

The minimum wet freeboard requirement for the Nye TSF is 4.5 ft. plus a 2 ft. berm around the impoundment for wave run-up.. The basin filling and freeboard requirements from the design along with current operating levels are summarized below:

- Maximum Tailings Surface: El. 5,104 ft. (currently ranges from 5,098 to 5,105 ft.)
- Operating Pond: El. 5,104.5 ft. (currently fluctuates between El. 5,103.5 and 5,105 ft.)
- Environmental Design Storm (EDS) Storage: El. 5,104.5 to 5,106.5 ft.
- Inflow Design Flood (IDF) Storge and Conveyance: El. 5,106.5 to 5,109 ft.
- Wave Run-up Protection: El. 5,109 to 5,111 ft.

The tailings basin is lined with a 100 mil HDPE geomembrane to minimize seepage from the tailings basin. The geomembrane is installed over a 12 oz./yd^2 non-woven geotextile cushion layer.

TABLE 2.1

STILLWATER MINING COMPANY
STILLWATER MINE

NYE TAILINGS IMPOUNDMENT - TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
DESIGN BASIS AND OPERATING CRITERIA

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Item		Design Criteria
1.0 General Design Criteria		
1.1	Codes and Standards	• MCA, ASTM, AASHTO, ACI, ANSI, MSHA, OSHA, UBC and related codes
1.2	Site Elevation	• Approximately 4,970 to 5,130 ft.
1.3	Meteorological Parameters	• Average Annual Precipitation = 16.8 inches (approx. 15-20% as snow)
		• Annual Evaporation = 24 inches (estimate)
		• Mean Annual Temp = 47 degrees F
		• 1 in 25 year 24-hour rainfall = 3.9 inches
		• 1 in 100 year 24-hour rainfall = 5.7 inches
		• 1 in 200 year 24-hour rainfall = 6.9 inches
		• 24-hour Probable Maximum Precipitation (PMP) = 29 in.
1.4	Hazard Classification and Design Storm	• Extreme (MCA)
		• Inflow Design Flood (IDF) = 36 in. (PMP plus 7 in. equivalent precip from snowmelt)
		• Design Storm: 72-Hour Probable Maximum Flood (PMF)
1.5	Seismic Design	• 1 in 10,000 year event (larger than Maximum Credible Earthquake)
		• Peak Ground Acceleration (PGA) for 1 in 10,000 year event = 0.34g
		• Site class B/C conditions with an earthquake magnitude of 7.5
2.0 Tailings Production		
2.1	Tailings Production Information	• Approximately 50% of the total tailings production will report to the Hertzler Tailings Impoundment. Tailings discharge to the Nye Impoundment during upset conditions.
		• Design Mill throughput = 3,000 tpd
		• Projected total Mill throughput = 2,450 tpd
2.2	Solids Content of Tailings Stream	• 35% (approximate)
2.3	Tailings Average Dry Density	• 70 pcf
2.4	Tailings Solids Specific Gravity	• 2.67
2.5	Tailings Discharge Pipework	• Tailings discharge pipeline on east side of impoundment
2.6	Water Reclaim and Discharge	• Design reclaim capacity = 1,500 gpm
		• Water discharge pipelines at the north end of the impoundment include the Process Water Overflow, Mine Water Overflow, 5150 Portal drain
		• Other discharge pipelines include overflow from the Water Treatment Plant and Paste Plant
3.0 Tailings Basin		
3.1	Storage Capacity	• 4.1 million cubic yards
3.2	Operating Pond Volume	• Minimal pond volume maintain to manage fugitive dust emissions
		• Current operating pond volume is less than 5 million gallons
3.3	Design Freeboard	• During operations the total freeboard is 6.5 ft. including the following: o Environmental Design Storm (EDS) Storage: El. 5,104.5 to 5,106.5 ft. (1 in 100 year 24-hour rainfall) o IDF Storage and Conveyance: El. 5,106.5 to 5,109 ft. o Approximately 2 ft. for wave run up protection, Containment Berm El. 5,109 to 5,111 ft.
3.4	Lining System	• The entire basin is lined with a 100-mil HDPE liner, liner installed to between El. 5,108 to 5,110 ft. An 8-inch thick layer of liner bedding materials was placed on upstream face of the embankment prior to liner installation.
		• Liner protection layer for Interim Cap increased minimum liner (GCL) elevation to 5,109 ft.
4.0 Tailings Embankment		
4.1	Embankment Crest Width	• Approximately 30 ft. (minimum)
4.2	Embankment Height (Max.)	• Design Max. 5,111; however embankment has a minimum elevation of 5,108 ft.
4.3	Embankment Slopes	• Downstream fill slope: Typical 1.7H:1V, northeast corner 1.5H:1V and 1.9H:1V for reclaimed slopes. Design 1.7H:1V during operations 2H:1V, final reclamation and closure.
		• Upstream fill slope: 2H:1V, Upstream cut slopes 2H:1V to 3H:1V
4.4	Embankment Fill Material	• Inner zone of sandy gravel borrow material and outer zone of Run-of-Mine waste rock
4.5	Stability Requirements	• The Minimum Acceptable Factors of Safety for each case considered are as follows: o Long-term (full tailings pond) 1.5 o Steady-state Seepage = 1.3 o Seismic loading (pseudo-static) 1.0

I:\1\01\00066\44\A\Report\Nye TOMS Update\Nye TOMS Manual_V1.5\[Table 2.1 - Key Design and Operating Parameters2022-12-22.xlsx]Design Criteria

2.3.4 Seepage Collection System

There is no separate external seepage collection system for the Nye TSF. The 100-mil HDPE geomembrane liner is the primary method for reducing seepage losses from the TSF. Monitoring wells are located downstream of the TSF which could be utilized to pump collected seepage back to the Nye TSF, if required. Additional collection wells could also be installed downgradient of the TSF.

2.3.5 Tailings Discharge and Management

Tailings are discharged periodically to the TSF from both the Concentrator and the Paste Plant. The HDPE discharge pipelines are located on the west side of the impoundment.

The tailings slurry flow is monitored at both ends of the pipeline system. Visual monitoring of the tailings slurry flow is carried out at the Nye TSF. Emergency shutoffs for the tailings discharge pipelines are located in the concentrator and Paste Plant.

2.3.6 Water Reclaim and Discharge

Supernatant water is recycled to the Concentrator through an inclined pump and HDPE reclaim pipeline located at the north end of the impoundment. The reclaim pipeline can also be used to transfer water to the Hertzler TSF, if required. Periodic water discharges to the Nye TSF include overflow from the water treatment system, process water overflow from the concentrator, mine water overflow and drain water from the west side portals. The HDPE pipeline for the water treatment system is located on the west side of the impoundment and the other HDPE discharge pipelines are located at the north end of the TSF.

2.4 Water Management

2.4.1 General

The Nye TSF is operated as a zero discharge facility and all tailings water and basin runoff is recycled. Water is recycled back to Concentrator via the reclaim system.

An Overflow Swale has been installed as part of the Interim Cap construction to convey the Inflow Design Flood (IDF) resulting from the 24-hour probable maximum precipitation plus snowmelt.

There is an upstream catchment area located adjacent to the west side of the TSF. Runoff from this catchment area is directed away from the TSF via a ditch and diversion berm.

Other surface water management measures for the facility include ditches and sedimentation basins located along the access roads and adjacent areas.

2.4.2 Water Balance

The water balance for the Nye TSF is maintained by Stillwater. The water balance is updated on a regular basis to reflect the operating conditions. The following data is pertinent to the operation of the TSF and is tracked and included as part of the water balance:

- Tailings throughput and process water volumes delivered to the TSF
- Reclaim water volumes recycled to the concentrator
- Water volumes from the water treatment system overflow, mine water overflow, process water overflow
- Meteorological data

2.5 CLOSURE PLAN

Per the approved plan (DEQ and USFS, 2012) reclamation of disturbed areas at the Nye TSF is being carried out during operations to the maximum extent practicable. The objectives of the reclamation plan are to cap the facility which will stabilize disturbed areas to prevent soil loss, minimize visual impacts, and prevent air and water pollution. Final reclamation of the Nye TSF will generally include the following:

- **Dewatering -** The supernatant pond will be removed from the facility via the reclaim water system. The water will be used as process water in the concentrator and/or transferred to the Hertzler TSF.
- **Capping -** The TSF will be capped with at least 24 inches of waste rock or borrow material, then covered with at least 8 inches of surface soil or borrow material.
- **Re-contouring -** The downstream embankment will be flattened to 2H:1V for final reclamation.
- **Revegetation -** Revegetation measures will include seedbed preparation and seeding with approved seed mixes in the upper soil layer of the capping layer.

Additional information on the reclamation of the TSF is presented in the Consolidated Operations and Reclamation Plan (DEQ and USFS, 2012). The reclamation plan is structured to meet the requirements of the Montana Metal Mine Reclamation Act.

3.0 OPERATIONS, MAINTENANCE AND SURVEILLANCE

3.1 INTRODUCTION

The Nye TSF consists of several components and associated facilities as shown on Figure 2.2. These components and facilities must be inspected and maintained regularly to ensure that any changes to the conditions, performance, or any potentially hazardous condition can be identified and promptly addressed. Selected photographs of the facility and associated components are included in Appendix D. Inspection and surveillance schedules are provided in Appendix C1.

The Concentrator Manager is responsible for ensuring that surveillance is carried out regularly. The Surface Supervisor is responsible for daily management of the TSF and directs the surface crew to carry out routine activities. The roles and responsibilities for the inspections are summarized in Section 1.2 of this TOMS Manual.

Routine inspections of the Nye TSF will be completed by the Surface Supervisor, Environmental Specialists, Concentrator Manager and Environmental Sustainability Manager as per Table C1.1 (Appendix C):

Inspection reports should be reviewed by the Concentrator Manager and stored in the Stillwater's electronic filing system.

Additional (non-routine) inspections may be required as outlined following any unusual event or observation (e.g., earthquake or extreme rainfall event). A summary of the recommended actions following an unusual event are outlined in Appendix C2.

If an inspection is performed by the EOR following an unusual event or observation, and corrective actions are identified by the EOR, the same procedural framework outlined in Section 4.1 for an annual inspection will be followed for preparing, submitting and implementing the corrective action plan and schedule.

