Knight Piésold CONSULTING

Management System Certified by: bsi ISO 9001 ISO 14001 ISO 45001 CERTIFIED

August 25, 2023

Knight Piésold Ltd.
Suite 1400 - 750 West Pender Street
Vancouver, British Columbia
Canada, V6C 2T8
T +1 604 685 0543
E vancouver@knightpiesold.com
www.knightpiesold.com

Mr. Mike Harvie
Manager of Engineering and Geology
Montana Resources, LLC
600 Shields Avenue
Butte, Montana
USA, 59701

Dear Mike,

RE: Q2 2023 – YDTI Quarterly Piezometric and Deformation Monitoring Update

1.0 INTRODUCTION

1.1 GENERAL

Montana Resources, LLC (MR) operates an open pit copper and molybdenum mine in Butte, Montana. Tailings produced from ore processing are stored within the Yankee Doddle Tailings Impoundment (YDTI), which is a valley-fill style impoundment contained within rockfill embankments. Knight Piésold Ltd. (KP) supports MR to routinely monitor hydrogeological and geotechnical conditions as part of their operational surveillance plan for the tailings facility, as described in the Tailings Operations, Maintenance and Surveillance (TOMS) Manual (MR/KP, 2022). Monitoring data are comprehensively reviewed on a quarterly basis to evaluate the performance of the YDTI in conjunction with observations made during periodic inspections.

Piezometric conditions within the YDTI embankments, tailings mass, and surrounding areas are an important indicator of facility performance. Real-time piezometric data from instrumentation at select monitoring sites have designated Quantitative Performance Parameters (QPPs) within the TOMS Manual and are regularly evaluated relative to piezometric 'trigger elevations' to pre-emptively identify and respond to changing conditions.

MR and KP commenced an embankment deformation monitoring program, with data collection beginning in 2020 to characterize and monitor surface and subsurface deformations using in-situ instrumentation and satellite-based remote sensing. Observed deformation rates, magnitudes and spatial distribution are an important indicator of embankment performance and are regularly reviewed by KP. The TOMS Manual does not yet include deformation based QPPs; however, these will be considered for future revisions. KP evaluated and presented available deformation data on a quarterly or more frequent basis throughout 2021 and 2022 to regularly monitor for changes in deformation behavior and evaluate incorporation of deformation instrumentation for QPP monitoring in the future; a practice that will continue through 2023.

This letter provides a quarterly summary of piezometric and deformation monitoring data collected during the second quarter (Q2) of 2023 for key monitoring sites.

1.2 SUMMARY OF ACTIVE CONSTRUCTION

MR substantially completed construction of the El. 6,450 ft crest raise of the YDTI embankments in approximately March 2023. Only minor construction activities occurred during Q2 2023, including construction of the tailings discharge pipeline bench and placement of alluvial facing between approximately Sections 38+00N and 23+00NW.

KP and MR have developed and implemented a supplemental construction monitoring program that includes monitoring of the construction related piezometric and deformation response (KP, 2021). Construction has significantly influenced monitored surface deformations in areas within and localized around active construction, as expected. Only minor construction-related pore water pressure influence has been observed to date. Construction-related monitoring data were comprehensively reviewed on a monthly basis and presented in monthly construction monitoring letters, during active EL. 6,450 ft raise construction (June 2021 through March2023). This program was completed in addition to the dam safety monitoring program and selected results are presented herein.

2.0 PIEZOMETRIC MONITORING

2.1 OVERVIEW OF PIEZOMETRIC MONITORING NETWORK

Piezometric data are available to KP via a Remote Monitoring System (RMS) and data from QPP sites are reviewed weekly by KP and MR. This letter presents trends and conditions based on data collection from the QPP sites during Q2 2023, with select additional data from non-QPP monitoring sites, when useful to support the key findings. Comprehensive analysis of data from the remaining non-QPP monitoring sites is completed annually and will be next presented in the 2023 Data Analysis Report. The active piezometric monitoring network and a summary of Q2 2023 piezometric conditions are presented in the following sections.

Pore pressures are monitored at 115 active instrumentation locations at the YDTI, the West Ridge, and Horseshoe Bend (HsB) areas. Locations of the piezometric monitoring sites are shown on Figure 1. These sites include 39 standpipe piezometers/monitoring wells, 76 drillholes with active vibrating wire piezometers (VWPs) and two active Elexon Geo4Sight (Geo4Sight) installations. Most existing standpipe piezometers and monitoring wells have been outfitted for continuous monitoring by suspending a VWP sensor within the PVC riser and connecting the sensor via radiotelemetry to the RMS.

Eighteen (18) standpipe piezometers and drillhole VWP sensors have designated QPPs within the TOMS Manual and are used to routinely assess the performance of the YDTI. The QPPs include a piezometric ‘trigger elevation’ at or above when the QPP is exceeded, and a Level 1 Unusual Occurrence would be triggered, as specified in Table 5.1 of the TOMS Manual (MR/KP, 2022). Trigger elevations assigned to each QPP site are re-evaluated by KP on an annual basis. A summary of the piezometric QPPs that are currently in use at the YDTI is included in Table 1.

Piezometric data availability via the RMS has typically been highly reliable, except for minor outages including battery depletion, minor hardware problems, and temporary loss of communication with the local network. Minor outages have continued to be regularly identified during weekly monitoring reviews and corrective measures carried out, with minor issues typically remedied within one week of identification. Several notable QPP outages were active during Q2 2023, as summarized below, and KP requests that MR prioritize troubleshooting and restoration of these instruments to facilitate performance monitoring during Q3 2023:

- DH15-S5 VW2 began recording erroneous data on May 21, 2023 (sensor has not been functional for approximately three months) due to suspected damage to the VWP cable. A replacement sensor is planned for installation as part of the 2023 site investigation program and will replace DH15-S5 VW2 as a QPP when it becomes available.
- DH18-S1 VW2, VW3, and VW4 have been temporarily disconnected since March 8, 2023 (sensors have been offline for approximately five months) in preparation for the EL. 6,450 ft embankment and upstream alluvium facing material placement. KP understands that these sensors will be relocated to the completed EL. 6,450 ft lift once construction activities are completed. However, if construction is not going to recommence until Q4 then this sensor should be temporarily reconnected to the RMS at its' current location.
- MW12-05 stopped recording data on August 8, 2023 (the sensor has not been functional for approximately two weeks) due to unknown causes.

2.2 SUMMARY OF Q2 2023 PIEZOMETRIC CONDITIONS

2.2.1 GENERAL

No piezometric trigger elevation exceedances were observed at QPP monitoring sites during Q2 2023. A high-level summary of QPP piezometric data and instrumentation status is provided in Table 1. Piezometric data recorded at QPP sites within the East-West, North-South, and West Embankments are shown relative to the trigger elevations on Figures 2 through 6. Piezometric conditions and quarterly change in piezometric elevation for instruments installed along Section 8+00W of the East-West Embankment are presented graphically on Figure 7.

2.2.2 EAST-WEST EMBANKMENT

QPP sites within the East-West Embankment exhibited relatively constant piezometric elevations during Q2 2023. Notable piezometric trends observed within the East-West Embankment during Q2 2023 are summarized below.

QPP sensors installed within basal rockfill near the East-West Embankment toe on Section 0+00 and 8+00W observed minor mixed pore pressure responses during Q2 2023. Supporting monitoring findings include:

- QPP monitoring sites DH15-S3 and DH17-S1 observed relatively stable to slightly increasing pore water pressures (approximately 0.1 and 0.6 ft increases, respectively).
- QPP monitoring site MW94-11 observed slightly decreasing pore water pressures (approximately 0.2 ft).
- QPP monitoring site MW94-08 observed slightly increasing pore water pressures (approximately 0.4 ft).

Conditions monitored by QPP and non-QPP sensors installed beneath the East-West Embankment crest and surcharge load generally monitored slightly decreasing pore water pressures during Q2 2023, with two exceptions. Key findings include:

- QPP sensor DH19-S7 VW1 (Section 0+00) continued to monitor decreasing pore water pressures (approximately 2.6 ft) within the basal saturated zone. No discernable influence during construction of the recently completed El. 6,450 ft central embankment lift construction was observed within the basal system at this site. More significant influence was observed by sensors DH19-S7 VW5 and VW7, within inferred perched saturated zones higher up within the embankment:

  - Non-QPP sensor DH19-S7 VW7 observed an overall minor quarterly pore water pressure increase (approximately 3 ft) during Q2 2023; however, a significant fluctuation was observed during the monitoring period. A large pore water pressure decrease was monitored between May 19th and June 19th, 2023 (approximately 25 ft) followed by a rapid return to conditions observed prior to the fluctuation. Slightly increasing pore pressures were observed through the end of Q2 2023. The cause of this trend is currently uncertain and additional monitoring is recommended. This sensor has previously observed increasing pore water pressures resulting from nearby El. 6,450 ft lift construction during mid- to late-2022 within the historical 1982 lift-top interval (relatively finer grained, saturated zone); however, no significant construction occurred during Q2 2023.
  - Non-QPP sensor DH19-S7 VW5, installed within the 1989 lift, observed minor fluctuations during Q2 2023 (comprising decreasing pore water pressures of approximately 3 ft from the end of Q1 2023 until April 12th, increasing conditions of approximately 3 ft through June 15th, and relatively stable conditions thereafter). The cause of these fluctuations is not known.
- QPP sensor DH15-S4 VW2 (Section 8+00W) observed minor decreasing pore pressures (approximately 1.6 ft) during the quarter.

The continuation of slightly decreasing pore water pressure trends within the East-West Embankment during Q2 2023 continues the long-term decreasing pore water pressure trend observed since the implementation of multiple point tailings discharge in late-2016.

2.2.3 NORTH-SOUTH EMBANKMENT

QPP sites within the rockfill of the North-South Embankment generally monitored minor pore water pressure increases during Q2 2023, interpreted to be associated with alluvial placement along the upstream North-South Embankment and/or related to local tailings discharge. Key findings include:

- QPP sensor DH18-S2 VW2 installed within the basal saturated zone monitored slightly increasing pore water pressures (approximately 0.5 ft). This sensor previously observed increasing pore water pressures resulting from nearby El. 6,450 ft lift construction during mid- to late- 2022, and conditions at the end of Q2 remained slightly elevated (approximately 5 ft) from pre-construction pore water pressures. It is anticipated that pore water pressures will begin to dissipate with time following completion of alluvial facing.
- Monitoring well MW12-01 observed increasing pore water pressures during Q2 2023 (approximately 3.8 ft), which may also be associated with alluvial facing along the upstream surcharge slope within the Central Pedestal Area. MW12-01 previously became inundated by the rising tailings beach (tailings flowed into the well riser) during September 2022 and subsequent water levels have since been notably elevated (by approximately 10 ft) and are thought to be influenced by local tailings discharge (i.e., periods of discharge and inactivity). Nearby tailings discharge point NS-01 was inactive during Q2 2023; however, discharge from the 12-inch diameter lines may have influenced the increase in piezometric conditions at MW12-01. Current elevations remain approximately 12 ft below the QPP threshold elevation.
- Monitoring well MW12-05 has historically been unsaturated and remained unsaturated through Q2 2023. This indicates that the piezometric elevation remains below the bottom of the well screen (less than 6,198 ft elevation) and is suggestive of a stable piezometric trend.

2.2.4 TAILINGS MASS

Pore water pressure instrumentation installed within the tailings mass upstream of the East-West Embankment Central Pedestal Area generally monitored relatively stable pore water pressures during Q2 2023. Key findings include:

- Pore pressures within the central tailings mass upstream of the rockfill surcharge at non-QPP sites SCPT15-04 VW2 and SCPT15-05 VW3 (the upper most saturated sensors at each site) monitored slightly decreasing piezometric elevations (0.7 and 0.3 ft, respectively).
- Non-QPP site DH17-S3 VW2 installed beneath the central rockfill surcharge monitored slightly increasing piezometric elevations (0.4 ft).
- Non-QPP site SCPT15-03 VW1 installed beneath the central rockfill surcharge monitored relatively stable piezometric elevations (+/- 0.2 ft).
- Non-QPP sensors SCPT21-S5 VW2 and VW3 were unsaturated at the start of Q2 2023. Both remained unsaturated during Q2 2023..

Instrumentation installed within the tailings beach adjacent to the North-South and East-West Embankments outside the Central Pedestal Area generally monitored mixed piezometric responses during Q2 2023. Key findings include:

- Non-QPP sensor SCPT15-06 VW1 and VW2monitored relatively stable water pressures during Q2 2023.
- Non-QPP sensors SCPT15-08 VW2, SCPT13-05 VW1, and SCPT13-06 VW1 monitored relatively stable pore water pressures (ranging from approximately stable to 0.5 ft increase). Non-QPP sensor SCPT21-S3 VW3 remained unsaturated during Q2 2023.
- Non-QPP sensor DH19-S6 VW6, installed upstream of the North-South Embankment near Section 56+00N, observed decreasing pore water pressures (approximately 5 ft). This site previously observed a pore pressure increase of approximately 8 ft due to extensive deposition from the nearby tailings discharge points during Q3 2022. The decrease in Q2 2023 is inferred to result from the inactivity of nearby tailings discharge point NS-04 which has reportedly not deposited tailings during Q1 and Q2 2023.
- Non-QPP sensor SCPT21-S2 VW2 monitored relatively stable pore water pressures, following a slight decrease of approximately 1 ft observed during Q1 2023. This site is installed within the upper tailings mass and previously monitored increasing pore water pressures during Q3 2022 due to increased discharge from NS-1, followed by subsequent dissipation beginning in early-November through December 2022.

There are presently no QPPs designated for pore water pressures within the tailings mass.

2.2.5 WEST EMBANKMENT AND DRAIN

Relatively stable to slightly decreasing conditions were observed during Q2 2023. Slightly increasing pore water pressures were previously observed within the foundation of the West Embankment and West Embankment Drain (WED) during Q2 2022 (ranging from approximately 0.4 to 2 ft), that were attributed to increased seepage flow to the WED caused by extensive deposition from RK-3 during Q1 2023.. Key findings include:

- QPP sensors in drillhole DH15-12 (VW1, VW2, and VW3) are installed within the West Embankment foundation and monitored slightly increasing pore water pressures during Q2 2023 (approximately 0.6 to 1.2 ft). Sensors VW1, VW2, and VW3 remained 22, 20, and 20 ft respectively below their QPP trigger threshold.
- Pore water pressures monitored by QPP sensors installed in WED Drain Pods 1 and 2 (VWP-DP1 and VWP-DP2, respectively) monitored minor pore water pressure increases during Q2 2023 (approximately 0.6 and 0.9 ft, respectively). The sensors remain 32 and 28 ft below their respective QPP trigger thresholds.
- The piezometric elevation monitored by the non-QPP sensor in the WED Extraction Basin (VWP-EB1) also monitored a minor pore water pressure increase during Q2 2023 (approximately 1.2 ft).

3.0 DEFORMATION MONITORING

3.1 OVERVIEW OF DEFORMATION MONITORING NETWORK

Surface and subsurface deformation data are regularly reviewed by KP. A summary of the deformation monitoring programs and key monitoring trends from Q2 2023 are provided in the following sections. Quarterly monitoring generally observed continued constant rate surface deformations within regions of historical rockfill outside of construction recent influence, with no observation of progressive (accelerating) deformation rates in these areas. Elevated deformation rates continued to be observed within and localized around regions of recent construction (East-West and North-South Embankment El. 6,450 ft lift tie-in, and the North-South Embankment El. 6,450 ft crest). Deformation rates have continued to slow with time following the substantial completion of rockfill placement in Q1 2023.

Data from instrumentation sites were readily available via the RMS. This letter discusses available deformation data from Q2 2023. More comprehensive analysis of available deformation data will be presented in the 2023 Data Analysis Report to be issued in 2024. No deformation related QPPs are presently active; however, KP is evaluating the data and are considering incorporation of deformation related QPPs for future revisions of the TOMS Manual.

Surface and subsurface deformations of the YDTI embankments are actively monitored using in-situ instrumentation and remote sensing techniques. The instrumentation and remote sensing techniques incorporated into the monitoring program are summarized in the Data Analysis Report (KP, 2023), and within monthly construction monitoring and quarterly monitoring documents during 2022 and early-2023. A list of the available techniques is provided below:

- **Global Navigational Satellite System** (GNSS) monuments instrumentation at four locations (DH19-S3, DH19-S4, DH19-S5, and DH19-S7) within the Central Pedestal Area of the East-West Embankment
- **Manual survey-monuments** at 15 locations along the East-West Embankment and four locations along the North-South Embankment, surveyed using Differential Global Positioning System (DGPS) and a manually operated total station.
- **Satellite-based interferometric Synthetic Aperture Radar** (inSAR) Bulletin and SqueeSAR analyses with coverage throughout the YDTI embankments. Data collection is active from approximately April through October, while snow-free conditions persist. Snow coverage in 2023 prevented new data acquisition until May 2023. Three (3) short-term inSAR bulletins were available for review in Q2 2023. No SqueeSAR data is available for Q2 2023.

- **In-Place-Inclinometer** (IPI) instruments co-located with the GNSS instrumentation within drillholes DH19-S3, DH19-S4, DH19-S5, and DH19-S7 within the Central Pedestal Area of the East-West Embankment.
- **Geo4Sight deformation instruments** within drillholes DH20-S2 (Section 8+00W) and DH21-S4 (Section 0+00), installed through the rockfill surcharge, tailings, and upstream slope of the East-West Embankment in the Central Pedestal Area.

Trends and conditions observed in the monitoring data during Q2 2023 using available instrumentation and remote sensing data are summarized in the following sections.

3.2 OVERVIEW OF OBSERVED DEFORMATION TRENDS

3.2.1 GENERAL

Only minor construction activities were active in Q2 2023 and comprised regrading along the El. 6,450 ft crest and placement of alluvial facing along the upstream faces of the central rockfill surcharge and North-South Embankment. Increasing deformation rates were not anticipated or observed as a result of these activities, due to the limited quantity of material placement. Deformation rates throughout the East-West and North-South Embankments remain slightly elevated following construction of the EL. 6,450 ft crest raise but continue to slow with time. Findings from Q2 2023 do not indicate development of unexpected deformations within the downstream embankment shell nor evidence of progressive (accelerating) deformation following construction. Key findings are discussed by embankment in the following sections.

3.2.2 EAST-WEST EMBANKMENT DEFORMATIONS

East-West Embankment El. 6,450 ft lift construction was completed in August 2022 and deformation monitoring data collected since (including during Q2 2023) have monitored slowing surface and subsurface deformation rates. A high-level summary of monitored Q2 2023 deformations is provided below:

- InSAR bulletins continue to observe elevated deformation rates within and localized around areas of previously active El. 6,450 ft lift construction, with rates generally slowing with time following rockfill placement. Monitoring during May and June indicates that deformation rates remain elevated within the Central Pedestal Area, predominantly where the East-West and North-South Embankments join (around Section 0+00) and where the most recent construction in the area (January 2023) was completed. It appears that deformation rates in this area have slowed in sequential Q2 2023 bulletins.
- GNSS and manual survey-monuments have continued to monitor slowing surface deformation rates within the East-West Embankment since completion of the El. 6,450 ft lift:
  - Survey-monuments (GNSS DH19-S7, DS-1, DS-2, DS-3, and DS-4) installed along the central Tailings Pipeline Ramp have continued to monitor slowing vertical and lateral (predominantly southward) deformations since August 2022.
  - Survey-monuments (MS-1, MS-2, and MS-3) installed along the El. 6,150 ft bench have exhibited relatively minor influence from construction to-date (compared to the tailings pipeline ramp) and displacement rates generally continued to slow since completion of El. 6,450 ft lift construction.
  - Survey-monuments (GNSS DH19-S3, GNSS DH19-S4, SB-1, SB-2, and SB-3) installed along the Seep 10 Bench have previously observed slightly elevated surface deformation rates interpreted as construction influence. Monitoring during Q2 2023 continued to indicate slowing deformation rates.

