MONTANA RESOURCES, LLP
YANKEE DOODLE TAILINGS IMPOUNDMENT

TAILINGS OPERATIONS, MAINTENANCE AND SURVEILLANCE (TOMS) MANUAL
VA101-126/16-1

Rev	Description	Date
0	Issued in Final	April 20, 2016
1	Updated to Reflect 2017 Operational Changes	December 19, 2017
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Montana Resources

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ABBREVIATIONS

AIR ..... Annual Inspection Report
ARD ..... Acid Rock Drainage
BPit ..... Berkeley Pit
BSB ..... City and County of Butte-Silver Bow
CERCLA ..... Comprehensive Environmental Response, Compensation and Liability Act
CPit ..... Continental Pit
CMP ..... Construction Management Plan
DNRC ..... Department of Natural Resources and Conservation
EAP ..... Emergency Action Plan
EOR ..... Engineer of Record
EPA ..... Environmental Protection Agency
GPM ..... gallons per minute
HDPE ..... High Density Polyethylene
HsB ..... Horseshoe Bend
IRP ..... Independent Review Panel
KP ..... Knight Piésold Ltd.
MBMG ..... Montana Bureau of Mines and Geology
MSHA ..... Mine Safety and Health Administration
MDEQ ..... Montana Department of Environmental Quality
MCA ..... Montana Code Annotated
MR ..... Montana Resources, LLP
NID ..... National Inventory of Dams
QA/QC ..... Quality Assurance/Quality Control
OP ..... Operating Permit
PMF ..... Probable Maximum Flood
QPP ..... Quantitative Performance Parameter
SLWS ..... Silver Lake Water System
TOMS ..... Tailings Operations, Maintenance and Surveillance
TSF ..... Tailings Storage Facility
USACE ..... United States Army Corps of Engineers
U.S. EPA ..... United States Environmental Protection Agency
VWP ..... Vibrating Wire Piezometer
WED ..... West Embankment Drain
WTP ..... Water Treatment Plant
YDTI ..... Yankee Doodle Tailings Impoundment

SECTION 1.0 INTRODUCTION

1.1 SCOPE AND OBJECTIVE OF MANUAL

Montana Resources, LLP (MR) operates an open pit copper and molybdenum mine in Butte, Montana. The mine facilities include the mill and processing facilities and a tailings storage facility called the Yankee Doodle Tailings Impoundment (YDTI). The mine produces copper sulfide concentrate, molybdenum disulfide concentrate and copper precipitate (cement copper) for sale in U.S. and world markets.

This Tailings Operations, Maintenance and Surveillance (TOMS) Manual has been prepared for the YDTI. It considers and is applicable to the YDTI and associated embankments, tailings distribution works, reclaim water works, monitoring devices, stormwater diversions, and other ancillary structures associated with the operation and management of the facility during construction, operation and closure.

The principal objectives of this TOMS Manual are as follows:

- To describe the roles and responsibilities of MR personnel for the management of the YDTI and associated facilities
- To identify the operation, surveillance, maintenance and inspection requirements, and
- To provide details on the emergency processes, plans and procedures.

The TOMS Manual has been developed to comply with State law. The requirements of the TOMS Manual are described in Montana Code Annotated (MCA) 82-4-379.

1.2 MANUAL STRUCTURE

This TOMS Manual presents the required information in the following nine sections:

Section 1.0 - Introduction

Section 2.0 - Roles and Responsibilities

Section 3.0 - TOMS Manual Distribution and Updates

Section 4.0 - Description of Facilities

Section 5.0 - Operations, Maintenance and Surveillance

Section 6.0 - Inspections, Reporting and Reviews

Section 7.0 - Emergency Preparedness and Response

Section 8.0 - References

Section 9.0 - Certification

SECTION 2.0 ROLES AND RESPONSIBILITIES

2.1 MONTANA RESOURCES ORGANIZATION STRUCTURE

Section 2 identifies the key roles, responsibilities and assigned personnel for tailings management, operations and surveillance and inspection of the YDTI.

MR employs approximately 360 people for operation and management of the mine. The MR corporate organization chart is structured with five divisions as presented on Figure 2.1.

1. Administration
2. Operations
3. Environmental Affairs
4. Maintenance, and
5. Human Resources.

Figures 2.2 and 2.3 present separate organization charts for the MR Operations and Maintenance Divisions, respectively.

The President has the ultimate responsibility for the mine and the YDTI. A description of each of the supporting roles and responsibilities is presented on Table 2.1. Table 2.2 provides details on the MR designated personnel responsible for each of the roles, as well as their contact details.

MONTANA RESOURCES
2019 ORGANIZATION

Montana Resources

PRESIDENT
Rolin Erickson

Executive Assistant
M Brandl

CONTROLLER
Kyle Carter

SENIOR ACCOUNTANT
R. Crawford

ACCOUNTANT
B. Sullivan

Accounts Payable
L. Williams
Non Exempt

Payroll
J. Blom
Non Exempt

MATERIALS SUPERVISOR
C. Galle

Clerk
J. Wright
Non Exempt

BUYER / ANALYSTS (2)
S. Mellott
G. Peterson

Exempt – 6
Non Exempt - 6

SENIOR V.P. OPERATIONS
Stephen Walsh

MANAGER OF ENGINEERING AND GEOLOGY
M. Harvie

STRATEGIC PLANNING MINE ENGINEER
T. Boyle

MINE ENGINEER
C. Warner

SURVEYOR
J. Patton

MINE SUPERINTENDENT
T. Chiotti

TACTICAL MINE PLANNING ENGINEER
J. Hoover

ORE CONTROL GEOLOGIST
A. Griffith

MILL SUPERINTENDENT/ METALLURGIST
M. Antonioli

MILL/PPT/HsB/SHIPPING GENERAL FOREMAN
T. Kloker

OPS TECH
D. Hamry
Non Exempt

GENERAL SHIFT FOREMAN (4)
J. Raymond
K. Corbitt
M. Blom
M. Merrick

FRONT-LINE FOREMEN (16)

CHIEF CHEMIST
P. Garcia

CHEMIST (5)
R. Ball
J. Gress
M. Hogan
A. Olson
D. Scheitlin

Exempt – 37
Non Exempt – 186

V.P. OF ENVIRONMENTAL AFFAIRS
Mark Thompson

ENVIRONMENTAL ENGINEER
J. Fleege

Exempt – 2
Non Exempt - 0

V.P. MAINTENANCE
Robert Sanderson

CLERK
S. McClernan
Non Exempt

MINE MAINTENANCE SUPERINTENDENT
D. Lyons

PLANNER
W. McGee

FRONT-LINE MAINT. SUPERVISORS (5)
T. Galle
J. D'Arcy
W. Malyevac
R. Johnston
R. Sandoval

ELECTRICAL SUPERINTENDENT
J. Wiley

Electrical Supervisor
D. Sather

INSTRUMENTATION (3)
J. Hyndman
L. McHugh
R. Moodry

TROUBLESHOOTERS (4)
J. Datres
B. McHugh
W. Richards
B. Fitzpatrick

CONCENTRATOR MAINTENANCE SUPERINTENDENT
K. Zimpel

PLANNER
J. McCarthy

FRONT-LINE MAINT. SUPERVISORS (4)
B. Bacon
J. Dinius
T. Johnston
B. York

Exempt – 21
Non Exempt - 97

V.P. HUMAN RESOURCES
Michael McGivern

Assistant
N. Kenny
Non Exempt

H.R. MANAGER
J. Dove

SAFETY MANAGER
P. Steilman

Assistant
Z. Bates
Non Exempt

Grand Total Exempt – 71
Non Exempt – 290
Total Employed - 361

FOR INFORMATION ONLY

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
3	03JAN'19	ISSUED FOR TOMS MANUAL	RSS	RMM	KJB

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

MR CORPORATE ORGANIZATION CHART

FIGURE 2.1

SAVED: M:\1101\00126\19\A\Acad\FIGS\B24, 1/3/2019 10:44:46 AM , RMCLELLAN PRINTED: 1/3/2019 3:32:00 PM, FIG 2.1, RMCLELLAN
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YANKEE DOODLE TAILINGS IMPOUNDMENT

MR OPERATIONS ORGANIZATION CHART

FIGURE 2.2

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
2	21DEC'18	ISSUED WITH TOMS MANUAL	RSS	RMM	KJB

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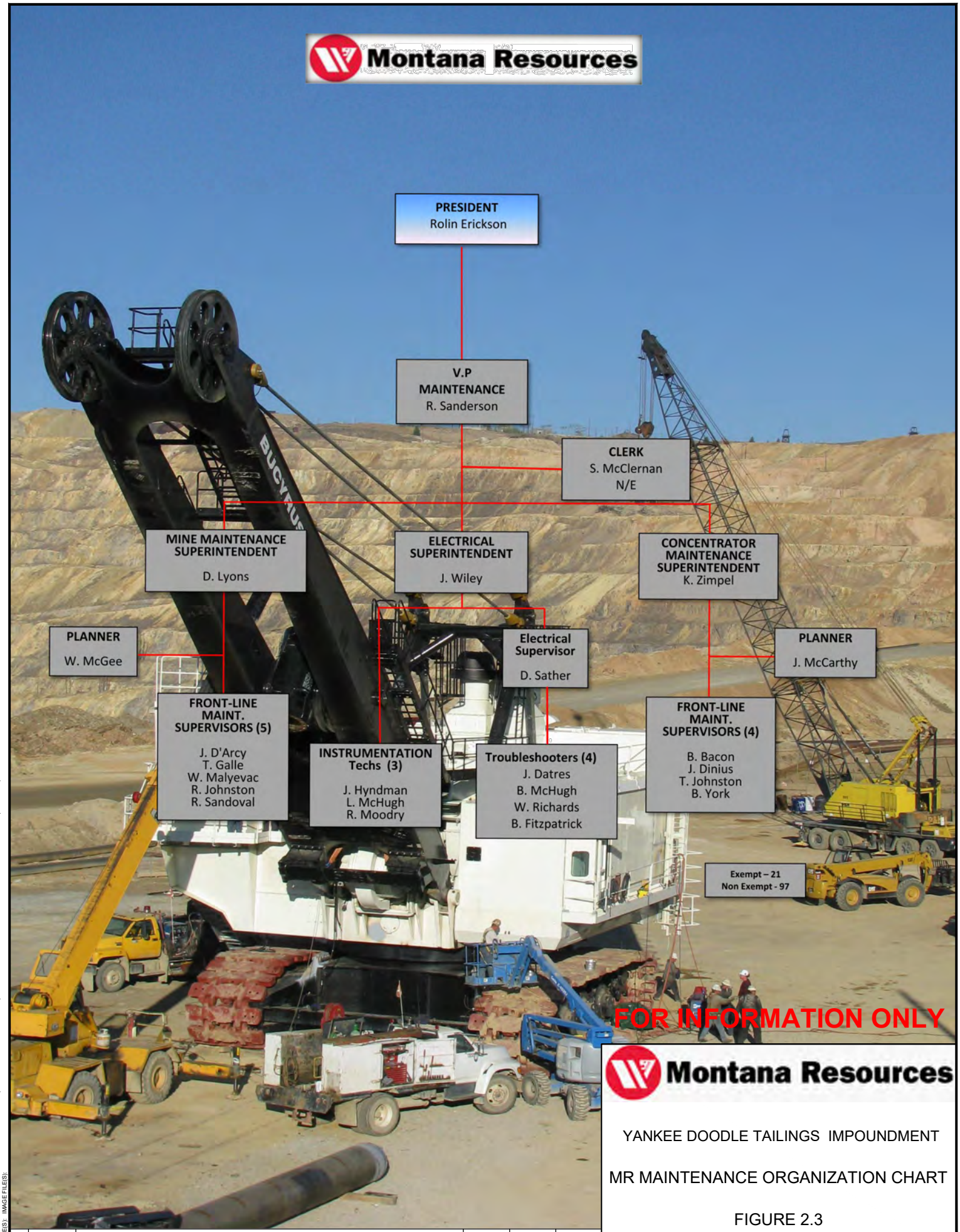

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YANKEE DOODLE TAILINGS IMPOUNDMENT

MR MAINTENANCE ORGANIZATION CHART

FIGURE 2.3

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
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SAVED: M:\1\101\00126\19\A\Acad\FIGS\A16, 12/20/2018 2:49:16 PM, RMCLELLAN PRINTED: 12/20/2018 3:04:17 PM, FIG 2.3, RMCLELLAN
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Table 2.1 Roles and Responsibilities

	Manager of Engineering and Geology	Mine Superintendent	Mill Superintendent /Metallurgist	Vice President of Environmental Affairs	Strategic Planning Mine Engineer	Environmental Engineer	Tactical Mine Planner	Ore Control Geologist	Mill/PPT/HsB/Shipping General Foreman	General Shift Foreman	Concentrator Maintenance Superintendent	Front-line Maintenance Supervisors (Mill)	Instrumentation (Electrical)	Engineer of Record
YDTI Embankment	X	X	X	X	X	X	X	X	X	X	X	X		
Tailings Delivery System			X							X	X	X	X	
Reclaim Water System			X							X	X	X	X	
HsB Seepage Collection System			X	X		X			X				X	
Tailings Deposition Management	X			X	X	X	X		X	X		X		
Embankment Piezometers	X			X	X	X	X							
Tailings Storage and Construction Staging	X	X	X	X	X	X	X	X			X			
Impoundment Water Balance	X	X	X	X		X			X				X	
Pond Surveys and Soundings	X				X		X							
Construction Drawings and Specifications	X				X		X							X
QA/QC	X			X	X	X		X						X
Drawings and As-Builts	X				X		X				X			X
Environmental Monitoring		X	X	X		X			X	X				
Emergency Action Plan	X	X	X	X	X	X				X	X			
Monthly Inspections	X			X	X	X	X							
Closure Planning	X			X	X	X								X
Annual Permit Reporting	X			X	X	X	X	X						
Annual EOR Inspection	X			X	X	X								X

Table 2.2 Roles Assignments and Contact Information

	NAME	POSITION	CONTACT INFORMATION
YDTI Operation and Monitoring	Rolin Erickson	President	Phone: +1 406 496 3214 Email: rerickson@montanaresources.com
	Stephen Walsh	Senior Vice President Operations	Phone: +1 406 496 3203 Email: swalsh@montanaresources.com
	Mark Thompson	Vice President of Environmental Affairs	Phone: +1 406 496 3211 Email: mthompson@montanaresources.com
	Mike Harvie	Manager of Engineering and Geology	Phone: +1 406 496 3215 Email: mharvie@montanaresources.com
	Travis Chiotti	Mine Superintendent	Phone: +1 406 496 3241 Email: tchiotti@montanaresources.com
	Mary Anne Antonioli	Mill Superintendent/Metallurgist	Phone: +1 406 496 3265 Email: mantonioli@montanaresources.com
	Jonathan Hoover	Tactical Mine Planning Engineer	Phone: +1 406 496 3216 Email: jhoover@montanaresources.com
	Tim Boyle	Strategic Planning Mine Engineer	Phone: +1 406 496 3263 Email: tboyle@montanaresources.com
	Amanda Griffith	Ore Control Engineer	Phone: +1 406 496 3262 Email: agriffith@montanaresources.com
	Jeremy Fleege	Environmental Engineer	Phone: +1 406 496 3205 Email: jfleege@montanaresources.com
YDTI Maintenance	Rob Sanderson	Vice President Maintenance	Phone: +1 406 496 3242 Email: rsanderson@montanaresources.com
	Dick Lyons	Mine Maintenance Superintendent	Phone: +1 406 496 3239 Email: dlyons@montanaresources.com
	Kevin Zimple	Concentrator Maintenance Superintendent	Phone: +1 406 496 3240 Email: kzimpel@montanaresources.com
	Josh Wiley	Electrical Superintendent	Phone: +1 406 496 3251 Email: jwiley@montanaresources.com
Engineer of Record	Ken Brouwer (Knight Piésold Ltd.)	Engineer of Record	Phone: +1 604 685 0543 Email: kbrouwer@knightpiesold.com

2.2 REGULATORY AGENCIES

The jurisdiction for regulation of tailings impoundments resides with the Montana Department of Environmental Quality (MDEQ). Embankments for tailings impoundments and 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 MR.