The Concentrator Manager and the Environmental Supervisor must be made aware of any unusual events or observations and must contact the EOR as required. Typical examples of unusual events and observations to be made during such walkovers are outlined in Appendix C2.

Inspection forms are provided in Appendix C3 to help guide the observation and surveillance process. The inspection forms cover major items related the TSF and associated facilities.

Copies of completed inspection forms, data sheets and field notes must be provided to, and kept in Stillwater's electronic filing system by the Environmental Compliance Manager. Any unusual observations must be reported to the Concentrator Manager and Environmental Compliance Manager immediately and will be responded to in accordance to the appropriate response level outlined in Section 5.3.

Additional details for each component of the facility are provided in the following sections.

The operation, maintenance and surveillance of the TSF is based on the use of current technologies. It is recognized that technology is evolving and other technologies should be considered as part of the future monitoring for the TSF. Several technologies that should be considered as part of future monitoring include:

- Landsat images to track tailings pond water volumes and construction progress over months and years, both for ongoing monitoring and for forensic evaluation
- Land-based time-lapse photography to document construction
- Unmanned aerial vehicles (UAVs or drones) to collect high-resolution imagery, LiDAR or Photogrammetry surveys to collect detailed topographic data on a regular basis
- Real-time and continuous record keeping

3.2 TAILINGS EMBANKMENTS

3.2.1 OVERVIEW

The tailings embankments are constructed of glacial materials and ROM rockfill using the downstream construction method as described in Section 2.3.2. Seven survey monuments are installed on the North and East Embankment crests. Global Positioning System (GPS) monitoring units are installed on the survey monuments. The GPS monitoring units are programmed to collect approximately hourly readings. An annual survey of the embankment crest should be completed by Stillwater for comparison with the existing embankment survey. This survey could be completed using conventional surveying methods or using a drone or other technology. Three slope inclinometers are located along the downstream toe of the east and north embankments to monitor for potential movement in the embankment foundation. Four slope inclinometers are installed in the north and east embankments in 2019 and 2020.. Vibrating wire piezometers (VWPs) are installed at the base of each slope inclinometer to monitor the phreatic surface in the embankment foundation. Monitoring requirements for instrumentation are summarized in Section 3.7.

3.2.2 SURVEILLANCE AND MAINTENANCE

Regular surveillance of the embankments and associated structures should follow the schedule outlined in Appendix C1. Inspection forms are provided in Appendix C3. Typical observations to be made during surveillance include:

- Evidence indicating dam structure deformation (e.g. slope bulging, cracks on the crest or crest settlement)
- Evidence indicating seepage, runoff or erosion
- Possible evidence suggesting internal erosion (piping) within the embankments (wet spots, seepage, etc.)
- Other unusual conditions in the impoundment area

The embankments and associated structures do not require regular maintenance; however, specific maintenance items may be identified because of regular observations and surveillance of the embankments. Maintenance items may include:

- Fill erosion gullies with properly compacted soil material. Seed or riprap repaired area to stabilize against future erosion.
- Maintain grass cover by spraying weeds, fertilizing and watering as needed.
- Maintain grading of the embankment crests to prevent potholes, rutting or other potential for standing water to accumulate.
- Maintain fences to provide site security and to exclude livestock from the embankments. Repair and revegetate damaged embankment surfaces.
- Perform regular inspections of the embankments and abutments to identify potential maintenance items.
- Maintain berms around the facility for wave run-up protection and worker safety.
- Maintain storm water control structures and practices.

Additional inspections are required after any unusual event. Appendix C2 outlines additional observations that will need to be documented. Appropriate repairs to the TSF will be implemented should any damage occur from an unusual event.

3.3 TAILINGS BASIN

3.3.1 OPERATIONAL OBJECTIVES

The minimum freeboard requirement for the impoundment during operations is 4.5 ft. plus a 2 ft. berm which includes management of the IDF and a dry freeboard allowance of 2 ft. for wave run-up. The maximum operating level is El. 5,104.5 ft.

Water and tailings discharge is to cease if the pond level exceeds the maximum operating level. Removal of water from the pond will commence using the water reclaim system. There are no restrictions on the rate of filling or on the rate of drawdown for the supernatant pond with respect to dam safety.

The tailings basin is lined with a geosynthetic lining system. Surveillance and maintenance for the tailings basin filling and geosynthetic lining system is required as part of the operation of the tailings basin.

3.3.2 SURVEILLANCE AND MAINTENANCE

The pond level must be below El. 5,104.5 ft. during normal operating conditions. Emergency procedures discussed in Section 5 must be followed if the pond exceeds the EDS storage level at El. 5106.5 ft. Regular inspections of the pond level must be carried out as part of the routine inspections according to the schedule outlined in Appendix C1 and the pond elevation should be recorded on a monthly basis. Inspection forms are included in Appendix C3.

Additional pond level inspections are required after an unusual event. The additional inspections are summarized in Appendix C2.

Maintaining the integrity of the geosynthetic lining system is integral for the safe operation of the TSF to minimize seepage from the TSF over the long-term. Inspection of the geomembrane should be completed as part of the routine quarterly inspections according to the schedule outlined in Appendix C1. An inspection log is provided in Appendix C3. Typical observations to be made for the geosynthetics lining system during surveillance include:

- Identification of defects in the geomembrane such as tears and holes
- Damage or degradation to geomembrane as a result of environmental exposure (e.g. ice, wind, UV damage, etc.)
- Identification of excess tension and trampolining in the geomembrane

Any defects or damage to the geomembrane must be repaired by a qualified third party geosynthetics installer. SMC contracts a third party geosynthetics installer to complete a detailed inspection of the HDPE geomembrane semi-annually.

3.4 TAILINGS DELIVERY SYSTEM

3.4.1 OPERATIONAL OBJECTIVES

Tailings slurry is pumped from the concentrator to the Nye TSF on an as-needed basis. The components of the tailings delivery system are described in Section 2.3.5. Tailings are delivered and discharged into the north and/or west sides of the TSF.

The tailings slurry is periodically pumped to the TSF from both the Concentrator and/or the Paste Plant as described in Section 2.3.5.

3.4.2 Surveillance and Maintenance

The tailings discharge pipelines do not require significant external adjustments during normal operations. The following are key points for the operation of the tailings discharge pipelines:

- Do not close all of the valves along the tailings discharge pipeline as they may be permanently blocked from sanding or suffer damage from excessively high pressures
- Ensure that there is an open pathway for tailings to exit the pipeline before switching tailings lines or after any spigots are relocated
- Flush the pipeline with water prior to shut down or relocation

The tailings discharge pipelines will be inspected and maintained regularly to ensure that the system operates properly. The tailings discharge locations are noted during the routine inspections. Appendix C1 provides a schedule for regular surveillance of the tailings delivery system. Inspection forms are provided in Appendix C3. Surveillance observations include:

- Locations of excessive wear of the pipeline
- Any evidence indicating leakage from the pipeline
- Wear at the bends on the butt-welded joints in the section of the pipeline installed on surface at the TSF
- Identification of pipe sections that are worn and require replacement

Additional inspections are required after an unusual event. Appendix C2 outlines additional observations that will need to be documented. Repairs to the system may be required after any unusual event.

3.5 Water Reclaim and Discharge

3.5.1 Operational Objectives

Supernatant water is recycled from the Nye TSF to the Concentrator head tank for use as process water. Several pipelines periodically discharge water into the TSF. The components of the water reclaim and discharge systems are described in Section 2.3.7. The water reclaim and discharge pipelines do not require any external adjustments during normal operations.

3.5.2 Surveillance and Maintenance

The water reclaim pipelines shall be inspected according to the schedule outlined in Appendix C1 and an inspection log will be completed as provided in Appendix C3. Typical items to inspect during surveillance of the pipelines include:

- Flow rates
- Locations of excessive wear of the pipeline
- Any evidence indicating leakage from the pipeline
- Monitor supernatant pond and reclaim pump elevations
- Monitor the tailings surface elevation adjacent to the reclaim pumps
- Ice buildup around the pumps and pipelines during freezing conditions

Additional inspections are required after any unusual event. Appendix C2 outlines additional observations that must be documented.

3.6 INSTRUMENTATION

3.6.1 OPERATIONAL OBJECTIVES

Instrumentation is installed to assist with the monitoring of the TSF in order to evaluate compliance with design objectives. The instrumentation includes the following:

- Survey Monuments located on the embankment crest to measure vertical and lateral movement of the embankment.
- Slope Inclinometers at the downstream toe of the embankment to monitor potential movement in the foundation.
- Slope Inclinometers within the embankment crest to monitor potential movement in the embankment and foundation.
- Groundwater monitoring wells to monitor water levels and quality downstream of the TSF. Water quality is monitored and reported separately by Stillwater's Environmental Department.

The locations of the survey monuments, slope inclinometers and groundwater monitoring wells are shown on Figure 2.2.

3.6.2 SURVEILLANCE AND MAINTENANCE

Instrumentation components are regularly monitored. Instrumentation is connected to and viewable in real-time in GeoExplorer, an instrumentation monitoring software package (NavStar, 2017). The instrumentation data is collected, plotted and reported according to the schedule outlined in Appendix C1. The instrumentation data is reviewed by the EOR on a quarterly basis. The EOR must be notified of any anomalous trends or values above the specified trigger levels. Additional readings and inspections as outlined in Appendix C2 will be required after any unusual event or observation. The survey monuments, slope inclinometers, vibrating wire piezometers locations and associated trigger levels are provided in the QRFG (Appendix A).

The instruments may require occasional maintenance which could include:

- The piezometer wires may need to be cut and re-attached if the readout box is unable to acquire data.
- Piezometer wires that are exposed may become corroded and may need to be trimmed until a fresh surface is exposed to allow readings to be taken.
- Protection of survey monuments from equipment traffic on embankment crest and other disturbances may be required during maintenance work.
- Instrumentation must be maintained according to the manufacturer's instructions.

3.7 SURFACE WATER MANAGEMENT

There is an upstream catchment area located adjacent to the west side of the TSF. Runoff from this catchment area is directed way from the TSF via a ditch and diversion berm. Other surface water management measures for the facility include ditches and sedimentation basins located along the access roads and adjacent areas. The ditches and sedimentation basins are inspected and maintained as part of the Storm Water Pollution Prevention Plan (SWPPP).