- Seep 10 Bench inclinometers DH19-S3 and DH19-S4 (Sections 0+00 and 8+00W, respectively) indicate that deformation rates have generally remained consistent or slowed slightly since mid-2022 (following El. 6,400 ft lift construction), with very minor rate and directional fluctuations interpreted to result from continuing settlement. DH19-S3 continued to monitor slightly elevated deformation rates during Q2 2023, while DH19-S4 has monitored minimal deformation since completion of El. 6,400 ft lift construction.
- Geo4Sight instrumentation within drillholes DH20-S2 and DH21-S4, installed beneath the surcharge on Sections 8+00W and 0+00, respectively, has continued to monitor minimal deformation rates following completion of the surcharge and embankment lift construction. These sites have previously monitored elevated subsurface deformation rates due to local central embankment lift construction in late-2021 and early-2022.

Significant transverse cracking and depressions were observed along the EL. 6,450 ft crest near Section 0+00 on April 27, 2023, which triggered a Level 1 Unusual Occurrence response that comprised on-site inspections (completed by MR and KP), a targeted monitoring campaign developed by KP and the YDTI Engineer of Record (EOR), and remedial activities completed by MR operations. A detailed summary of the observed cracking and monitoring analyses was reviewed with the Independent Review Panel (IRP) on June 13, 2023, and this presentation is included herein as Appendix E. A high-level summary is presented below:

- Differential settlement of recently placed rockfill of the El. 6,450 ft East-West Embankment crest is interpreted to have resulted in initial transverse cracking within the upper 0 to 1 metre (based on test trenching) of the lift. Recharge from significant meltwater- and precipitation-based ponding present on the embankment crest is inferred to have flowed into the cracks, exacerbated the cracking and resulting in development of localized collapse features (see Appendix E Slide 12). No seepage discharge was observed at the downstream or upstream embankment faces, indicating that the infiltrating water may have dissipated within the underlying rockfill.
- Monitoring data and inspections following identification of the cracks did not indicate progression of cracking (i.e., development of additional new cracks, lengthening of existing cracks, increasing vertical offsets) or accelerating deformation rates in the area.
- Cracking was remediated in mid-June 2023 (approximately June 16th through 20th, 2023). Remedial activities comprised ripping and shallow excavation of the main cracking/depression area and initial leveling/infilling of the low area around the location to minimize potential for further ponding. Widespread levelling (up to design grade at El. 6,450 ft) and regrading is planned throughout the Central Pedestal Area.
- Additional inspection (by MR) and monitoring (by KP) following remediation was completed during Q2 2023 to screen for re-expression of cracking within the main cracking/depression area and monitor deformations in the area. No re-expression of cracking has been reported and deformation rates continue to slow following El. 6,450 ft lift construction (i.e., no evidence of accelerating deformations in proximity to the cracking area).

KP and the EOR are satisfied that the cracking event does not pose an elevated dam safety concern but will continue to routinely monitor the area during 2023.

3.2.3 NORTH-SOUTH EMBANKMENT DEFORMATIONS

North-South Embankment El. 6,450 ft lift construction was completed in March 2023 and deformation monitoring data collected since (including during Q2 2023) have monitored slowing surface and subsurface deformation rates. A high-level summary of monitored Q2 2023 conditions is provided below:

- InSAR bulletins continue to observe elevated deformation rates within and localized around areas of recently active El. 6,450 ft lift construction along the North-South Embankment. Observed rates appear to slow with time following construction. Monitoring in Q2 2023 also indicates continued elevated deformation rates where the East-West and North-South Embankments join, as noted in Section 3.2.1.
- Manual survey-monuments (NS-01, NS-02, NS-03, NS-04, NS-05, and NS-06) are installed along the North-South Embankment and have monitored deformations during and following El. 6,450 ft crest construction using a total station. Data indicate slightly elevated, slowing deformation rates resulting from El. 6,450 ft lift construction in Q1 2023. The highest deformation rates are observed near the East-West and North-South Embankment tie-in (NS-01), where construction was relatively recent (January 2023). It is anticipated that these rates will continue to slow in Q3 2023.

KP expects deformation rates to slow with time given that no further large-scale embankment construction activities are upcoming. This expectation has been regularly demonstrated through available deformation monitoring data.

4.0 CONCLUSIONS

KP supports MR with routine monitoring of the hydrogeological and geotechnical conditions, as part of their operational surveillance plan for the tailings facility, as described in the TOMS Manual (MR/KP, 2022). Piezometric, surface deformation, and subsurface deformation data are available in near real-time using the RMS. Formal analysis and reporting of monitoring data are completed on a quarterly basis to evaluate the performance of the YDTI. The quarterly evaluations along with an assessment of conditions and trends at all piezometric monitoring sites will be included in a comprehensive annual Data Analysis Report, to be issued in 2024. Additional monthly piezometric and deformation data analyses for conditions associated with active embankment construction was completed during El. 6,450 ft lift embankment construction (June 2021 through March 2023) within the East-West and North-South Embankments. Influence from construction (localized elevated pore water pressures and elevated surface/subsurface deformation rates) have continued to slow with time following completion of construction.

Piezometric conditions are monitored within the YDTI embankments, tailings mass, and surrounding areas and are an important indicator of facility performance. A subset of piezometric monitoring sites have designated QPPs within the TOMS Manual and are regularly evaluated relative to piezometric ‘trigger elevations’ to pre-emptively identify and respond to changing conditions. There were no piezometric QPP exceedances during Q2 2023. Minor, isolated elevated pore pressures associated with construction are anticipated to dissipate with time following completion of El. 6,450 ft lift placement within the Central Pedestal Area.

Elevated surface and subsurface deformations continue to be observed within and localized around areas of recent North-South and East-West Embankment construction. Monitored deformation rates within the Central Pedestal Area remain slightly elevated but continued to decrease during Q2 2023. Findings do not indicate development of unexpected deformation following construction. North-South Embankment deformation rates increased due to construction during Q1 2023 but have subsequently started to slow following completion of the El. 6,450 ft lift in March 2023. KP anticipates that elevated deformation rates

resulting from construction will continue to slow with time. KP and the EOR are satisfied that the recent Level 1 cracking event does not pose an elevated dam safety concern but will continue to routinely monitor the area during 2023.

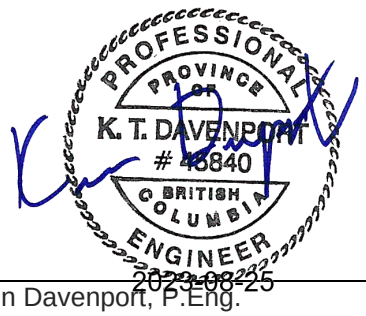
Please do not hesitate to contact the undersigned should you have any questions or if you would like any additional information.

Yours truly,
Knight Piésold Ltd.

Prepared:

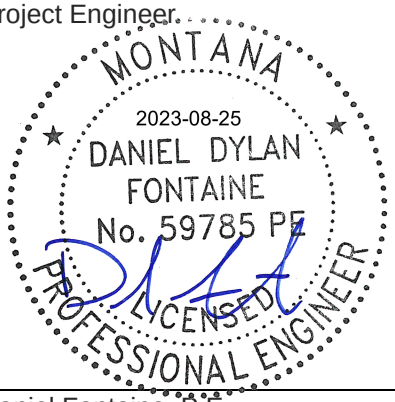
Gwen James, P.Eng.
Project Engineer

Reviewed:



Kevin Davenport, P.Eng.
Senior Engineer

Reviewed:



Daniel Fontaine, P.E.
Specialist Engineer | Associate
YDTI Engineer-of-Record

KNIGHT PIÉSOLD LTD.
PERMIT NUMBER
1001011
EGBC PERMIT TO PRACTICE

Approval that this document adheres to the Knight Piésold Quality System: DDF

Attachments:

Table 1 Rev 0	Summary of Piezometric Quantitative Performance Parameter (QPP) Monitoring
Figure 1 Rev 0	Active Piezometric Instrumentation and Monitoring Site
Figure 2 Rev 0	Summary of Measured vs. QPP Trigger Piezometric Elevations East-West Embankment
Figure 3 Rev 0	Summary of Measured vs. QPP Trigger Piezometric Elevations East-West Embankment
Figure 4 Rev 0	Summary of Measured vs. QPP Trigger Piezometric Elevations North-South Embankment
Figure 5 Rev 0	Summary of Measured vs. QPP Trigger Piezometric Elevations West Embankment
Figure 6 Rev 0	Summary of Measured vs. QPP Trigger Piezometric Elevations West Embankment
Figure 7 Rev 0	Piezometric Conditions Along East-West Embankment Section 8+00W (Looking West)

Figure 8 Rev 0	Comparison of Cumulative Vertical GNSS Displacement Magnitudes (July 1, 2020 through June 30, 2023)
Appendix A	GNSS Deformation Plots
Appendix B	Inclinometer Deformation Plots
Appendix C	Geo4Sight Deformation Plots
Appendix D	InSAR Bulletins
Appendix E	YDTI Performance Monitoring Overview & Level 1 Cracking Event (Presentation)

References:

Knight Piésold Ltd. (KP, 2021). Monthly El. 6,450 Construction Progress and Monitoring Summary - MP#1 (Jun 22 to Jul 31, 2021) (KP Reference No. VA21-01362), dated September 30, 2021.

Knight Piésold Ltd. (KP, 2023). 2022 Data Analysis Report (KP Reference No. VA101-126/27-4 Rev 0), dated June 8, 2023.

Montana Resources and Knight Piésold (MR/KP, 2022). Yankee Doodle Tailings Impoundment – Tailings Operations, Maintenance and Surveillance (TOMS) Manual, Rev 4, dated January 2022.

Copy To: Mark Thompson, Amanda Griffith (Montana Resources)

/goj

Knight Piésold CONSULTING

TABLE 1

MONTANA RESOURCES, LLC
YANKEE DOODLE TAILINGS IMPOUNDMENT

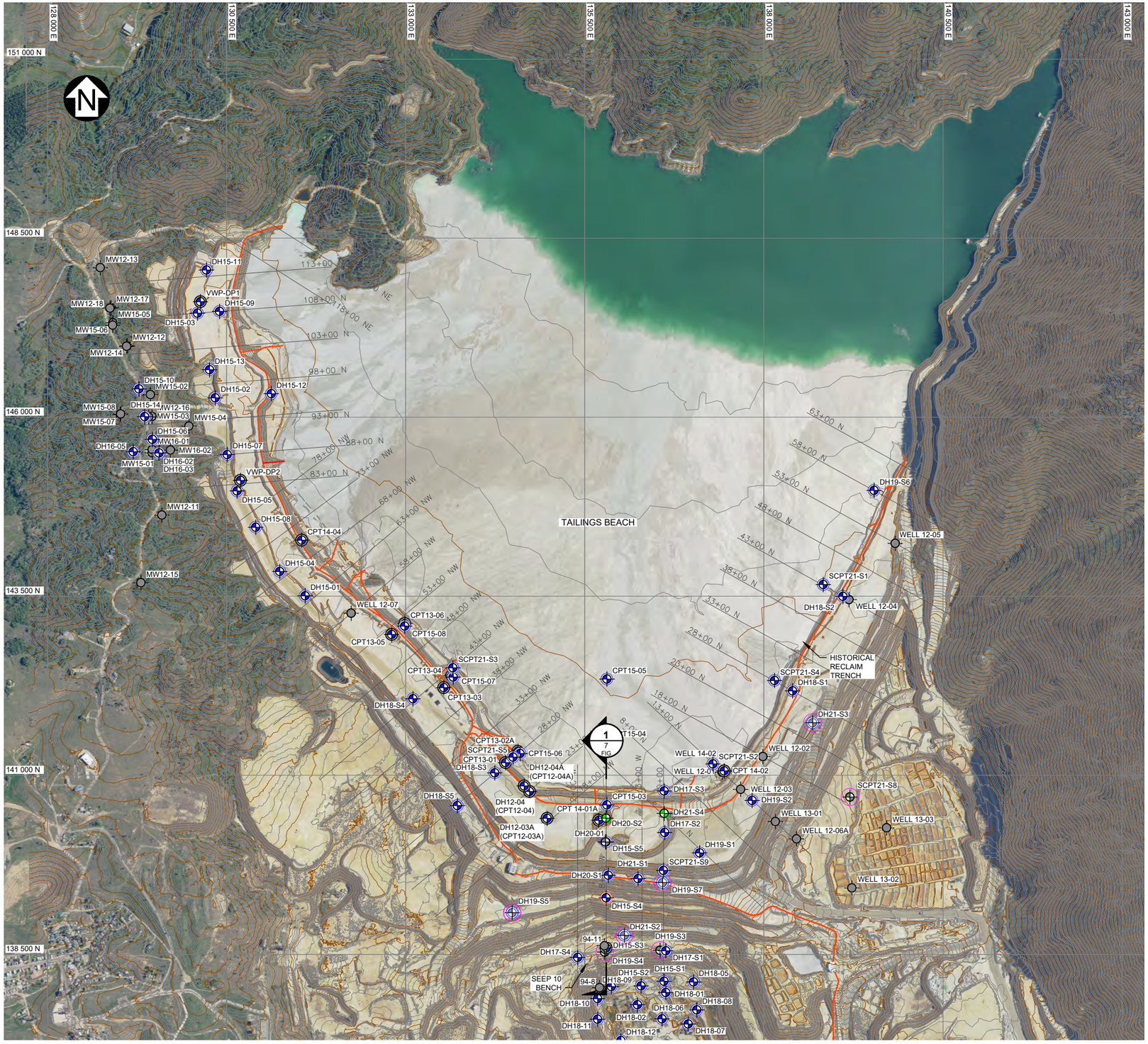
YDTI PIEZOMETRIC AND DEFORMATION MONITORING UPDATE (Q2 2023)
SUMMARY OF PIEZOMETRIC QUANTITATIVE PERFORMANCE PARAMETER (QPP) MONITORING

Print Aug/22/23 12:03:12

Monitoring Region	QPP Instrumentation Site	Monitoring Site Type [1]	Piezometric Trigger Elevation (ft)	Maxiumum Piezometric Elevation Recorded Q2 2023 (ft)	End of Q2 2023 Piezometric Elevation (ft)	Exceeded Trigger Elevation During Q2 2023 (Yes/No)	Pore Pressure Change Q2 2023 (ft)	Comments
East-West Embankment	MW94-08	VWP Sensor	5,680	5,669	5,668	No	0.36	
	MW94-11	VWP Sensor	5,693	5,673	5,672	No	-0.18	
	DH15-S3 VW1	VWP Sensor	5,690	5,664	5,664	No	0.11	
	DH15-S4 VW1	VWP Sensor	5,740	5,711	5,710	No	-0.56	
	DH15-S4 VW2	VWP Sensor	5,800	5,768	5,767	No	-1.59	
	DH15-S5 VW2	VWP Sensor	5,890	5,854	5,853	No	-0.15	Activated as a QPP on October 3, 2022[5]. Predominantly erroneous readings have been collected since April 15, 2023. Intermittent representative values from March 31 and June 24, 2023 have been used to evaluate the QPO herein.
	DH17-S1 VW2	VWP Sensor	5,741	5,714	5,713	No	0.58	
	DH18-S3 VW3	VWP Sensor	6,044	6,022	6,022	No	0.16	
	DH19-S7 VW1	VWP Sensor	5,770	5,732	5,729	No	-2.55	Activated as a QPP on March 19, 2021 to replace DH17-S2 VW2[4]
North-South Embankment	MW12-01	VWP Sensor	5,940	5,928	5,928	No	3.80	Sensor went offline on June 6, 2023. Data shown from last reading
	MW12-05	VWP Sensor	6,200	-	-	-	-	Sensor remains unsaturated. Sensor went offline on August 8, 2023.
	DH18-S1 VW2	VWP Sensor	6,010	-	-	-	-	Sensor disconnected in preparation of material placement since March 8, 2023
	DH18-S2 VW2	VWP Sensor	6,029	6,011	6,011	No	0.51	
West Embankment	VWP-DP1	VWP Sensor	6,374	6,342	6,342	No	0.90	
	VWP-DP2	VWP Sensor	6,366	6,338	6,338	No	0.55	
	DH15-12 VW1	VWP Sensor	6,372	6,350	6,350	No	0.67	
	DH15-12 VW2	VWP Sensor	6,372	6,352	6,352	No	1.21	
	DH15-12 VW3	VWP Sensor	6,372	6,352	6,352	No	1.10	

NOTES:
1. PIEZOMETRIC DATA FROM VWP SITES ARE COLLECTED HOURLY USING DATA LOGGERS AND A REMOTE MONITORING SYSTEM.
2. THE SPECIFIED QPP TRIGGER ELEVATION FOR MW12-05 WAS UPDATED FROM 6,195 ft. TO 6,200 ft. IN THE 2018 REVISION OF THE TOMS MANUAL (MR/KP, 2018).
3. THE PIEZOMETRIC QPP NETWORK WAS EXPANDED TO INCLUDE ADDITIONAL SENSORS DURING THE 2020 TOMS UPDATE (MR/KP, 2020).
4. DH17-S2 VW2 WAS DAMAGED ON MARCH 19, 2021 AND DATA THEREAFTER ARE INTERPRETED TO BE ERRONEOUS. THIS SENSOR WAS RETIRED FROM THE QPPS AND REPLACED WITH THE NEARBY DH19-S7 VW1.
5. SENSOR DH15-S5 VW1 WAS DAMAGED DURING A COLLAR RAISE AND HAS BEEN ABANDONED. THIS SENSOR WAS RETIRED FROM THE QPPS AND REPLACED WITH DH15-S5 VW2 ON OCTOBER 3, 2022.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	19JUL'23	ISSUED WITH LETTER VA23-01198	CNN	KTD



NOTES:

1. COORDINATE SYSTEM AND ELEVATIONS BASED ON ANACONDA MINE GRID.
2. QPP = QUANTITATIVE PERFORMANCE PARAMETER.
3. RK-3 TAILINGS DISCHARGE POINT WAS RELOCATED NORTH IN OCTOBER 2017.
4. THE AERIAL PHOTO SHOWN IS FROM JULY, 2022.
5. TOPOGRAPHY PROVIDED BY MONTANA RESOURCES, LLC IN JULY, 2022.
6. NO PORE WATER PRESSURE DATA ARE AVAILABLE FROM DH20-S1 AS THE INSTRUMENTS ARE NOT FUNCTIONAL.