Federal regulatory involvement was initiated through the National Dam Inspection Act (Public Law 92-367) dated August 8, 1972, which directed the United States Army Corps of Engineers (USACE) to conduct inspections of non-federal dams and alert owners and the State to conditions that may constitute a danger to human life or property. The USACE inspections led to the development of a National Inventory of Dams (NID). A delegation from USACE inspected the YDTI on May 11, 1978 and issued their Phase 1 Inspection Report in February of 1980 (USACE, 1980). The NID includes the YDTI (NID ID# MT01425) and indicates that it is a State regulated dam that falls under the jurisdiction of the MDEQ (USACE, 2015). The USACE has not inspected the YDTI since the initial Phase 1 Inspection, and has not stated a regulatory interest since the initial inspection.

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.

The Environmental Protection Agency (EPA) is not directly involved in the current MR mine operations on site. The EPA however does monitor and oversee the remediation and environmental management of the Berkeley Pit and control of Horseshoe Bend (HsB) water[1].

2.3 ENGINEER OF RECORD (EOR)

The Engineer of Record (EOR) cannot be an employee of the operator or the permit holder and has the following responsibilities:

- Review design and other documents pertaining to the tailings storage facility
- Certify and seal designs or other documents pertaining to the tailings storage facility submitted to the MDEQ
- Complete an annual inspection of the tailings storage facility
- Notify the operator when credible evidence indicates the tailings storage facility is not performing as intended, and
- Immediately notify the operator and the MDEQ when credible evidence indicates the tailings storage facility presents an imminent threat or has a high potential for imminent threat to human health or the environment.

[1] The EOR and IRP have been made aware of a proposed project that would use the tailings and YDTI as a treatment facility for certain BMFOU waters and result in the off-site discharge of YDTI pond water.

The EOR is responsible for providing construction oversight as specified in the Construction Management Plan. The EOR for the YDTI is Ken Brouwer, P.E, of Knight Piésold Ltd (KP).

2.4 INDEPENDENT REVIEW PANEL (IRP)

An Independent Review Panel (IRP) consisting of three independent review engineers or specialists is required when a new facility or existing facility raise is proposed. The IRP is responsible for review of the amendment application design document, the underlying analysis, and assumptions for consistency with MCA 82-4-376. The IRP will assess the practicable application of current technology in the proposed design, submit review comments, indicate any recommended modifications and specify the required IRP design and progress review schedule relevant to the amendment application.

The first IRP was assembled in July 2015 for an amendment application that was submitted to the MDEQ in October 2017. On August 31, 2018, MDEQ determined that MR's application to amend its operating permit complies with the substantive requirement of State law. The compliance determination was made in conjunction with the issuance of a draft permit that is now subject to environmental review. The draft permit provides for the YDTI embankment crests be constructed to a crest elevation of 6,450 ft to provide for continued mining beyond 2020. The proposed Amendment will provide approximately 12 years of additional mine life.

The current members of the IRP are as follows:

- Dr. Dirk Van Zyl
- Dr. Leslie Smith, and
- Mr. Jim Swaisgood.

The IRP is required to be reassembled at least every five years following MDEQ approval of the amendment application to complete the following:

- Inspect the YDTI
- Review of TOMS Manual and associated records
- Interview people with responsibilities identified in the TOMS Manual, and
- Review EOR inspection reports, corrective action plans, records associated with construction, and any other information relating to the tailings storage facility that the IRP needs to ensure that the YDTI is constructed, operated, and maintained as designed and is functioning, and can be closed as intended, and meets acceptable engineering standards.

Additional details regarding the submission requirements for the five-year review report are included in Section 6.4.

2.5 COMPETENCY AND TRAINING

New personnel (full time or contract) that work within the mine property must comply with the training requirements of the Federal Mine Safety and Health Act of 1977. Personnel whose activities at the site exceed forty consecutive hours must receive twenty-four hours of Part 48 New Miner Training. Personnel working at the site must attend a Site-specific Health and Safety Induction Training Session before commencing work at the mine.

Additional training for personnel involved in the operation, maintenance, inspection and surveillance of the YDTI is provided on an individual basis depending on the specific work the individual is required

to perform. New personnel are accompanied by a suitably qualified MR representative while working on site until they have proven a satisfactory level of work competence. Competence is assessed by the supervisor through visual observation of personnel behavior.

SECTION 3.0 TOMS MANUAL DISTRIBUTION AND UPDATES

3.1 GENERAL

Section 3.0 presents the protocol regarding TOMS Manual distribution and updates, which includes consideration of the following components:

- Distribution of the TOMS Manual
- TOMS Manual review requirements, and
- TOMS Manual update procedures.

The distribution, review and update of the TOMS Manual is the responsibility of the Vice President of Environmental Affairs.

3.2 TOMS MANUAL DISTRIBUTION LIST

One hard copy of the TOMS Manual will be maintained in the offices of the following individuals:

- Senior Vice President Operations
- Vice President of Environmental Affairs
- Manager of Engineering and Geology
- Operations Foreman, and
- Engineer of Record (off-site).

3.3 TOMS MANUAL REVIEW REQUIREMENTS

The TOMS Manual will be reviewed annually to confirm that it reflects the current site conditions. The review will include identification and update of out-of-date information and incorporation of new details and components.

Required updates and modifications will be made according to the TOMS Manual update procedures detailed below.

3.4 TOMS MANUAL UPDATE PROCEDURES

Operating procedures and personnel will likely change during operation of the mine. Changes (procedural and personnel) that affect the content of the TOMS Manual need to be updated.

An update may comprise the entire TOMS Manual or may be limited to specific pages or sections.

The following procedures will be followed when updating the TOMS Manual:

- Each updated page must be clearly marked with the version number and date.
- A letter of transmittal that clearly identifies the distribution list must accompany each update of the TOMS Manual. A copy of the most recent transmittal letter must be kept in the Vice President of Environmental Affairs office.
- All updates must be reviewed by the EOR. Approval of the TOMS Manual revisions will be certified by EOR seal on the letter of transmittal.
- The Vice President of Environmental Affairs is responsible for ensuring the MR copies of the TOMS Manual (both electronic and hardcopies) are updated.

- The EOR is responsible for updating the EOR's hardcopy of the TOMS Manual.

3.5 REFERENCES AND SUPPORTING DOCUMENTS

References and other supporting documents specifically relevant to the operation of the YDTI and this TOMS Manual include the following:

- Montana Resources Operations Plan
- Montana Resources Dust Control Plan
- Montana Resources Tailings Discharge Plan
- Montana Resources Closure Plan
- MDEQ 2015 Comprehensive Bond Review, and
- Emergency Action Plan (EAP) - Yankee Doodle Tailings Impoundment.

3.5.1 Montana Resources Operations Plan

The Operations Plan presents an overview of the entire mine operations including the Mill Process, Yankee Doodle Tailings Impoundment, Continental Pit and Precipitation Plant. The Operations Plan includes an Operational Surface Water Management Plan and a Temporary Cessation of Operations Plan in the event of a temporary mine closure ranging from several days to a few months. The TOMS Manual complements the Operations Plan and provides additional details applicable to the YDTI and associated embankments, tailings distribution works, reclaim water works, monitoring devices, storm water diversions, and other ancillary structures associated with the operation and management of the tailings storage facility during construction, operation and closure.

3.5.2 Montana Resources Dust Control Plan

The *Dust Control Plan for Yankee Doodle Tailings Impoundment* (Dust Control Plan) for the YDTI was prepared by MR in 2018 (MR, 2018a). The Dust Control Plan formalizes the existing management and monitoring systems MR uses to monitor and mitigate the risk of wind-blown tailings dust from the tailings facility. MR have a proactive monitoring program implemented that includes visual inspections and weather forecasting. Strategies to address any elevated dust risk from the facility are managed through wetting and stabilization of the tailings beach with tailings slurry, freshwater or manual application of dust suppressants.

3.5.3 Montana Resources Tailings Discharge Plan

The *Tailings Discharge Plan for Yankee Doodle Tailings Impoundment* (Tailings Discharge Plan) was prepared by MR in 2018 (MR, 2018b). The plan presents the operating philosophy and discharge plan for the YDTI multiple-point tailings discharge system that was initiated in 2017. The multiple-point tailings discharge system consists of eight tailings discharge locations and provides versatility for tailings deposition. The multiple tailings discharge locations allow for continued development of extensive, drained tailings beach adjacent to the YDTI embankments. Use of the multiple-point configuration in 2017 and 2018 has begun to transform the tailings beach as planned into a 'U' shape compared to the historical 'fan' shape.

The key objectives for the tailings deposition plan includes the maintenance of the tailings beach between the embankments and the supernatant pond, and to provide wetting of the beach surface to minimize the risk for wind-blown tailings dust. The plan outlines the tailings discharge system

infrastructure, the deposition objectives, discharge philosophy and existing beach monitoring program. The plan considers operation under three conditions: Normal (during beach transition), Normal (post beach transition) and Contingency. The transition of the tailings beach is expected to take two to three years and will be completed in 2020.

3.5.4 Montana Resources Closure Plan

The existing closure plan for the facility was developed in November 1998.

The primary objective of the closure and reclamation initiatives are to ensure that reclaimed areas are compatible with the approved post-mine land use to restore previously un-reclaimed areas affected by the project to conditions compatible with future desired land uses (as required by State law) stabilized post-mining slopes and soils, and to protect air, surface, and groundwater resources in the long-term. Reclamation activities will generally include;

- Construction of a vegetated soil cover over the trafficable region of the exposed tailings beach. A pond will be maintained along the headwaters of the facility after closure where surface runoff from the capped layer and from upstream catchments would tend to pool. Non-trafficable intermediate areas between the final pond and the vegetated soil cover will be reclaimed as wetlands.
- The downstream face of the embankments will be regraded where necessary and covered with a suitable growth medium.

The current post-closure reclamation plan for the YDTI is outlined in the 2015 5-year bond review, which was prepared by the MDEQ. The 2015 Bond was calculated based on the estimated costliest reclamation condition the facility will experience in the five years following the bond review (through 2019).

3.5.5 Montana Resources Emergency Action Plan

The existing Emergency Action Plan (EAP) for the facility was developed in December 2015. The EAP outlines the Responsibilities and Authorities, Notification Procedures and the Mitigation Actions. The plan is described in further detail in Section 7.5.1.

3.5.6 Design and Site Investigation Reports

Numerous design and site investigation reports have been produced since the mine started operating and the YDTI was commissioned. Table 3.1 is a list of available documents related to the YDTI. Copies of these documents are available from the Vice President of Environmental Affairs.

Table 3.1 Reference Design and Site Investigation Documents

Year	Report	Author
1962	Feasibility Study – Proposed Tailings Pond	Dames & Moore
1963	Development of Design & Construction Criteria	Dames & Moore
1981	Geotechnical and Hydrologic Studies of YDTD	IECO
1990	Engineering (Literature) Review – Yankee Doodle Tailings Dam	Goldberg
1993	Seismic Stability Evaluation – Yankee Doodle Tailings Dam	Harding Lawson Associates (HLA)
1999	YDTI Design and Construction (Original Revision 1997)	MR Engineering Dept.
2014	Hydrologic Evaluation of YDTI West Ridge	Hydrometrics
2012	Geotechnical Site Investigation	Knight Piésold Ltd.
2013	Failure Mode Analysis Information Summary	Knight Piésold Ltd.
2013	Geotechnical Site Investigation	Knight Piésold Ltd.
2014	Geotechnical Site Investigation	Knight Piésold Ltd.
2015	Montana Resources, LLP - 2015 Bond Review Calculations	Montana Department of Environmental Quality
2015	Geotechnical Site Investigation	Knight Piésold Ltd.
2016	Geotechnical Site Investigation – West Embankment	Knight Piésold Ltd.
2018	Stage 1 Construction Summary Report (West Embankment Drain)	Knight Piésold Ltd.
2018	2017 Geotechnical Site Investigation Report	Knight Piésold Ltd.
2018	6450 Amendment Design Document (11 reports)	Knight Piésold Ltd./ Hydrometrics

3.6 REGULATORY DOCUMENTS AND REQUIREMENTS

Mine operations at MR currently occur under the following operating permits (OPs):

- Operating Permit No. 00030
- Operating Permit No. 00030A
- Operating Permit No. 00041, and
- Operating Permit No. 00108.

Operation of the YDTI specifically comes under the OPs No. 00030 and No. 00030A. Explanation of the OP requirements and limitations is detailed in the MR Operations Plan.

MR submitted an Application to the MDEQ in October 2017 to amend OPs No. 00030 and No. 00030A. The Application proposed to amend the exiting OPs to permit construction of the YDTI embankment crests to an elevation of 6,450 ft, which would provide for continued mining beyond 2020 and provide approximately 12 years of additional mine life. The Application was formally accepted by the MDEQ as complete and compliant and a draft permit was issued in August 2018 and is currently undergoing environmental review.

SECTION 4.0 DESCRIPTION OF FACILITIES

4.1 OVERVIEW

The components of the MR facilities, the design basis, general mine history and specific information on the YDTI are presented in this section. This information provides background and context for the operating, maintenance, and surveillance protocols that are required during future operation, development and closure of the YDTI.

4.1.1 Location

The MR Mine is located in Butte, Silver Bow County, in Sections 5 and 6 Township 3 North (T3N), Range 7 West (R7W) and Sections 31 and 32 Township 4 North (T4N), Range 7 West (R7W) of the Montana Principal Meridian. The site is bounded by Interstate 15 and the Continental Divide on the east, Moulton Reservoir Road on the west, and Farrell Street, Continental Drive and Shields Avenue to the south.

The main access route to the guard house for the mine is from Farrell Street. The entrance to the administrative department is from Shields Avenue.

The service address for the MR Mine is:

Montana Resources, LLP
600 Shields Avenue
Butte, Montana 59701

4.1.2 Facilities

The key components of the MR facilities are as follows:

- Butte Concentrator and Processing Facilities (Mill)
- Yankee Doodle Tailings Impoundment (YDTI)
- Continental Pit (CPit)
- Precipitation Plant and associated Leach Pad Facilities
- HsB Water Treatment Plant (WTP), and
- Berkeley Pit (BPit) - inactive since 1983.

Mill tailings are disposed in the YDTI and rockfill material from the Continental Pit is used for construction of the YDTI embankments.

The existing leach operations incorporate acid leaching of historically placed low grade ore. Minimal placement of new ore material for leaching has occurred since 1990.

4.2 SITE MINING HISTORY

The Anaconda Copper Mining Company began open pit mining at the BPit in 1955 and operation of the YDTI began in 1963. The initial YDTI embankment was constructed using rockfill from the BPit and was placed using mine haul trucks in 30 to 100 ft thick end dumped lifts. Leach pads were constructed along the base of the east and west limbs of the embankment.

Mining activity in the BPit was reduced in the early 1980's due to low metal prices. Mining commenced in a new operation separate from the Berkeley Pit in July 1981. This pit was named the "Southeast BPit" and subsequently renamed the CPit when MR began operation. Operations within the BPit ceased in April 1982 and all mining was terminated June 30, 1983. District dewatering pumps situated on the 3,900 ft level of the Kelley Mine were turned off and the underground mines and BPit were allowed to gradually fill with water from the bedrock and alluvial aquifers and site runoff once mining operations ceased.

Mining recommenced in the adjacent CPit in 1986 and YDTI construction continued using CPit rockfill. MR officially suspended operation of the leach pads in 1999 but then resumed limited leaching in 2004 (i.e. approximately 600 gallons per minute (GPM) for five days per week) with gradually increasing volume (i.e. 1,000 to 1,200 GPM seven days per week) and recommenced leaching of pads on September 19, 2012 (approximately 5,000 GPM seven days per week).