4.0 SAFETY INSPECTIONS, REPORTING AND REVIEWS

4.1 QUARTERLY AND ANNUAL INSPECTIONS

Quarterly and Annual inspections of the TSF and associated facilities are required to evaluate current and past performance and to observe potential deficiencies in condition, performance and/or operation. The Environmental Sustainability Manager is responsible for arranging the inspections. The level of dam safety evaluation will be based on detailed observations made by the EOR and/or Deputy EOR and on relevant information on the TSF operations collected by site personnel. Additional reviews may also be required to follow up on reports of unusual events or observations.

The Environmental Sustainability Manager, Concentrator Manager and Environmental Specialist will accompany the EOR during the annual inspection. The EOR will evaluate the safety of the TSF and incorporate a review of the following:

- TOMS Manual
- The availability of all documents pertaining to dam safety on site
- Site surveillance practices
- Changes in relevant regulatory requirements since the last inspection

The EOR will issue an annual inspection report after completing the review. The report will include the following at a minimum:

- Conclusions on the status of the TSF
- Statement indicating completion of recommendations from previous inspections and reviews
- New recommendations if necessary

The annual inspections and reporting for the Nye TSF include the following:

- The EOR shall inspect the TSF annually during operations or as required during closure.
- The EOR prepares a report describing the scope of the inspection and recommended actions for the proper operation and maintenance of the Nye TSF.
- The EOR submits the report to Stillwater and the DEQ and will immediately notify the DEQ and SMC if the facility presents an imminent threat or has the potential for an imminent threat to human health or the environment.

Should the annual inspection report contain recommendations, the following actions will be taken:

- Stillwater will prepare a Corrective Action Plan (CAP) and schedule to guide the implementation of the recommendations made by the EOR.
- Stillwater will submit the CAP and schedule to the EOR.
- The EOR will review the CAP and schedule and verify that the proposed corrective actions are reasonably expected to effectively address the recommendations made in the annual report.

4.2 INDEPENDENT REVIEW

The ITRB completes annual reviews of the TSF as per Stillwater's internal corporate governance document.

4.3 THIRD-PARTY REVIEW

The principle objective of a third party is to ascertain that a dam has an adequate margin of safety, based on the current engineering practice and updated design input data. A third-party review may also be carried out to address a specific problem.

A third-party qualified engineer will be responsible for conducting the review at the Nye TSF. The engineer conducting the review must be qualified to conduct safety evaluations and be familiar with designs and other site-specific conditions and requirements pertaining to the operation of the TSF and associated facilities; but ideally should not have been involved in the design, construction or operations of the TSF.

A third-party review at the Nye TSF will be carried out every 5 years and this scheduling requirement will be confirmed or revised at the time of each annual inspection. The next review scheduled for the Nye TSF is in 2025, as a third-party review was completed in 2020.

5.0 EMERGENCY PREPAREDNESS AND RESPONSE PLAN

5.1 GENERAL

An Emergency Preparedness Plan (EPP) (Stillwater, 2022b) has been developed to enable SMC to

- Identify emergency and hazardous conditions threatening the facility
- Expedite effective response actions to prevent failure
- Reduce loss of life, minimize property damage, and protect the environment, should failure occur

In the event that SMC is unable to comply with any of the terms and conditions of the operating permit, due to any cause, SMC will:

- Immediately notify the DEQ of the failure to comply
- Immediately take action to stop, contain, and clean up unauthorized discharges or otherwise stop the non-compliance immediately
- Submit a detailed written report to the DEQ within thirty (30) days (5 days for upsets and bypasses), unless requested earlier by the DEQ. The report will contain a description of the non-compliance, including exact dates and times if the non-compliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent recurrence of the non-compliance.

5.2 FAILURE MODES AND EFFECTS ANALYSIS

A high level Failure Modes and Effects Analysis (FMEA) was completed for the TSF to inform the dam breach assessment that was completed to support the development of the EPP.

Credible failure modes that have been identified for Nye TSF are related to a breach in the facility that would lead to a release of water and tailings solids. These failure modes are related to hypothetical structural, foundation and/or erosional failures.

Therefore, SMC has developed an EPP for the scenario of a hypothetical failure of either the Nye or Hertzler TSF that would result in a flash flood downstream of the facilities due to a release of water and tailings solids. A breach analysis has been completed for the Nye TSF to estimate the downstream flood inundation zone. In turn, this identified the residences and roads that are at risk downstream of the TSF. The Nye TSF breach analysis is incorporated into the EPP (Stillwater, 2022b).

The Nye TSF has been classified as having a High Hazard Potential (U.S. Army Corps of Engineers). The hypothetical failure modes and the factors that would contribute to a breach have been taken into consideration in determining the potential extent of the downstream flood inundation zone.

5.3 EMERGENCY CONDITIONS

The EPP (Stillwater, 2022b) should be referred to if emergency conditions are expected or have been identified. Three levels of emergency conditions (or warning signs) can be identified with respect to the site operations. These are defined as follows:

- **Level 1 -** Conditions that represent a potential emergency are those that if sustained or allowed to progress may result in an emergency, but no emergency situation is imminent.
- **Level 2 -** An emergency condition is defined by either failure of a significant component of the TSF and/or associated facility, or a significant failure of the performance of a component of the TSF. Such failure may have already occurred or be imminent.

For each level of emergency condition, the EPP identifies subsequent response and/or corrective actions, including emergency notification contacts.

6.0 REFERENCES

Montana Department of Environmental Quality and United States Dept. of Agriculture, Forest Service (DEQ and USFS), 2012. *Record of Decision for the Final Environmental Impact Statement for the Stillwater Mining Company's Revised Water Management Plans and Boe Ranch LAD*.

NavStar Geomatics Ltd. (NavStar), 2017. *GeoExplorer* 6. Version 2.4.0.0. Kelowna, British Columbia.

Sibanye Stillwater (Stillwater), 2022a *Hertzler Tailings Storage Facility - Tailings Operations, Maintenance and Surveillance (TOMS) Manual*. December 22. Nye, Montana, V1.5.

Sibanye Stillwater (Stillwater), 2022b. *Tailings Storage Facilities - Emergency Preparedness Plan (EPP)*. December 23. Nye, Montana, V1.4.

State of Montana (MT), 2019. *Montana Code Annotated (MCA) 2017*. Title 82. Minerals, Oil, and Gas. Chapter 4. Reclamation. Part 3. Metal Mine Reclamation.

7.0 CERTIFICATION

This report was prepared and reviewed by the undersigned.

We hereby certify that the following:

- This TOMS Manual is consistent with the design of the Nye TSF;
- The inspections and monitoring described in this TOMS Manual are reasonably sufficient to ensure the Nye TSF will perform as intended and will reasonably be expected to detect deviations if they occur; and
- The Emergency Preparedness Plan (EPP) describes reasonable measures that can be taken to protect human health and the environment.

Prepared:

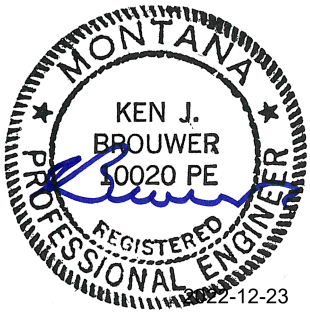
Craig N. Hall, P.Eng.
Knight Piésold Ltd. - Managing Principal
Deputy Engineer of Record for Nye Tailings Storage Facility

Reviewed:

Matt Wolfe
Environmental Sustainability Manager - US Region

The Engineer of Record has reviewed this manual and hereby certifies the following:

- This TOMS Manual is consistent with the design of the Nye TSF;
- The inspections and monitoring described in this TOMS Manual are reasonably sufficient to ensure the Nye TSF will perform as intended and will reasonably be expected to detect deviations if they occur; and
- The Emergency Preparedness Plan (EPP) describes reasonable measures that can be taken to protect human health and the environment.



Reviewed: _____

Ken J. Brouwer, P.E.
Knight Piésold Ltd. – Principal Engineer
Engineer of Record for Nye Tailings Storage Facility

Appendix A
Quick Reference Field Guide

(Pages A-1 to A-8)

APPENDIX A
QUICK REFERENCE FIELD GUIDE

1.0 INTRODUCTION

This Quick Reference Field Guide (QRFG) provides a concise summary of key information for the operation, monitoring and surveillance of the Nye TSF. The Qualitative Performance Parameters (QPPs), instrumentation trigger levels and locations, and tailings and water management details for the tailings impoundment area summarized below.

2.0 QUANTITATIVE PERFORMANCE PARAMETERS

QPPs represent measurable parameters to confirm that the tailings impoundment is being operated in accordance with the design intent. The QPPs for the Nye TSF are summarized on Table A.1.