LEGEND:

- EXISTING DRILLHOLE WITH NESTED VIBRATING WIRE PIEZOMETERS AND GEO4SIGHT INSTRUMENTATION
- EXISTING GEOPHYSICAL CASING
- EXISTING INCLINOMETER
- EXISTING INCLINOMETER WITH NESTED VIBRATING WIRE PIEZOMETERS
- EXISTING NESTED VIBRATING WIRE PIEZOMETERS
- EXISTING SINGLE VIBRATING WIRE PIEZOMETER
- EXISTING THERMISTOR WITH VIBRATING WIRE PIEZOMETER
- EXISTING INSTRUMENTED MONITORING WELL OR STANDPIPE
- TAILINGS PIPELINE

SCALE A 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	25AUG'23	ISSUED WITH LETTER	SY3	RMM	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

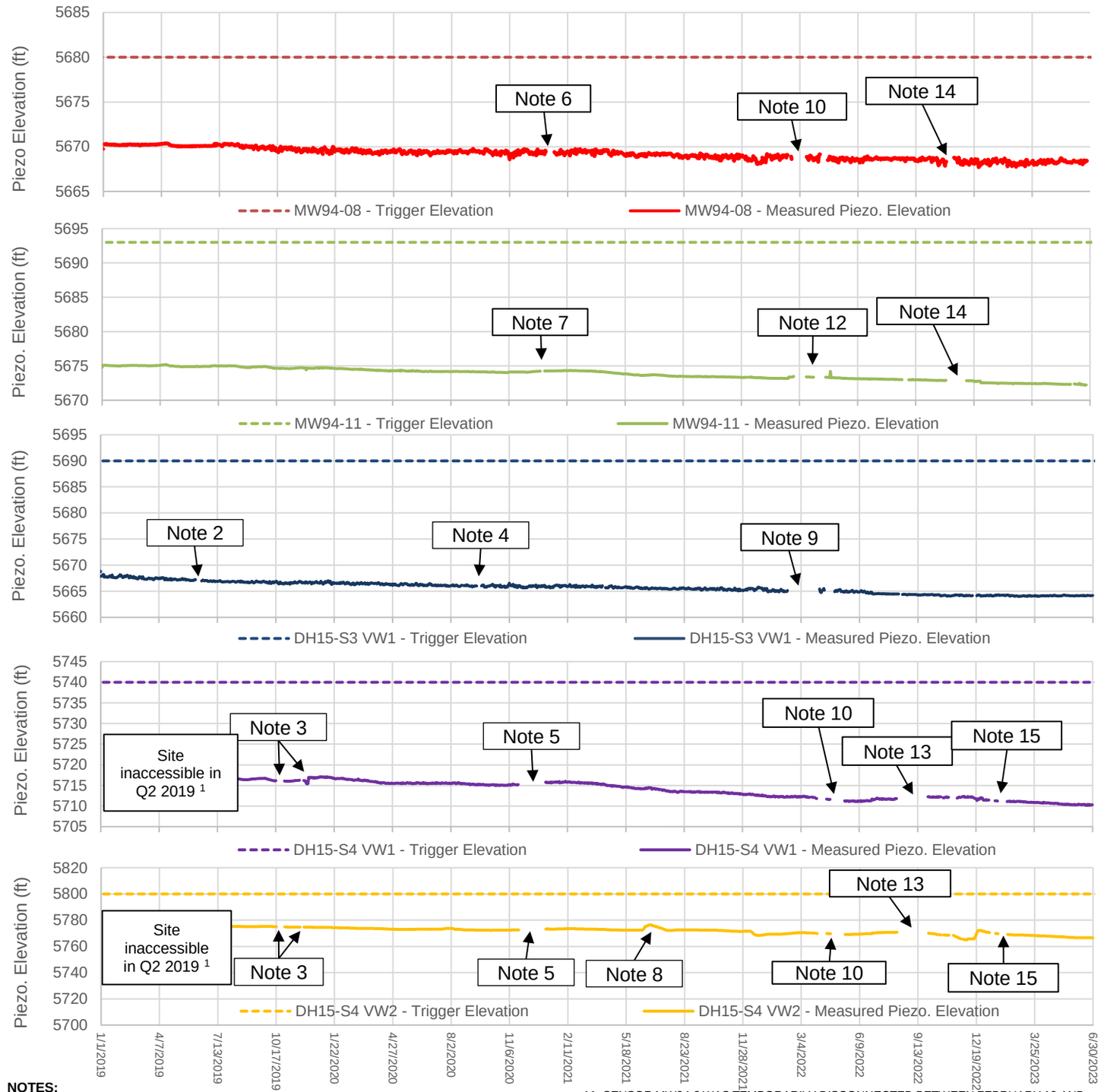
ACTIVE PIEZOMETRIC INSTRUMENTATION AND MONITORING SITE

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/29	VA23-01198

FIGURE 1 REV 0

SAVED: M:\101\00126\29\A\Acad\FIGS\B24, 8/25/2023 10:32:07 AM, SCAMMAYO PRINTED: 8/25/2023 10:35:38 AM, FIG 1, SCAMMAYO
XREF FILE(S): TOPO_5' - July 2022_58_01_2022-07-18, Tailings and Reclaim Pipelines IMAGE FILE(S): 58_01 2022-07-18



NOTES:

1. NO DATA ARE SHOWN FROM DEC 20, 2017 TO JULY 25, 2019 FOR DH15-S4 VW1 AND VW2 AS MR STAFF WERE UNABLE TO CONNECT THE INSTRUMENTATION WITH THE REMOTE MONITORING SYSTEM DUE TO SITE INACCESSIBILITY.
2. NO DATA WERE COLLECTED BY DH15-S3 VW1 FROM JUNE 7, 2019 TO JUNE 16, 2019 DUE TO INSUFFICIENT BATTERY VOLTAGE
3. NO DATA WERE COLLECTED BY DH15-S4 VW1 AND VW2 DUE TO POWER SUPPLY ISSUES OCTOBER 19 TO 31 AND NOVEMBER 27, 2019 TO DECEMBER 3, 2019. SENSORS MOVED NEW LOGGER.
4. NO DATA WERE COLLECT BY DH15-S3 VW1 FROM SEPTEMBER 15 TO SEPTEMBER 21, 2020 DUE TO DEPLETED GEONET BATTERY WHICH WAS SUBSEQUENTLY REPLACED.
5. NO DATA WERE COLLECTED BY DH15-S4 VW1 AND VW2 DUE TO SUSPECTED LOGGER ISSUE FROM NOVEMBER 22, 2020. FUNCTIONALITY WAS RESTORED USING A REPLACEMENT LOGGER IN Q1 2021.
6. NO DATA WERE COLLECTED BY MW94-08 FROM JANUARY 7 TO 19, 2021 DUE TO A DEPLETED BATTERY WHICH WAS SUBSEQUENTLY REPLACED.
7. NO DATA WERE COLLECTED BY MW94-11 FROM DECEMBER 30, 2020 TO JANUARY 4, 2021 DUE TO A DEPLETED BATTERY WHICH WAS SUBSEQUENTLY REPLACED.
8. PIEZOMETRIC ELEVATION INCREASED IN RESPONSE TO OBSERVED INFILTRATION OF TAILINGS SLURRY WATER INTO THE CENTRAL ROCKFILL SURCHARGE FROM JUNE 14 TO JUNE 28, 2021 AS DESCRIBED IN VA21-01320.
9. SENSOR DH15-S3 VW1 WENT OFFLINE ON FEBRUARY 9, 2022 DUE TO A SUSPECTED RMS CONNECTIVITY ISSUE. CONNECTIVITY WAS RE-ESTABLISHED ON APRIL 20, 2022.
10. SENSORS DH15-S4 VW1 AND VW2 WERE TEMPORARILY DISCONNECTED BETWEEN APRIL 1 AND MAY 17, 2022 DUE TO A SUSPECTED RMS CONNECTIVITY ISSUE.
11. SENSOR MW94-8 WAS TEMPORARILY DISCONNECTED BETWEEN FEBRUARY 19 AND APRIL 21, 2022 DUE TO A SUSPECTED LOGGER VOLTAGE ISSUE.
12. SENSOR MW94-11 WAS TEMPORARILY DISCONNECTED BETWEEN MARCH 6 AND APRIL 18, 2022 DUE TO A SUSPECTED RMS CONNECTIVITY ISSUE.
13. SENSORS DH15-S4 VW1 AND VW2 COLLECTED ERRONEOUS READINGS STARTING ON AUGUST 9, 2022 DUE TO SUSPECTED LOGGER ISSUE. VALUES HAVE BEEN OMITTED FOR CLARITY. TROUBLESHOOTING IS CURRENTLY IN PROGRESS.
14. SENSOR 94-8 AND 94-11 VW1 WAS TEMPORARILY DISCONNECTED BETWEEN NOVEMBER 3 AND DECEMBER 9, 2022 DUE TO A SUSPECTED LOGGER VOLTAGE ISSUE.
15. SENSORS DH15-S4 VW1 AND VW2 COLLECTED MINIMAL DATA BETWEEN JANUARY 11 TO FEBRUARY 8, 2023 DUE TO A SUSPECTED DATA LOGGER ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	CNN	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

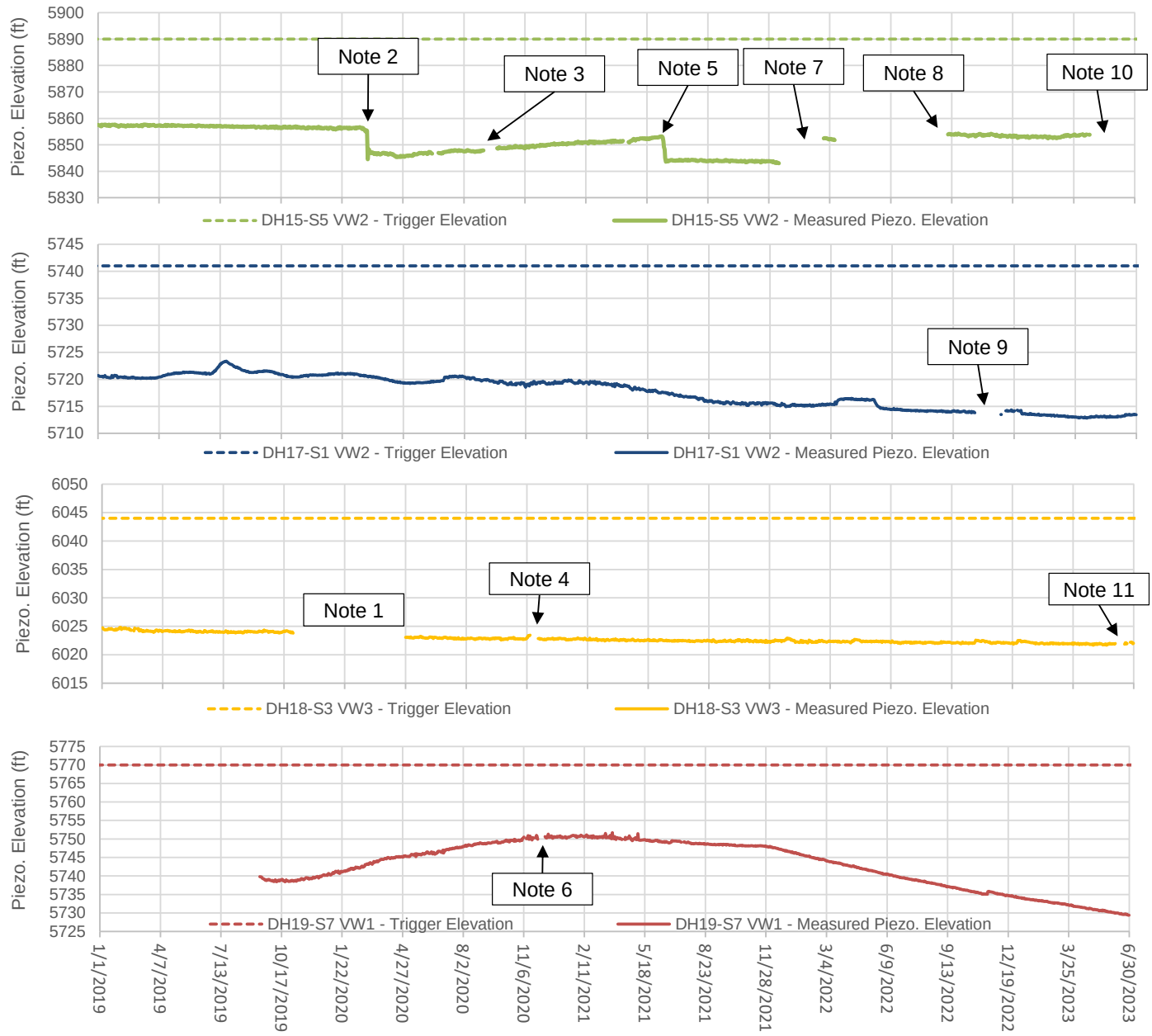
SUMMARY OF MEASURED VS. QPP TRIGGER PIEZOMETRIC ELEVATIONS EAST-WEST EMBANKMENT

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/29	VA23-01198

FIGURE 2

REV 0



NOTES:

1. NO DATA WERE COLLECTED BY DH18-S3 VW1 FROM NOVEMBER 1, 2019 TO FEBRUARY 3, 2020 AND FEBRUARY 4 TO APRIL 30, 2020 DUE TO SUSPECTED HARDWARE DAMAGE.
2. NO DATA WERE COLLECTED BY DH15-S5 VW2 DUE TO LOGGER POWER SUPPLY ISSUES FROM JUNE 13 TO 23, 2020.
3. NO DATA WERE COLLECTED BY DH15-S5 VW2 DUE TO WATER DAMAGED LOGGER FROM SEPTEMBER 2 TO 24, 2020. THE LOGGER WAS SUBSEQUENTLY REPLACED.
4. NO DATA WERE COLLECTED BY DH18-S3 DUE TO A DEPLETED DATA LOGGER BATTERY FROM NOVEMBER 12 TO 25, 2020.
5. NO DATA WERE COLLECTED BY DH15-S5 VW2 FROM APRIL 11 TO APRIL 20, 2021 DUE TO A DEPLETED DATA LOGGER BATTERY.
6. NO DATA WERE COLLECTED BY DH19-S7 VW1 FROM NOVEMBER 30 TO DECEMBER 10, 2020 DUE TO AN UNKNOWN HARDWARE ISSUE.
7. SENSORS IN DH15-S5 WERE TEMPORARILY DISCONNECTED BETWEEN DECEMBER 14, 2021 AND FEBRUARY 24, 2022 TO FACILITATE A COLLAR RAISE IN ADVANCE OF THE EL. 6,450 ft CREST CONSTRUCTION. SENSOR WAS TEMPORARILY RECONNECTED AND BECAME DISCONNECTED ON MARCH 12, 2022 DUE TO A SUSPECTED RMS CONNECTIVITY ISSUE. SENSOR BECAME RECONNECTED AND REMAINED OFFLINE UNTIL SEPTEMBER 8, 2022 TO FACILITATE THE PLANNED COLLAR RAISE.
8. QPP SENSOR DH15-S5 VW1 WAS DAMAGED DURING EL. 6450 ft LIFT CONSTRUCTION AND HAS BEEN ABANDONED. KP HAVE ELECTED SENSOR DH15-S5 VW2 AS A REPLACEMENT QPP.
9. THE DATA LOGGER AT DH17-S1 WAS DAMAGED AND NO DATA WERE RECORDED BETWEEN OCTOBER 18, 2022 AND DECEMBER 9, 2022. FUNCTIONALITY HAS SUBSEQUENTLY BEEN RESTORED.
10. SENSOR DH15-S5 VW2 HAS COLLECTED ERRONEOUS DATA SINCE APRIL 25, 2023 DUE TO A SUSPECTED DATALOGGER ISSUE. THESE VALUES HAVE BEEN OMITTED FOR CLARITY.
11. SENSOR DH18-S3 VW3 COLLECTED ERROENOUS DATA BETWEEN JUNE 21 AND 24, 2023. THESE VALUES HAVE BEEN OMITTED FOR CLARITY.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	19JUL'23	ISSUED WITH LETTER	CNN	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

SUMMARY OF MEASURED VS. QPP TRIGGER PIEZOMETRIC ELEVATIONS EAST-WEST EMBANKMENT

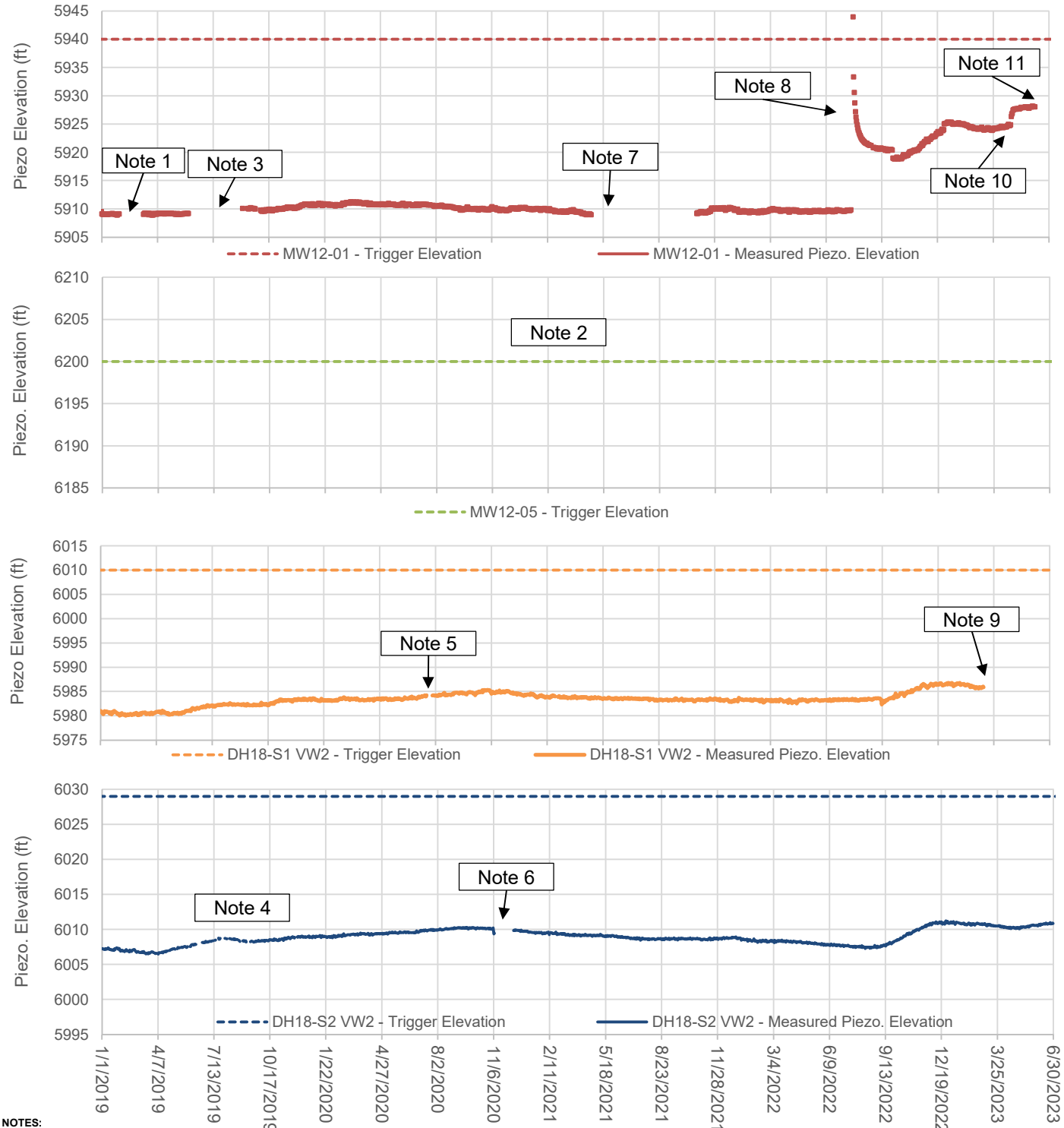
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE 3

REV 0



NOTES:

1. MW12-01 BECAME UNSATURATED FROM FEBRUARY 1 TO MARCH 13, 2019.
2. NO DATA WERE COLLECTED BY MW12-05. THE STANDPIPE WAS AND REMAINS UNSATURATED (DRY).
3. NO DATA WERE COLLECTED BY MW12-01 FROM MAY 31 TO SEPTEMBER 11, 2019 DUE TO DATA LOGGER FAILURE.
4. ERRONEOUS NOISE WAS RECORDED IN THE DATA BY DH18-S2 VW2. THESE DATA HAVE BEEN OMITTED FOR CLARITY.
5. NO DATA WERE COLLECTED BY DH18-S1 VW2 FROM JULY 27 TO 29, 2020 DUE TO UNKNOWN SENSOR ISSUE.
6. NO DATA WERE COLLECTED BY DH18-S2 VW2 FROM NOVEMBER 8 TO DECEMBER 12, 2020 WHILE THE SENSORS WERE REROUTED TO A NEW MONITORING HUB LOCATION.
7. SENSOR MW12-01 VW1 WAS UNSATURATED BETWEEN APRIL 28 AND OCTOBER 28, 2021. DATA HAVE BEEN OMITTED FROM PLOT FOR CLARITY. THE SENSOR RESATURATED ON OCTOBER 18, 2021 AND REMAINED SATURATED THEREAFTER.
8. THE MW12-01 STANDPIPE WAS INUNDATED BY THE RISING TAILINGS BEACH ON JULY 22, 2022 AND HAS SUBSEQUENTLY RECORDED HIGHER PIEZOMETRIC ELEVATIONS. RECENT READINGS MAY BE INFLUENCED BY LOCAL TAILINGS DISCHARGE.
9. SENSOR DH18-S1 VW2 WAS DISCONNECTED ON MARCH 8, 2023, IN PREPARATION FOR EL. 6,450 FT LIFT CONSTRUCTION AND HAS ONT YET BEEN RECONNECTED.
10. SENSOR MW12-01 MONITORED AN INCREASE IN PIEZOMETRIC ELEVATION THAT IS INFERRED TO RESULT FROM UPSTREAM ALLUVIAL FACING .
11. SENSOR MW12-01 STOPPED COLLECTING DATA ON JUNE 6, 2023 DUE TO SUSPECTED HARDWARE ISSUES.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	19JUL'23	ISSUED WITH LETTER	CNN	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