Mining operations were suspended from 2000 to 2003 due to high electricity prices. A thin capping layer of rockfill material was placed over the YDTI beach during this time to reduce wind-blown tailings dust. Mining operations recommenced in 2003 and discharge of tailings to the YDTI was resumed.

The Horseshoe Bend (HsB) Water Treatment Plant (WTP) was commissioned in November 2003. The WTP treats water recovered at HsB that previously either flowed into the BPit or was pumped back to the YDTI.

4.3 MINING AND PROCESSING

Mining operations at MR involve open pit mining in the CPit. The mine process consists of three stages: ore extraction, ore processing and tailings disposal. Ore extraction consists of drilling, blasting, loading and hauling to the Butte Concentrator (Mill Process). Ore processing is undertaken in the Butte Concentrator, a three division sulfide copper flotation concentrator. Each of the three divisions (A, B and C) have similar grinding, flotation, and thickening circuits. After concentrate extraction in the Mill Process, the remaining tailings are pumped to three thickeners for thickening in preparation for pumping and discharge to the YDTI.

4.4 YANKEE DOODLE TAILINGS IMPOUNDMENT

The YDTI is located approximately 2 miles northeast of Butte, within the Silver Bow Creek, Dixie and Yankee Doodle Creek drainages. The YDTI consists of rockfill embankments which facilitate the storage of tailings solids and a surface water reservoir (supernatant pond). The impoundment covers a total surface area of approximately 1,480 acres (as of 2018).

The principal objectives[2] for the ongoing design and construction of the YDTI are to maintain adequate storage capacity for mill tailings, protect the regional groundwater and surface water flows (both during operations and closure) and to achieve effective reclamation at mine closure. The principal design features are as follows:

[2] The proposed modifications in BMFOU water management, which includes using the tailings and YDTI as BMFOU water treatment facilities and the off-site discharge of YDTI pond water, is not inconsistent with these principle objectives. It is expected that the proposed BMFOU project will provide additional flexibility in managing YDTI pond water inventory.

- Permanent, secure and total confinement of solid materials within an engineered storage impoundment.
- Secure and reliable transportation of tailings from the Mill to the YDTI.
- Temporary storage of supernatant water in the YDTI with maximum recycling to the mill to produce a zero discharge condition for process water.
- Control, collection and removal of free draining liquids from the tailings during operations and management of seepage from the impoundment.
- The inclusion of monitoring features for aspects of the impoundment to confirm performance goals are monitored and achieved.
- Staged development of the impoundment over the life of the mine.
- Development of extensive drained tailings beach adjacent to the embankments to limit seepage rates and to facilitate controlled drainage into the embankments.

The design basis and key operating parameters for the YDTI and related facilities are described below. Other information, including descriptions of site conditions, is provided within the various investigation, design and construction reports previously identified in Table 3.1.

4.4.1 YDTI Embankments

The YDTI currently comprises a valley-fill style impoundment created by a rockfill embankment that, for descriptive purposes, is divided into three sections according to the general geometry of each limb of the continuous embankment. The YDTI layout is shown on Figure 4.1. These embankments are:

- North-South Embankment - The North-South Embankment forms the eastern to southeastern limb of the YDTI and runs approximately north to south in orientation. The North-South Embankment abuts onto the base of Rampart Mountain, a topographic ridge that forms the eastern battery limit of the site.
- East-West Embankment - The East-West Embankment forms the southwestern limb of the YDTI and runs approximately east to west in orientation. The East-West Embankment is situated upstream of HsB and BPit.
- West Embankment - The West Embankment extends north of the existing East-West Embankment and runs approximately south to north in orientation to form the western boundary of the YDTI.

The YDTI was originally constructed in 1963 using rockfill from the BPit to form the East-West and North-South Embankments. The embankments have been continuously raised using rockfill from the BPit (1963 through 1982) and from the CPit (1986 through current).

The North-South and East-West Embankments are constructed by progressively placing rockfill to form the free-draining rockfill embankments. The rockfill comprises pit-run material end dumped in 30 to 100 foot lifts with nominal traffic compaction from the mine haul fleet. The embankment incorporates a zone of fine-grained material (alluvium) dumped along the upstream face to limit tailings migration from the active discharge stream into the rockfill.

The West Embankment is a zoned earthfill and rockfill embankment comprised of a free draining upstream rockfill zone (pit-run material), a less permeable downstream rockfill zone and an alluvium facing layer. The pit-run material is end dumped in 50 foot lifts, while the less permeable downstream material is placed in thinner, compacted lifts with maximum thickness of 5 ft.

The West Embankment incorporates the West Embankment Drain (WED), an upstream seepage collection drain, and several other seepage control features to maintain a groundwater piezometric surface similar to current conditions on the western boundary of the impoundment. The WED hydraulically confines the YDTI from the West Ridge by maintaining elevated groundwater pressures within the ridge and an easterly hydraulic gradient towards the YDTI. Construction of the WED system commenced in 2016. Stage 1 of the drain alignment north of the topographic boundary between the West and East-West Embankments, the Extraction Basin and the drain pods were completed in 2017. Construction of Stage 2 of the WED commenced in 2018. Bulk earthworks to create the permanent Extraction Pond and the section of the WED from the cut through Rocky Knob to the Extraction Pond were completed in 2018. Placement of the HDPE liner in the Extraction Pond and most of the drain was also completed. Stage 1 and Stage 2 of the WED are not yet connected, and continued construction of that section of the drain is anticipated in early 2019.

The crest elevations of the YDTI embankments are maintained at least 22 ft above the normal operating supernatant pond elevation. This design provision provides sufficient storage capacity to accommodate runoff from the Probable Maximum Flood (PMF) within the impoundment while maintaining an additional 5 feet of freeboard.

The 6450 Amendment Design Document (KP, 2018) consists of 11 reports, which make up the technical component of the YDTI Amendment Application. The Design Document provides an in-depth analysis of the facility design basis, site characterization, stability, construction management, water management and closure reclamation strategies for the YDTI. The reports were reviewed and the design conditionally approved by the IRP in November 2017. The IRP approval included several conditions, such as continued embankment monitoring and regular updates of the water balance.

4.4.2 YDTI Beach

The YDTI beach is formed by the discharge and deposition of tailings slurry from the YDTI embankment. The drained tailings beach is considered part of the impoundment containment system which, collectively with the rockfill embankments, contains the supernatant pond. The tailings beach extends over 40% to 50% of the total YDTI surface area. The tailings delivery system and operations is further described in subsequent sections.

4.4.3 YDTI Supernatant Pond

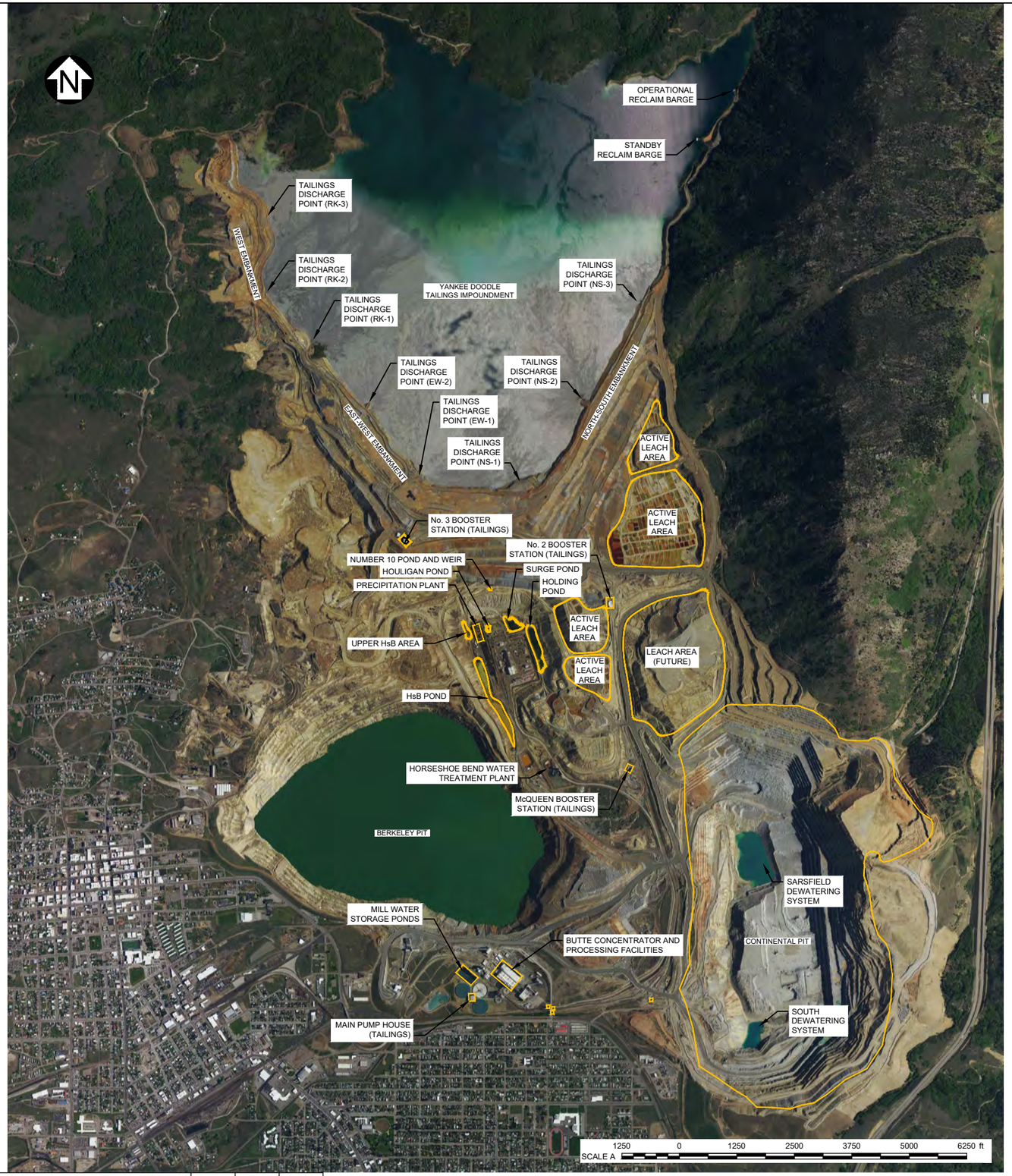
The YDTI supernatant pond provides a source of water for the mill operations. Water enters the YDTI and supernatant pond from three sources:

1. Tailings water: approximately 1,085 M ft^3/year (15,450 gpm)
2. Precipitation runoff: approximately 58 M ft^3/year (825 gpm), and
3. Silver Lake (make-up water): various as required.

The size of the supernatant pond varies seasonally and annually, but typically occupies 50% to 60% of the total YDTI surface area. The total volume of the supernatant pond varies depending on the season and the annual precipitation but typically has ranged from 15,000 to 30,000 acre-ft (650 M ft^3 to 1,300 M ft^3).

Make-up and freshwater supply for the mine operations are supplied by the Silver Lake Water System (SLWS) pursuant to the terms of a Water Services agreement with the City and County of Butte-Silver

Bow (BSB) and is located approximately 40 miles east of Butte. Up to one million gallons per day of water may be supplied to the mine from Silver Lake during normal operating conditions. During upset conditions, up to 18 million gallons per day may be supplied for mine operations.



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YANKEE DOODLE TAILINGS IMPOUNDMENT

GENERAL ARRANGEMENT

FIGURE 4.1

4.4.4 Tailings Delivery System

Tailings are continuously discharged into the YDTI from a maximum of two locations at any time. The Tailings Delivery System is configured to facilitate tailings discharge from eight fixed locations on the three embankment limbs. Figure 4.2 presents a schematic of the tailings delivery system and Figure 4.3 presents the Tailings Delivery System general arrangement.

Three tailings delivery pipelines (two operational and one standby) transport tailings from the Mill to the YDTI. The tailings slurry flow rate is approximately 18,000 gpm with a solids concentration (by weight) ranging between 32% and 37%.

The 21,000 ft tailings delivery pipelines are constructed from a combination of 22" Steel, 24" HDPE or 26" HDPE pipe. The single walled tailings pipelines are installed on the ground surface and locally anchored with mounds of overburden or pipe support deadmen. Four tailings pump stations Main Tailings Pump-house, McQueen Booster Station, No. 2 Booster Station and No. 3 Booster Station (up to 13 pump stages) provide the required pressure to pump the tailings up to the YDTI, a total elevation increase of approximately 880 ft. An additional 17,500 ft of 24" HDPE pipe conveys the tailings along the YDTI embankment crests to the eight discharge locations. The location of tailings discharge is controlled by hydraulically actuated knife gate valves located at each discharge location along the pipeline alignment. The tailings discharge schedule is managed by MR and is based on the objective to develop extensive beach adjacent to each of the three embankments.

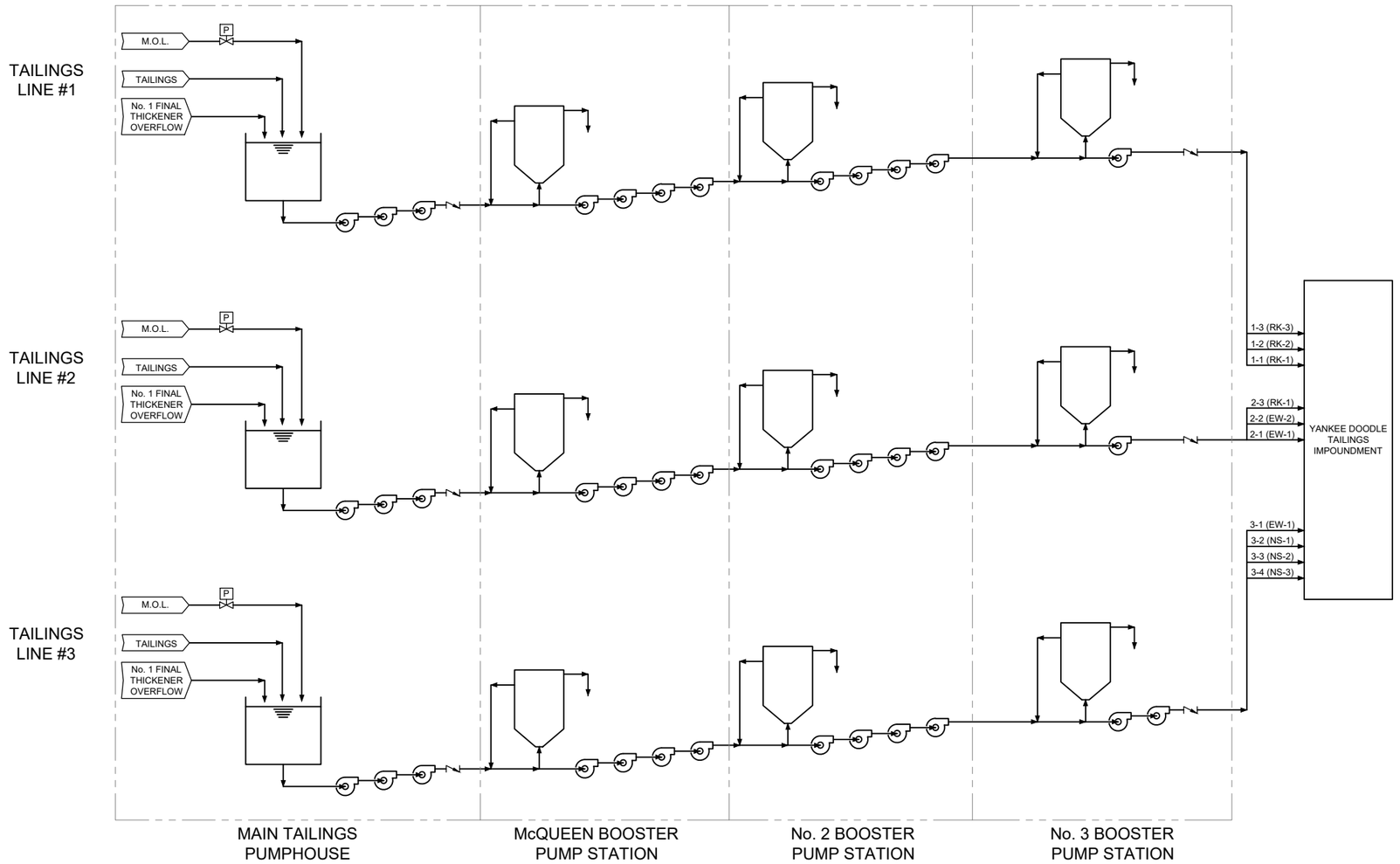
The pipelines are routed up to the YDTI such that there is positive drainage back to each of the pump stations. The pump stations are each equipped with tailings drain back discharge systems that are used if the tailings pipelines need to be drained or flushed. The drain back systems are routed to flow into the site wide stormwater drainage network. In the unlikely event of a pipe leak tailings slurry will flow adjacent to the pipeline and drain into the nearest surface runoff drainage ditch or other on-site containment.

