APPENDIX A

Process and Pipeline Release Prevention, Control and Response Plan
Kennecott Utah Copper LLC (Kennecott)
Copperton Concentrator Groundwater Discharge Permit UGW350017

1.0 Introduction

The Copperton Concentrator Process and Pipeline Release Prevention, Control and Response Plan provides detailed procedures for release prevention, response, and reporting.

This Plan applies to the Copperton Concentrator permitted facilities, the tailings pipelines (the "48-inch" and "60-inch" pipelines), and return process water pipeline (the 48" process water return line) on Kennecott property covered by Ground Water Discharge Permit UGW350017.

The tailings pipelines have five distinct features:

- The tailing pipelines, referred to as the 48-inch and 60-inch;
- Tailings pipeline drop boxes,
- Tailings pipeline splitter box,
- Tailings pipeline vent stacks,
- Tailings pipeline bubble dissipaters, and
- Tailings flow level indicators.

The tailings pipeline system consists of two, approximately 12.5-mile parallel pipelines that deliver whole tailings slurry to the north splitter box. The tailings lines (48-inch and 60-inch) and all associated drop boxes and vent stacks start at the H1A drop box near the Concentrator and end on the north side of SR-201 where the tailings lines cross onto the South Tailings Impoundment. The tailings pipelines convey tailings slurry from the Copperton Concentrator north to the tailings impoundment using a gravity flow system. The gravity flow system requires the tailings lines to have open vent stacks along the pipeline to ensure proper hydraulic fluid flow. The vent stacks are also used as inspection ports and access points for monitoring and cleaning activities associated with the tailings line preventative maintenance (PM) program. The tailings lines also incorporate a series of drop boxes along the length of the corridor. The drop boxes reduce the velocity of the tailings slurry and adjust for elevation change along the corridor.

The process water return system extends from the Magna Reservoir to the Copperton Concentrator. This system consists of Pump Stations 3A and 3B, approximately 12 miles of 48" diameter steel with concrete reinforced pipeline, and associated infrastructure. Pump Station 3B is a booster station that is located mid-line and incorporates a concrete surge basin to buffer pump operations and process upsets as well as provide adequate suction head pressure to the booster pumps. The surge system at Pump Station 3B provides water storage above the pump station to maintain minimum pump suction inlet pressure, provide reserve capacity to buffer pump starts and stops between the pump stations, and absorb surges from upset conditions. The pumping system hydraulics cause pressure surges and pressure spikes with each start and stop. The system is designed to absorb these changes in pressure.

Figures 1 and 2 illustrate the Copperton Concentrator and sections of the tailings pipelines and process water return pipeline subject to the UGW350017 Permit. Figure 2 also illustrates the locations of all drop boxes, vents, bubble dissipaters and level indicators on the tailings pipelines.

2.0 Release Prevention and Best Available Technology (BAT)

This release prevention section is consistent with the BAT referenced in Permit UGW350017, Table 2. It describes the design and controls in place to prevent releases from Kennecott's two tailings pipelines, drop boxes, vent stacks, and the 48" process water return line. The management of the pipelines relies on monitoring systems, inspections, the implementation of certain Standard Operating Procedures (SOPs), and regular maintenance.

2.1 Tailings Pipeline Release Prevention Mechanisms

The tailings pipelines have the following design features to reduce the potential for a release:

(1) A hydraulic manifold that controls valves at the Concentrator recycle pump station. The hydraulic manifold at the Copperton recycle pump station allows control of the isolation valves on the return water system thereby reducing the potential for water overflow into the Tailing lines.

(2) During 2015 Kennecott conducted a detailed review of pipeline hydraulics and ventilation of the 48-inch and 60-inch Tailings Pipelines. The review resulted in the following design modifications:

- Removal of some covers to improve the functioning of the vents and enhance tailings flow;
- Extension of some vents; and
- Modification of ten vents to include a bubble dissipater to eliminate the bubble reaction inside the pipeline. The added bubble dissipater enhances the initial and primary air relief that promotes the Tailings Pipeline hydraulics. The dissipaters will be inspected at least annually.
- Prior to 2015, six level indicators were installed on the tailings lines to alarm the Control Room of high level conditions.