SUMMARY OF MEASURED VS. QPP TRIGGER PIEZOMETRIC ELEVATIONS NORTH-SOUTH EMBANKMENT

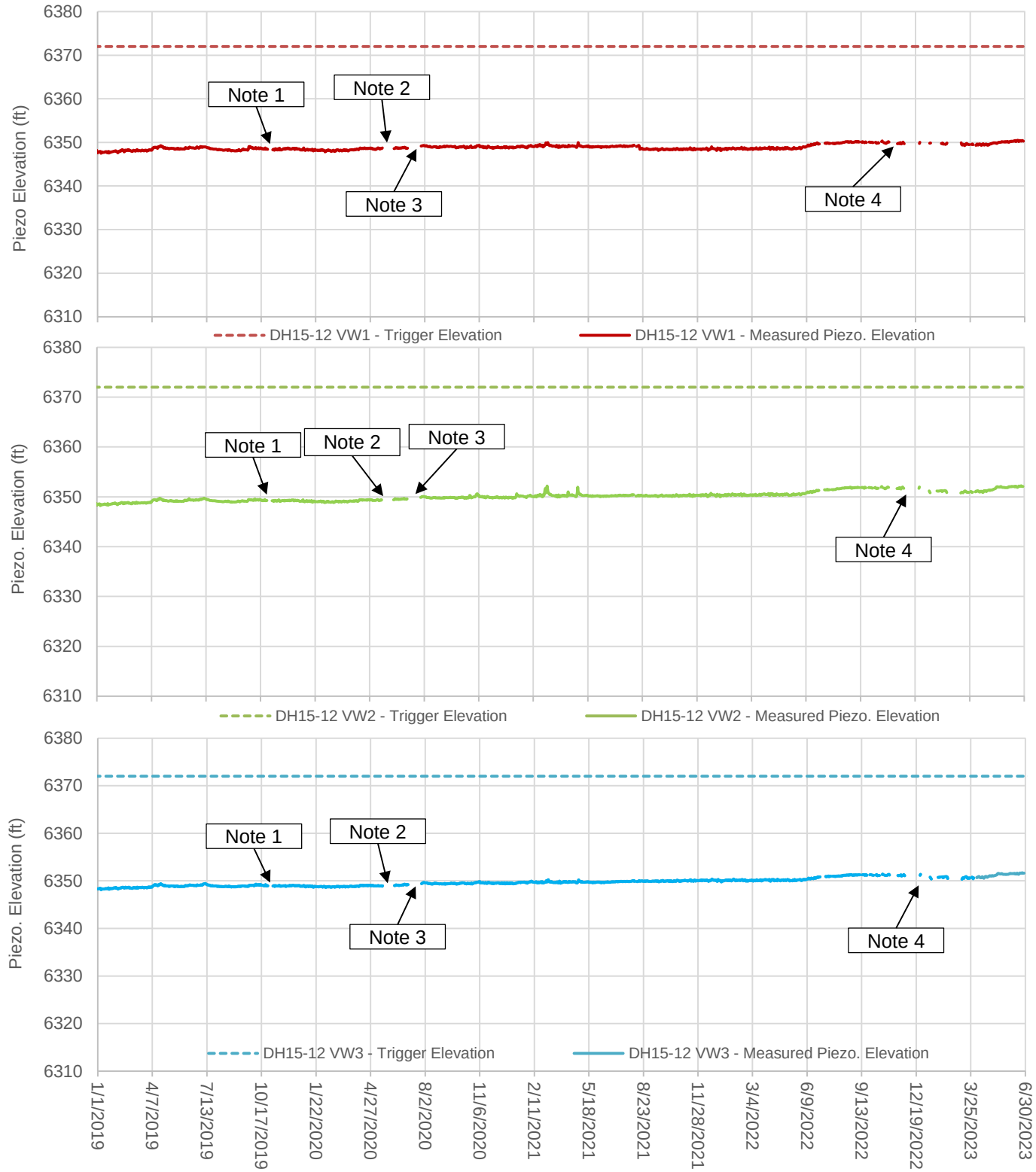
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE 4

REV 0



NOTES:

1. NO DATA WERE COLLECTED BY DH15-12 VW1, VW2, AND VW3 FROM OCTOBER 30, 2019 TO NOVEMBER 6, 2019 DUE TO A CONNECTIVITY ISSUE.
2. NO DATA WERE COLLECTED BY DH15-12 VW1, VW2, AND VW3 FROM MAY 19 TO JUNE 9, 2020 DUE TO A SUSPECTED LOGGER CONNECTIVITY ISSUE.
3. NO DATA WERE COLLECTED BY DH15-12 VW1, VW2, AND VW3 FROM JULY 3 TO JULY 26, 2020 DUE TO A CONNECTIVITY ISSUE.
4. ALL SENSORS IN DRILLHOLE DH15-12 EXPERIENCED INTERMITTENT OUTAGES BETWEEN NOVEMBER 2, 2022 AND APRIL 15, 2023.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	19JUL'23	ISSUED WITH LETTER	CNN	KTD

MONTANA RESOURCES, LLC

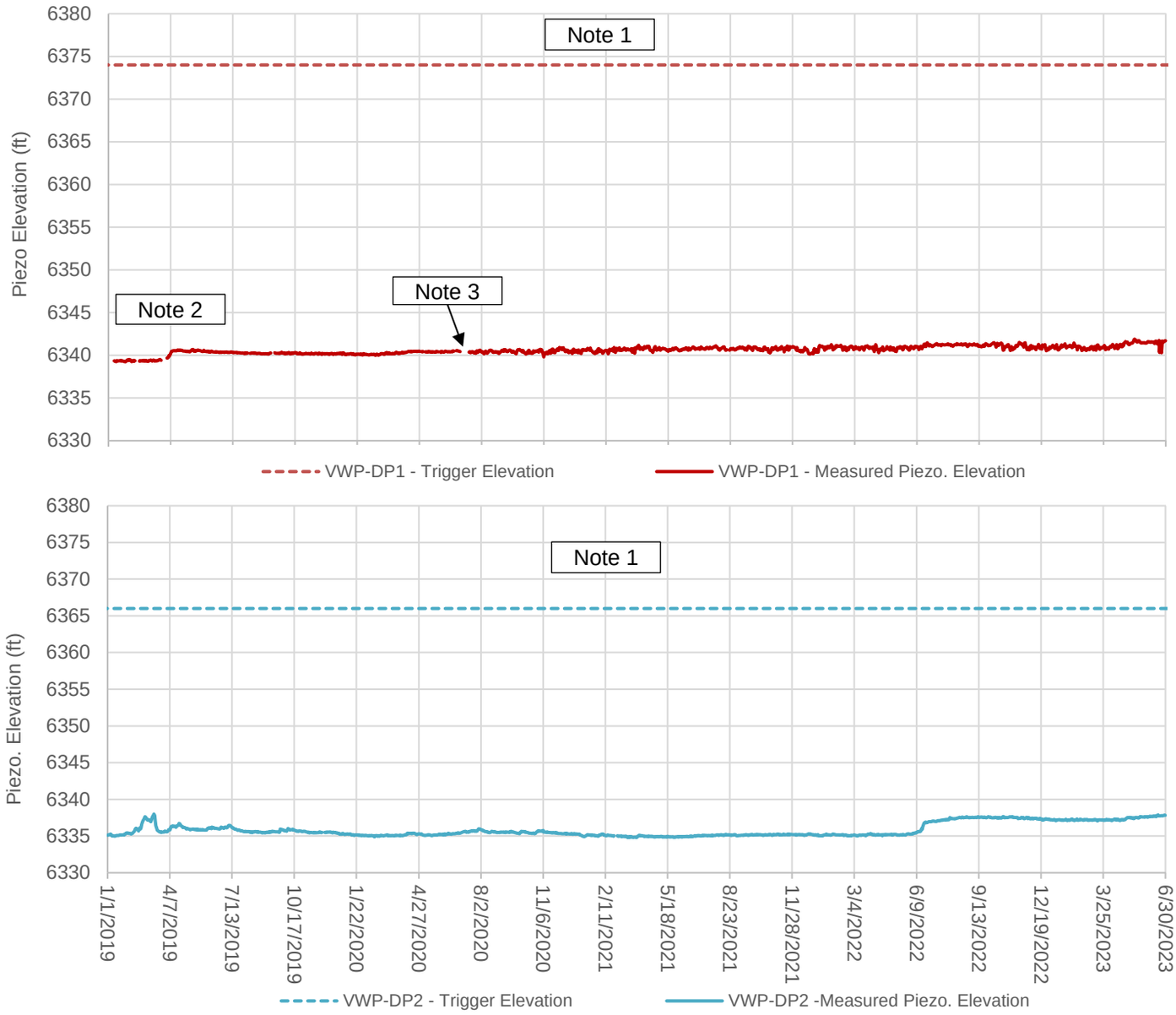
YANKEE DOODLE TAILINGS IMPOUNDMENT

SUMMARY OF MEASURED VS. QPP TRIGGER PIEZOMETRIC ELEVATIONS WEST EMBANKMENT

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/29	VA23-01198

FIGURE 5 REV 0



NOTES:

1. TRIGGER ELEVATIONS FOR SENSORS INSTALLED IN THE DRAIN PODS HAVE BEEN SPECIFIED AT THE ALLOWABLE HYDRAULIC GRADE LINE.
2. PERIODIC OUTAGES OCCURED AT VWP-DP1 DUE TO INTERMITTENT BATTERY VOLTAGE ISSUES.
3. NO DATA WERE RECORDED BY VWP-DP1 FROM JULY 1 TO 14, 2020 DUE TO A COMMUNICATION OUTAGE. A REPLACEMENT DATA LOGGER WAS SUBSEQUENTLY INSTALLED TO RESOLVE THE ISSUE.

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

SUMMARY OF MEASURED VS. QPP TRIGGER PIEZOMETRIC ELEVATIONS WEST EMBANKMENT

Knight Piésold CONSULTING

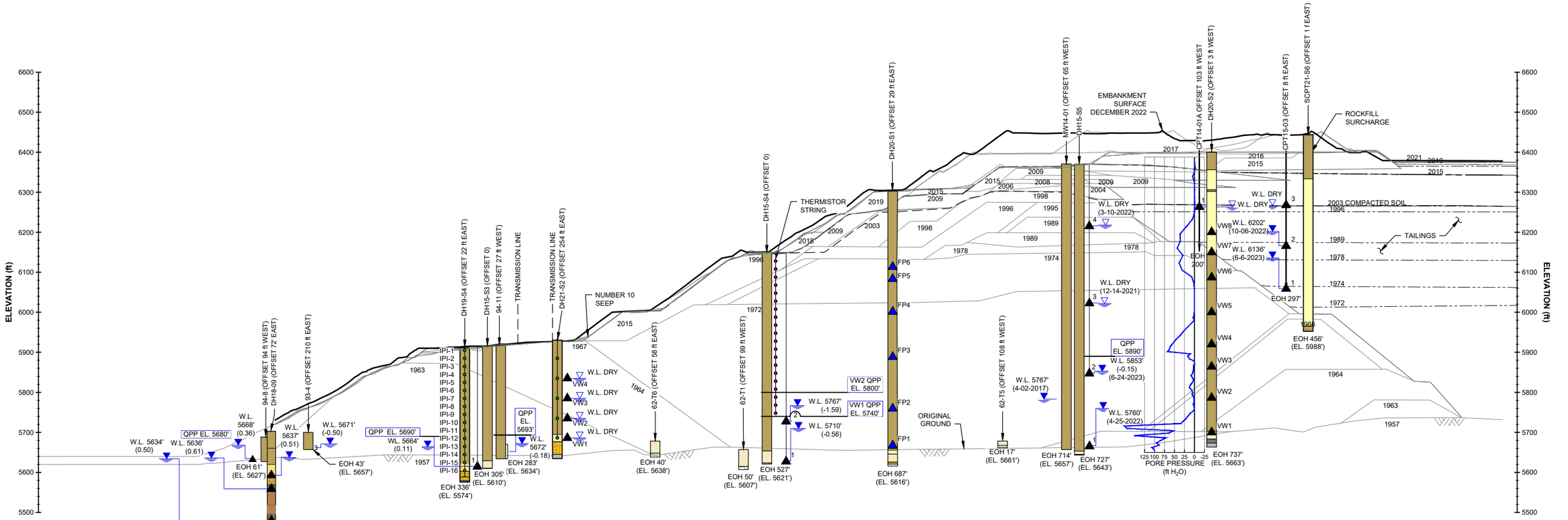
P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE 6

REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	CNN	KTD



1 SECTION
1 FIG
STATION 8+00 W
SCALE A

NOTES:

1. COORDINATE SYSTEM IS ANACONDA MINE GRID.
2. DIMENSIONS AND ELEVATIONS ARE IN FEET, UNLESS NOTED OTHERWISE.
3. PIEZOMETRIC LEVELS (W.L.) SHOWN USING END OF Q2 2023 READINGS (JUNE 30, 2023), UNLESS OTHERWISE INDICATED.
4. CHANGE IN WATER LEVEL FOR QPP SITES IS RELATIVE TO END OF Q1 2023.
5. MONITORING WELL MW14-01 ABANDONED DUE TO RISER BLOCKAGE DURING Q4 2019, RESULTING IN ERRONEOUS DATA. DATA OMITTED FOR CLARITY.
6. QPP STANDS FOR QUANTITIVE PERFORMANCE PARAMETER.
7. NO PORE WATER PRESSURE DATA ARE AVAILABLE FROM DH20-S1 AS THE INSTRUMENTATION IS NOT FUNCTIONAL.
8. SENSORS DH15-S5 VWP1, VWP3, AND VWP4 WERE DAMAGED DURING A COLLAR RAISE AND HAVE BEEN ABANDONED.

LEGEND:

- TAILINGS
- EMBANKMENT FILL
- ALLUVIUM
- RECENT ALLUVIUM
- HIGHLY ALTERED BEDROCK
- HIGHLY WEATHERED BEDROCK
- MODERATELY WEATHERED BEDROCK
- BEDROCK

- W.L. XXX — QUARTERLY PIEZOMETRIC ELEVATION CHANGE (±X.X feet) SINCE LAST QUARTER
- VIBRATING WIRE PIEZOMETER
- THERMISTOR
- IN-PLACE INCLINOMETER SENSOR
- SOL — SETTING OUT LINE
- 1972 — HISTORICAL TAILINGS SURFACE
- 1972 — DATE OF EMBANKMENT RAISE

SCALE A: 125 0 125 250 375 500 625 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	KTD
0	25AUG'23	ISSUED WITH LETTER	SY3	RMM	KTD

MONTANA RESOURCES, LLC

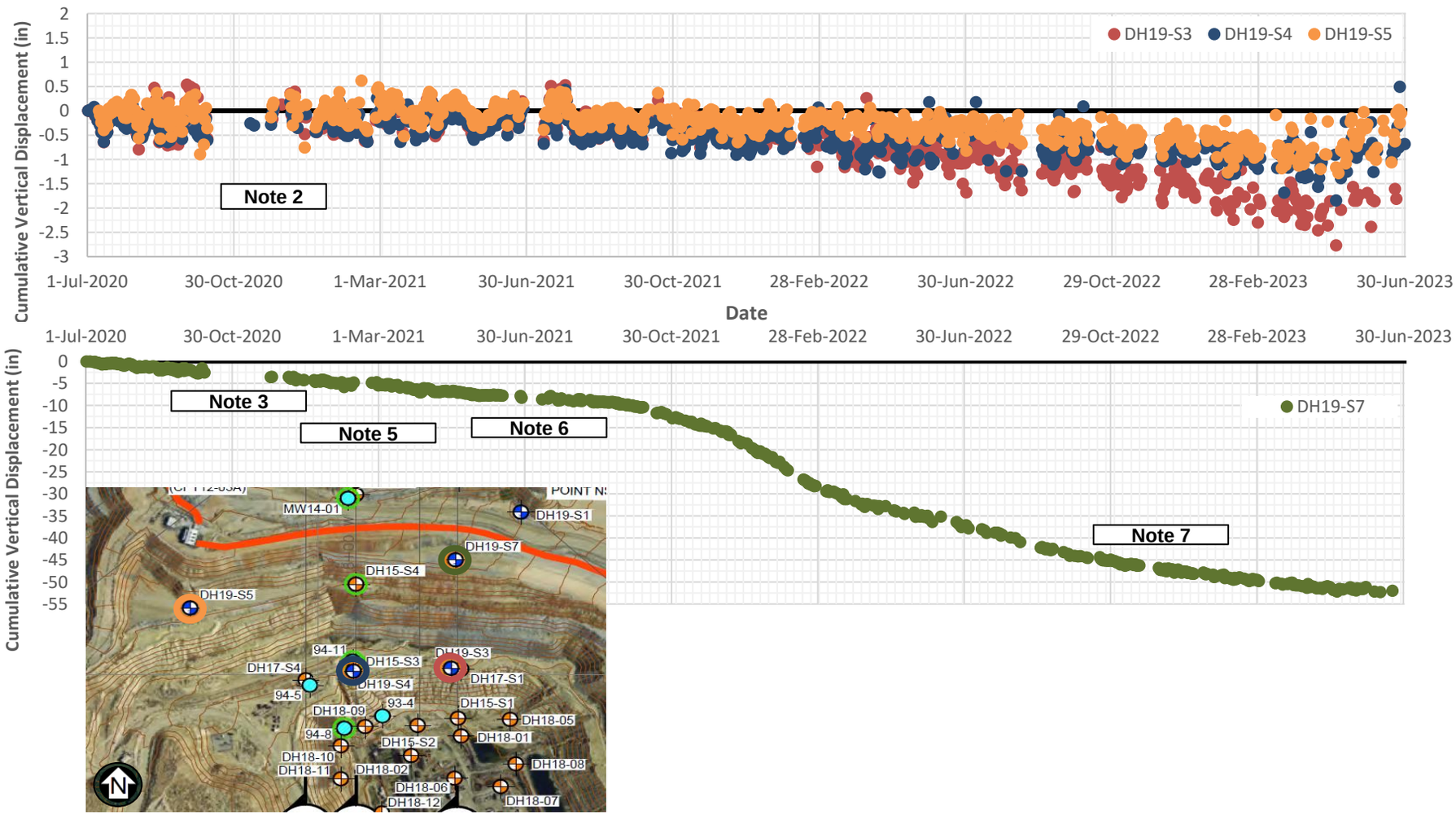
YANKEE DOODLE TAILINGS IMPOUNDMENT

PIEZOMETRIC CONDITIONS ALONG EAST-WEST EMBANKMENT SECTION 8+00W (LOOKING WEST)

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-126/29	VA23-01198

FIGURE 7 REV 0



NOTES:

1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTEDFROM DH19-S2 AND DH19-S5 BETWEEN OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NO DATA WERE COLLECTED FROM DH19-S3 AND DH19-S7 BETWEEN OCTOBER 7 TO NOVEMBER 13, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
4. NEGATIVE VERTICAL DISPLAEMENTS INDICATE DOWNWARD DISPLACEMENT.
5. NO DATA WERE COLLECTED FROM FEBRUARY 9 TO 21, 2021 DUE TO A DEPLETED DATA LOGGER BATTERY.
6. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
7. NO DATA WERE COLLECTED FROM AUGUST 16 TO SEPTEMBER 2, 2022, NOVEMBER 23 TO DECEMBER 10, 2022, AND MARCH 2 TO 16, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

COMPARISON OF CUMULATIVE VERTICAL GNSS DISPLACEMENT MAGNITUDES (JULY 1, 2020 THROUGH JUNE 30, 2023)

Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

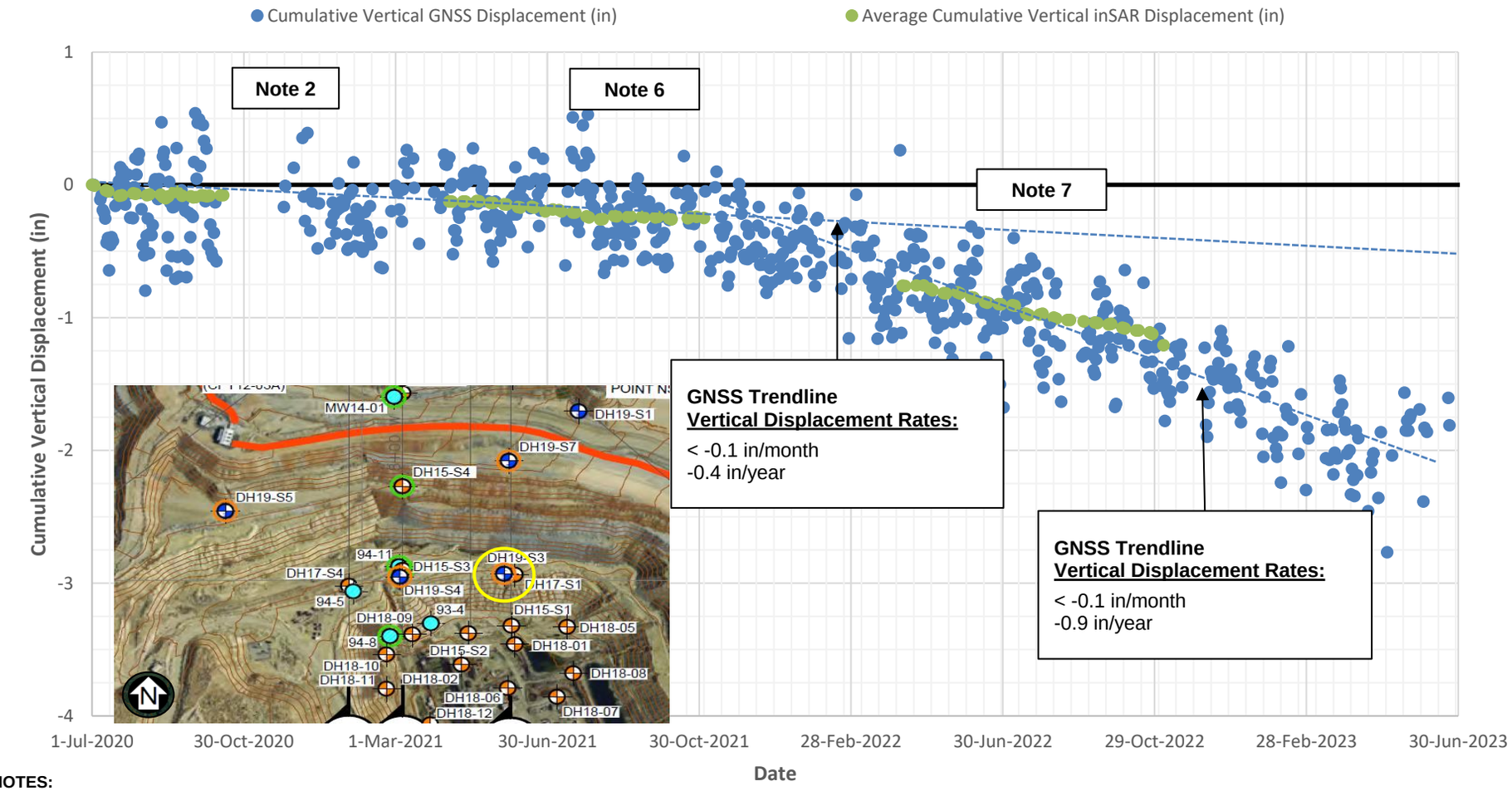
FIGURE 8

REV 0

APPENDIX A

GNSS Deformation Plots

(Figures A.1 to A.8)



NOTES:

1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S3.
5. NO LONG-TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021, NOVEMBER 3, 2021 TO APRIL 13, 2022, AND NOVEMBER 6 TO MARCH 31, 2023 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
7. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
8. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8, 2022 DUE A PROCESSING SERVER ISSUE.
9. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE.
10. NO DATA WERE COLLECTED FROM JUNE 5 TO JUNE 23, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S3 (JULY 1, 2020 THROUGH JUNE 30, 2023)

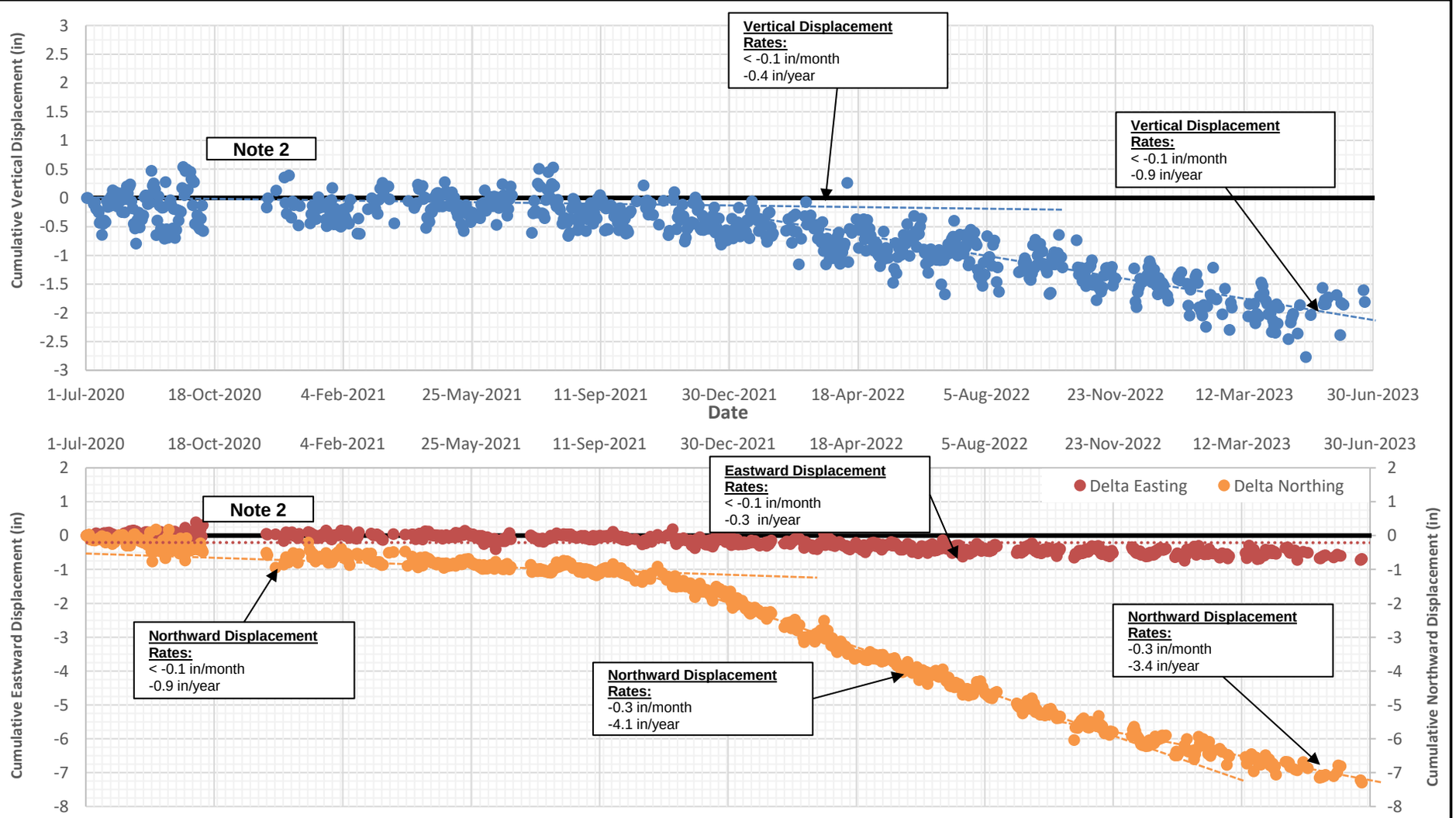
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE A.1

REV 0



NOTES:

1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
5. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
6. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8, 2022 DUE A PROCESSING SERVER ISSUE.
7. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE.
8. NO DATA WERE COLLECTED FROM JUNE 5 TO JUNE 23, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

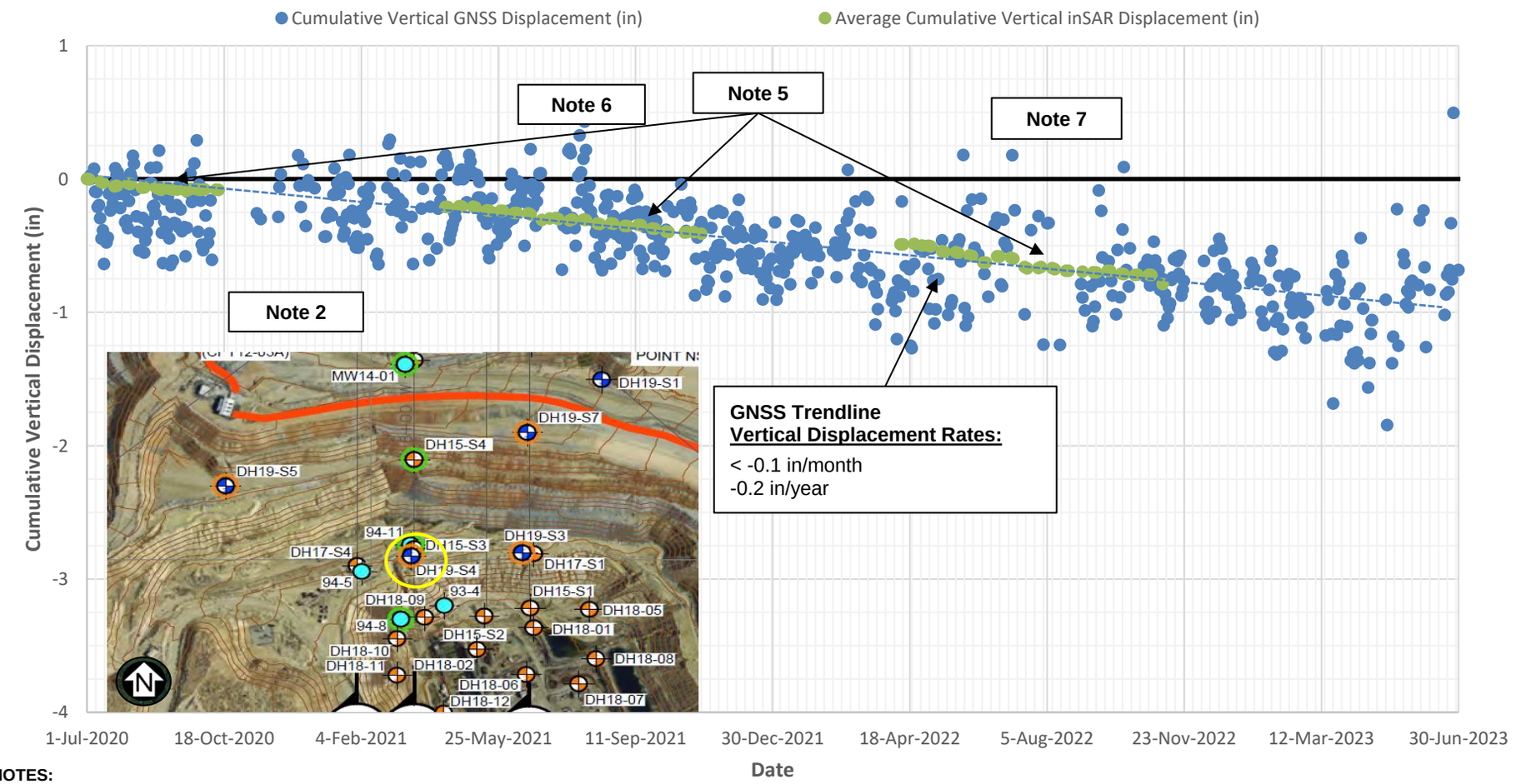
CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S3 (JULY 1, 2020 THROUGH JUNE 30, 2023)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/29	VA23-01198

FIGURE A.2

REV 0



NOTES:

1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S4.
5. NO LONG-TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021, NOVEMBER 3, 2021 TO APRIL 13, 2022, AND NOVEMBER 6 TO MARCH 31, 2023 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
7. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
8. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8, 2022 DUE TO A PROCESSING SERVER ISSUE.
9. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE.
10. NO DATA WERE COLLECTED FROM JUNE 7 TO JUNE 19, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S4 (JULY 1, 2020 THROUGH JUNE 30, 2023)

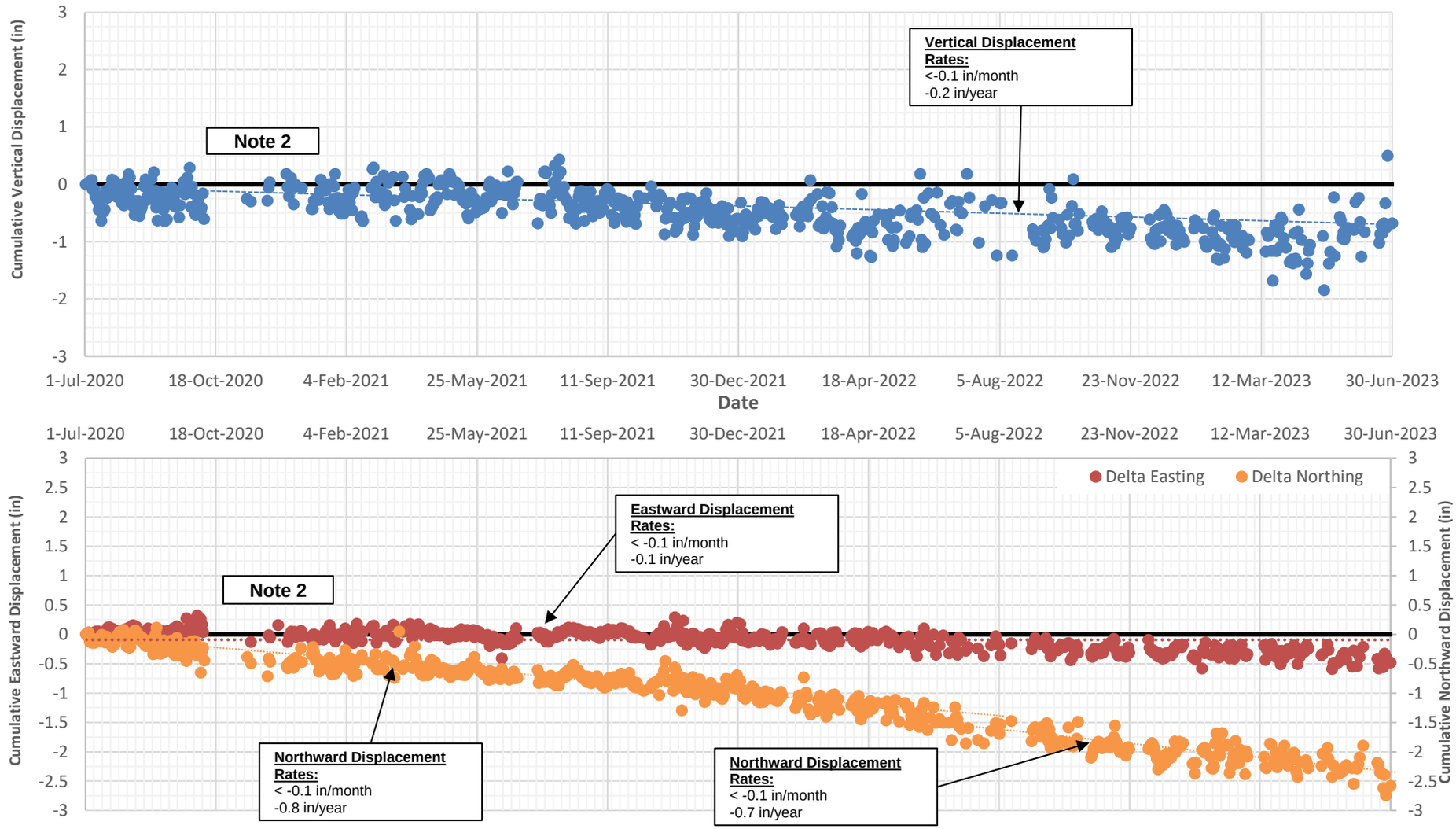
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE A.3

REV 0



NOTES:

1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
5. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
6. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8, 2022 DUE TO A PROCESSING SERVER ISSUE.
7. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE.
8. NO DATA WERE COLLECTED FROM JUNE 7 TO JUNE 19, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S4 (JULY 1, 2020 THROUGH JUNE 30, 2023)

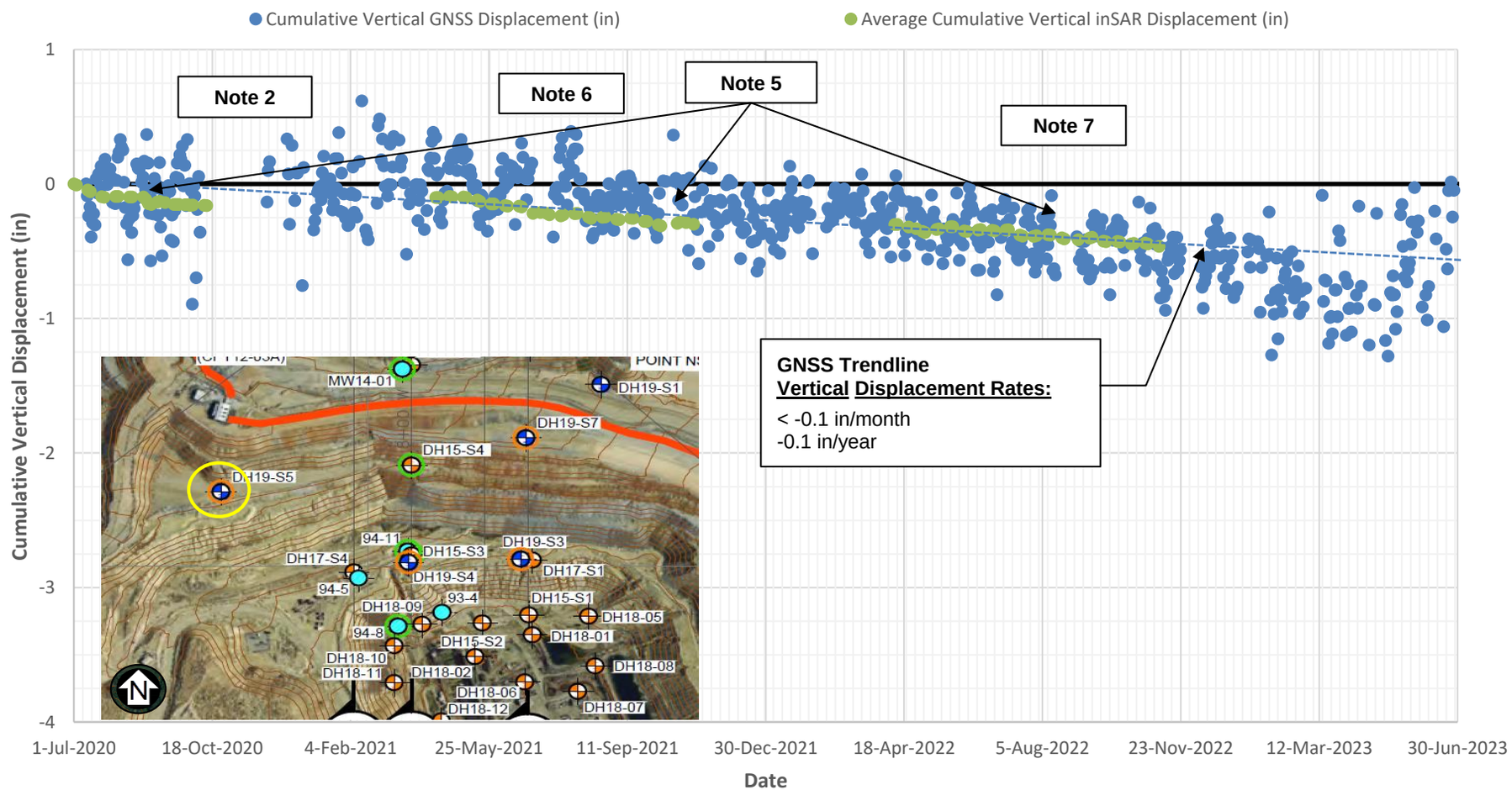
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE A.4