4.4.5 Water Reclaim System

Figure 4.4 presents a schematic of the reclaim pipeline network. Supernatant water is reclaimed for reuse in the mill process from the north-east end of the YDTI using a floating barge. MR maintains two barge units in the supernatant pond. Each of the barges is equipped with three vertical turbine pump units (three operational at anytime). The barge pumps deliver approximately 10,000 gpm of reclaim water into a junction box approximately 1,500 ft away (50 ft elevation increase) using two HDPE pipelines. From the junction box, reclaim water gravity discharges to the Mill at an elevation decrease of approximately 810 ft, and at a distance 5.1 miles away. The reclaim water initially discharges via two 36" diameter HDPE pipelines (0.7 miles long). As the pipeline grade increases the reclaim water is conveyed into a single 42" diameter HDPE pipeline. The last mile of reclaim pipeline is further downsized to a 30" HDPE pipeline for conveyance into the Mill facilities.

The reclaim pipeline alignment follows the access road along the eastern edge of the YDTI. Immediately south of the Tailings No. 2 Booster Station, the reclaim pipeline enters the Site pipeline corridor, which extends from the Mill to the YDTI.

The reclaim water is delivered to two locations at the Mill: the concentrator building for direct use in processing and to the process water reservoir located west of the Concentrator and Lime Silos.



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YANKEE DOODLE TAILINGS IMPOUNDMENT

TAILINGS DELIVERY SYSTEM
FLOW SCHEMATIC

FIGURE 4.2

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YDTI FACILITY (OCTOBER 2017)

EAST-WEST AND WEST EMBANKMENT (OCTOBER 2017)

NORTH-SOUTH EMBANKMENT (OCTOBER 2017)

PHOTO REFERENCE:
PROVIDED BY MONTANA RESOURCES SEPTEMBER 2018

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YANKEE DOODLE TAILINGS IMPOUNDMENT

TAILINGS DELIVERY SYSTEM
GENERAL ARRANGEMENT

FIGURE 4.3

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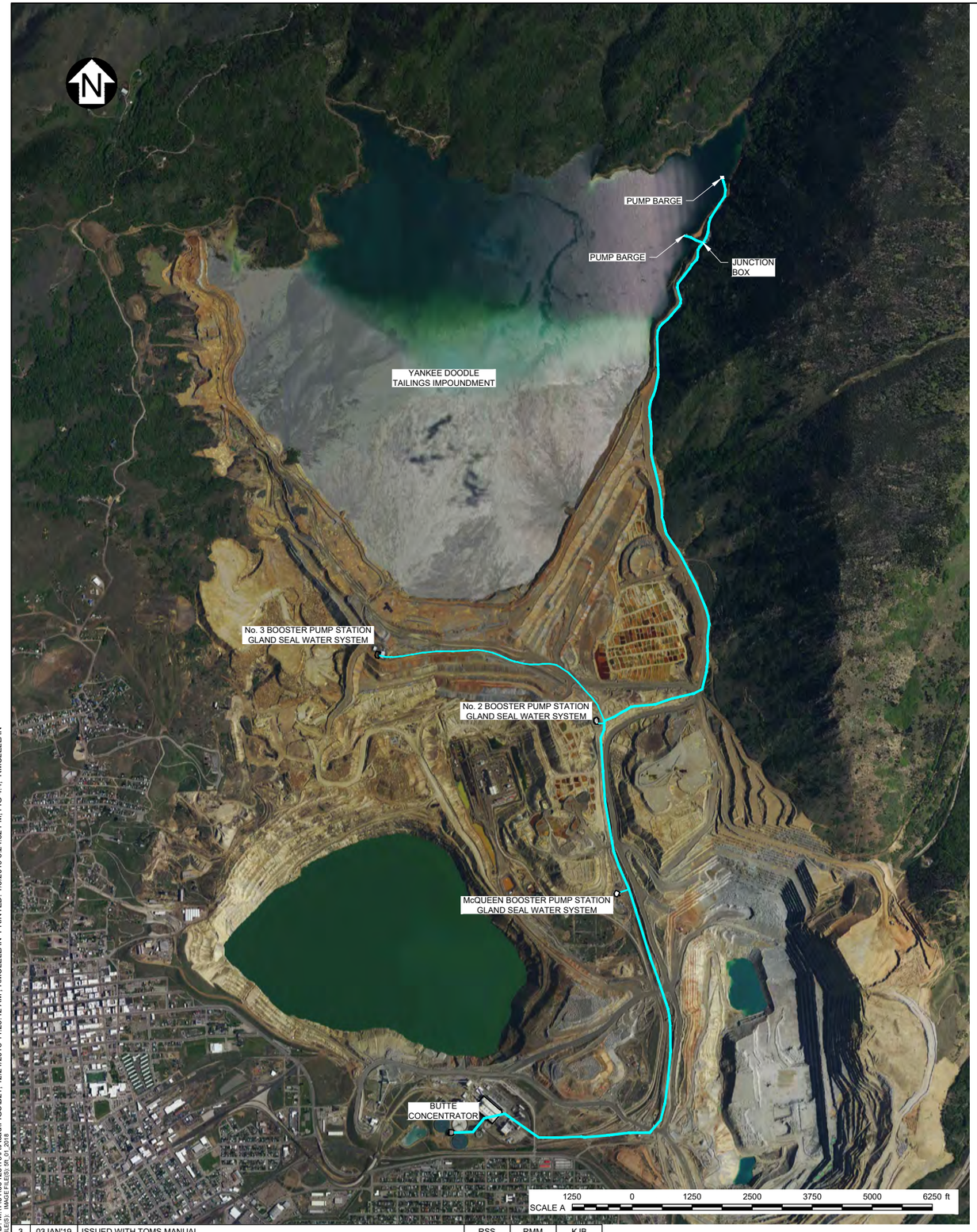

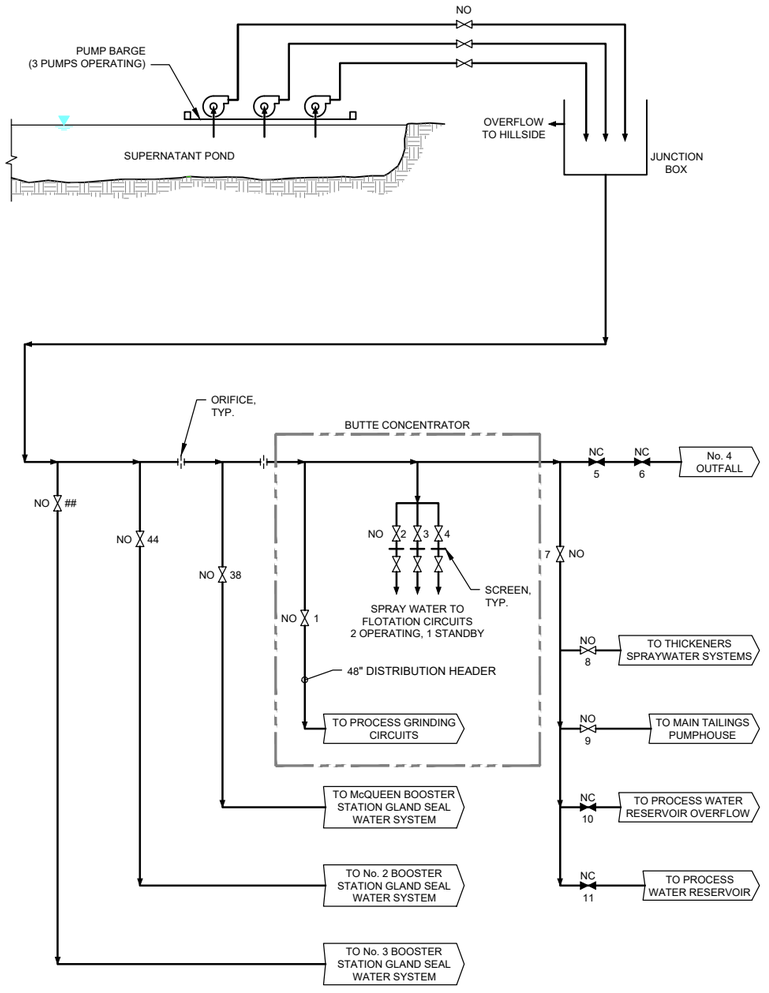

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YANKEE DOODLE TAILINGS IMPOUNDMENT

RECLAIM PIPELINE NETWORK

FIGURE 4.4

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SAVED: M:\1\01\00126\19\AA\cad\FIGS\B21, 12/21/2018 11:26:12 AM, RMCLELLAN PRINTED: 1/3/2019 3:24:32 PM, FIG 4.4, RMCLELLAN
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4.4.6 Horseshoe Bend Seepage Collection System

Seepage from the YDTI is collected at HsB, situated at the most southern area along the toe of the East-West Embankment. The area is shaped like an inverted 'U', bounded on both the east and west by historically leached mine rock. Seepage migrates through the free-draining YDTI rock embankments and discharges at the toe of the downstream slope. The seepage discharge daylights as a number of small seeps (HsB Seeps) at various locations along the embankment toe. The seepage flows and drainage from precipitation runoff are collected in surface drainage ditches that convey the water to the Upper HsB Pond on the west side of the HsB area.

Several smaller seeps daylight above the main HsB Seep area, approximately 250 ft above the downstream toe of the embankment. These perched seepage flows (known as Number 10 Seep) have been attributed to a buried historic haul road which channels seepage as perched flows to the Number 10 Seep collection facilities. The perched seepage discharge is collected in a drainage ditch and collection pond (Number 10 pond). The seepage discharges from the collection pond, over a v-notch weir (Number 10 weir) and into a pipeline that conveys the flow down the lower embankment slope to comingle with the main HsB seepage flows.

The HsB seepage collects in the Upper HsB Area and flows south to the Cell 10 pump. The pump conveys the flows to Cell 10 of the Precipitation Plant for processing. This flow is then directed downstream of the pump into the HsB Pond after copper removal. The Cell 10 flow is measured using a calibrated flume (Precipitation Flume) prior to discharging into the HsB Pond. HsB Pond is a long, narrow basin approximately 100 ft wide and 2,000 ft long. The seepage passes across a rectangular weir (HsB Weir) near the end of the HsB Pond. A diversion structure at the south end of HsB Pond diverts the water by gravity to the equalization basin for the HsB WTP.

The HsB WTP effluent is pumped to the Return Water Line near the McQueen Tailings Booster Station after treatment where it joins reclaimed water from the YDTI and flows by gravity to the Butte Concentrator. Figure 4.5 presents a schematic of the HsB seepage collection system.

The EOR and IRP are aware of a proposed BMFOU project that would modify BMFOU water management on the site by:

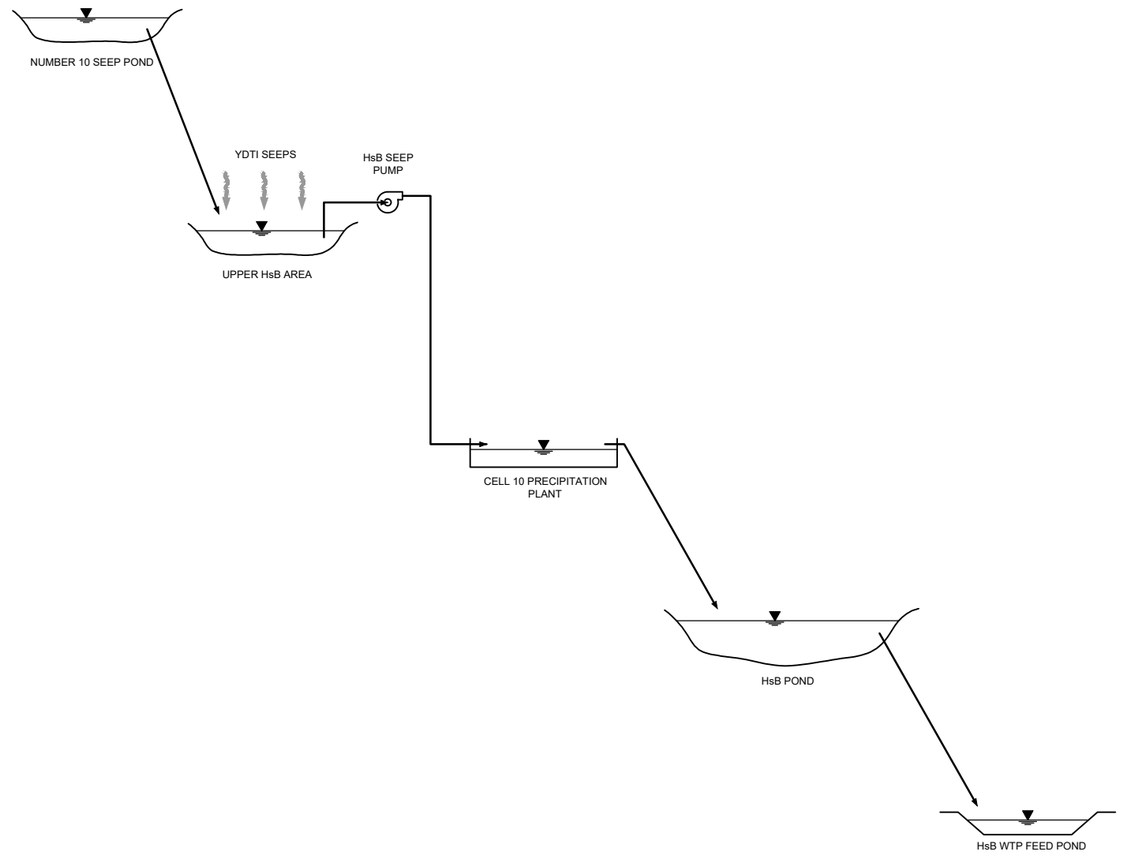
- Treating approximately 3 MGD of Berkeley Pit water in the HsB WTP
- Using the tailings and YDTI to treat the HsB area water, and
- Discharging approximately 7 MGD off-site.

4.4.7 Precipitation Plant and Associated Leach Pads

Leach operations at the mine were initiated in the 1960s with leaching of uncrushed low grade rockfill in the area immediately south of the YDTI. The leach operations were suspended in 1999, but recommenced in 2004, and flowrates were further ramped up in 2012. Leaching of the north-east leach pads are currently active, while the west and south-east pads are currently inactive.

Pregnant leach solution and drainage from precipitation runoff are collected in surface drainage ditches along the east and north-east side of the HsB area. The surface ditches convey the water to one of either three pre-processing storage ponds: Houligan, Surge or Holding. Leach solution is discharged from the ponds to the Precipitation Plant for processing. The barren leach solution is acidified prior to pumping back to the leach pads. The leach operation is a gaining system due to the capture of certain HsB seeps into the pre-processing ponds. The system configuration of the barren solution pumps

results in the gravity discharge of leach flow into HsB Pond. This flow is measured prior to discharge using a weir and level transmitter adjacent to the barren solution pump house.