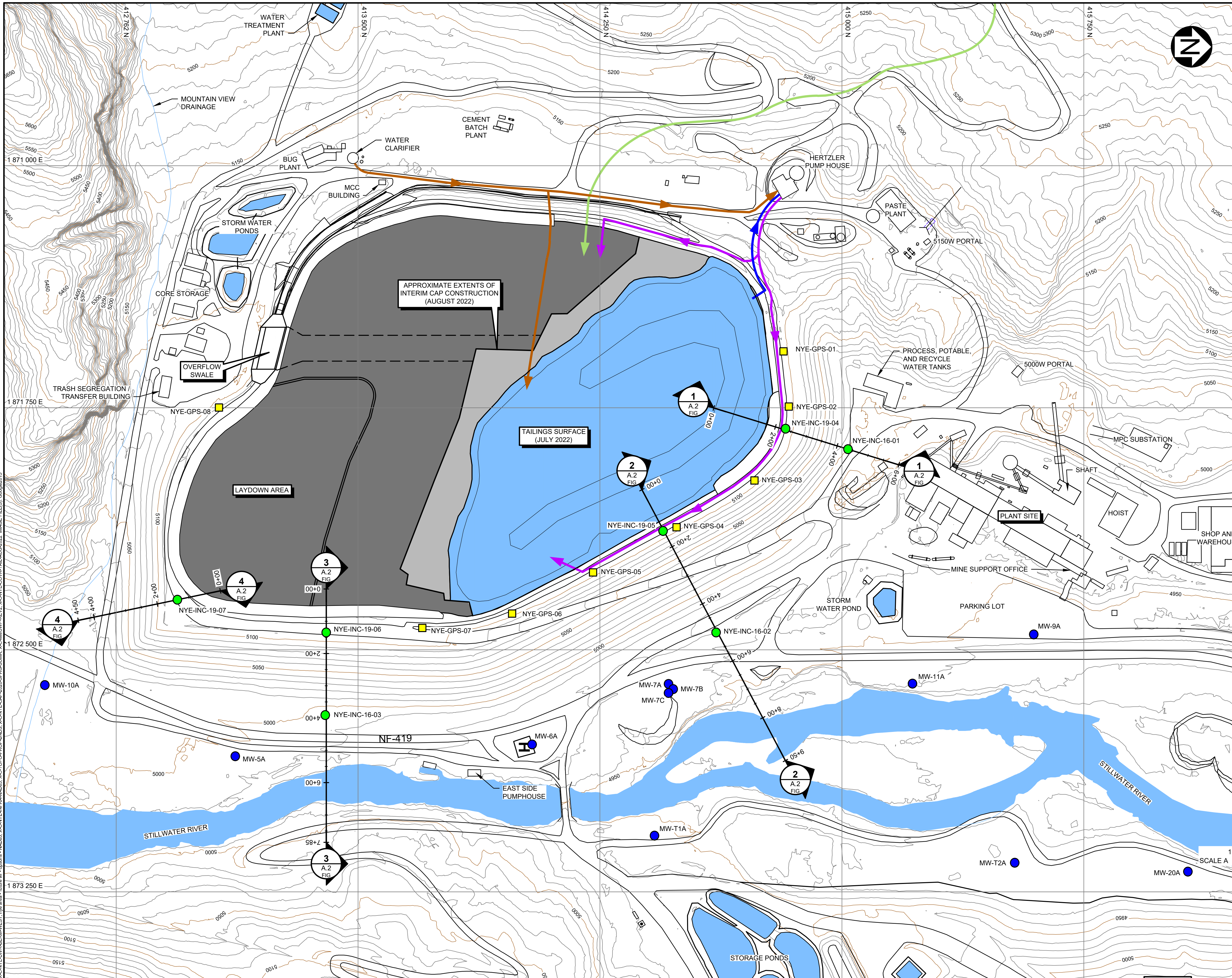
Table A.1 Nye TSF Quantitative Performance Parameters

Parameter	Value
Crest Elevation	5,108 ft. to 5,111 ft.
Minimum Freeboard	6 ft. including berm for wave run-up where embankment crest is below El. 5,111 ft.
Maximum Operating Level	5,105 ft.
Crest Width	30 ft.
Embankment Slope Angle	Upstream: 2H:1V to 3H:1V Downstream: 1.7H to 2H:1V
Operating Pond	30 to 35 M gal

3.0 INSTRUMENTATION

Instrumentation has been installed in the Nye TSF to monitor the performance of the embankment. The embankment survey monuments, embankment slope inclinometers and select vibrating wire piezometers (VWPs) are designated as QPPs for monitoring the performance of the Tailings Impoundment. The QPPs specify a displacement trigger level for the survey monuments and slope inclinometers and a piezometric trigger elevation for the piezometers. If trigger levels for the survey monuments, slope inclinometers and piezometers are reached, appropriate notifications are provided, and Unusual Occurrence monitoring and reporting is triggered The instrumentation locations for the tailings impoundment are shown in Figure A.1. The slope inclinometer sections are illustrated on Figure A.2. Instrumentation trigger levels are summarized on Tables A.2 to A.4.

If an instrumentation trigger level is exceeded, inspections of the embankment crest and slopes are required to be completed to determine if indications of displacement such as cracking, sloughing, slumping or seepage are present. If no indications of displacement or adverse operating conditions are observed, the inspection observations should be documented and the instrumentation should continue to be monitored. If indications of displacement or adverse operating conditions are observed, refer to the Emergency Preparedness Plan (EPP) (Stillwater, 2022b) and contact the Engineer of Record (EOR).



SCALE A: 150 0 150 300 450 600 750 ft.

LEGEND:

- WATER
- TAILINGS
- INTERIM CAP (EL. 5,106 ft. MIN)
- ROAD
- RIVER/STREAM/DRAINAGE
- TAILINGS DELIVERY PIPELINE
- RECLAIM WATER PIPELINE
- 5300W PORTAL DRAINAGE PIPELINE
- CLARIFIER UNDERFLOW PIPELINE
- BUILDING / TANK / PAD
- SLOPE INCLINOMETER LOCATION
- MONITORING WELL
- SURVEY MONUMENTS

NOTES:

1. HORIZONTAL DATUM IS MONTANA COORDINATE SYSTEM, SINGLE ZONE, NAD83. UNITS ARE IN INTERNATIONAL SURVEY FEET.
2. CONTOURS ARE IN FEET. CONTOUR INTERVAL IS 10 FEET.
3. MONITORING WELL LOCATIONS PROVIDED BY SIBANYE STILLWATER.
4. DETAILED TOPOGRAPHICAL DATA BASED ON USGS LIDAR COMBINED WITH LOCAL DRONE SURVEYS PROVIDED BY SIBANYE STILLWATER (2015-2022).
5. JULY 2022 BATHYMETRIC SURVEY PROVIDED BY SIBANYE STILLWATER.

SIBANYE STILLWATER

STILLWATER MINE

NYE TSF
INSTRUMENTATION LOCATIONS AND PIPEWORK

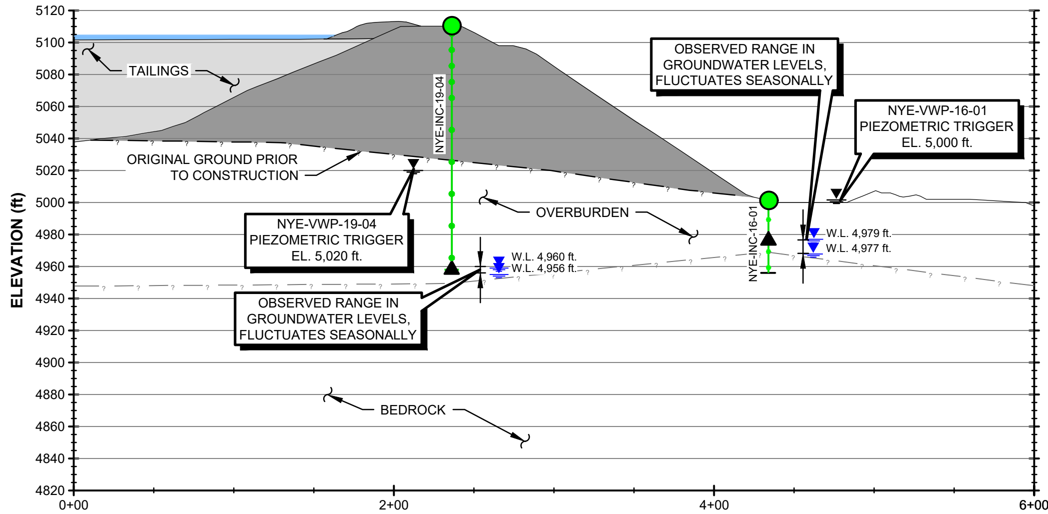
Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-66/44	NB22-01398

FIGURE A.1 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	23DEC'22	ISSUED FOR INFORMATION	CNH	MMD	KJB

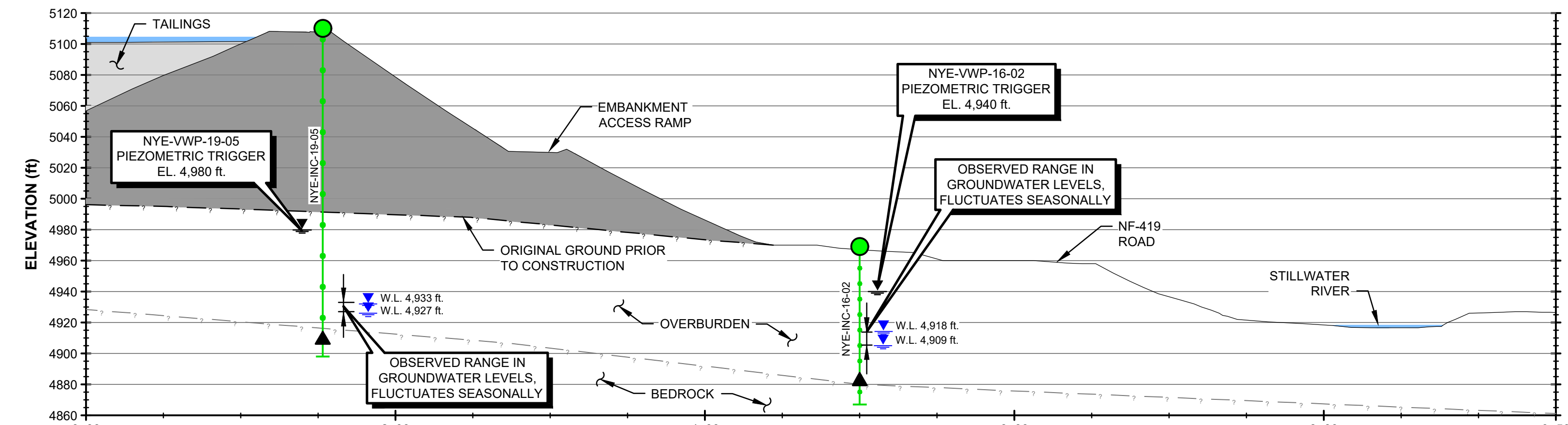
SAVED: I:\1\01\00066\44\A\Acad\FIGS\B14 R0, 12/22/2022 2:54:23 PM, MDEMERS PRINTED: 12/22/2022 2:56:16 PM, PLAN, MDEMERS ACAD VERSION: 24.2S (LMS TECH)