REV 0



NOTES:

1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S5.
5. NO LONG-TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021, NOVEMBER 3, 2021 TO APRIL 13, 2022, AND NOVEMBER 6 TO MARCH 31, 2023 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
7. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
8. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8 DUE A PROCESSING SERVER ISSUE.
9. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S5 (JULY 1, 2020 THROUGH JUNE 30, 2023)

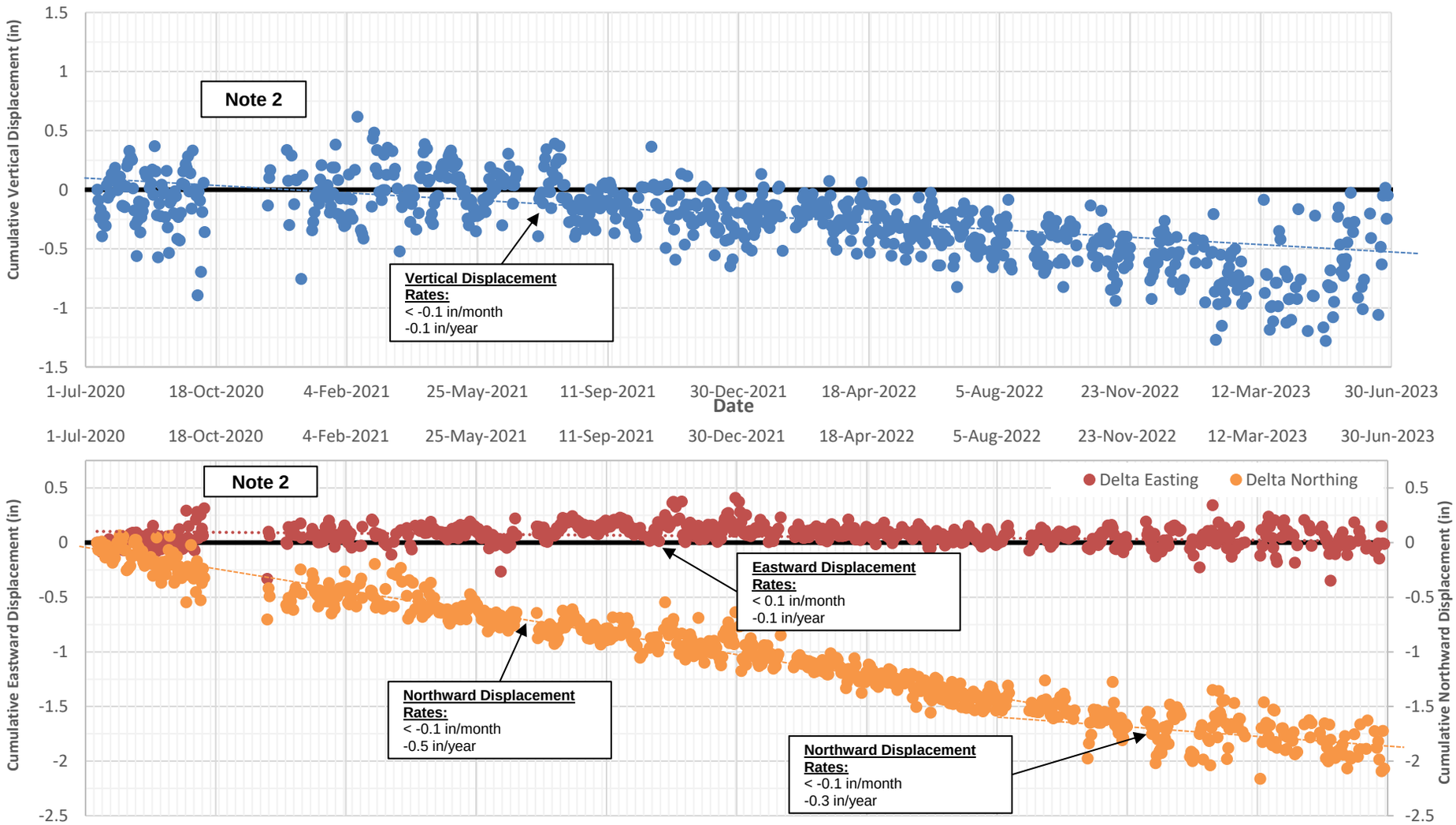
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE A.5

REV 0



NOTES:

1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
5. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
6. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8, 2022 DUE TO A PROCESSING SERVE ISSUE.
7. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

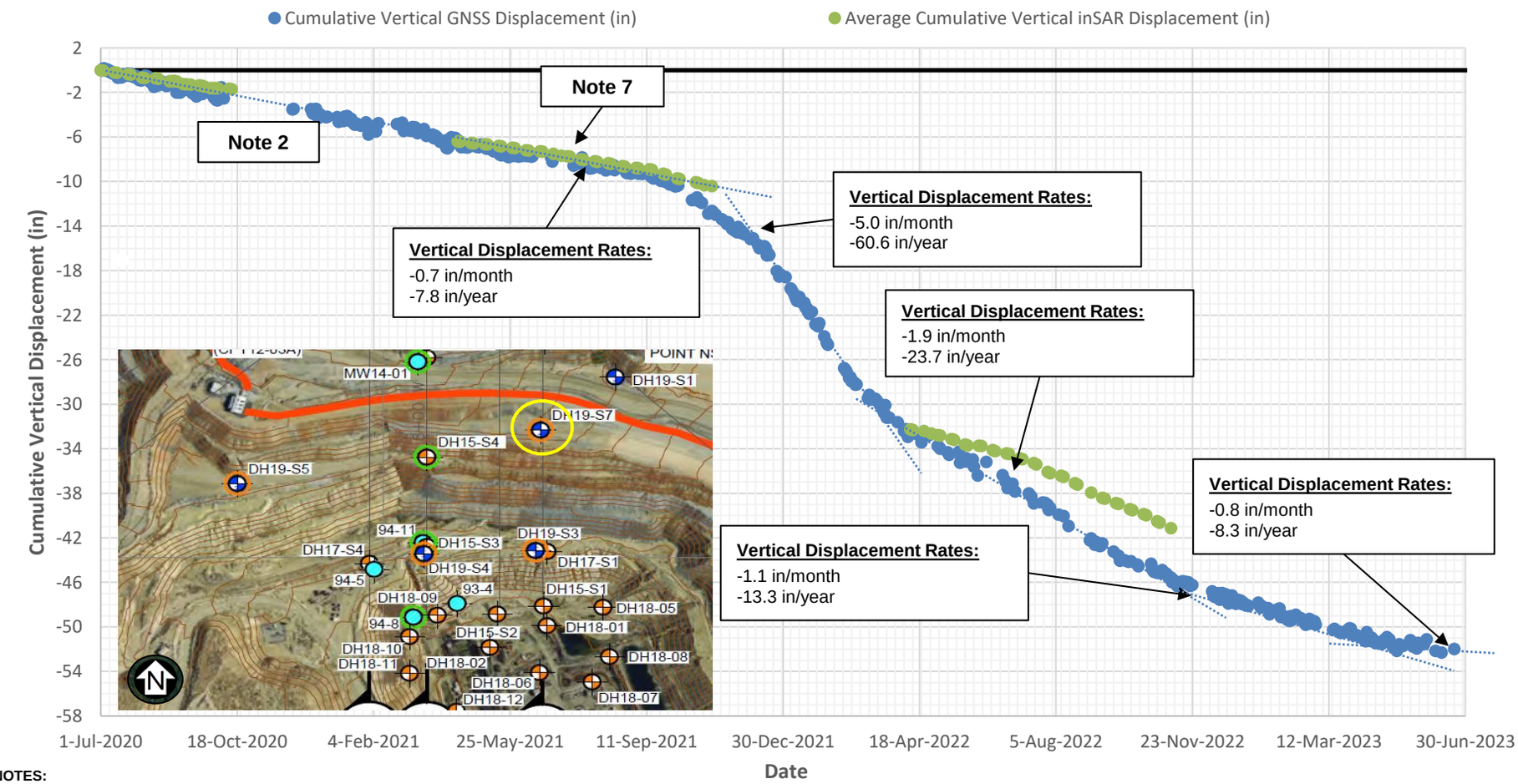
YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S5 (JULY 1, 2020 THROUGH JUNE 30, 2023)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/29	VA23-01198

FIGURE A.6 REV 0



NOTES:

1. CUMULATIVE VERTICAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. THE AVERAGE CUMULATIVE VERTICAL INSAR DISPLACEMENT IS CALCULATED BY AVERAGING TIME-SERIES DISPLACEMENTS FROM NINE INSAR DATA POINTS LOCATED ADJACENT TO DH19-S7.
5. NO LONG-TERM (SQUEESAR) INSAR DATA ARE AVAILABLE FROM OCTOBER 2, 2020 TO APRIL 13, 2021, NOVEMBER 3, 2021 TO APRIL 13, 2022, AND NOVEMBER 6 TO MARCH 31, 2023 DUE TO THE ONSET OF WINTER CONDITIONS.
6. NO DATA WERE COLLECTED FROM FEBRUARY 9 TO 21, 2021 DUE TO A DEPLETED DATA LOGGER BATTERY.
7. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
8. THE -1 STD. DEV. SERIES IS THE AVERAGE INSAR DEFORMATION RATE MINUS THE STANDARD DEVIATION OF DATA POINTS LOCAL TO THE INSTRUMENTATION SITE.
9. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
10. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8, 2022 DUE TO A PROCESSING SERVER ISSUE.
11. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE.
12. LIMITED DATA WERE COLLECTED FROM JUNE 6 TO JUNE 30, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL DISPLACEMENTS MONITORED AT DH19-S7 (JULY 1, 2020 THROUGH JUNE 30, 2023)

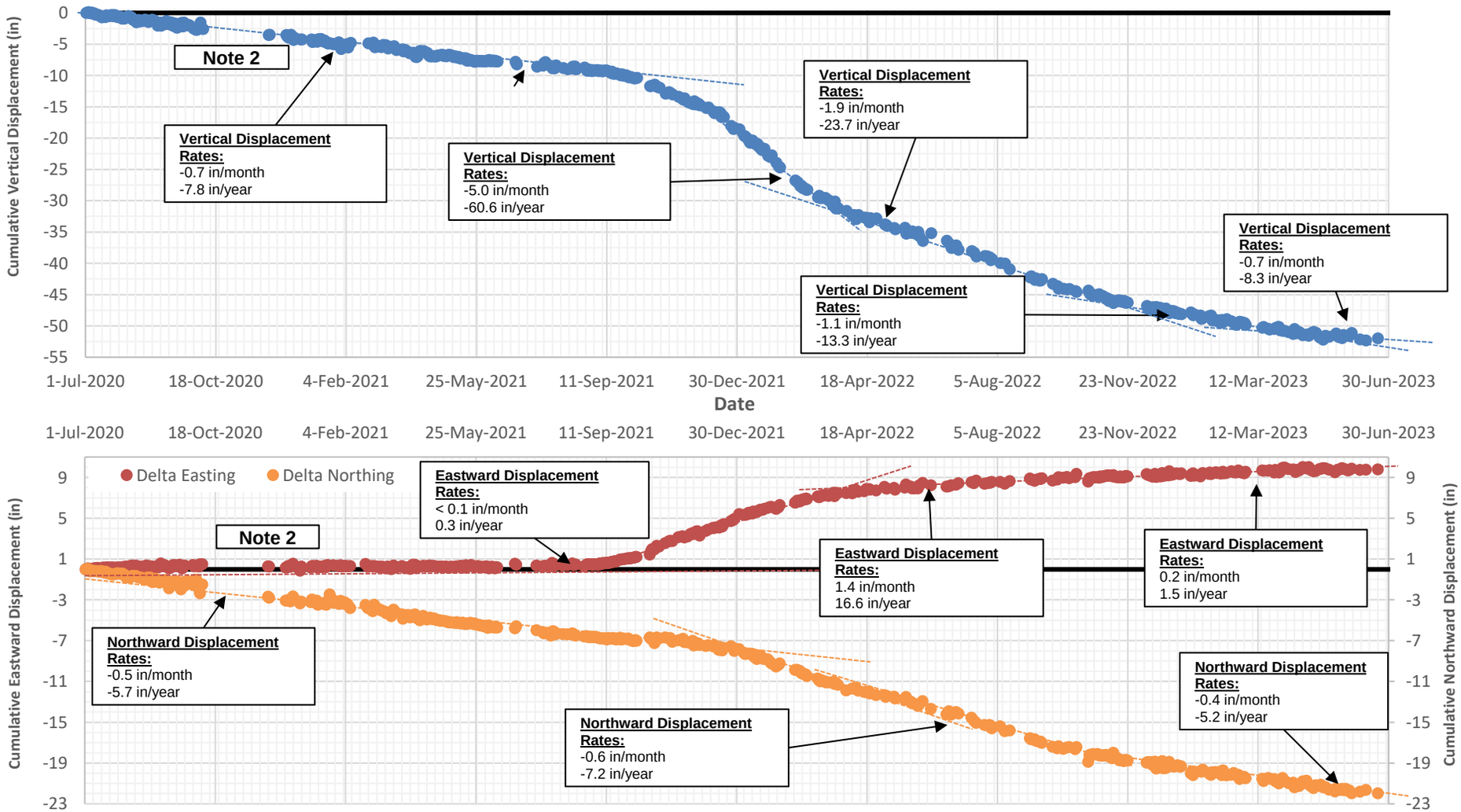
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE A.7

REV 0



NOTES:

1. CUMULATIVE VERTICAL AND LATERAL DISPLACEMENTS ARE CALCULATED RELATIVE TO JULY 1, 2020.
2. NO DATA WERE COLLECTED FROM OCTOBER 7 TO DECEMBER 2, 2020 DUE TO A POWER MANAGEMENT SCHEDULE ISSUE AT THE GNSS REFERENCE STATION (DH16-04).
3. NEGATIVE VERTICAL DISPLACEMENTS INDICATE DOWNWARD DISPLACEMENT.
4. NO DATA WERE COLLECTED FROM FEBRUARY 9 TO 21, 2021 DUE TO A DEPLETED DATA LOGGER BATTERY.
5. NO DATA WERE COLLECTED FROM JUNE 12 TO JULY 15, 2021 DUE TO A TELEMETRY HARDWARE OUTAGE.
6. NO DATA WERE COLLECTED FROM AUGUST 17 TO SEPTEMBER 2, 2022 DUE TO A SATELLITE UPDATE REQUIRING THE SENSORS TO HARD RESET.
7. NO DATA WERE COLLECTED FROM NOVEMBER 24 TO DECEMBER 8, 2022 DUE TO A PROCESSING SERVER ISSUE.
8. NO DATA WERE COLLECTED FROM MARCH 3 TO MARCH 15, 2023 DUE TO A HARDWARE ISSUE.
9. LIMITED DATA WERE COLLECTED FROM JUNE 6 TO JUNE 30, 2023 DUE TO A HARDWARE ISSUE.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	11JULY'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

CUMULATIVE VERTICAL & LATERAL DISPLACEMENTS MONITORED AT DH19-S7 (JULY 1, 2020 JUNE 30, 2023)

Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

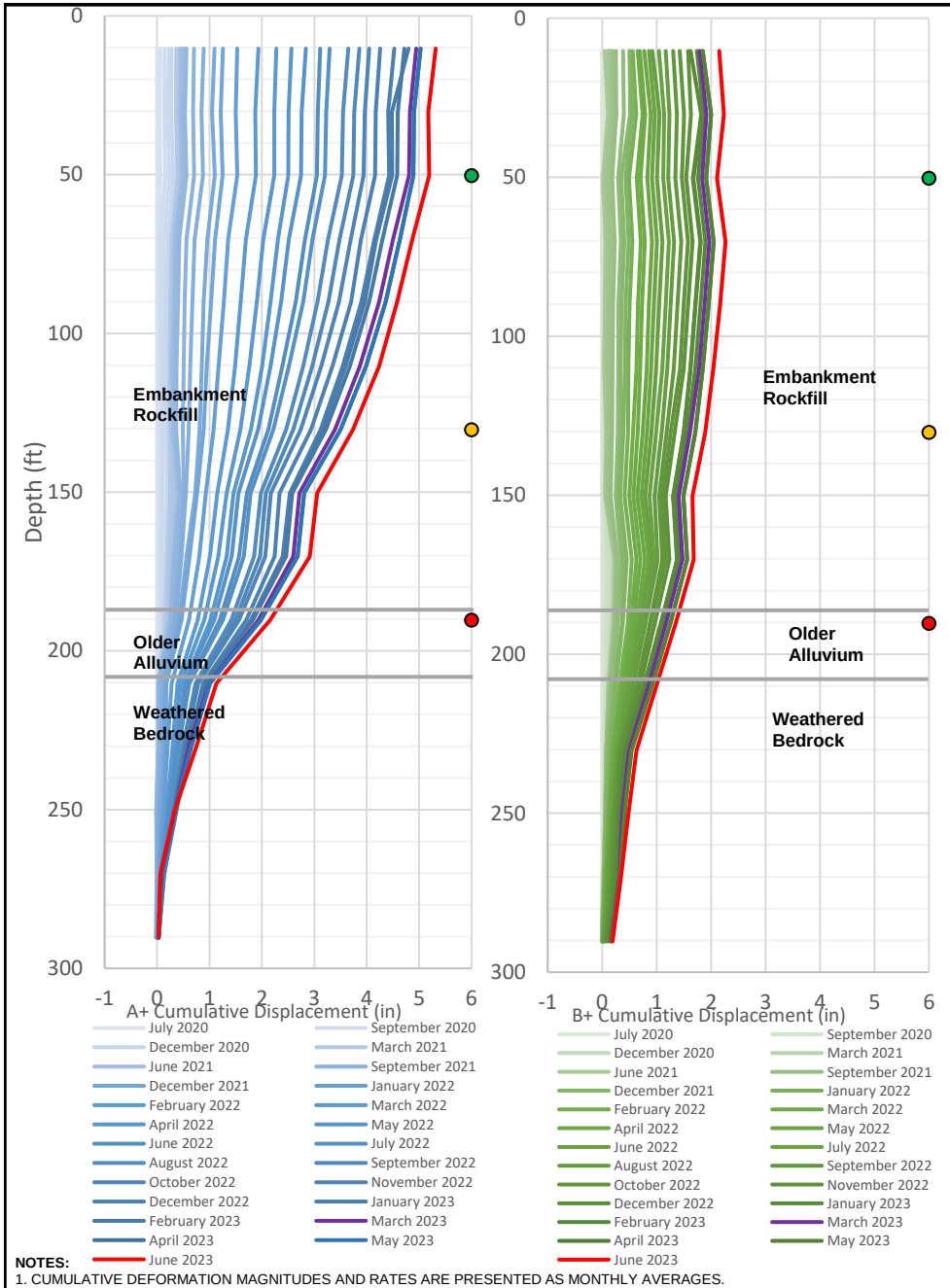
FIGURE A.8

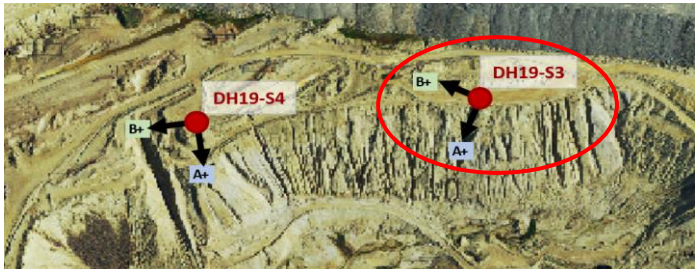
REV 0

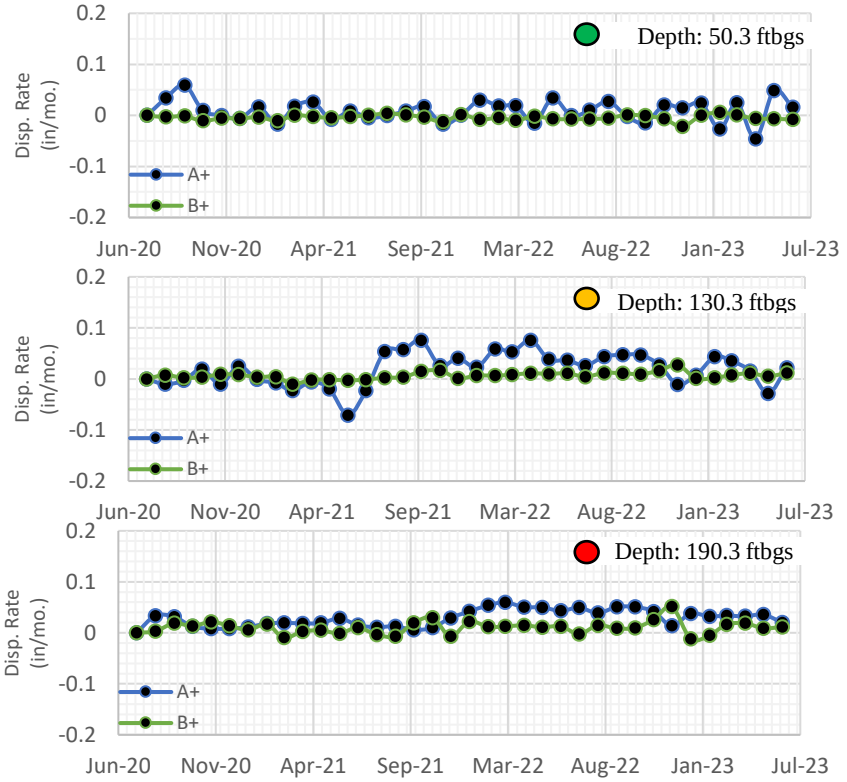
APPENDIX B

Inclinometer Deformation Plots

(Figures B.1 to B.10)