2.2 Process Water Pipeline and Surge Basin Release Prevention Mechanisms

Redundant water management systems at 3B pump station (including the Surge Basin) ensure water does not backflow uncontrollably when the 3B pumps are not operating or interrupted due to power outage (CPSOP250-0081-Attachment 1). These systems include:

- Isolation gate valves between the existing surge protection valves and the pipeline. The isolation gate valves between these surge protection valves and the pipeline from 3B to Copperton Reservoir allows the operator to stop flow if the surge protection valve will not close. The isolation valve also has an electro-hydraulic actuator that has uninterruptible power supply for control power.

- At the 3B pump station, the downstream isolation valves are outfitted with electro-hydraulic actuators that can be remotely operated. These actuators, position indicators and programmable logic controllers open/close commands are backed up with uninterruptible power supply allowing functionality during power outages.

- At the 3B pump station, redundant transmitters, indicators and Input/Output feeding information are on uninterruptible power supply also allowing functionality during power outages.

- At the Surge Basin, redundant pressure transmitters are installed which allow the full elevation range of the surge basin to be read.

- At the Surge Basin, a radar level indicator with telemetry communicating the level of the surge basin overflow to the 3B programmable logic controller is installed. Solar power is installed at the surge basin to power the equipment.

2.3 Pipeline Monitoring Systems

The pipeline monitoring systems assess flow, pump performance, valve position and fluid level. Monitoring occurs on a real-time basis from the Copperton Concentrator and the Tailings control rooms.

Flow monitoring for the tailings pipelines is primarily visual. To assist this visual monitoring, level transmitters were installed at three vents in each pipeline (6 total) and set with alarms that represents 70% fill of the pipeline to alert operations that the pipeline is approaching design capacity. The 70% pipe capacity set point represents the optimal hydraulic performance of the tailings slurry. Above this optimal pipe capacity, the tailings slurry begins to lose hydraulic cohesiveness allowing the solid phase flow to slow down and increase the risk of solid settlement on the bottom of the pipeline causing potential plugging. If alarms are activated, upstream sources are adjusted to bring the pipeline into proper operating levels.

Process water return line flow monitoring is also primarily visual (see 2.4). Pressure transmitters at the 3A and 3B pump stations are used to control the operation of the pumps and the volume of the pipeline. Real-time status of the pumps is monitored to verify that the pumps are functional using run status and amperage. Status of the pipeline using pressure transmitters is limited due to characteristics of the pipeline. With dual pressure transmitters at the suction side of 3B pump station, status of the surge pipeline and basin for 3B pump station suction system is reported in real time.

As noted above and described below, Kennecott maintains level sensors in strategic locations within the tailings pipelines as well as within the process water return system pump sumps and reservoirs. These strategic locations were selected based on placement above historic release locations and conceptual friction loss areas that could impact hydraulic performance of flows. Additionally and as also detailed below, the tailings pipeline monitoring system includes continuous level monitoring instrumentation at select locations (Figure 2). The level indicators and monitoring instrumentation are monitored by the control rooms consistent with Standard Operating Procedures (SOPs). Specifically, Kennecott implements an SOP to evaluate the tailings pipeline system and alarms including tailings levels in the identified drop boxes and vent stacks. See generally TASOP300-247 (Attachment 2). Alarms are programmed to sound when an operating condition is outside of regular operating ranges; control room operators are trained to respond to alarm conditions as provided in the SOPs. As indicated in the SOPs, the level indicators are checked monthly for proper operation.

The following describes the particular drop boxes and vent stacks subject to the remote monitoring SOPs:

- Drop Box H1A – This drop box has a level indicator for the composite tailings flow (LIT 2402).
- Drop Box A.25 – This drop box has a level indicator on both sides (LIT 600 and LIT 601).
- Vent Stacks – There are six level indicators (three on each line at Vents 195, 197, 331, 335, 735 and 745). These level indicators are not only used for high alarm levels but also to detect level changes which could be an early warning of a possible pipeline upset.

2.4 Inspections

The tailings pipelines are visually inspected once per shift or 2 times in a 24-hour period. The inspection is performed by a tailings rover who drives the tailings pipeline corridor and visually checks for external pipeline damage and evidence of releases from the pipelines, drop boxes, and/or vent stacks and external damage to the pipelines.

The drop boxes are also observed by the tailings rovers once per shift as part of the above-referenced drive-by visual inspection. Where needed, the drop boxes have hanging curtains of high grade rubber on the side of the box. This curtain is in place to lessen the wear on the side of the drop box where flows cascade. These curtains are inspected for damage annually, and replaced if needed.