1 SECTION - NORTH EMBANKMENT

NYE-INC-19-04, NYE-INC-16-01

SCALE A



2 SECTION - NORTHEAST EMBANKMENT

NYE-INC-19-05, NYE-INC-16-02

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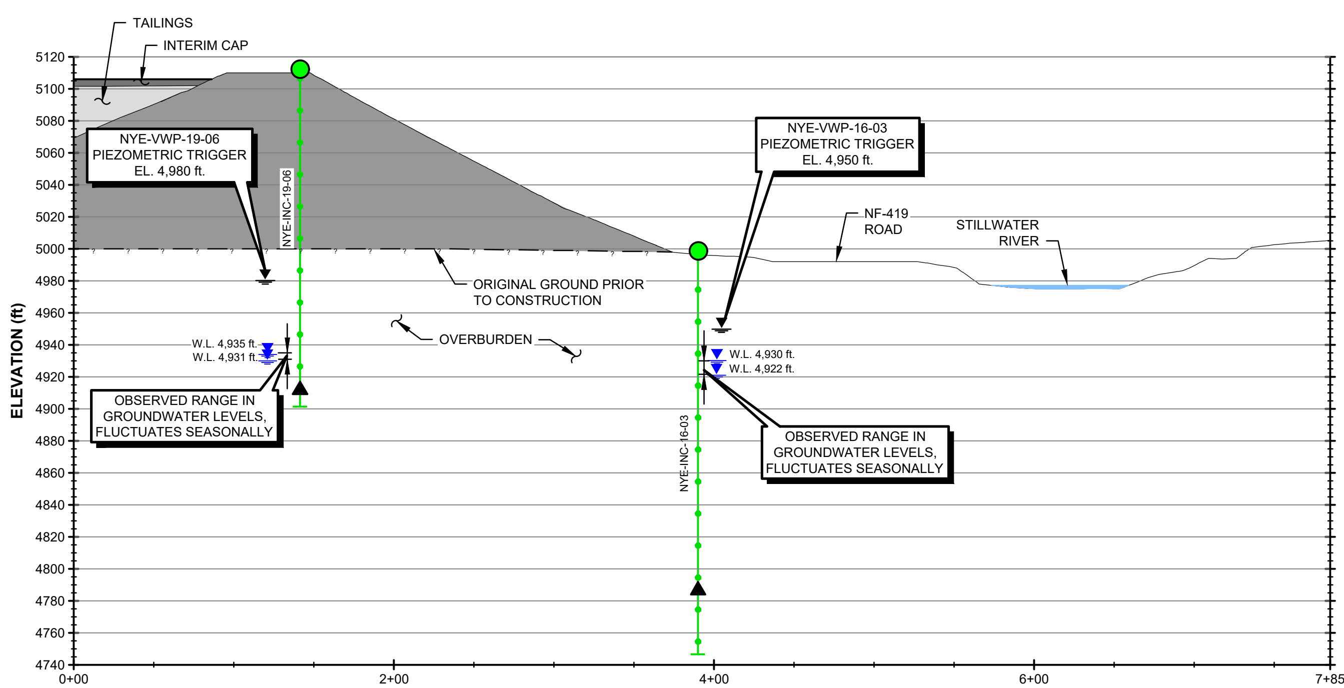

3 SECTION - EAST EMBANKMENT

NYE-INC-19-06, NYE-INC-16-03

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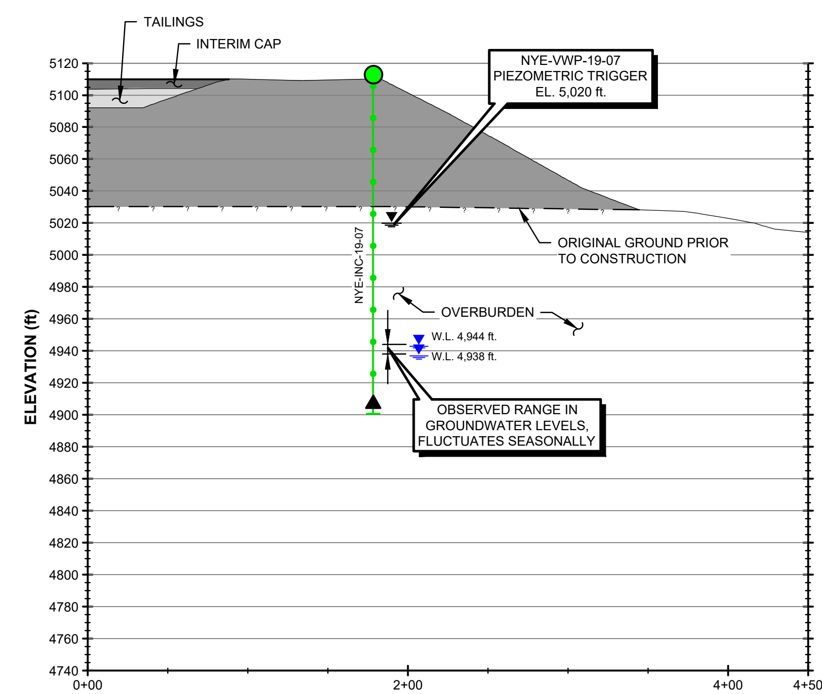

4 SECTION - SOUTHEAST EMBANKMENT CORNER

NYE-INC-19-07

SCALE A

LEGEND:

- TAILINGS
- EMBANKMENT FILL
- CLOSURE CAP (EL. 5,106 ft. MIN)
- EXISTING GROUND SURFACE
- ASSUMED ORIGINAL GROUND PRIOR TO CONSTRUCTION
- INFERRED BEDROCK (APPROXIMATE ONLY)
- SLOPE INCLINOMETER LOCATION
- TILTMETER SENSOR LOCATION
- VIBRATING WIRE PIEZOMETER LOCATION

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE IN FEET, UNLESS NOTED OTHERWISE.

SCALE A: 50 0 50 100 150 200 250 300 ft

SIBANYE STILLWATER

STILLWATER MINE

NYE TSF
SLOPE INCLINOMETER SECTIONS

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-66/44	NB22-01398

FIGURE A.2 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	23DEC'22	ISSUED FOR INFORMATION	CNH	MMD	KJB

SAVED: I:\1\01\00066\44\A\Acad\FIGS\B14 R0, 12/22/2022 2:58:02 PM, MDEMERS PRINTED: 12/22/2022 2:58:59 PM, SECTIONS, MDEMERS ACAD VERSION: 24.2S (LMS TECH)

Table A.2 Survey Monument Trigger Levels

Embankment Survey Monuments	Standard Operations	Level 1 Trigger Level	Level 2 Trigger Level
NYE-GPS-01	24-hour average displacement (ΔEl, ΔN, ΔE) < 0.7 in. (25 mm) and Three consecutive 3D displacement readings < 2 in. (50 mm)	24-hour average displacement (ΔEl, ΔN, ΔE) > 0.7 in. (25 mm) or Three consecutive 3D displacement readings > 2 in. (50 mm)	N/A
NYE-GPS-02			
NYE-GPS-03			
NYE-GPS-04			
NYE-GPS-05			
NYE-GPS-06			
NYE-GPS-07			
NYE-GPS-08			
Monitoring and Reporting Requirements	Regular Instrumentation Monitoring and Reporting	Increase Monitoring Frequency, Inspect Survey Monument and Embankment and Complete Unusual Condition Report	N/A

Table A.3 Slope Inclinometer Trigger Levels

Embankment Slope Inclinometers	Standard Operations	Level 1 Trigger Level > 0.4 in. (10 mm) [1]	Level 2 Trigger Level > 1.0 in. (25 mm) [1]
NYE-IPI-16-01-01	<0.188 Degrees Displacement	>0.188 Degrees Displacement	>0.47 Degrees Displacement
NYE-IPI-16-01-02			
NYE-IPI-16-01-03			
NYE-IPI-16-01-04			
NYE-IPI-16-02-01	<0.188 Degrees Displacement	>0.188 Degrees Displacement	>0.47 Degrees Displacement
NYE-IPI-16-02-02			
NYE-IPI-16-02-03			
NYE-IPI-16-02-04			
NYE-IPI-16-02-05			
NYE-IPI-16-02-06			

Embankment Slope Inclinometers	Standard Operations	Level 1 Trigger Level > 0.4 in. (10 mm) [1]	Level 2 Trigger Level > 1.0 in. (25 mm) [1]
NYE-IPI-16-02-07			
NYE-IPI-16-02-08			
NYE-IPI-16-02-09			
NYE-IPI-16-03-01	<0.094 Degrees Displacement	>0.094 Degrees Displacement	>0.235 Degrees Displacement
NYE-IPI-16-03-02			
NYE-IPI-16-03-03			
NYE-IPI-16-03-04			
NYE-IPI-16-03-05			
NYE-IPI-16-03-06			
NYE-IPI-16-03-07			
NYE-IPI-16-03-08			
NYE-IPI-16-03-09			
NYE-IPI-16-03-10			
NYE-IPI-16-03-11			
NYE-IPI-16-03-12			
NYE-IPI-19-04-01	<0.188 Degrees Displacement	>0.188 Degrees Displacement	>0.47 Degrees Displacement
NYE-IPI-19-04-02			
NYE-IPI-19-04-03			
NYE-IPI-19-04-04			
NYE-IPI-19-04-05	<0.094 Degrees Displacement	>0.094 Degrees Displacement	>0.235 Degrees Displacement
NYE-IPI-19-04-06			
NYE-IPI-19-04-07			
NYE-IPI-19-04-08			
NYE-IPI-19-04-09			
NYE-IPI-19-04-10			

Embankment Slope Inclinometers	Standard Operations	Level 1 Trigger Level > 0.4 in. (10 mm) [1]	Level 2 Trigger Level > 1.0 in. (25 mm) [1]
NYE-IPI-19-05-01	<0.094 Degrees Displacement	>0.094 Degrees Displacement	>0.235 Degrees Displacement
NYE-IPI-19-05-02			
NYE-IPI-19-05-03			
NYE-IPI-19-05-04			
NYE-IPI-19-05-05			
NYE-IPI-19-05-06			
NYE-IPI-19-05-07			
NYE-IPI-19-05-08			
NYE-IPI-19-05-09			
NYE-IPI-19-05-10			
NYE-IPI-19-06-01	<0.094 Degrees Displacement	>0.094 Degrees Displacement	>0.235 Degrees Displacement
NYE-IPI-19-06-02			
NYE-IPI-19-06-03			
NYE-IPI-19-06-04			
NYE-IPI-19-06-05			
NYE-IPI-19-06-06			
NYE-IPI-19-06-07			
NYE-IPI-19-06-08			
NYE-IPI-19-06-09			
NYE-IPI-19-06-10			
NYE-IPI-19-07-01	<0.094 Degrees Displacement	>0.094 Degrees Displacement	>0.235 Degrees Displacement
NYE-IPI-19-07-02			
NYE-IPI-19-07-03			
NYE-IPI-19-07-04			
NYE-IPI-19-07-05			
NYE-IPI-19-07-06			
NYE-IPI-19-07-07			
NYE-IPI-19-07-08			
NYE-IPI-19-07-09			
NYE-IPI-19-07-10			

Embankment Slope Inclinometers	Standard Operations	Level 1 Trigger Level > 0.4 in. (10 mm) [1]	Level 2 Trigger Level > 1.0 in. (25 mm) [1]
Monitoring and Reporting Requirements	Regular Instrumentation Monitoring and Reporting	Level 1 exceedances require daily review of inclinometer readings to be implemented and contingency or remedial measures to be developed if trigger levels continue to be exceeded	Level 2 exceedances require an Unusual Condition investigation and action plan

NOTE:

1. TRIGGER LEVELS WERE CONVERTED TO DEGREES OF DISPLACEMENT FOR USE IN SIBANYE STILLWATER'S MONITORING SYSTEM, GEOEXPLORER. DEGREES OF DISPLACEMENT ARE CALCULATED BASED ON 10 OR 20 FT. TILTMETER SPACING.