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YANKEE DOODLE TAILINGS IMPOUNDMENT

HsB SEEPAGE COLLECTION SYSTEM

FIGURE 4.5

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SAVED: M:\1\01\00126\19\A\Acad\FIGS\B22, 12/19/2018 8:40:38 AM , RMCLELLAN PRINTED: 1/3/2019 3:28:44 PM, FIG 4.5, RMCLELLAN
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4.4.8 Surface Water Management

There are six[3] locations where surface water drainage is collected for use in the concentrator milling process:

- Yankee Doodle Tailings Impoundment
- Continental Pit
- Clear water ditch
- McQueen Booster Station
- Horseshoe Bend, and
- Mill water storage ponds.

Water stored in these locations is ultimately routed to the Concentrator for reuse in the process operations and is pumped to the YDTI in the tailings slurry.

The majority of precipitation (rainfall and snowfall) that occurs on the catchments upstream of the YDTI drains into the YDTI via three creeks: Yankee Doodle, Dixie and Silver Bow. Precipitation occurring in the Moulton Reservoir watershed (part of the Yankee Doodle Watershed) is collected in the Moulton Reservoirs. The two Moulton Reservoirs are part of the Butte public water supply system.

4.4.9 Tailings Production and Characteristics

The tailings production rate is approximately 49,000 short tons per day. The tailings characteristics used in the design of the facility include the following:

- Solids specific gravity: 2.65
- Slurry specific gravity: 1.28
- Average tailings slurry solids content (by weight): 35%, and
- Tailings beach initial settled dry density: 85 pcf.

4.5 WATER MANAGEMENT

MR operates a conventional copper/molybdenum flotation process circuit with slurry tailings disposal. The process relies on efficient water management practices.

Sources of water into the mine process include:

- Moisture in the ore
- Dewatering of the Continental Pit
- Drainage and surface run-off from watersheds upstream of the YDTI and Continental Pit
- Surface run-off from within the mine site
- Berkeley and Continental Pit dewatering wells for high-wall slope stability
- Butte water (potable water), and
- Fresh water from Silver Lake Water System.

Consumption of water leaving the mine process includes:

- Evaporation from the tailings beach, ponded water and reservoirs
- Water contained in the stored tailings

[3] Management of surface water on site is, in part, is subject to the requirements of the BMFOU RoD and CD.

- Water shipped with concentrates as moisture, and
- Process water used for dust control on the haul roads.

The main sources of water introduced to the MR mine operations are from precipitation and runoff into the facility and Silver Lake Water System (SLWS) water.

The majority of Silver Lake water is added into the MR process at the Concentrator and as service water at the Horseshoe Bend Water Treatment Plant (HsB WTP); however water may also be pumped directly to the YDTI via a tailings pipeline when operations staff determines if there is a potential for wind-blown dusting from the tailings beach and beach wetting is required for mitigation.

4.5.1 Water Balance Calibration

A site water balance was developed to identify and characterize the key variables that influence water demands and water supply requirements for the YDTI. The water balance model simulates the supply and demand for water on a month-by-month basis, from the initiation of mine operations through to current operating conditions. The water balance model was developed considering average model input assumptions for the historic and current operating conditions. The water balance includes evaluation of the historic conditions to facilitate calibration of the model.

The water balance was most recently updated to reflect the current operating conditions at MR. The water balance model incorporates the following major project components:

- YDTI and contributing catchments
- Continental Pit
- MR Concentrator
- Active Leach Pads and Precipitation Plant
- Great Northern Leach Dumps (Inactive)
- Northwest Area
- Berkeley Pit
- HsB WTP, and
- Silver Lake Water System.

The following data is collected on site and is used in the balance:

- Supernatant pond water volume - annual bathymetric survey
- HsB WTP flows (effluent and sludge reject) - daily
- HsB Weir flows - daily
- Reclaim water return volume - weekly
- Silver Lake Water System flows - monthly, and
- Mine site dust control (road network) water volume - monthly.

The following water balance flows are currently estimated as there is no recording mechanism:

- Continental Pit dewatering, and
- Evaporation.

The water balance model results indicate the mine operates with an overall water deficit. The water sources collected and stored on site (i.e. surface runoff from contributing catchments areas, YDTI

embankment seepage, YDTI pond, and pit dewatering) is insufficient to support the mill processing and water consumption, therefore makeup water is required from an outside source (i.e. Silver Lake).

SECTION 5.0 OPERATIONS, MAINTENANCE AND SURVEILLANCE

5.1 INTRODUCTION

The YDTI components and associated facilities must be inspected and maintained regularly to ensure that any changes to the conditions, performance, or any potentially hazardous conditions can be identified and promptly addressed. Selected photographs of the facility and associated components are included in Appendix A.

The maintenance and inspection responsibilities for the various MR facility components are discussed in Section 2 of this Manual. An inspection log is provided in Appendix B to help guide the observation and surveillance process. The inspection log covers major items related to the YDTI and associated facilities. Appendix B also provides templates for supernatant pond monitoring and for the monitoring wells and piezometers.

Additional details of the specific operation, maintenance and surveillance requirements for each component of the facility are provided in the following sections. Table 5.1 presents a summary of the routine operational surveillance requirements.

Table 5.1 Operational Surveillance Requirements

Location	Inspection	Frequency[1]
YDTI Embankment	Inspect for cracking, slumping/deformation, erosion, slope failure, and any other changes in the embankment shape and surface. Inspect the upstream slope, downstream slope and embankment crest.	monthly
	Inspect for daylighting seeps on the downstream embankment slope/benches, water pooling/ponding, soft/wet areas	monthly
	Inspect the embankment upstream slope and the integrity of the facing materials, particularly when the tailings discharge stream is flowing adjacent to the embankment	monthly
	Measurement of water levels in the monitoring wells	monthly
	Download of water levels from vibrating wire piezometers	monthly
YDTI Supernatant Pond	Measure water level	weekly
	Evaluate pond storage volume	annually
	Bathymetric survey of the tailings pond	annually
YDTI Beach	Inspect beach surface for dusting risk/potential	daily
Tailings Delivery System	Observe discharge flow looking for whirlpools or indication the discharge flow is entering the embankment when a discharge stream is adjacent to the embankment	daily
	Observe the active tailings discharge pipes to confirm discharge is not blocked by beach/tailings sand.	daily
	Monitor tailings pump electrical current draw for changes in pump system demand. Visually inspect the tailings pipelines for leaks.	twice daily
	Survey the tailings beach elevation at the tailings discharge locations	weekly
	Sample tailings slurry and analyze characteristics	quarterly
Water Reclaim System	Record the reclaim water meter (flowrate and total volume pumped)	daily
HsB Seepage Collection System	Record the HsB Seeps (Precipitation Flume) flowrate	daily
	Record the Number 10 seep flowrate	weekly
	Collect HsB WTP influent sample	monthly
Site Wide Water Management	Observe surface drainage ditches and culverts for erosion, blockage, damage	monthly

NOTES:

1. MR will make every effort to comply with the general monitoring frequency specified in the table. However, the schedule can be modified should circumstances temporarily preclude monitoring at the desired frequency.

5.2 QUANTITATIVE PERFORMANCE PARAMETERS

Quantitative Performance Parameters (QPPs) are parameters which can be easily measured and evaluated on-site without complex calculation or data interpretation. QPPs are a good reference to quickly assess the performance of the YDTI. The following QPPs have been selected to enable performance review and a high level compliance assessment of all YTDI components.

Table 5.2 summarizes the QPPs that have been identified. Further explanation and details regarding the QPPs are presented in the specific sections below.

Table 5.2 Quantitative Performance Parameters

Location	QPP	Value
YDTI Embankments	Downstream Overall Slope	≥ 2H:1V
	Minimum Crest Width	> 200 ft
East-West Embankment Piezometers	Water level: MW94-08	< 5,680 ft
	Water level: MW94-11	< 5,693 ft
	Water level: MW14-01	< 5,800 ft
	Water level: DH15-S3 VW1	< 5,690 ft
	Water level: DH15-S4 VW1	< 5,740 ft
	Water level: DH15-S4 VW2	< 5,800 ft
North-South Embankment Piezometers	Water level: MW12-01	< 5,940 ft
	Water level: MW12-05	< 6,200 ft
West Embankment Piezometers	Water level: DH15-12 VW1	< 6,372 ft
	Water level: DH15-12 VW2	< 6,372 ft
	Water level: DH15-12 VW3	< 6,372 ft
YDTI Supernatant Pond	Pond Freeboard	> 22 ft
YDTI Beach	Minimum beach length	No ponded water adjacent to embankment

5.3 YDTI EMBANKMENTS

The YDTI embankments are developed to impound the settled tailings solids, provide disposal of rock and to facilitate water recovery for the mill operations.

5.3.1 Operational Objectives

The operational objectives of the YDTI embankments include:

- Rock disposal within and along the embankments
- Safe storage of tailings solids and supernatant water recovery
- Management of all incident precipitation and runoff up to the PMF storm event, and
- Provision of 5 ft of freeboard in addition to the PMF freeboard.

5.3.2 Operation and Maintenance Requirements

The current embankment design and operating parameters are as follows:

- Storage of 850 M short tons of mine tailings

- Storage of the supernatant pond (approx. 15,000 to 30,000 acre-feet)
- Downstream embankment slope 2H:1V, and
- Crest width 200 ft.

The East-West and North-South Embankments are constructed by placement of rockfill in 50 ft thick end dumped lifts. An alluvium facing layer, approximately one to two feet thick, is selectively end dumped along the upstream face of the embankment as required. The facing layer provides a finer grained zone to prevent uncontrolled ingress of water or tailings slurry into coarse rockfill zones, which typically develop along the base of the 50 ft rockfill lifts within the embankment.

The West Embankment is a zoned earthfill and rockfill embankment comprised of a free draining upstream rockfill zone (Zone U), earthfill facing layer (Zone F) and less permeable downstream rockfill zone (Zone D1). Zone U material is placed in 50 ft thick end-dumped horizontal lifts and Zone F in one to two ft thick zones, in a manner comparable to the similar zones in the existing East-West and North-South Embankments. The Zone D1 material is placed in thinner, compacted lifts up to a maximum thickness of 5 ft. The Zone U rockfill will promote infiltration of seepage into the West Embankment Drain (WED), while the Zone D1 acts as an impediment to lateral drainage and horizontal migration of perched seepage flow towards the downstream face of the embankment and to enhances drainage within Zone U.

The WED system consists of a subsurface aggregate drain, Extraction Pond, Extraction Basin, contingency drain pods, and secondary seepage collection drains. The WED system components are all connected and work together to promote the drainage of seepage from the West Embankment. Operation of the WED system is planned to commence following approval of the Amendment Application currently under DEQ review and after construction of the drain connection to the Extraction Pond (Stage 2). During normal operations seepage collected in the WED will gravity drain to the Extraction Pond, where it is then pumped over the embankment crest into the YDTI. The Extraction Basin, which is located approximately halfway along the WED alignment, is a contingency WED dewatering system. Two wells, each could be fitted with a submersible pump and operated to dewater the WED and reduce water levels in the West Embankment if required.

Tailings beach is required along the upstream face of all embankments. The revised multiple point tailings deposition plan promotes the development of this protective beach. The facing layer on the upstream slope of the embankments also prevents tailings slurry from flowing into coarse rockfill layers in the event the tailings discharge flows adjacent to the embankment upstream toe. Periodic inspection of the embankment upstream slope and the facing materials is required, particularly when the tailings discharge stream is flowing adjacent to the embankment.

The current YDTI is designed to store the entire PMF runoff volume within the impoundment. The PMF volume has been determined to be 19,000 acre-ft (KP Letter, VA15-03210) and represents a combination of rainfall, snowpack melt and a concurrent hypothetical 540 acre-ft breach of the Moulton Reservoir. Based on the depth-area capacity evaluation for the YDTI the PMF runoff volume equates to a water storage depth of approximately 17 ft above the operating pond elevation. The PMF storage, when combined with an additional 5 ft of freeboard for wave run-up, therefore requires that at least 22 ft must be maintained above the supernatant pond level as compared to the lowest elevation along the embankment crest.

Technical specifications associated with the continuous construction of the embankment are detailed in the report *'Construction Management Plan' (CMP)*, VA101-126/12 Report 5. The CMP outlines the Quality Assurance / Quality Control (QA/QC) requirements for embankment construction including construction inspection and compaction requirements. Rockfill gradation requirements are outlined on the Construction drawings.

Drawings and specifications for the new West Embankment extension up to a crest elevation of 6,400 feet have been issued under the seal and signature of the EOR who is a registered Professional Engineer in the State of Montana.

Regular surveillance of the embankments should follow the schedule outlined in Table 5.1. Typical observations to be made during surveillance include:

- Evidence indicating embankment structure deformation (e.g. slope bulging, cracks on the crest, settlement, etc.)
- Evidence indicating tailings slurry migration and/or seepage into the embankment (e.g. tailings discharge flowing adjacent to the embankment and presence of 'whirlpools')
- Embankment erosion
- Dirty or turbid seepage flows downstream of the embankments, that may indicate internal erosion and piping within the embankments, and
- Other unusual conditions in the impoundment area.

The YDTI embankments do not require regular maintenance; however specific maintenance items may be identified as a result of the inspections and surveillance of the embankment. Embankment maintenance items may include:

- Perform regular inspections of the embankments to identify potential maintenance items
- Fill erosion gullies when necessary. Stabilize areas to prevent future erosion, and
- Maintain grading of the embankment crests to prevent depressions, rutting or other potential areas for standing water to accumulate.

5.3.3 Embankment Instrumentation

The YDTI embankment has 98 active instrumentation locations, which are distributed as follows:

- 41 instrumentation locations installed within the embankment rockfill
- 26 instrumentation locations installed in the West Ridge area
- 13 instrumentation locations installed in the Horseshoe Bend Area, and
- 18 instrumentation locations installed within the tailings mass.

MR implemented and commissioned a web-based remote monitoring system in 2018 for the embankment instrumentation. The system allows real-time access to piezometric data from monitoring sites via a radio and cellular mesh telemetry network. The historical standpipe locations were each fitted with a vibrating wire piezometer as part of the monitoring network upgrade. MR had implemented remote monitoring at 93 of the instrumentation sites by December 2018. The remaining five, which are currently inaccessible due to embankment construction, will be connected in 2019.

Figure 5.1 and Table 5.3 present instrumentation locations that are currently being monitored.