Kennecott implements quarterly internal inspections of the section of the 48-inch tailings pipeline starting with the A.25 drop box and proceeding downstream for 25,000 linear feet. Inspections for the 48-inch line are done at a higher frequency rate compared to the 60-inch line because the 48-inch line receives a larger diversity of fluids that includes tailings, concentrate from the Zone A RO plant at Box H1A and all acidic flows from the Kennecott's south end operations, which are typically added to the 48-inch line at Box A.25. The internal inspections are also governed by specific SOPs (*see* TASOP300-248, Attachment 3). The internal inspections are performed by placing a camera on a "raft" and floating the camera down the pipeline on a fraction of the normal slurry flow. The inspections are initiated by lowering cameras through the vent stacks on the pipelines. This allows maintenance personnel to safely inspect the pipelines and identify areas with excessive scaling, missing or damaged wear heels or structural integrity issues inside the pipelines. The entire 48-inch tailings pipeline (starting at the A.25 drop box to the North Splitter box) is inspected via camera or a physical inspection annually. For more detail on the line inspection and cleaning please refer to TASOP300-248 (Attachment 3).

The 60-inch tailings pipeline (starting at the A.25 drop box to the North Splitter box) is inspected with the camera or via physical inspection on an annual basis (see TASOP300-248).

2.5 Regular Maintenance

As indicated, the tailings pipeline monitoring program is comprised of frequent visual inspection and remote monitoring. Kennecott prepares documentation of inspections and, as assessed, pipeline conditions. The documentation consists of (1) the twice daily rover inspections (as documented on the route sheets); (2) the quarterly camera 48-inch pipeline inspections; (3) any physical inspections; and (4) the annual inspection on both lines. Maintenance and repairs are initiated in response to inspection results consistent with the SOPs. Each inspection is documented; any action items are identified and separately tracked on work order forms. Documentation relative to the referenced inspections and any repair work is maintained on file at Kennecott consistent with the record retention requirements of the Permit.

As indicated, the vent stacks' level indicators are inspected and repaired monthly, as necessary, consistent with the SOPs.

3.0 Release Management

This section discusses actions Kennecott will take in the event of a pipeline release.

3.1 Release Detection

Releases will be identified by one or more of the following measures:

1. Visual observations are made by roving operators or area personnel. The frequency of visual inspections is outlined in Section 2.2.

2. Tailings or Copperton Concentrator control room monitoring of level indicators, flow metering, sump levels, and other pipeline monitoring equipment with response actions consistent with the above-referenced SOPs.

3.2 Release Minimization

There are at least two steps to release minimization. First, when high level alarms indicate elevated pipeline flow levels, Kennecott can potentially reduce flow to the specific pipeline. Second, Kennecott will immediately implement release containment where and when it is safe to do so. The following describes those steps.

Upon identification of a release, Kennecott operations personnel will reduce the flows into the respective pipeline experiencing high levels by either routing flow to the other tailings line or by reducing flow from the Concentrator and/or isolating the compromised pipeline for repair to minimize additional releases. Kennecott personnel are instructed to implement the procedures immediately.

The Control Room and/or Operations Supervisor is responsible for taking steps to minimize and contain released material to the immediate area if and when it is safe to do so. Release containment may consist of one or more of the following activities: dedication of manpower and equipment, construction of earthen berms and evacuation of sumps and containments. If equipment is readily available it will be mobilized to the site of the release and containment measures implemented to prevent released material from spreading. During the initial assessment of the released material, any standing water will be removed from the ground and either placed back into the Kennecott's process water management system or disposed of properly.

3.3 Release Response

After a release has been identified and Kennecott has determined the area to be safe to enter, it will be the duty of Kennecott personnel to access the release area and for the Operations Supervisor to assemble the appropriate release management team. The Operations Supervisor is also responsible for immediately notifying the Kennecott Environmental Department. The release response team will be responsible for determining the release source, cause and constituents of the release. The Operations Supervisor, assisted by the Environmental personnel as appropriate, will initially assess the release area and confirm that the source has been isolated. The Operations Supervisor will coordinate clean-up efforts (if required) and liaise with the Kennecott Environmental Department regarding proper handling and disposal. If cleanup efforts are required, any associated handling,

transportation, reclamation or disposal of any released material shall comply with applicable laws and regulations. The environmental personnel assigned to the release will coordinate sample collection and any required reporting to regulatory agencies.

If there is standing water sufficient to sample, a sample will be collected near the source and as close to the toe of the release as possible (if practicable) before it is removed and placed back into the process water management system. If no standing water is available to sample, the environmental personnel will coordinate with the Operations Supervisor to collect a release representative sample from the process or to use best available data (e.g., recent historical data that is representative of conditions that were present at the time of the release) to assist in compliance with applicable reporting requirements.