Table A.4 Vibrating Wire Piezometers Trigger Levels

Piezometers	Standard Operations	Level 1 Trigger Level	Level 2 Trigger Level
Embankment Slope Inclinometer VWPs [1]			
NYE-VWP-16-01	< 5,000 ft.	> 5,000 ft.	N/A
NYE-VWP-16-02	< 4,940 ft.	> 4,940 ft.	
NYE-VWP-16-03	< 4,950 ft.	> 4,950 ft.	
NYE-VWP-19-04	< 5,000 ft.	> 5,000 ft.	
NYE-VWP-19-05	< 4,980 ft.	> 4,980 ft.	
NYE-VWP-19-06	< 4,980 ft.	> 4,980 ft.	
NYE-VWP-19-07	< 4,940 ft.	> 4,940 ft.	
Monitoring and Reporting Requirements	Regular Instrumentation Monitoring and Reporting	Increase Monitoring Frequency, Review Piezometer Data with precipitation and flow monitoring records to determine reason for exceedance and Complete Unusual Condition Report	N/A

NOTE:

1. MONITORS PHREATIC SURFACE IN THE EMBANKMENT FOUNDATION.

4.0 TAILINGS AND WATER MANAGEMENT

The Nye TSF is operated close to its design capacity. The impoundment is primarily utilized for process water management and tailings slurry is pumped to the tailings impoundment on an as-needed basis. If supernatant pond level exceeds the maximum operating level, supernatant water must be transferred to the Hertzler Tailings Impoundment via the water reclaim system.

Appendix B
References

(Page B-1)

APPENDIX B
REFERENCES

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Appendix C
Inspection and Surveillance

Appendix C1
Inspection and Surveillance Schedule

Appendix C2
Unusual Events and Occurrences Requiring Non-Routine Walkovers

Appendix C3
Inspection Forms

Appendix C1
Inspection and Surveillance Schedule

(Page C1-1)

TABLE C1.1

SIBANYE STILLWATER
STILLWATER MINE

NYE TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
INSPECTION AND SURVEILLANCE SCHEDULE

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Component	Description	Operations	Inspection and Surveillance	Responsible Parties
Tailings Embankment	Perimeter embankment around the impoundment.	Maintain access roads on the embankment crest.	Inspect the embankments **weekly** and look for evidence indicating instability or deformation. Inspect downstream face **weekly** for evidence of seepage, runoff, erosion or piping. Take photographs of the embankments **semi-annually**.	Surface Supervisor Surface Supervisor Environmental Supervisor, Concentrator Manager
Tailings Basin	Process water and tailings solids storage in an HDPE lined basin. Basin underdrain layer to reduce seepage and promote tailings consolidation.	Pond required to store 72 hr PMP event plus provide an additional 3 ft, of freeboard. Maximum operating pond level is 6 ft. below the crest elevation during normal operations. Compare pond levels with design filling schedules. Relocate spigots as necessary to develop the tailings beach around the perimeter of the impoundment.	Record Tailings throughput **daily**. Inspect the tailings discharge location **weekly** and note the approximate extent of beach development in the facility. Inspect the tailings beach **weekly**. Note any sinkholes or excessive beach erosion. Inspect the geomembrane **monthly**. Measure and monitor the pond water levels **weekly**. Take photographs of the pond **semi-annually**. Determine the volume of the supernatant pond annually (prior to winter freeze-up) by sounding the pond depths from a boat.	Surface Supervisor Surface Supervisor Surface Supervisor, Surface Crew Surface Supervisor Surface Supervisor Environmental Supervisor, Concentrator Manager Concentrator Superintendent
Tailings Delivery System	Consists of the tailings delivery pipeline and discharge spigots around perimeter of impoundment.	Ensure that the discharge pipeline is fully flushed prior to relocating any pipework. Ensure that there is always an open path for the tailings to exit during operations and discharge relocation. Keep spigot points downstream of active spigotting sections open to allow the unused pipeline to drain. Maintain non-erosive laminar flow over the tailings beaches.	Inspect the pipeline **weekly** for evidence indicating leakage. Conduct detailed inspections of the tailings pipeline during **pipeline maintenance**. Take photographs of the tailings delivery spigots **semi-annually**. Inspect and measure HDPE inner pipe wall thickness at each vault **every 5 years**.	Surface Supervisor, Surface Crew Concentrator Superintendent Environmental Supervisor, Concentrator Manager Surface Supervisor, Surface Crew
Reclaim Water Pipeline	Consists of the 3 inclined reclaim pumps and pipes, reclaim manifold from tailing impoundment to the mill, reclaim water pipeline and booster pump station adjacent to the mine site.	The inclined pumps and booster pump may be controlled from the Mill control room, or breather panel on the dam crest. Monitor the water and tailings elevation relative to the inclined pump location.	Inspect the pipeline **weekly** for evidence of leakage. Monitor and assess the inclined pump elevation **quarterly** and determine if pumps need to be raised. Conduct detailed inspections of the reclaim pipeline during **pipeline maintenance**. Take photographs of the reclaim pipeline semi-annually. Inspect and measure HDPE inner pipe wall thickness at each vault **every 5 years**.	Surface Supervisor, Surface Crew Surface Supervisor, Surface Crew Surface Supervisor Environmental Supervisor, Concentrator Manager Concentrator Manager, Surface Supervisor
Instrumentation	Includes vibrating wire piezometers, survey monuments, groundwater monitoring wells and slope inclinometers.	Piezometers and slope inclinometers connected to LoggerNet data collection system. Survey monuments transmit data to Navstar monitoring system. Instrumentation data plotted and reviewed on Navstar's GeoExplorer software, SMC's internal monitoring system for slope inclinometers and piezometers. Check condition of instrumentation and complete maintenance as required. Make note of any instrumentation that is not functioning. Follow manufacture's instructions for instrumentation operation. Notify EOR of any anomalous trends in the data.	Review instrumentation data **monthly**. Check condition of instrumentation as required Provide instrumentation data **quarterly** to the EOR for review. Monitor water levels in each groundwater monitoring well and obtain water quality samples as required by permits. Data is compiled by the Environmental Specialist and a reported to the appropriate agencies as required by the permit.	Environmental Specialist Environmental Specialist Environmental Specialist Environmental Specialist

I:\1\01\00066\44\A\Report\Nye TOMS Update\Nye TOMS Manual_V1.5\Appendix C - Inspection and Surveillance\[Table C1.1 - Inspect_Sched-updated format.xlsx]Table C1.1

Appendix C2

Unusual Events and Occurrences Requiring Non-Routine Walkovers

(Page C2-1)

TABLE C2.1

SIBANYE STILLWATER
STILLWATER MINE

NYE TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
UNUSUAL EVENTS AND OCCURRENCES REQUIRING NON-ROUTINE WALKOVERS

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Event/Observation	Recommended Action
Extreme rainfall	Monitor the TSF pond level. Confirm pond level is below the maximum operating level. Monitor the LAD Storage Pond. Confirm pond level is below the maximum operating level. Inspect the TSF embankments for signs of concentrated runoff and erosion. Inspect the TSF embankments for indications of localized slumping or instability. Note areas of saturated or soft ground. Inspect surface water management ditches and sediment ponds along access roads.
Water levels rising in the TSF more than expected and above El. 5,104.5 ft.	Monitor pond levels Weekly. Develop plan to slow or stop the water level rise and draw down the pond (stop tailings deposition, transfer water to the Hertzler TSF and/or underground mine).
Water levels rising in the TSF more than expected and above El. 5,106.5 ft.	Monitor pond levels daily. Initiate plan to slow or stop the water level rise and draw down pond (stop tailings deposition, transfer water to the Hertzler TSF and/or underground mine). Contact the EOR.
Significant earthquake event (See Note 1.)	Read all instrumentation. Follow inspection and reporting procedures if instrumentation readings exceed trigger levels.
Rupture of pipeline at the embankment	Stop pumping tailings to the TSF and stop reclaiming water to the mill. Check the upstream slope and crest for erosion. Take photographs and make notes of exact location and cause (if known) of leak. Contact the EOR.
Significant, rapid erosion of embankment slopes; Sudden seepage break on embankment slope or downstream of embankment in form of continuous seepage or boils	Estimate seepage flow rate. Estimate size of area. Take photographs and make notes of exact location (if known) of erosion. Contact the EOR.
Minor surface erosion on embankment crest and/or slopes	Repair as necessary. Determine the cause of the erosion.
Soft toe condition or minor seepage at the downstream slope or toe	Conduct embankment walkovers daily until the problem is understood and addressed. Monitor seepage development (e.g. clarity, content/quality, extent etc.). Prepare to carry out corrective repairs. Contact the EOR if appropriate.
Extended power failure	Drain the reclaim water and tailings delivery pipelines if power failure occurs during extreme freezing temperatures. Flush the tailings delivery pipelines prior to restarting tailings deposition.
Exceedance of instrumentation trigger levels	Refer to trigger levels in QRFG. Re-check the readings. Continue monitoring daily until readings return to normal. Contact the EOR if appropriate.
Failure of reclaim water and/or Tailings Delivery Pipeline resulting in erosion of the embankment crest	Document and repair as necessary. Monitor water levels daily. Ensure backup pumps are available. Repair or replace failed pumps ASAP.
Tailings Delivery Pipeline blocked	Stop tailings discharge. Flush pipeline with water to clear obstruction. Inspect the pipeline for damages or leaks. Determine the cause or reason for blockage.
Minor cracks developing at the embankment crest or slope	Conduct embankment walkovers daily until the problem is understood and addressed. Monitor crack development (e.g. crack size, extent, etc.). Prepare to carry out corrective repairs. Contact the EOR if appropriate.
Geomembrane damage due to unusual environmental occurrences (ice, wind, erosion damages, etc.)	Document the extent of the geomembrane damage. Identify a repair plan. Contact the Geomembrane Installer to complete the repairs.
Other events/observations	Use judgement, consult your peers.