Table 5.3 Embankment Monitoring and Instrumentation Locations

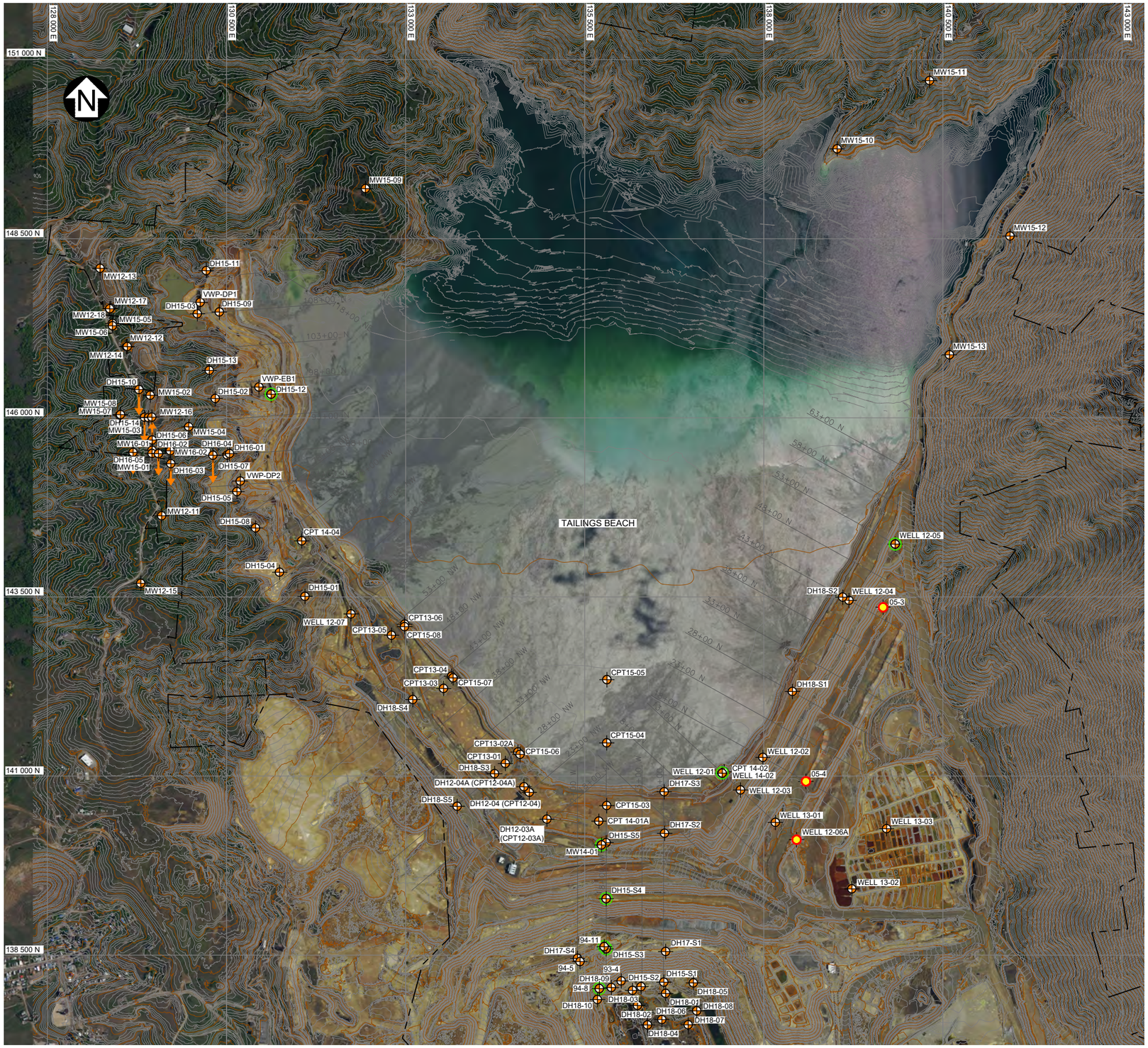
Monitoring Location	Well ID	Instrumentation
North-South Embankment	MW 12-01	VWP
	MW 12-02	VWP
	MW 12-03	Standpipe
	MW 12-04	VWP
	MW 12-05	VWP
	MW 13-01	VWP
	MW 13-02	VWP
	MW 13-03	VWP
	MW 14-02	Standpipe
	DH18-S1	4 x VWP
	DH18-S2	5 x VWP
East-West Embankment	DH15-S1	3 x VWP
	DH15-S2	3 x VWP
	DH15-S3	VWP
	DH15-S4	2 x VWP
	DH15-S5	4 x VWP
	DH17-S3	3 x VWP
	DH17-S4	3 x VWP
	DH18-S3	5 x VWP
	DH18-S4	4 x VWP
	DH18-S5	5 x VWP
	MW 93-4	VWP
	MW 94-5	VWP
	MW 94-8	VWP
	MW 94-11	VWP
	MW12-07	VWP
	MW14-01	VWP
West Embankment	DH15-01	3 x VWP
	DH15-02	3 x VWP
	DH15-03	3 x VWP
	DH15-04	3 x VWP
	DH15-05	3 x VWP
	DH15-07	3 x VWP
	DH15-08	3 x VWP
	DH15-09	3 x VWP
	DH15-11	3 x VWP
	DH15-12	3 x VWP
	DH15-13	3 x VWP
	VWP-EB1	VWP
	VWP-DP1	VWP
	VWP-DP1	VWP

Monitoring Location	Well ID	Instrumentation
Tailings Beach	DH12-03A	VWP
	DH12-04	VWP
	DH12-04A	VWP
	CPT13-01	3 x VWP
	CPT13-02A	VWP
	CPT13-03	VWP
	CPT13-04	VWP
	CPT13-05	VWP
	CPT13-06	VWP
	CPT14-01A	VWP
	CPT14-02	VWP
	CPT14-04	VWP
	CPT15-03	3 x VWP
	CPT15-04	3 x VWP
	CPT15-05	3 x VWP
	CPT15-06	2 x VWP
	CPT15-07	2 x VWP
	CPT15-08	2 x VWP
West Ridge Area	DH15-06	5 x VWP
	DH15-10	5 x VWP
	DH15-14	5 x VWP
	DH16-01	4 x VWP
	DH16-03	5 x VWP
	DH16-04	6 x VWP
	DH16-05	7 x VWP
	MW 12-11	VWP
	MW 12-12	VWP
	MW 12-13	VWP
	MW 12-14	VWP
	MW 12-15	VWP
	MW 12-16	VWP
	MW 12-17	VWP
	MW 12-18	VWP
	MW 15-01	VWP
	MW 15-02	VWP
	MW 15-03	VWP
	MW 15-04	VWP
	MW 15-05	VWP
	MW 15-06	VWP
	MW 15-07	VWP
	MW 15-08	VWP
	MW 16-01	VWP
	MW 16-02 (D and S)	2 x VWP

Monitoring Location	Well ID	Instrumentation
Horseshoe Bend Area	DH-11	VWP
	DH17-S1	3 x VWP
	DH17-S2	6 x VWP
	DH18-01	3 x VWP
	DH18-02	3 x VWP
	DH18-05	3 x VWP
	DH18-06	3 x VWP
	DH18-07	3 x VWP
	DH18-08	3 x VWP
	DH18-09	3 x VWP
	DH18-10	3 x VWP
	DH18-11	3 x VWP
	DH18-12	3 x VWP

NOTES:

1. VWP = Vibrating Wire Piezometer.



SCALE A 500 0 500 1000 1500 2000 2500 ft

LEGEND:

- PIEZOMETRIC MONITORING SITE
- WELL NOT ACCESSIBLE (BURIED OR ABANDONED)
- QUANTITATIVE PERFORMANCE PARAMETER MONITORING SITE
- PROPERTY LINE

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

SITE INSTRUMENTATION AND MONITORING

FIGURE 5.1

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
3	07JAN'19	ISSUED WITH TOMS MANUAL	RSS	RMM	KJB

SAVED: M:\1101\0126\19\A\Acad\FIGS\B23, 12/19/2018 9:30:01 AM , RMCLELLAN PRINTED: 1/7/2019 10:40:21 AM, FIG 5.1, RMCLELLAN
XREF FILE(S): Aerial_201706; Bath2017_Topo IMAGE FILE(S): 58_01_2018

5.4 YDTI SUPERNATANT POND

The supernatant pond is maintained along the northern extent of the YDTI, where process and make-up water is recovered for use in the milling process.

5.4.1 Operational Objectives

The operational objectives for the YDTI supernatant pond include:

- Safe (physical and environmental) storage of supernatant water for reuse in the milling process.
- Maintenance of adequate water storage (contingency water volume) to provide for continuous mill water supply during winter months and extended dry periods.
- Inundation and wetting of the tailings beach surface to the greatest extent possible to minimize the potential for dust generation, while maintaining drained beach conditions and low pore pressures within the free draining embankments.
- Provision of adequate retention/settling of tailings fines to maintain appropriate water clarity prior to uptake by the reclaim water pumps.

5.4.2 Operation, Maintenance and Surveillance Requirements

The main requirements for the supernatant pond are as follows:

- Supernatant pond volume: 15,000 to 30,000 acre-ft, and
- Maintain pH at approximately 10.5.

The supernatant water pond must be managed in a manner such that the storage capacity and integrity of the YDTI embankments is not compromised. Surface water runoff from catchments upstream of the YDTI also flow into the impoundment and accumulate in the supernatant pond.

Maintenance of adequate storm water storage (contingency water volume) is checked every quarter by comparison of the measured pond water levels with the lowest containment elevation within the impoundment. A freeboard of at least 22 feet between the supernatant pond elevation and the lowest containment elevation must be maintained at all times.

Wetting of the tailings beach is managed primarily using the multiple tailings discharge points from the YDTI embankments. The multiple discharge points provide additional flexibility and depositional control to maintain wetted beach and mitigate the potential for dusting. Wetting of the tailings beach using additional freshwater discharges across the surface of the tailings beach may also be used as a contingency dust management measure.

5.5 YDTI BEACH

The YDTI beach is developed adjacent to and along the impoundment embankments.

5.5.1 Operational Objectives

The operational objectives of the YDTI beach include:

- Efficient and safe storage of tailings solids, and
- Development of extensive drained tailings beach linearly along the entire upstream face of the YDTI embankments.

5.5.2 Operation, Maintenance and Surveillance Requirements

The tailings beach is progressively developed during mine operations as the tailings are discharged, and the solids settle and accumulate within the impoundment. The current operations incorporate multiple tailings discharge points situated along the upstream toe of the North-South, East-West and West Embankments. The multiple points enable greater control of beach development adjacent to the embankments, beach wetting to mitigate against dusting, and to allow greater control of the location, size and extent of the supernatant pond.

The tailings solids are stored in a manner such that the integrity of the confining embankments is not compromised and there is minimal environmental impact from the tailings in the facility. Efficient storage of tailings is achieved through maximizing the settled tailings dry density by subaerial drying and drainage to enhance natural consolidation within the tailings mass. The tailings beach will naturally consolidate over time due to ongoing settling and consolidation within the accreting tailings mass.

The operational management of the tailings beach development includes regular monitoring of the tailings beach area. Beach surveillance includes observation of beach deposition uniformity at the discharge locations, observation of tailings discharge stream position and any flowpaths adjacent to the embankments, and identification of beach areas at risk of blowing tailings that require mitigation.

The active discharge locations in the YDTI are regularly inspected to ensure that accumulating tailings solids do not block the discharge outlet. Tailings naturally accumulate around the discharge location and the discharge pipe must be cut off or pulled back as the beach surface increases and inundates the discharge point.

5.6 TAILINGS DELIVERY SYSTEM

The tailings delivery system consists of three identical parallel steel and HDPE pipeline networks with four multiple-stage pump stations. The system discharges tailings into the YDTI at eight discharge locations. A Tailings Discharge Plan, as described in Section 4.4.10, was prepared by MR in 2018. The Tailings Discharge Plan outlines the operational management and monitoring of the tailings discharge system.

5.6.1 Operational Objectives

The key objectives of the tailings delivery system include:

- Safe and reliable conveyance of the tailings slurry from the mill to the YDTI
- Develop and maintain extensive, drained tailings beaches adjacent to the upstream face of the YDTI embankments
- Provide flexibility in tailings deposition planning to vary from the normal operating plan to maintain wetted beaches and mitigate the potential for wind-blown tailings events, and
- Conveyance of additional Silver Lake make-up water to the YDTI as required.

5.6.2 Operation, Maintenance and Surveillance Requirements

The main tailings delivery system design parameters are as follows:

- Tailings slurry transfer: approx. 18,000 gpm
- Tailings solids concentration (by weight): approx. 32% to 37%, and

- Tailings solids concentration (by volume): approx. 16% to 18%.

Regular maintenance and monitoring of the tailings delivery pipelines and pumping stations is required to ensure tailings flow is not impeded. Review of the tailings pump amperage trends at each booster station to monitor for changing pumping conditions is required. Increasing pump amperage would indicate tailings deposition and sanding of the tailings delivery pipelines.

Flushing of the pipelines with water should be undertaken when switching an operational line to standby to ensure that tailings sediments do not accumulate and solidify in the bottom of the pipeline. Regular inspection of the pipelines for leakages, signs of internal pipe abrasion and external damage to the pipeline is also required. The abrasive nature of the tailings solids will progressively wear the internal walls, particularly along the bottom of the pipeline. Rotation of the tailings pipelines is undertaken periodically to reduce concentrated abrasion along the bottom of the pipeline, thereby increasing the life of the pipe.

Pipeline inspection requirements are included in the Inspection Log in Appendix B.

The redundant tailings pipeline maybe used intermittently to facilitate delivery of additional make-up water from Silver Lake to the YDTI for blowing tailings mitigation. The Silver Lake supply line is connected to the tailings pipeline at the Concentrator and the existing tailings pump stations are used to deliver the water.

5.7 WATER RECLAIM SYSTEM

The water reclaim system consists of two floating barge units, each of which can pump water to a junction box located at a topographic high point on the reclaim access road. Reclaim water then flows by gravity from the junction box to the Concentrator for reuse in the milling process.

5.7.1 Operational Objectives

The key objectives of the water reclaim system is the safe and reliable pumping and conveyance of reclaim water from the supernatant pond to the mill process water reservoir.

5.7.2 Operation and Maintenance Requirements

The key water reclaim system operating parameters are as follows:

- Reclaim water pump rate: approximately 10,000 gpm, and
- Maintain reclaim water pH at approximately 10.5.

Safe and reliable operation of the reclaim water system is achieved through proper operation and maintenance of the reclaim barge, pumps and pipelines. Routine inspections of the pipeline and barge unit and replacement of worn or damaged components minimize down time.

The barge deicing system is operated continuously during extreme cold conditions to prevent freezing around the barge pontoons. Maintenance shut-downs during cold periods are avoided, and, if necessary, pipes are drained to avoid freezing of standing water in the lines.

5.8 HORSESHOE BEND WATER COLLECTION SYSTEM

The Horseshoe Bend (HsB) Water Collection System consists of surface ditches and drainage structures to facilitate the collection of seepage flows daylighting along the downstream toe of the YDTI

embankment and along the toes of the leach pads east and south of the YDTI. The collected water consists of seepage from the YDTI and runoff from the leach pads and from Rampart Mountain. Portions of the HsB Water Collection System also serve as a collection system for pregnant leach solution when the leach pads are actively leached.

5.8.1 Operational Objectives

The key objectives of the HsB Water Collection System include:

- Diversion of HsB flows away from Berkeley Pit
- Effective and reliable collection of the HsB flows
- Safe and reliable conveyance of the HsB flows, and
- Reliable monitoring of seepage flows (Number 10 weir and HsB Weir).

5.8.2 Operation and Maintenance Requirements

The main HsB Water Collection system operating parameters are as follows:

- Average flowrate: approximately 3,500[4] gpm, and
- Seepage pH: approximately 3.

The low pH of the seepage results in additional management requirements due to precipitate accumulation and corrosion. Regular maintenance of pipe and pumps is undertaken and components are replaced as required. Inspections for leaks or damage parts must be undertaken regularly. Monitoring of pump delivery pressures may be used to evaluate precipitate build up in the pipelines and the frequency for descaling.

Seepage water is sampled and chemical analysis completed approximately weekly to monitor changes in the chemical composition.

Data loggers continuously record the water levels in the HsB weir. The data is downloaded by Montana Bureau of Mines and Geology (MBMG) on a regular basis. Water level flows over the Number 10 weir are manually recorded by MR staff on a weekly basis. Regular inspection and clearing of debris and algae/weed growth from the weir and surrounding area is required for data measurement accuracy.

5.9 SITE WIDE WATER MANAGEMENT

Site wide water management consists of surface ditches and drainage structures to facilitate the collection and conveyance of surface runoff.

5.9.1 Operational Objectives

The key objective of the water management systems are the effective and reliable collection and conveyance of the surface water flows generated during precipitation events and from snowmelt.

[4] The average HsB flowrate in 2018 was approximately 3,100 gpm. This reduced flowrate is possibly due to operational changes at the YDTI (i.e. multiple discharge locations).

5.9.2 Operation and Maintenance Requirements

All surface water conveyance ditches and structures must be maintained in good working order. Water conveyance ditches and structures are to be inspected following periods of significant rainfall or snowmelt. Inspection will address erosion and vegetation coverage degradation of earthen structures. Civil structures, i.e. culverts, inlet, discharge all be inspected for damage, blockage, or general wear and tear.

5.10 SITE CLIMATE STATION

MR have maintained a climate station at the YDTI since 2014. The climate station currently records temperature, precipitation, barometric pressure, wind speed, wind direction and humidity.

5.10.1 Operational Objectives

The key objective of the YDTI climate station is to collect real-time data that can be used to generate weather forecasts for the YDTI, specifically to identify conditions that may cause wind-blown tailings.