Solid or slurry samples (tailings pipeline release) will be collected based on:

- If the release goes beyond the tailings pipeline corridor, a minimum of three solid samples will be collected near the source, middle of the release (on the centerline of the release) and the toe of the release and a liquid sample will be collected from standing waters as near to the source as possible.
- Any material within a drainage identified on Figure 4 will be removed as practicable. Tailings material outside of a drainage shown on Figure 4 will be removed as practicable to prevent mobilization and possible discharge to an identified drainage.

All sampled material will be analyzed by the State Certified Kennecott Environmental Laboratory (KEL) for constituents listed in the Permit Part I Section F. In most cases the samples from the released material can be analyzed within five days.

3.4 Release Reporting

Reporting shall be in accordance with Table 2A. Tailings releases greater than 12,000 gallons are not permitted discharges and must follow spill protocol as required under Part II.(I) of the Permit.

For any releases requiring 24-hour notification to the DWQ, a written report shall be submitted to the Director within five days of the time Kennecott is aware of the release and consistent with the requirements of the Permit, Part II.I. A supplemental written report shall be submitted within 45-days of the incident. The supplemental report shall contain, to the extent the information is available:

- A description of the spill and its cause;
- Date, time, duration, and volume of the spill;
- Parameters used to estimate the volume of the spill;
- Estimated liquid/solid percentages of the spill;
- Volume of liquids and solids recovered and parameters used to determine recovered volume;
- Laboratory analytical results from all liquid and solid samples that were collected to assess the spill;
- Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the spill;

- Steps taken, if any, to mitigate the adverse impacts on the environment and human health as a result of the spill; and,
- Confirmation soil samples will be submitted to KEL following cleanup activities, if conducted; the results will be reported to the DWQ as part of the 45-day report.

The Director may waive the written 45-day report on a case-by-case basis based on the spill information verbally reported under the 24-hour notice requirement or the information reported in the 5-day letter.

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Kennecott Utah Copper

FIGURE 1: CONCENTRATOR SITE MAP

N 1:8,084

0 0.05 0.1 0.2 MI

0 0.05 0.1 0.2 KM

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GIS User: teresa.cockayne

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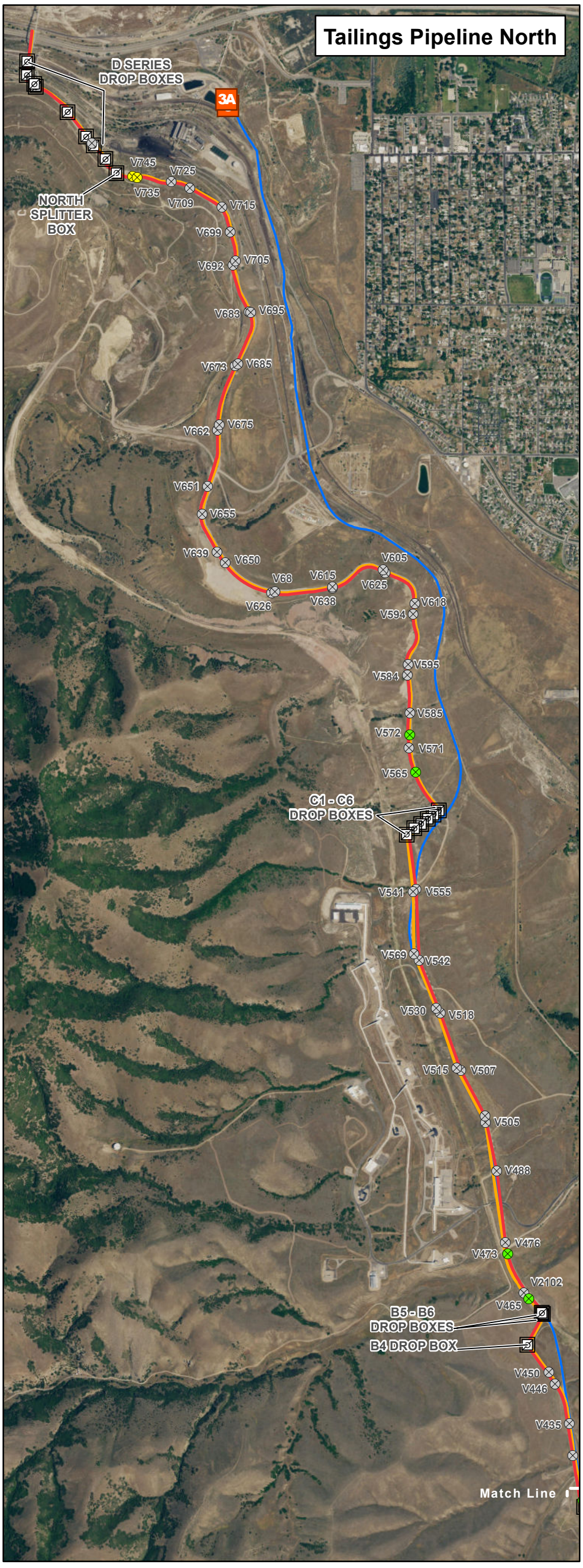
Coordinate System: NAD 1983 StatePlane Utah Central FIPS 4302 Feet