I:\1\01\00066\44\A\Report\Nye TOMS Update\Nye TOMS Manual_V1.5\Appendix C - Inspection and Surveillance\[Table C2.1 - Nye Unusual Events-updated format.xlsx]Table C2.1

NOTE:

1. A SIGNIFICANT EARTHQUAKE IS DEFINED AS AN EARTHQUAKE THAT COULD POTENTIALLY DISPLACE, DAMAGE OR CAUSE AN EMBANKMENT TO CRACK OR SETTLE, RESULTING IN A LOSS OF STRUCTURAL INTEGRITY OR FREEBOARD. THE OCCURRENCE OF AN EARTHQUAKE GREATER THAN MAGNITUDE 5.0 ON THE RICHTER SCALE WITHIN 60 MILES (100 KILOMETERS) OF THE FACILITY WILL AUTOMATICALLY TRIGGER A LEVEL 1 OR HIGHER CONDITION. ASSESSING AND REPORTING POTENTIAL DAMAGE CAUSED BY AN EARTHQUAKE WILL BE THE REQUIRED REMEDIAL ACTION.

Appendix C3
Inspection Forms

TABLE C3.1

SIBANYE STILLWATER
STILLWATER MINE

NYE TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
WEEKLY TSF INSPECTION
(Surface Supervisor or Surface Crew)

Print Dec-22-22 18:43:11

Inspectors:		**Inspection Date:**	**Inspection Time:**
Name:	**Title:**	**Signature:**	
Name:	**Title:**	**Signature:**	
Weather Conditions	Precipitation (24hr):	Wind Speed:	
	Temperature °F:	Sky: Clear Partly Cloudy Cloudy Overcast	
Samples Collected:	Yes No		

TAILINGS EMBANKMENT			
Crest of Dam	**Condition/Issue/Defect Present (circle one)**		**Comments**
Cracking	Yes	No	
Subsidence, Depressions	Yes	No	
Lateral Deformation	Yes	No	
Standing Water or Wet Areas	Yes	No	
Upstream Slope			
Liner Trampoline (due to potential displacement of underlying subgrade)	Yes	No	
Liner Bulging (due to potential displacement of underlying subgrade)	Yes	No	
Excessive Ice Build-up and/or Snow Accumulation	Yes	No	
Ice Rafting on Geomembrane			
Downstream Slope			
Cracking	Yes	No	
Subsidence	Yes	No	
Bulging, Sliding or Sloughing	Yes	No	
Erosion	Yes	No	
Animal Burrows	Yes	No	
Damp Areas	Yes	No	
Seeps, Soft Areas	Yes	No	

TAILINGS BASIN			
Basin Filling	**Condition/Issue/Defect Present (circle one)**		**Comments**
Tailings Beach Location (sinkholes or excessive erosion)	Yes	No	
Pond Elevation (estimated from marked location (ft.))			
Tailings Beach Development (approx. area)			
Tailings Discharge Location (Spigot No.)			

TAILINGS DELIVERY SYSTEM			
Pipelines	**Condition/Issue/Defect Present (circle one)**		**Comments**
Pipeline Leakage (external inspection)	Yes	No	
Pipeline Damage (external inspection)	Yes	No	
Valves - Conditions/Issues Identified (external inspection)	Yes	No	
Maintenance Activities (repairs and replacements)			

WATER RECLAIM SYSTEM			
Pipelines and Pumps	**Condition/Issue/Defect Present (circle one)**		**Comments**
Pipeline Leakage (external inspection)	Yes	No	
Pipeline Damage (external inspection)	Yes	No	
Valves - Conditions/Issues Identified (external inspection)	Yes	No	
Maintenance Activities (repairs and replacements)			

OTHER	
Other Issues or Observations Identified	**Comments**

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TABLE C3.2

SIBANYE STILLWATER
STILLWATER MINE

NYE TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
MONTHLY TSF INSPECTION
(Surface Supervisor)

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Inspectors:		**Inspection Date:**	**Inspection Time:**
Name:	**Title:**	**Signature:**	
Name:	**Title:**	**Signature:**	
Weather Conditions	Precipitation (24hr):	Wind Speed:	
	Temperature °F:	Sky: Clear Partly Cloudy Cloudy Overcast	
NOTE: Photograph all conditions, issues or defects identified.			
Photos Taken:	Yes No	**Instrumentation Data Collected:**	Yes No
Samples Collected:	Yes No	**Data Collection Sheets Completed:**	Yes No

TAILINGS EMBANKMENT			
Crest of Dam	**Condition/Issue/Defect Present (circle one)**		**Comments**
Cracking	Yes	No	
Subsidence, Depressions	Yes	No	
Lateral Deformation	Yes	No	
Standing Water or Wet Areas	Yes	No	
Excessive Ice Build-up and/or Snow Accumulation	Yes	No	
Upstream Slope			
Liner Trampoline (due to potential displacement of underlying subgrade)	Yes	No	
Liner Bulging (due to potential displacement of underlying subgrade)	Yes	No	
Excessive Ice Build-up and/or Snow Accumulation	Yes	No	
Ice Rafting on Geomembrane			
Downstream Slope			
Cracking	Yes	No	
Subsidence	Yes	No	
Bulging, Sliding or Sloughing	Yes	No	
Erosion	Yes	No	
Animal Burrows	Yes	No	
Damp Areas	Yes	No	
Seeps, Soft Areas	Yes	No	

TAILINGS BASIN			
Basin Filling	**Condition/Issue/Defect Present/Observation (circle one)**		**Comments**
Tailings Beach Location (sinkholes or excessive erosion)	Yes	No	
Freeboard minimum of 6 feet below crest required	Yes	No	
Pond Elevation (estimated from marked location (ft.))			
Tailings Beach Development (approx. area)			
Tailings Discharge Location (Spigot No.)			
Geomembrane			
Defects (holes, tears, ice, wind, uv degradation, etc.)	Yes	No	
Tension/Trampoline	Yes	No	
Areas of Previous Repair			
Concerns or Issues with Conditions	Yes	No	
Basin Underdrain			
Pump Operating	Yes	No	
Sump and Pumphouse (concerns or issues with conditions)	Yes	No	
Clarity of Discharge Water (WTP Sample Port)	Clear Cloudy Dirty		
Excessive Ice Buildup during Freezing Conditions	Yes	No	

TAILINGS DELIVERY SYSTEM			
Pipelines	**Condition/Issue/Defect Present/Observation (circle one)**		**Comments**
Pipeline Leakage (external inspection)	Yes	No	
Pipeline Damage (external inspection)	Yes	No	
Valves - Conditions/Issues Identified (external inspection)	Yes	No	
Spigot Inspection (issue identified)	Yes	No	
Record Spigot Locations (Spigot No.)			
Excessive Ice Buildup during Freezing Conditions	Yes	No	

WATER RECLAIM SYSTEM			
Pipelines and Pumps	**Condition/Issue/Defect Present/Observation (circle one)**		**Comments**
Pipeline Leakage (external inspection)	Yes	No	
Pipeline Damage (external inspection)	Yes	No	
Valves - Conditions/Issues Identified (external inspection)	Yes	No	
Pumps - Conditions/Issues Identified (external inspection)	Yes	No	
Excessive Ice Buildup during Freezing Conditions	Yes	No	

OTHER	
Other Issues or Observations Identified	**Comments**

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TABLE C3.3

SIBANYE STILLWATER
STILLWATER MINE

NYE TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
QUARTERLY TSF INSPECTION
(Environmental Compliance Supervisor or Concentrator Manager)

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Inspectors:		**Inspection Date:**	**Inspection Time:**	
Name:		**Title:**	**Signature:**	
Name:		**Title:**	**Signature:**	
Weather Conditions	Precipitation (24hr):		Wind Speed:	
	Temperature °F:		Sky: Clear Partly Cloudy Cloudy Overcast	
Photos Taken:	Yes No		**Instrumentation Data Collected:**	Yes No
Samples Collected:	Yes No		**Data Collection Sheets Completed:**	Yes No