5.10.2 Operation and Maintenance Requirements

The MR climate station is located adjacent to the No. 3 Tailings Booster Station. The station generates real-time information that is accessed remotely and is used by MR's control room operator and meteorologist. Weather forecasting for the MR operations are updated daily by a contracted meteorologist. The 5-day forecasts are used to guide operations, plan dust control/mitigation activities and schedule tailings management. The climate data review and forecasting procedures are detailed further in the Dust Control Plan (MR, 2018a).

Annual inspection and calibration of the site climate station should be undertaken to ensure the recording instrumentation and equipment set-up has not shifted or been damaged.

5.11 UPGRADIENT MONITORING LOCATIONS

MR have five instrumentation locations upgradient of the YDTI that are connected to the web-based remote monitoring system. The five locations consist of standpipe monitoring wells that are fitted with piezometers for real-time measurement of the groundwater level. Manual water sampling may also be conducted from these locations.

Figure 5.1 and Table 5.4 present the up-gradient instrumentation locations that are monitored.

Table 5.4 YDTI Up-gradient Instrumentation Locations

YDTI Up-gradient Wells	MW15-09	VWP
	MW15-10	VWP
	MW15-11	VWP
	MW15-12	VWP
	MW15-13	VWP

5.12 YDTI OPERATIONS AND PERFORMANCE REVIEW

On an annual basis MR staff responsible for management of the various components of the YDTI will review the performance during the prior year. The following topics should be considered:

- Review of weekly and monthly monitoring results
- Review of QPPs compliance, and
- Review of maintenance required and maintenance completed.

Any questions or concerns noted during the review should be forwarded to the EOR for review and feedback as required.

SECTION 6.0 INSPECTIONS, REPORTING AND REVIEWS

6.1 REGULATORY DOCUMENTS

A copy of regulatory documents prepared by MR or consultants related to the YDTI construction, operation and maintenance will be provided to the EOR at the same time as submission to the EPA or MDEQ.

6.2 MONTHLY INSPECTION

An inspection of the embankment structure is undertaken by MR staff on a monthly basis. The inspection includes observation of the embankment slopes and crest, and tailings discharge lines. Recording of the inspection event and any observations is logged on the Monthly Impoundment Inspection Log (Appendix B.1-1).

MR provides a summary of monthly inspection logs to the EOR on a quarterly basis. The EOR has real-time remote access to the embankment piezometric information.

6.3 ANNUAL EOR INSPECTION

As per MCA 82-4-381, the EOR will inspect the tailings impoundment annually during operations or as required during closure pursuant to a reclamation plan under MCA 82-4-336. The requirements for the annual inspection are as follows:

- The EOR will prepare a report describing the scope of the inspection and actions recommended to ensure the impoundment is being properly operated and maintained.
- The EOR will submit the report to MR and the MDEQ and immediately notify the MDEQ and MR if the facility presents an imminent threat or the potential for an imminent threat to human health or the environment.

The following actions will be taken if the Annual Inspection Report (AIR) contains recommendations:

- MR will prepare a corrective action plan and schedule to guide the implementation of the recommendations made by the EOR.
- MR will submit the corrective action plan and schedule to the EOR.
- The EOR will review the corrective action plan and schedule and verify the proposed corrective actions will reasonably be expected to effectively address the recommendations made in the AIR.
- MR will submit the verified corrective action plan and schedule to the MDEQ within 120 days following the date of the inspection.
- MR will implement the corrective action plan in accordance with the implementation schedule.

6.4 PERIODIC IRP REVIEWS

As per MCA 82-4-380, at least every 5 years MR must assemble an IRP review in accordance with the IRP requirements (MCA 82-4-377). The IRP must conduct the following:

- Inspect the tailings impoundment.
- Review the TOMS Manual and records collected in association with the Manual.
- Interview people with responsibilities identified in the TOMS Manual.

- Review EOR Annual Inspection Reports, corrective actions, records associated with construction, and any other aspect, plan, record, document, design, model, or report related to the facility, which IRP needs to ensure the facility is constructed, operated, and maintained as designed and is functioning, can be closed as intended, and meets acceptable engineering standards.
- The IRP will prepare a report detailing the scope of review and include any recommendations resulting from the review.
- The IRP will immediately notify the MDEQ and MR if there is an imminent threat to human health or the environment.
- The final review report must be signed by each IRP member and provided to the MDEQ and MR.
- MR will prepare a corrective action plan and schedule effectively implementing the recommendations included in the IRP report. MR will submit the corrective action plan and schedule to the IRP within 60 days after receipt of the IRP report.
- The IRP will review the corrective action plan and schedule to determine whether the corrective action plan and schedule proposed by the operator will effectively implement the recommendations included in the IRP's report.
- Within 30 days after receipt of approval from the IRP, the operator will submit the corrective action plan with an implementation schedule to the department.

MR will provide documents and records necessary for the IRP to complete the periodic review.

6.5 INTERIM REVIEW AND REPORTING

Additional inspections or monitoring may be required following any unusual event (e.g., earthquake or extreme rainfall event) or observation made during a routine inspection or monitoring. The response action plan following an unusual event is outlined in Table 6.1. The response procedures following identification of unusual conditions during inspection or monitoring will be undertaken according to the monitoring and mitigation actions presented in Section 7.0.

Reporting of any unusual conditions and documentation of any additional monitoring or remedial measures undertaken will be recorded on the Impoundment Incident Report Form (Appendix C) which must be completed as soon as possible and a copy submitted to the EOR.

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 6.3 for an annual inspection will be followed for preparing, submitting and implementing the corrective action plan and schedule.

Table 6.1 Response Action Plan (Condition/Notification/Response)

EVENT / OBSERVATION	RECOMMENDED ACTION
Extreme Rainfall or Runoff Event	Monitor the YDTI pond levels against the critical levels daily (or more frequently) until pond inflow reduces to normal.
	Monitor the HsB weir flowrates and water level in the HsB WTP storage pond. Increase inflow to HsB WTP to meet the maximum treatment capacity of HsB WTP pond and open discharge overflow into Berkeley Pit as required.
	Inspect the embankments and HsB Seepage Collection System for signs of concentrated runoff and erosion.
	Inspect surface drainage ditches and culverts for blockages, bank scouring or localized erosion.
	Inspect the YDTI embankments for indications of localized slumping or instability, and note areas of saturated or soft ground
	Read piezometers daily to monitor pore pressure response to increased precipitation. Report findings to the MR Engineering Team.
Extreme winds	Monitor beach for dusting risk. Recirculate reclaim water or pump Silver Lake water to YDTI to discharge over the tailings beach. Apply Magnesium chloride to surface of dry beach areas if safe. Alter tailings discharge location to address areas of dry or blowing tailings.
YDTI pond level close to or approaching maximum operating level	Monitor Pond levels every 3 hours
	Increase reclaim water pump back flow rate. Commence additional reclaim water pump back with standby reclaim barge unit. Mobilize additional pump equipment to increase pumping capacity if accelerated water level reduction is required. Discharge additional water into the Concentrator dredge pond, Berkeley Pit or Continental Pit.
	Stop discharge of tailings into the YDTI.
Extreme earthquake event	Undertake a detailed inspection of the YDTI embankments, pipelines and associated structures. Observe downstream and upstream (visible) slopes to look for signs of cracks, bulging, settlement and/or other deformations. Look for and note any changes in seepage, particularly with respect to the rate of seepage flow at the embankment toe and seepage clarity.
	Record water levels in piezometers.
	Inspect downstream embankment toes for sand boils and along the slopes for sinkholes. Inspect the tailings beach upstream to look for whirlpools.
	Discuss findings with the MR Engineering Team and EOR.
	Inspect HsB seepage flow for change in flowrates and seepage clarity.
Rupture of pipeline at the embankment	Switch to alternate tailings pipeline.
	Check the upstream slope and crest for erosion.
	Take photographs and make notes of exact location and cause (if known) of leak. Contact the MR Engineering Team.
Significant, rapid embankment erosion, seepage break out or sand boils	Estimate seepage flow rate. Estimate size of area affected.
	Take photographs and make notes of exact location (if known) of erosion. Contact the MR Engineering Team and EOR.
Extreme freezing temperatures	Drain reclaim pipeline if not in use.
	Ensure de-icing system on reclaim barge is functioning properly. System should be checked prior to expected onset of freezing temperatures.
	Check surface runoff management pumps i.e. Muddler Pump for frozen pipes and intake pipes blocked with ice or snow.
	Check Tailings Pump System to ensure pipelines are not frozen.
	Take photographs and make notes of any damages or unusual observations.
Significant change in the HsB water quality results	Significant change for two consecutive monitoring events - notify the MR Engineering Team.
Power Failure	Drain tailings pipelines if power failure occurs. Drain reclaim pipeline if power failure occurs during freezing temperatures.
	Monitor water levels in the YDTI and check against critical levels. Check more regularly if the water levels are rising and the pond level is close to the maximum level. If the pond level is close to the maximum level portable generators may be required to power the reclaim pump until power is restored.
Significant change in the piezometer levels	Re-check the reading, and contact the MR Engineering Team
Irreparable damage to a monitoring location	Notify MR Engineering Team and EOR. The requirement to replace the well will depend on the effected location.
Other events/observations	Use judgement, consult with MR engineers.

SECTION 7.0 EMERGENCY PREPAREDNESS AND RESPONSE

7.1 GENERAL

Emergency preparedness and response planning is critical to prevent failure from occurring, and to reduce and mitigate loss of life and property damage in the event failure transpires. Evaluation of potential emergency and hazardous conditions threatening the facility, and appropriate response actions to prevent development and further advancement of emergency conditions have been identified in the following sections.

7.2 FAILURE MODES

Potential failure modes at the YDTI have been identified as follows:

- Overtopping
- Surface Erosion
- Slope Failure
- Internal Erosion, and
- Foundation Failure.

Each of the above listed failure modes, and their contributing factors, have been taken into consideration in determining the potential emergency conditions.

7.3 POTENTIAL EMERGENCY CONDITIONS

7.3.1 Definitions and Classification

A potential emergency condition is an event or condition that is not normally encountered during routine operations (or construction) and that may endanger one or more of the facilities, or may pose a threat to human life, the environment, or infrastructure downstream.

Potential emergency conditions are classified into three emergency levels depending on the severity and development of the condition. A condition or incident may escalate to a higher emergency level if the appropriate actions are not taken to prevent it or are inadequate to mitigate the condition deteriorating. The potential emergency conditions are defined as follows:

- **Level 1: Unusual Occurrence**. Events or observations that do not yet represent a potential emergency, but do require prompt investigation and resolution. The hazard or incident does not pose immediate danger but could develop into one.
- **Level 2: Potentially Hazardous Situation**. Conditions that represent a potential emergency, if sustained or allowed to progress, but no emergency situation is imminent. Steps to mitigate damage or prepare for evacuation may need to be taken.
- **Level 3: Actual or Imminent Failure**. An emergency defined by either imminent or actual failure of a significant component of the impoundment. Widespread evacuation of the downstream area is appropriate.

7.4 YDTI EMERGENCY CONDITIONS

Events or situations that may lead to potential emergency conditions for the YDTI include, but are not limited to:

- Earthquakes
- Large runoff events resulting from storms and/or snowmelt
- Loss of tailings beach adjacent to tailings embankments
- Springs, seeps, sand boils, sinkholes or increased seepage/leakage rates
- Exceedance of an established trigger level (water level or piezometric pressure)
- Erosion, rockfall, slumping, sloughing or cracking of an embankment or abutment
- Landslides, debris flows or avalanches
- Embankment breach by overtopping or geotechnical/structural failure, and
- Human interference by vandalism, terrorism or accidents.

These events or situations are described below.

7.4.1 Earthquake

An earthquake 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 100 km of the facility will automatically trigger a Level 1 or higher condition. Assessing and repairing potential damage caused by an earthquake will be the required remedial action.

7.4.2 Large Runoff Event

A large runoff event resulting from a storm and/or snowmelt could lead to rapid filling and the potential loss of freeboard, extensive erosion, or uncontrolled discharge from one or more of the facilities. Access to the embankments may be affected or may not be possible due to flooding, as roads and culverts could be washed out, and pump and pipeline systems could be affected. Large flooding events that encroach on embankment freeboard requirements as detailed in the TOMS Manual will trigger the emergency response as a Level 1 or higher condition. Regaining freeboard for the normal and safe operation of a facility, by controlled discharge or pumping to an alternative location (with the appropriate regulatory approvals) will be the remedial action.

7.4.3 Loss of Tailings Beach

Tailings beach provides a barrier that hydraulically separates the supernatant pond from the embankment, thereby reducing pore pressures and seepage. The loss of this beach can lead to a decrease in embankment stability, increased seepage, and increased potential for embankment failure. The loss of a tailings beach can cause a greater volume of tailings and water to be mobilized during an embankment failure, leading to a more catastrophic event. The loss of tailings beach will trigger the emergency action as a Level 1 or Level 2 condition. The re-establishment of tailings beach when it is noticed to be decreasing, by strategic tailings deposition, will be the required remedial action.

7.4.4 Springs, Seeps, Sand Boils, Sinkholes or Increased Leakage

The presence of new springs, seeps, sand boils, sinkholes or increased leakage could be a sign of internal erosion of an embankment. Internal erosion, also referred to as piping, could result in the weakening of the structure that may lead to localized or large scale embankment failure. If new springs, seeps, sand boils, sinkholes or increased leakages are observed, the following details must be determined: location and size of the affected area, estimated discharge rate, and nature of seepage (clear or cloudy). Such an event will trigger the emergency response as a Level 1 or higher condition, depending on the severity of the problem that is observed. Continual monitoring and mapping of the affected area and prompt remedial action will be required.

7.4.5 Exceedance of an Established Trigger Level

The TOMS Manual provides details on the regular monitoring of geotechnical instrumentation (standpipe piezometers and vibrating wire piezometers) installed in the YDTI. The TOMS Manual provides trigger levels at which the emergency response should be implemented, for instance if pore pressures change rapidly or dramatically. The emergency response will be triggered as a Level 1 or higher condition, depending on the severity of the occurrence. Remedial action may be required to return within the trigger levels.

7.4.6 Erosion, Rockfall, Slumping, Sloughing or Cracking of the Embankment or Abutment

Erosion, rockfalls, slumping, sloughing or cracking of the embankment or abutment could potentially result in the loss of freeboard, uncontrolled discharge from the facility or weakening of the structure, with the potential implication of embankment failure. If unusual erosion, rockfalls, slumping, sloughing or cracking is observed at an embankment or abutment area, then the location and size of the affected area(s) (depth, height, width), severity, estimated discharge rates, nature of discharge (clear or cloudy), and water level elevation must be determined. These events trigger the emergency response as a Level 1 condition or higher.

7.4.7 Landslides, Debris Flows, or Avalanches

Landslides, debris flows, or avalanches have the capability to rapidly displace large volumes of water that could generate large waves with the potential to move across a pond and overtop an embankment, resulting in discharge of water and potentially inducing larger embankment failure. Additionally, if such an event occurs near an embankment, the structure could be destabilized (foundation or overall structure). These events trigger the emergency response as a Level 3 condition. Remedial action may be required to repair damage and restore overall facility safety.

7.4.8 Embankment Breach by Overtopping or Geotechnical/Structural Failure

An embankment breach may occur as a result of embankment overtopping and erosion, or internal geotechnical/structural failure. The magnitude of such a failure will be a function of the volume of free water and tailings that may be mobilized. Embankment breach will trigger the emergency response as a Level 3 condition. The immediate requirement will be to notify those who may be at risk and evacuate workers from the downstream area.

7.4.9 Human Interference (Vandalism, Terrorism or Accident)

The nature and form of human interference is difficult to predict, and may range from quite minor to very serious potential impacts. The emergency response will be triggered by human interference as a Level 1 or higher condition.

Description of the emergency conditions classified under the three levels and the monitoring and mitigation to be implemented are outlined in Table 7.1.

Note, the emergency condition level shall be increased to Level 3 (imminent or actual emergency) if the embankment is failing or will imminently be failing.