NOTES:
1. CUMULATIVE DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE CUMULATIVE SUBSURFACE DEFORMATION DRILLHOLE DH19-S3 (JULY 2020 THROUGH JUNE 2023)

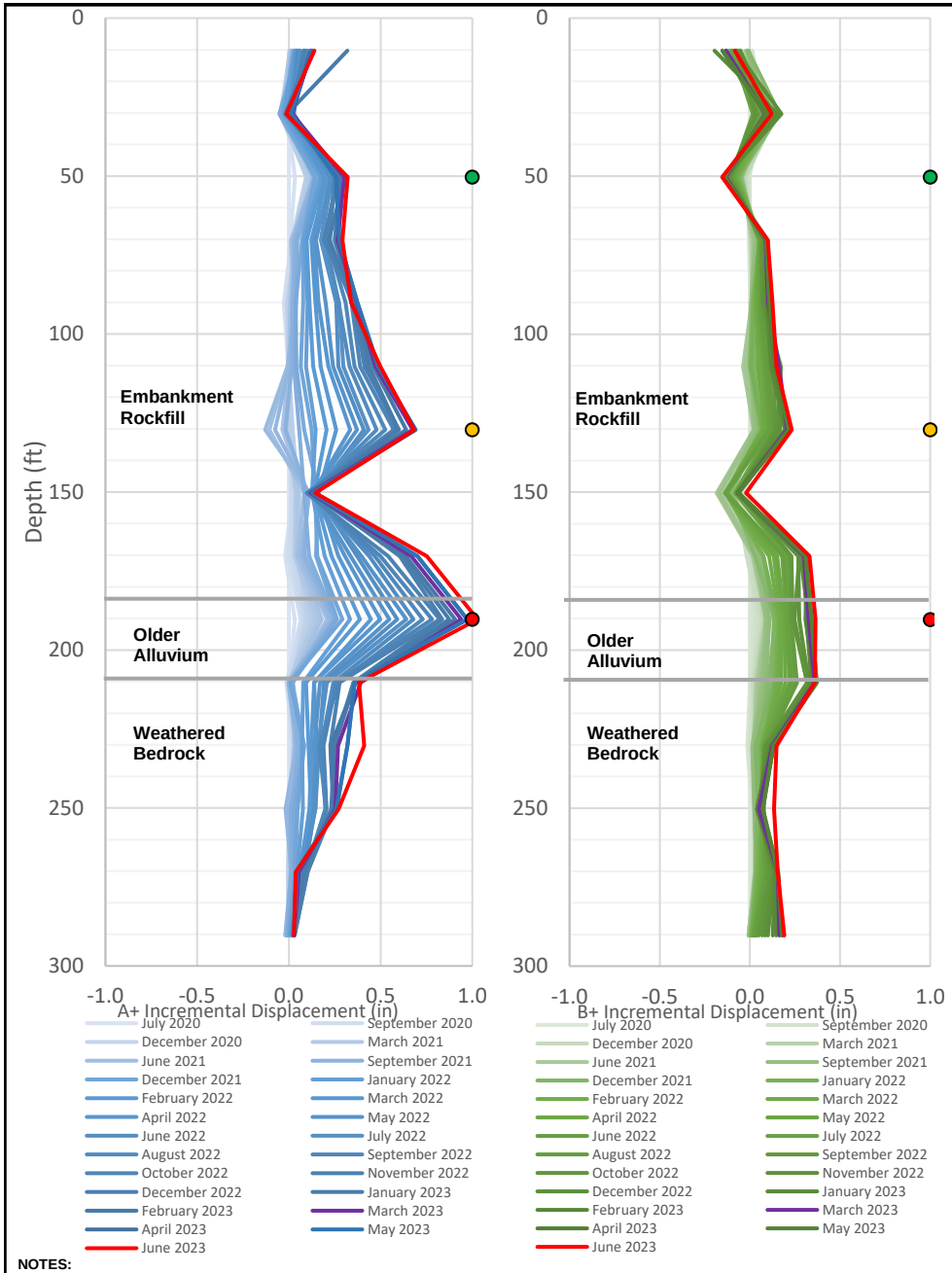
Knight Piésold CONSULTING

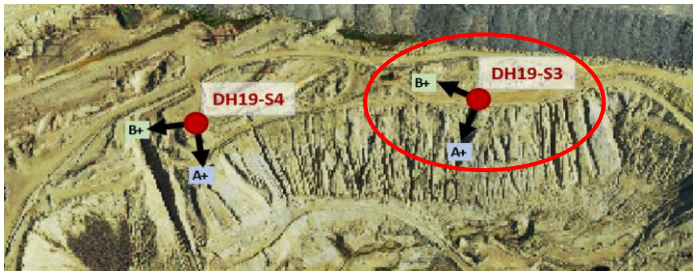
P/A NO. VA101-126/29

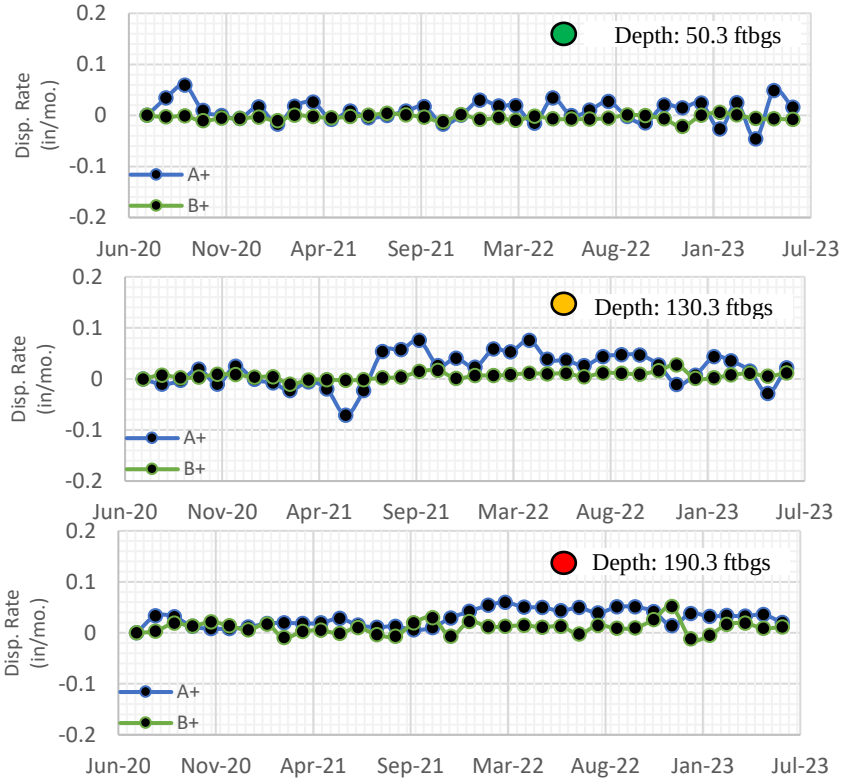
REF. NO. VA23-01198

FIGURE B.1

REV 0







NOTES:
1. INCREMENTAL DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE INCREMENTAL SUBSURFACE DEFORMATION DRILLHOLE DH19-S3 (JULY 2020 THROUGH JUNE 2023)

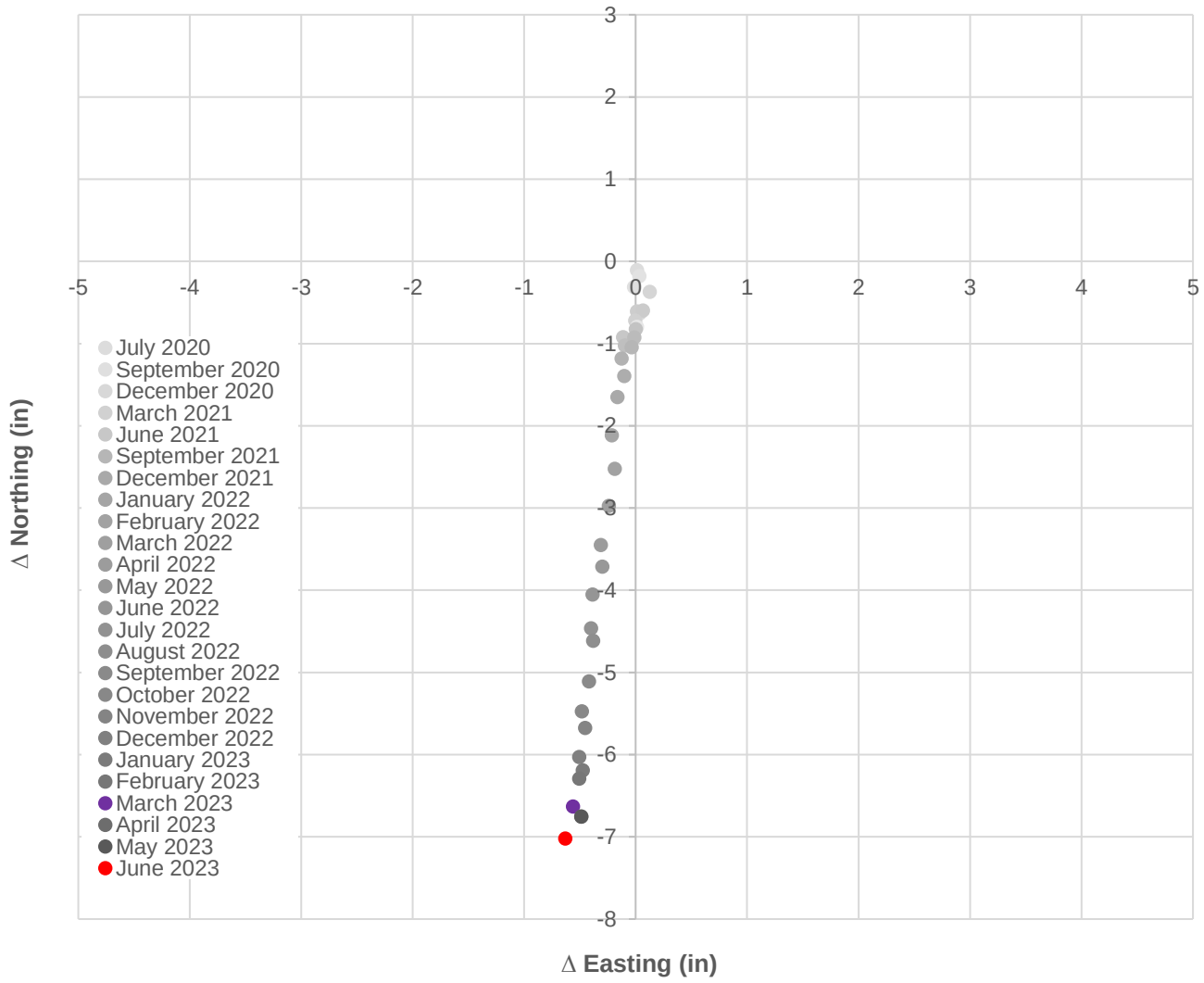
Knight Piésold CONSULTING

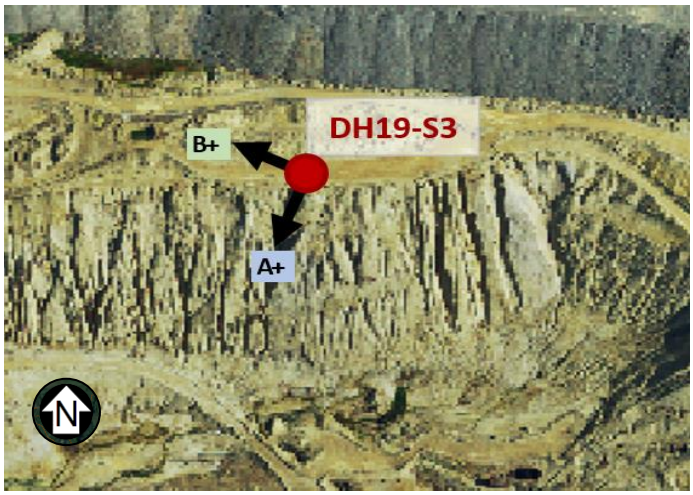
P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE B.2

REV 0





NOTES:
1. COLLAR WANDER IS MONITORED USING GNSS INSTRUMENTATION INSTALLED AT THE INCLINOMETER COLLAR LOCATION.
2. THE PLOT ABOVE PRESENTS COLLAR POSITION BASED ON NORTH AND EAST CHANGE RELATIVE TO A JULY 1, 2020 BASELINE GNSS SURVEY.
3. NO DATA ARE AVAILABLE FOR NOVEMBER, 2020 WHILE THE INSTRUMENTATION WAS OFFLINE DUE TO A POWER MANAGEMENT ISSUE.

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH19-S3 GNSS-BASED INCLINOMETER COLLAR WANDER (JULY 1, 2021 THROUGH JUNE 30, 2023)

Knight Piésold CONSULTING

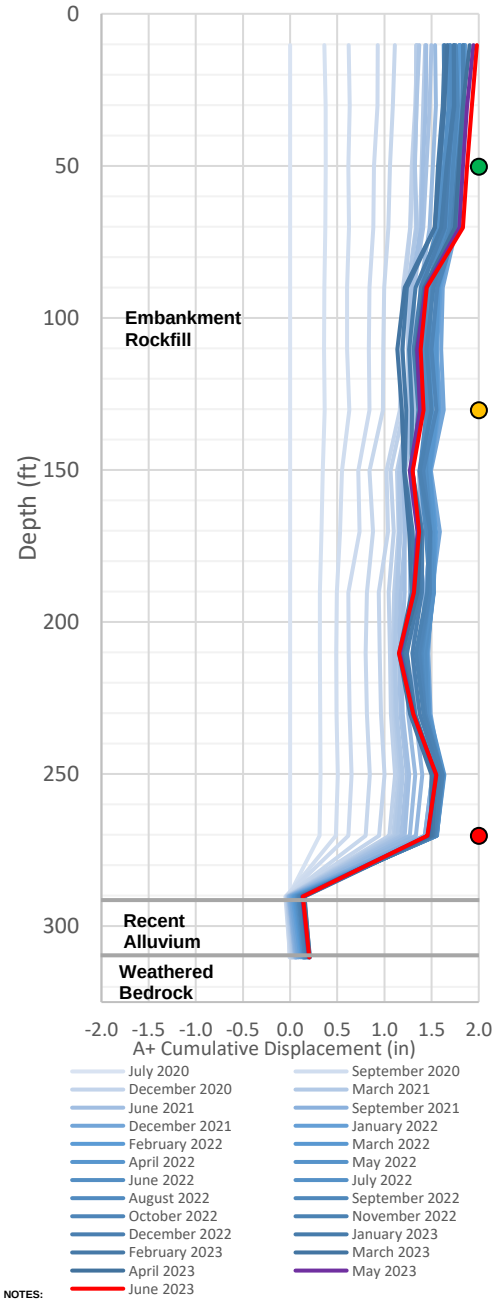
P/A NO. VA101-126/29

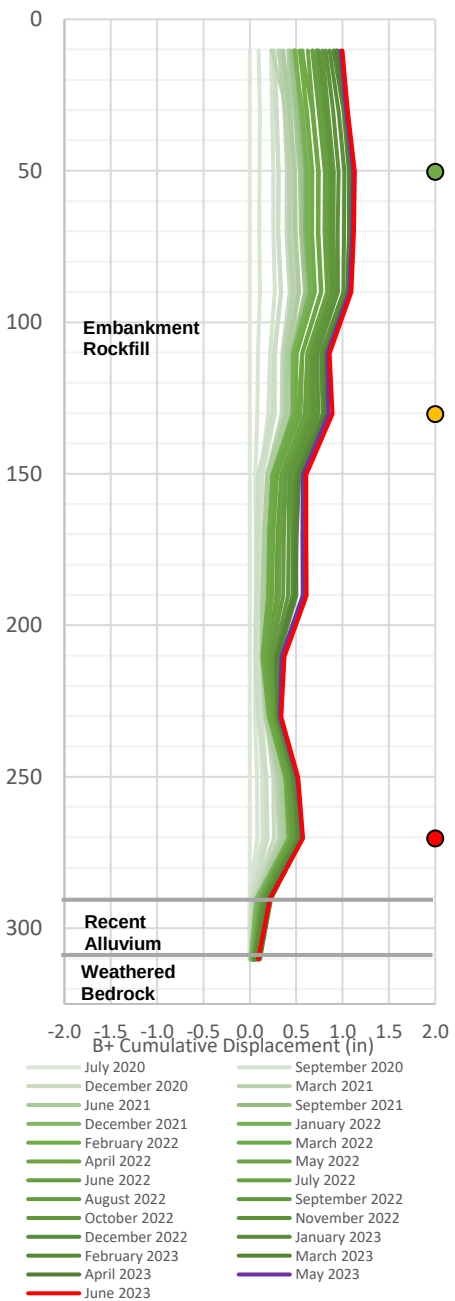
REF. NO. VA23-01198

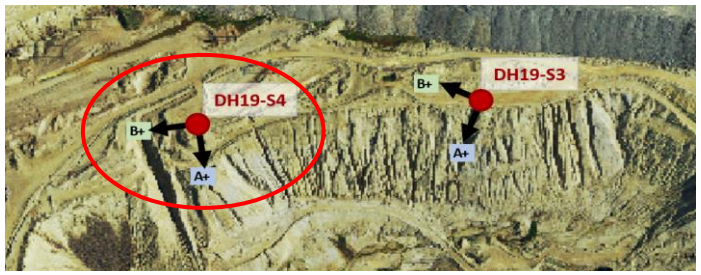
FIGURE B.3

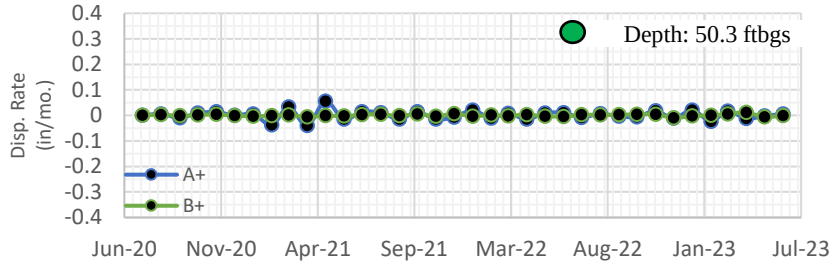
REV 0

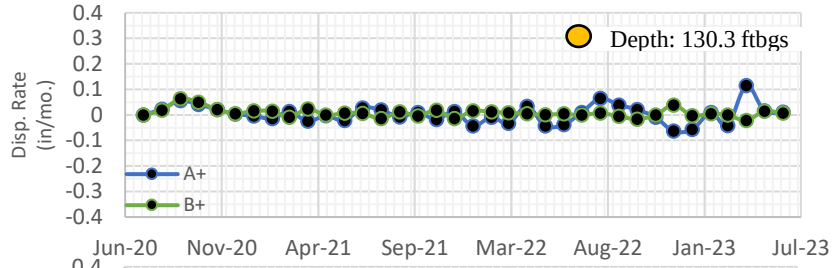
REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	SY3	KTD