TAILINGS EMBANKMENT				
Crest of Dam	**Condition/Issue/Defect Present (circle one)**		**Comments**	**Photos Taken**
Cracking	Yes	No		
Subsidence, Depressions	Yes	No		
Lateral Deformation	Yes	No		
Standing Water or Wet Areas	Yes	No		
Excessive Ice Build-up and/or Snow Accumulation	Yes	No		
Upstream Slope				
Liner Trampoline (due to potential displacement of underlying subgrade)	Yes	No		
Liner Bulging (due to potential displacement of underlying subgrade)	Yes	No		
Excessive Ice Build-up and/or Snow Accumulation	Yes	No		
Excessive Ice Build-up and/or Snow Accumulation				
Downstream Slope				
Cracking	Yes	No		
Subsidence	Yes	No		
Bulging, Sliding or Sloughing	Yes	No		
Erosion	Yes	No		
Animal Burrows	Yes	No		
Damp Areas	Yes	No		
Seeps, Soft Areas	Yes	No		
Vegetation (Reclamation)				
Wet Ground Vegetation	Yes	No		
Poor Growth	Yes	No		
Destroyed by Erosion	Yes	No		
Instrumentation				
Survey Monuments - Inspect Condition (damaged or maint needed)	Yes	No		
Piezometers - Inspect Condition (damaged or maint needed)	Yes	No		
Slope Inclinometers - Inspect Condition (damaged or maint needed)	Yes	No		
Areas of Previous Repair				
Concerns or Issues with Conditions	Yes	No		
TAILINGS BASIN				
Basin Filling	**Condition/Issue/Defect Present/ Observation (circle one)**		**Comments**	**Photos Taken**
Tailings Beach Location (sinkholes or excessive erosion)	Yes	No		
Freeboard Minimum of 6 feet below Crest Required	Yes	No		
Pond Elevation (estimated from marked location (ft.)				
Tailings Beach Development (approx. area (ft.))				
Tailings Discharge Location (Spigot No.)				
Geomembrane				
Defects (holes, tears, ice, wind, uv degradation, etc.)	Yes	No		
Tension/Trampoline	Yes	No		
Areas of Previous Repair				
Concerns or Issues with Conditions	Yes	No		
Basin Underdrain				
Pump Operating	Yes	No		
Sump and Pumphouse (concerns or issues with conditions)	Yes	No		
Clarity of Discharge Water (WTP Sample Port)	Clear Cloudy Dirty			
Excessive Ice Buildup during Freezing Conditions	Yes	No		
TAILINGS DELIVERY SYSTEM				
Pipelines	**Condition/Issue/Defect Present/Observation (circle one)**		**Comments**	**Photos Taken**
Pipeline Leakage (external inspection)	Yes	No		
Pipeline Damage (external inspection)	Yes	No		
Valves - Conditions/Issues Identified (external inspection)	Yes	No		
Spigot Inspection (issue identified)	Yes	No		
Record Spigot Locations (Spigot No.)				
Excessive Ice Buildup during Freezing Conditions	Yes	No		
WATER RECLAIM SYSTEM				
Pipelines and Pumps	**Condition/Issue/Defect Present (circle one)**		**Comments**	**Photos Taken**
Pipeline Leakage (external inspection)	Yes	No		
Pipeline Damage (external inspection)	Yes	No		
Valves - Conditions/Issues Identified (external inspection)	Yes	No		
Pumps - Conditions/Issues Identified (external inspection)	Yes	No		
Inclined Pump Elevation (set elevation acceptable)	Yes	No		
Excessive Ice Buildup during Freezing Conditions	Yes	No		
SURFACE WATER MANAGEMENT (COMPLETED AS PART OF THE SWPPP)				
Ditches, Sediment Collection	**Condition/Issue/Defect Present (circle one)**		**Comments**	**Photos Taken**
Blockages	Yes	No		
Flowing Water, Boils or Seeps	Yes	No		
Signs of Erosion	Yes	No		
FENCING				
Fencing	Yes	No		
OTHER				
Other Issues or Observations Identified	**Comments**			**Photos Taken**

I:\1\01\00066\44\A\Report\Nye TOMS Update\Nye TOMS Manual_V1.5\Appendix C - Inspection and Surveillance\[Table C3.1 to C3.5- Nye Inspection Log Templates - updated format.xlsx]Env. or Mill Quarterly Insp.

TABLE C3.4

SIBANYE STILLWATER
STILLWATER MINE

NYE TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
TSF INSPECTION - UNUSUAL OCCURRENCE INSPECTION
(Environmental Compliance Supervisor or Concentrator Manager)

Print Dec-22-22 18:52:23

Inspectors:		**Inspection Date:**	**Inspection Time:**
Name:		**Title:**	**Signature:**
Name:		**Title:**	**Signature:**
Weather Conditions	Precipitation (24hr):	Wind Speed:	
	Temperature °F:	Sky: Clear Partly Cloudy Cloudy Overcast	
Photos Taken:	Yes No	**Instrumentation Data Reviewed:**	Yes No
Samples Collected:	Yes No		

Event	Comments	Photo
EXTREME RAINFALL EVENT (2 inches in 24 hours)		
Monitor TSF Pond Level. Confirm Pond Level is below Maximum Operating Level		
Inspect Embankments for Signs of Concentrated Runoff and Erosion		
Inspect Embankments for Indications of Localized Slumping or Instability		
Note Areas of Saturated or Soft Ground		
Inspect Surface Water Management Ditches and Sediment Ponds along Access Roads		
TSF POND LEVEL WITHIN 2 ft. MAXIMUM OPERATING LEVEL		
Monitor Pond Level Weekly		
Develop Plan to Reduce Pond Level		
TSF POND LEVEL WITHIN 1 ft. MAXIMUM OPERATING LEVEL		
Monitor Pond Level Daily		
Initiate Plan to Reduce Pond Level		
SIGNIFICANT EARTHQUAKE EVENT (Magnitude greater than 5 within 60 miles)		
Review Instrumentation Readings		
Carry Out Detailed Walkover of TSF, Pipelines and Associated Structures if Instrumentation Trigger Levels are Exceeded		
Investigate Downstream and Upstream (visible) Slopes for Cracks, Bulging Settlement or Deformation		
Look for and note any Seepage, particularly the Rate of Seepage Flow at the Embankment Toe and Clarity		
Review all Surface Monument and Slope Inclinometer Readings		
Inspect Downstream Embankment slope for Sand Boils and Sinkholes		
Inspect Tailings Beach for Whirlpools		
Discuss findings with Engineer of Record		
Check and ensure that the Basin Underdrain Sumps and Pumps are Functioning		
RUPTURE OF PIPELINE AT THE EMBANKMENT		
Stop Pumping Tails to the TSF and Stop Reclaiming Water to Mill		
Check Upstream Slope and Crest for Erosion		
Take Photographs and make Notes of Exact Location and Cause of Erosion (if known), Contact EOR		
SIGNIFICANT EROSION OF THE EMBANKMENT SLOPES; SEEPAGE ON THE EMBANKMENT SLOPE OR DOWNSTREAM OF THE EMBANKMENT TOE		
Estimate Seepage Flow Rate. Estimate Size of Area.		
Take Photographs and make Notes of Exact Location and Cause (if known) of Erosion		
Contact the EOR		
SIGNIFICANT TEAR OR DEFECT IN GEOMEMBRANE		
Document Location and Extent of Tear/Defect		
Develop Repair Plan		
EXCEEDANCE OF INSTRUMENTATION TRIGGER LEVEL		
Embankment Inspection Observations		
OTHER OBSERVATIONS		

I:\1\01\00066\44\A\Report\Nye TOMS Update\Nye TOMS Manual_V1.5\Appendix C - Inspection and Surveillance\[Table C3.1 to C3.5- Nye Inspection Log Templates - updated format.xlsx]Unusual Events Insp.

Appendix D
Select Site Photos

(Pages D-1 to D-5)

STILLWATER MINE
SELECT SITE PHOTOS

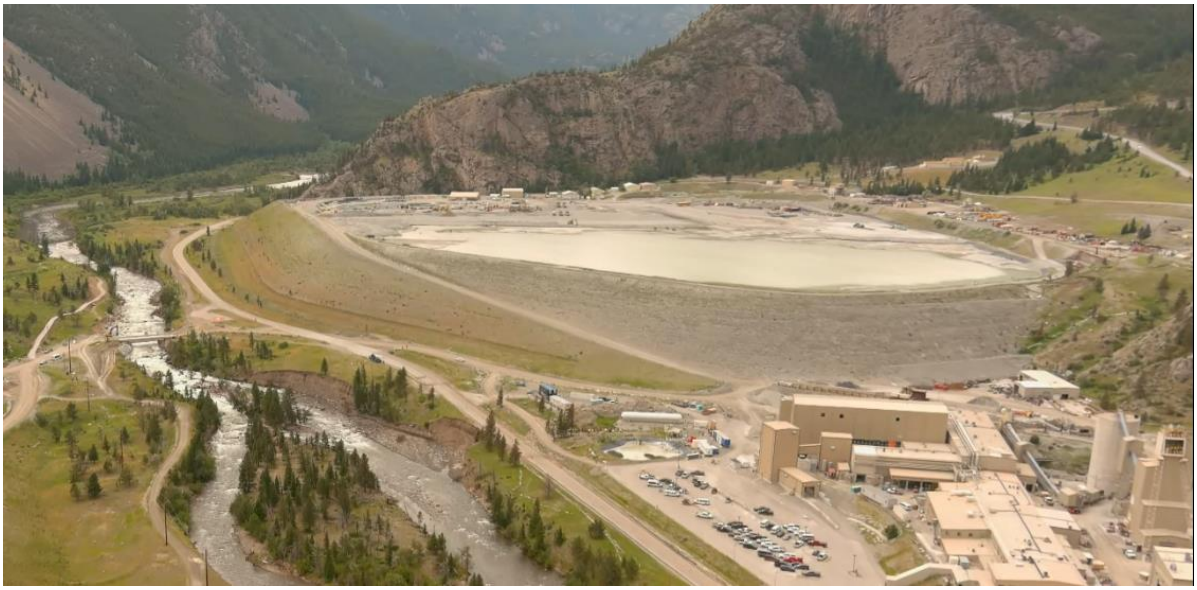

PHOTO 1 – Overview of Nye Tailings Storage Facility (July 2022).

PHOTO 2 – West Embankment Crest and downstream slope (July 2022).

PHOTO 3 – Upstream slope of Northwest Embankment (Sept. 2022).

PHOTO 4 – Downstream slope of North Embankment (Sept. 2022).

PHOTO 5 – Water reclaim and discharge pipework at the north end of the impoundment (Sept. 2022).

PHOTO 6 – West Embankment upstream slope (Sept. 2022).

PHOTO 7 – Southwest Embankment corner and West Diversion (Sept. 2022).

PHOTO 8 – Southwest Embankment downstream slope (Sept. 2022).

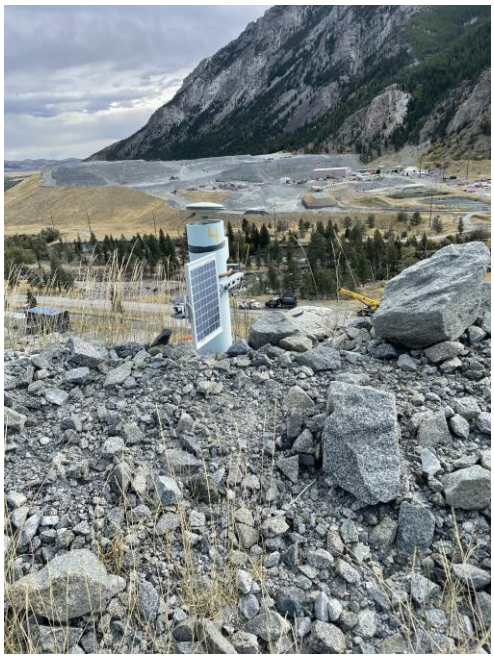

PHOTO 9 – Survey Monument on East Embankment crest.

PHOTO 10 – Interim Closure Cap construction progress (Sept. 2022).