Table 7.1 Emergency Condition Monitoring and Mitigation

LEVEL	UNUSUAL OCCURRENCE	MONITORING AND MITIGATION
1	Water levels in the YDTI rising but still under maximum operating level.	Monitor water levels daily.
		Develop plan to decreased pond levels or increase embankment freeboard.
		Reduce inflow of make-up water from Silver Lake.
	Minor surface erosion or localized cracking on YDTI embankment crest/slopes.	Repair as necessary. Conduct embankment walkovers daily until the problem is understood and addressed.
		Survey and monitor erosion area, crack extent and displacement as appropriate. Resurvey any new or reoccurring cracks.
		Determine the cause of the erosion or cracking
	Unusually high piezometer reading(s)	Re-check the reading again.
		Continue monitoring daily until readings return to normal. Otherwise see Level 2 Response.
	Increased Seepage flowrates at HsB Weir and/or Horseshoe Bend seepage collection system.	Continue monitoring until readings return to normal. Otherwise see Level 2.
	Seep or water discharge on embankment downstream slope at approximate tailings beach elevation.	Place rockfill as required along the upstream face opposite the location of the seeps on the downstream face until seepage stops. Place thin layer of alluvium material over rockfill.
		Contact the Engineer of Record.
		Monitor seepage rates through embankment, if flows are unable to be stopped cease tailings discharge into YDTI.
	Failure of Reclaim Pumps	Monitor water levels daily. Use standby barge pumps.
		Ensure portable pumps are available. Repair or replace failed pumps ASAP.
	Tailings Pipeline blocked	Stop tailings discharge, switch to standby tailings pipeline.
		Flush pipeline with water to clear obstruction. Inspect the pipeline for damages or leaks.
		Determine the cause or reason for blockage.
	Rupture of the tailings pipeline	Stop tailings discharge through ruptured pipeline, switch to standby tailings pipeline.
		Check for erosion on the tailings embankment.
		Build confinement berms as necessary to contain the tailings. Clean up tailings.
		Determine cause of rupture.

LEVEL	UNUSUAL OCCURRENCE	MONITORING AND MITIGATION
2	Water Levels in the YDTI exceed maximum operating level.	Cease pumping of make-up water from Silver Lake and tailings discharge into the YDTI.
		Implement plan to decreased pond levels or increase embankment freeboard.
		Monitor water levels every four hours.
	Flowrates at HsB seepage collection system / HsB Weir near maximum flowrate and rising steadily	Monitor seepage flowrates every four hours.
		Inspect tailings discharge flow across tailings beach for short circuiting through embankment.
		Inspect upstream embankment slope for water ponding adjacent to embankment.
	Unusually high piezometer reading(s) maintained over a few days	Re-check readings. Continue daily readings. Contact the Engineer of Record.
	Major erosion of a downstream slope or crest/sediment build-up at the toe of the embankment from erosion.	Contact the Engineer of Record.
		Prepare to carry out corrective repairs.
	Soft toe condition	Determine if water source is natural or from the tailings pond. Contact the Engineer of Record.
		Commission a field investigation program. Prepare to carry out corrective repairs.
	Boils observed downstream of embankment	Contact the Engineer of Record.
		Prepare to carry out corrective repairs. Place granular filter material over the boils, as directed/approved by the Engineer.
	Water vortex within ponded water adjacent to embankment	Check area on downstream side of the embankment for increased and/or turbid seepage discharge.
		Place granular filter material against any such areas, as directed/approved by the Engineer of Record.
	Large earthquake and significant loss of freeboard	Carry out detailed post-earthquake inspection of the embankment with the assistance of the Engineer of Record. Restore embankment as directed by the Engineer.
	Slope movement / significant failure of embankment slope impacting the crest width	Repair as necessary. Conduct embankment walkovers daily until the problem is understood and addressed. Contact the Engineer of Record.
		Survey and monitor crack development (e.g. crack size, extent, etc.). If movement or failure is progressive, upgrade to Level 3.
	High turbidity in seepage collection flow	Conduct HsB pond and YDTI embankment walkovers daily until the problem is understood and addressed. Take water samples for suspended solids analysis twice a week.
		Contact the Engineer of Record.
		Prepare to carry out corrective repairs.
	Slumping, sliding, or bulging of an embankment slope or adjacent ground	Follow procedures identified for 'Failure or suspected imminent failure of embankment'.
		Do not attempt placement of additional material or construction of a stabilizing berm until plan has been discussed with the Engineer of Record.
3	Failure or suspected imminent failure of an embankment (any reason)	Contact the Engineer of Record.
		Initiate chain of communications and ensure safety of people. Stop tailings discharge into the YDTI and make-up water flow from Silver Lake.
		Lower pond by any practical and safe means. Mobilize pumps and earthmoving equipment to safe location if safe to do so.

7.5 EMERGENCY CONDITION NOTIFICATION PROCEDURES

The Emergency Condition Notification Procedures should be initiated following identification of any level of potential emergency condition. Depending on the emergency condition level, different notification processes and sequences will be implemented.

7.5.1 2015 Emergency Action Plan – Yankee Doodle Tailings Impoundment

MR prepared and updates the report '*Emergency Action Plan – Yankee Doodle Tailings Impoundment' (EAP)*. The main objective was to insure the safety of the public at large by the prevention of emergency conditions and by providing response strategies in the event of emergency conditions occurring, specifically Level 2 and Level 3 emergency conditions.

The EAP includes the following keys features:

1. Responsibilities and Authority
2. Notification Procedures (Level 2 and Level 3 Emergency Conditions)
    a. Notification Flowchart
    b. Imminent or Actual Failure mechanisms, and
    c. Potentially Hazardous situations.
3. Mitigation Actions
    a. Emergency Response Actions
    b. Supplies and Resources, and
    c. Local Contractors and Engineers.

The EAP is required to be reviewed on an annual basis to ensure the emergency response procedures and mitigation actions are still relevant and all emergency response contact details correct. An update may incorporate a general revision of the entire EAP or be limited to specific pages or sections.

7.5.2 Level 1 Notification Procedures

The Level 1 notification procedures are as follows:

- The person first noticing a Level 1 Emergency Condition shall notify the General Shift Foreman. The Mine Foreman will immediately notify the Vice President of Operations, Manager of Engineering and Geology, and the Vice President of Environmental Affairs.
- Corrective actions will be determined and initiated, monitoring will be intensified.
- The Vice President of Environmental Affairs will notify the Engineer of Record (EOR).

7.5.3 Level 2 and 3 Notification

The same initial Level 1 notifications are required for Level 2 and 3 Emergency Conditions. Level 2 and 3 Emergency Conditions however also require notification to external individuals and groups. The notification processes and flowcharts for Level 2 and 3 are presented in the Emergency Action Plan.

7.6 EMERGENCY CONDITION DOCUMENTATION AND REPORTING

Documentation and reporting of all levels of potential emergency condition events and occurrences is important to ensure that appropriate monitoring, management, and tracking of site conditions and events is maintained.

7.6.1 Level 1 Reporting

In the case of any emergency condition, the Impoundment Incident Report Form (Appendix C) must be completed as soon as possible as a first report of the Incident. Follow up reporting and presentation of the emergency condition may be required depending on the severity of the condition.

7.6.2 Level 2 and 3 Reporting

The Impoundment Incident Report Form (Appendix C) must be completed as soon as possible as a first report of the Incident. Additional reporting requirements for Level 2 and Level 3 emergency conditions are presented in the Emergency Action Plan.

SECTION 8.0 REFERENCES

Knight Piésold Limited (KP) Letter, 2016, Review of the PMF Estimate for the Yankee Doodle Tailings Impoundment, March 2016, VA15-03210.

Montana Resources (MR), 1999. Yankee Doodle Tailings Impoundment: Design and Construction, MR Engineering and Geology Department, July 1997, revised March 1999.

Montana Resources (MR), Montana Resources Operations Plan, November 1998.

Montana Resources (MR), Montana Resources Reclamation Plan, November 1998.

Montana Resources (MR), 2015. Emergency Action Plan, December 2015.

Montana Resources (MR, 2018a). Dust Control Plan for Yankee Doodle Tailings Impoundment, November 2018.

Montana Resources (MR, 2018b). Tailings Discharge Plan for Yankee Doodle Tailings Impoundment, December 2018.

Montana Code Annotated (MCA), 2015. Title 82: Minerals, Oil, and Gas, Chapter 4: Reclamation, Part 3: Metal Mine Reclamation. Accessed: November 2015. Available at: http://leg.mt.gov/bills/mca_toc/82_4_3.htm

SECTION 9.0 CERTIFICATION

This report was jointly prepared and reviewed by the undersigned.

Prepared:

Roanna Stewart, P.Eng.
Senior Engineer
Knight Piésold Ltd.

Reviewed:

Daniel Fontaine, P.E.
Senior Civil Engineer | Associate
Knight Piésold Ltd.

Reviewed:

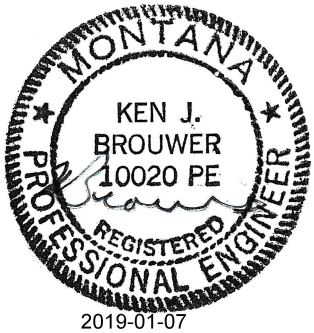
Mark Thompson
Vice President of Environmental Affairs
Montana Resources, LLP

Reviewed:

Steve Walsh
Senior Vice President of Operations
Montana Resources, LLP

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

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



Reviewed: 2019-01-07

Ken Brouwer, P.E.
Principal - Knight Piésold Ltd.
Engineer of Record for the Yankee Doodle Tailings Impoundment

Approval that this document adheres to Knight Piésold Quality Systems: KJB

APPENDIX A

SITE PHOTOS

(Pages A-1 to A-8)

HsB SEEP SURFACE COLLECTION AREA

HsB SEEP AREA

NUMBER 10 POND AND WEIR

NUMBER 10 SEEPS

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

HsB SEEPS

APPENDIX A-1

DSN: RSS	DTL: RMM	21DEC2018

HsB WEIR

SURGE AND HOLDING PONDS

HsB SEEPAGE COLLECTION SYSTEM

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

HsB SEEPAGE AREA

APPENDIX A-2

DSN: RSS	DTL: RMM	21DEC2018

TYPICAL DRAINAGE DITCH

CLEAN WATER DITCH

SITE DRAINAGE DITCH

MUDDLER PUMP TO PPT FACILITY

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

SITE DRAINAGE SYSTEM

APPENDIX A-3

DSN: RSS	DTL: RMM	21DEC2018

BEACH - POND INTERFACE

No. 2 BOOSTER STATION

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

TAILINGS SYSTEM

APPENDIX A-4

DSN: RSS	DTL: RMM	21DEC2018

TAILINGS DISCHARGE WEST EMBANKMENT

TAILINGS DISCHARGE EAST-WEST EMBANKMENT

TAILINGS DISCHARGE NORTH-SOUTH EMBANKMENT

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

TAILINGS DISCHARGES

APPENDIX A-5

DSN: RSS	DTL: RMM	21DEC2018

RECLAIM BARGE

RECLAIM DISCHARGE INTO MILL RESERVOIRS

CONTINENTAL PIT - SARSFIELD PUMP

RECLAIM WATER JUNCTION BOX

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

RECLAIM SYSTEM

APPENDIX A-6

DSN: RSS	DTL: RMM	21DEC2019

DOWNSTREAM EMBANKMENT SLOPE

UPSTREAM EMBANKMENT SLOPE

FOR INFORMATION ONLY

Montana Resources

YANKEE DOODLE TAILINGS IMPOUNDMENT

EMBANKMENT

APPENDIX A-7

DSN: RSS	DTL: RMM	21DEC2018

SAVED: \\KPLVA-Prj$\11\01\0012\19\A\Acad\FIGS\B32, 12/19/2018 9:54:30 AM , RMCLELLAN PRINTED: 12/19/2018 10:16:45 AM, FIG A-7, RMCLELLAN
XREF FILES (IMAGE FILES): Embankment Downstream Slope Embankment Upstream Slope

APPENDIX B

INSPECTION LOG, INSTRUMENTATION AND DATA COLLECTION TEMPLATES

Appendix B1 Impoundment Inspection Template (Monthly)
Appendix B2 YDTI Supernatant Pond Water Level Recording Template

APPENDIX B1

IMPOUNDMENT INSPECTION TEMPLATE (MONTHLY)

(Pages B1-1 to B1-2)

2018
Yankee Doodle Tailings Dam Inspections

Date	Initial	Embankment		Seeps			Comments
		N-S	E-W	HSB	No. 10	W. 7%	
1/23/2018	JMS	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No steam indicative of seepage was observed. All areas inspected appeared normal.
2/15/2018	JMS	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No steam indicative of seepage was observed. All areas inspected appeared normal.
3/28/2018	JMS & DF	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No steam indicative of seepage was observed. All areas inspected appeared normal.
4/24/2018	JMS &TYB	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No steam indicative of seepage was observed. All areas inspected appeared normal.
5/24/2018	TB,MH , DF	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No stream indicative of seepage was observed. All areas inspected appeared normal.
6/28/2018	MH	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No stream indicative of seepage was observed. All areas inspected appeared normal.
							Monthly Dam Inspection was missed in July.
8/24/2018	MH	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No stream indicative of seepage was observed. All areas inspected appeared normal.
9/5/2018	MH, JG	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No stream indicative of seepage was observed. All areas inspected appeared normal.
10/1/2018	KB, DF, MH	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No stream indicative of seepage was observed. All areas inspected appeared normal. Part of Yearly EOR Inspection
11/20-21/18	MH	OK	OK	OK	OK	OK	All N-S & E-W lifts inspected. No stream indicative of seepage was observed. All areas inspected appeared normal.

OK = Area Inspected; Appeared normal. ALERT = Transverse cracking; increased seepage as noted.
CK = Area Inspected; Changes as noted.

APPENDIX B2

YDTI SUPERNATANT POND WATER LEVEL RECORDING TEMPLATE

The YDTI Supernatant Pond Water Level is recorded on a monthly basis (minimum). The water levels are recorded in an Excel Workbook entitled 'TPOND email data.xlsx' which is updated, maintained and managed on-site by the Strategic Planning Mine Engineer.

A pdf example of the Water Level Recording Workbook is presented in Appendix B2.

(Pages B2-1 to B2-2)

Appendix A2: YDTI Supernatant Pond Water Level Recording Template

TAILINGS POND			CHANGE	COMMENTS
DATE	ELEV	DELTA	Feet/Day	
10-8-15	6332.93	0.31	0.044	
10-16-15	6332.94	0.02	0.002	
10-21-15	6332.94	0.00	-0.001	
10-28-15	6333.01	0.08	0.011	
11-5-15	6333.18	0.17	0.021	
11-12-15	6333.46	0.28	0.040	
11-19-15	6333.42	-0.04	-0.006	
12-5-15	6333.68	0.26	0.016	

APPENDIX C

IMPOUNDMENT INCIDENT REPORT FORM

(Pages C-1 to C-2)

IMPOUNDMENT INCIDENT REPORT FORM

Date of Incident: _____ Time of Incident: _____

Report filed by :_____

Embankment Incident Location: _____

Nature of the Incident: _____

_____

_____

_____

Mitigation measures taken:_____

_____

_____

_____

Is the incident resolved? Yes / No Photos taken: Yes / No

Did tailings or water discharge from the embankment? Yes/ No (circle)
If Yes, where did the discharge flow and for how long? i.e. path of travel, final destination, duration_____

_____

_____

Who was notified of the incident?_____

_____

Extent of Incident Impacts:_____

_____

_____

Would changes to the operational procedures reduce the likelihood of incident reoccurrence? Yes / No

Additional Monitoring Required:_____

_____

Additional Comments:_____

_____

_____

Is a follow-up Incident Report required? Yes/No
Follow-up Report responsibility (author name): _____

Signed: _____ Date: _____

Signature Manager of Engineering and Geology: _____
Incident Reference Number: _____ (assigned by Manager of Engineering and Geology)