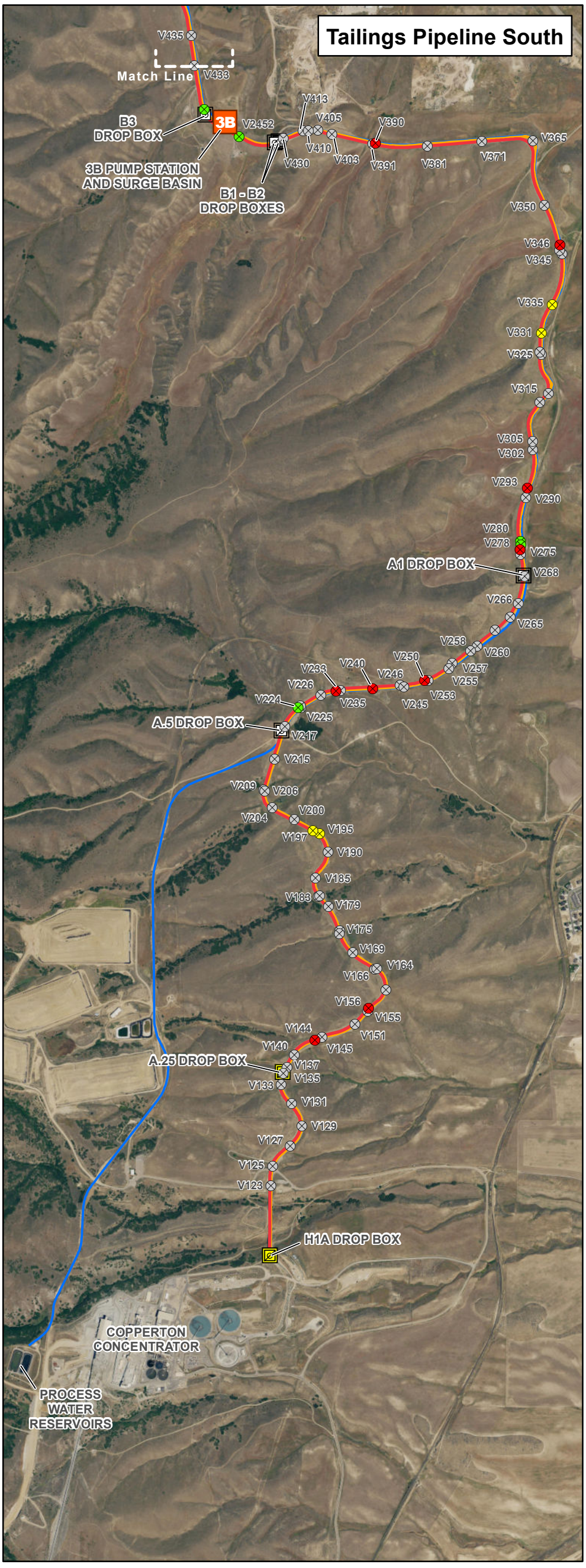


FIGURE 2: TAILINGS AND PROCESS WATER PIPELINE CORRIDORS

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N
W E
S

0 0.1 0.2 0.3 0.4 0.5 MI

- TAILINGS PIPELINE VENT
- VENT WITH LEVEL INDICATOR
- VENT THAT HAS BEEN EXTENDED
- VENT WITH BUBBLE DISSIPATER
- TAILINGS PIPELINE DROP BOX
- TAILINGS PIPELINE DROP BOX WITH LEVEL INDICATOR
- 48" TAILINGS PIPELINE
- 60" TAILINGS PIPELINE
- 48" PROCESS RETURN PIPELINE

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