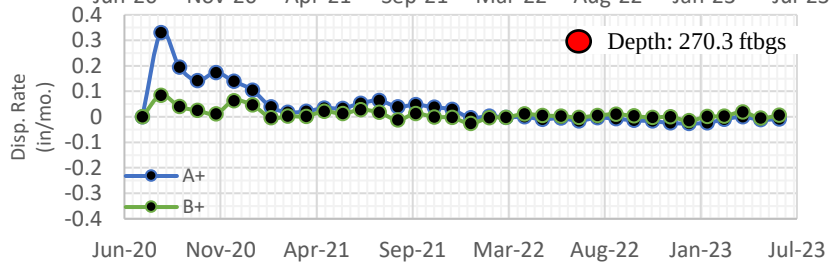












NOTES:
1. CUMULATIVE DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	20JUN'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE CUMULATIVE SUBSURFACE DEFORMATION DRILLHOLE DH19-S4 (JULY 2020 THROUGH JUNE 2023)

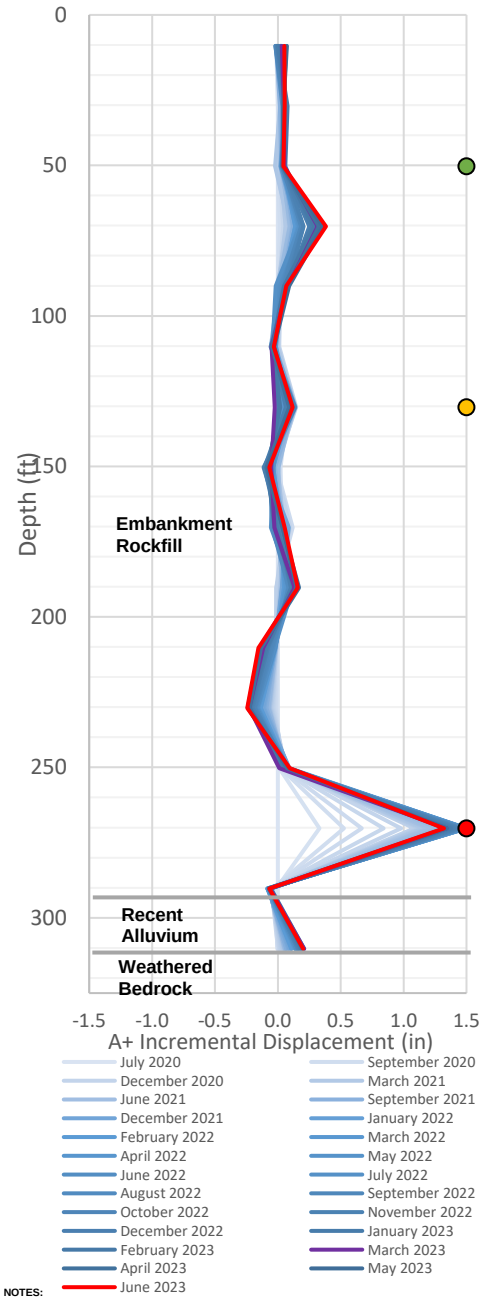
Knight Piésold CONSULTING

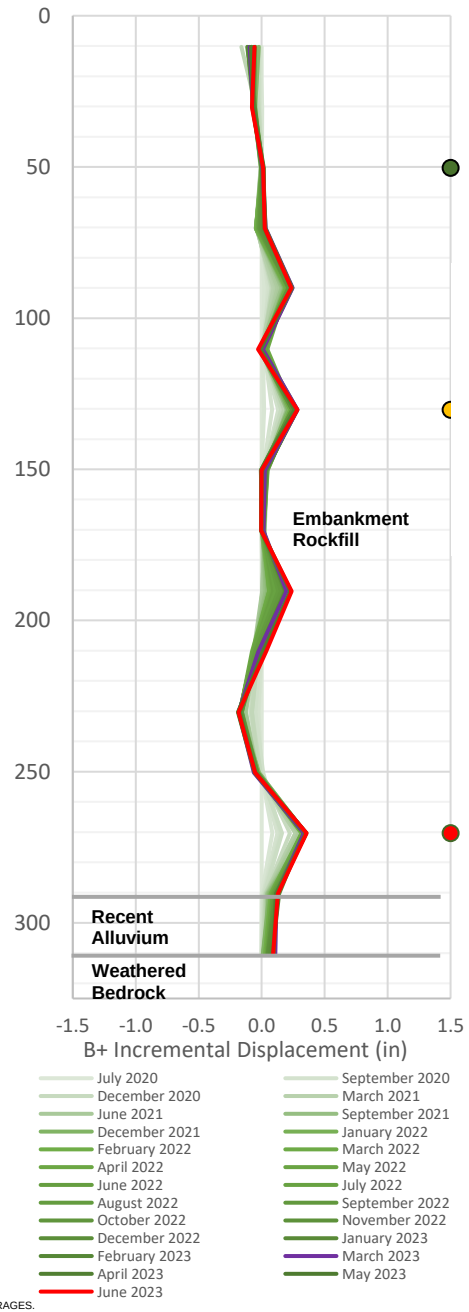
P/A NO. VA101-126/29

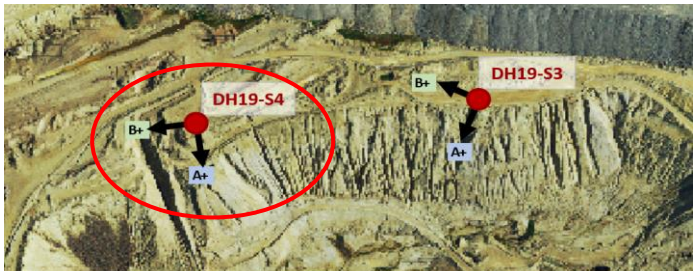
REF. NO. VA23-01198

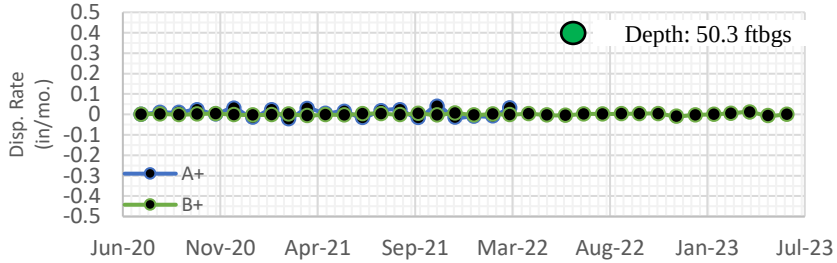
FIGURE B.4

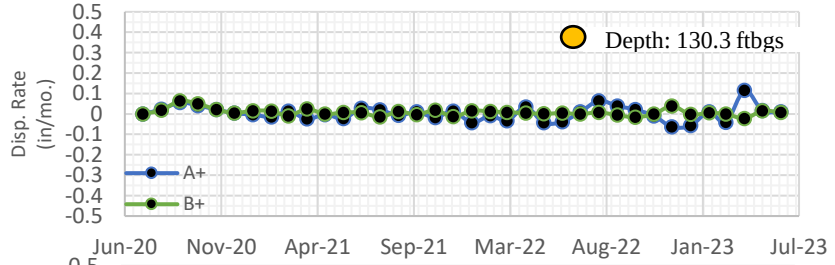
REV 0

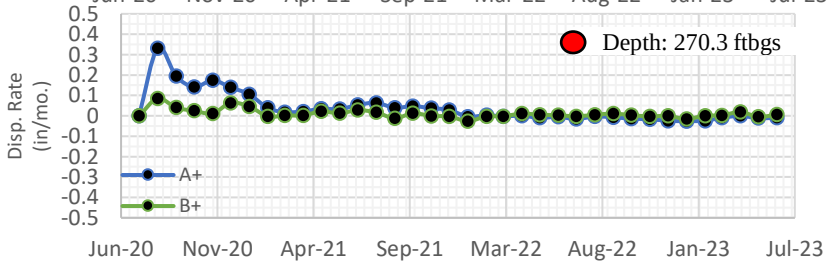












NOTES:
1. INCREMENTAL DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	20JUN'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE INCREMENTAL SUBSURFACE DEFORMATION DRILLHOLE DH19-S4 (JULY 2020 THROUGH JUNE 2023)

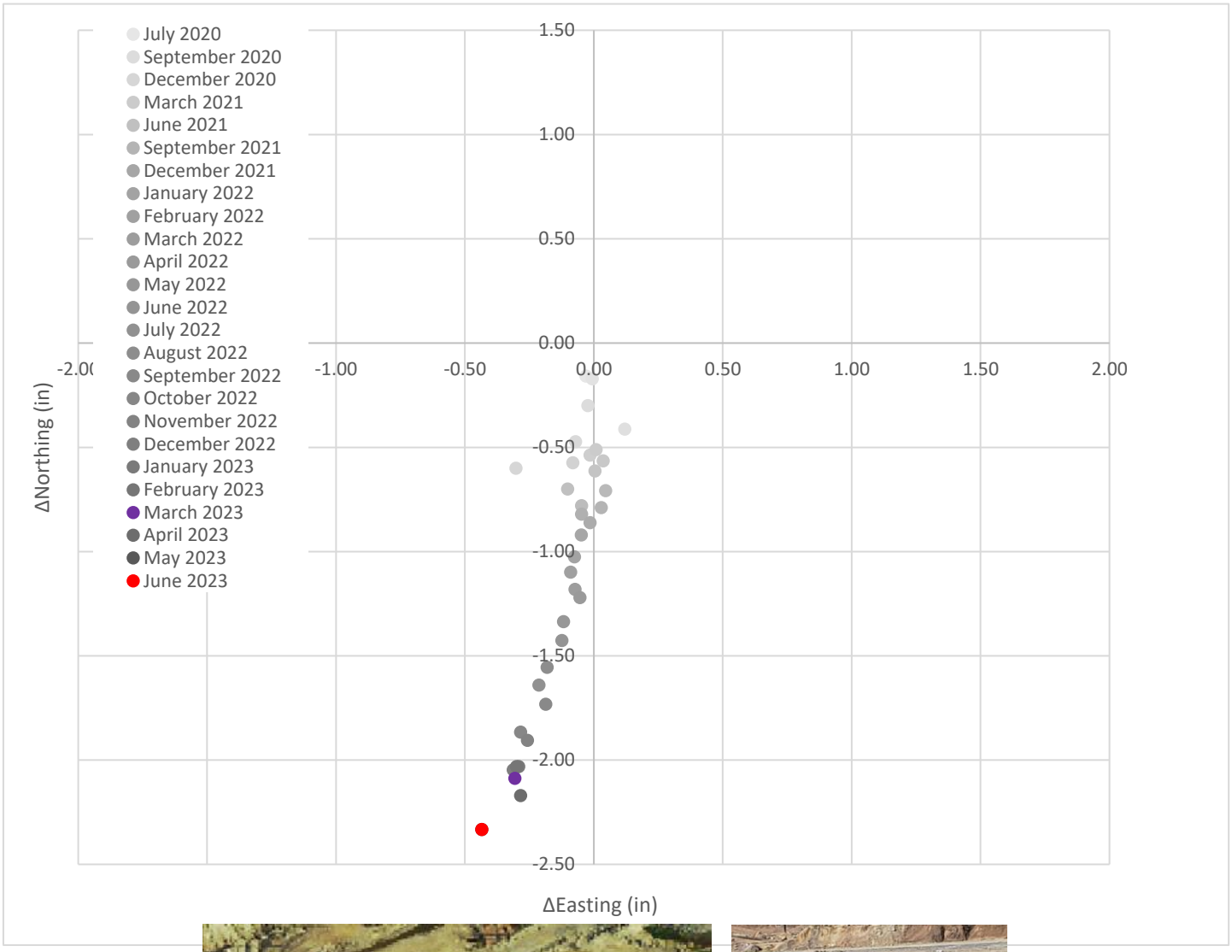
Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE B.5

REV 0



NOTES:
1. COLLAR WANDER IS MONITORED USING GNSS INSTRUMENTATION INSTALLED AT THE INCLINOMETER COLLAR LOCATION.
2. THE PLOT ABOVE PRESENTS COLLAR POSITION BASED ON NORTH AND EAST CHANGE RELATIVE TO A JULY 1, 2020 BASELINE GNSS SURVEY.
3. NO DATA ARE AVAILABLE FOR NOVEMBER, 2020 WHILE THE INSTRUMENTATION WAS OFFLINE DUE TO A POWER MANAGEMENT ISSUE.

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH19-S4 GNSS-BASED INCLINOMETER COLLAR WANDER (JULY 1, 2020 THROUGH JUNE 30, 2023)

Knight Piésold CONSULTING

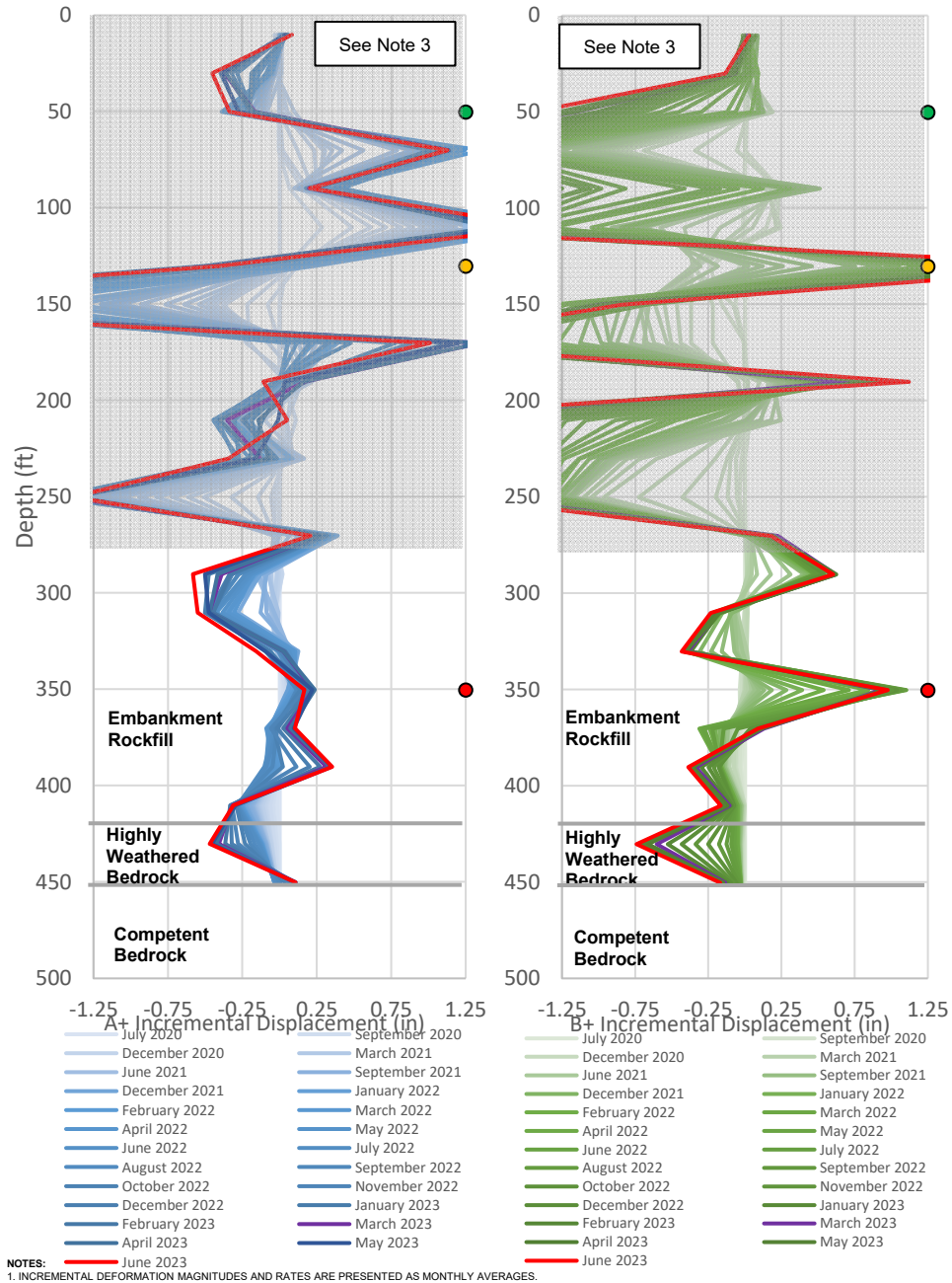
P/A NO. VA101-126/29

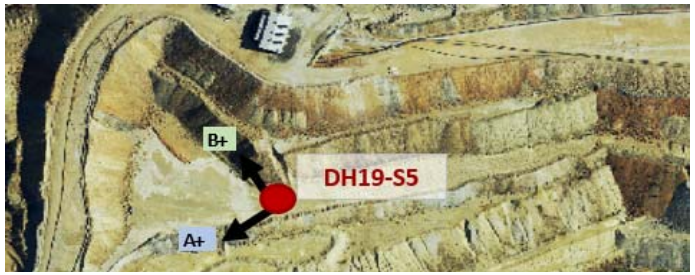
REF. NO. VA23-01198

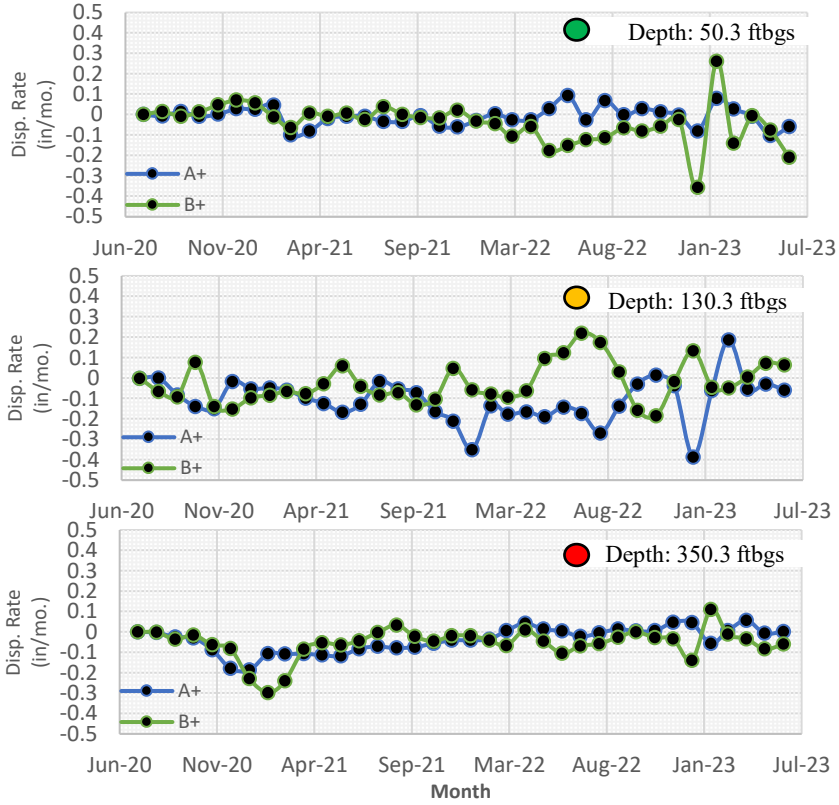
FIGURE B.6

REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	SY3	KTD







NOTES:
1. INCREMENTAL DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.
3. DEFORMATION DATA WITHIN THE UPPER 275 FTBG ARE INTERPRETED TO RESULT PREDOMINANTLY FROM SETTLEMENT-DERIVED CASING DISTORTION WITHIN HISTORICALLY LEACHED ROCKFILL

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	30JUN'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC

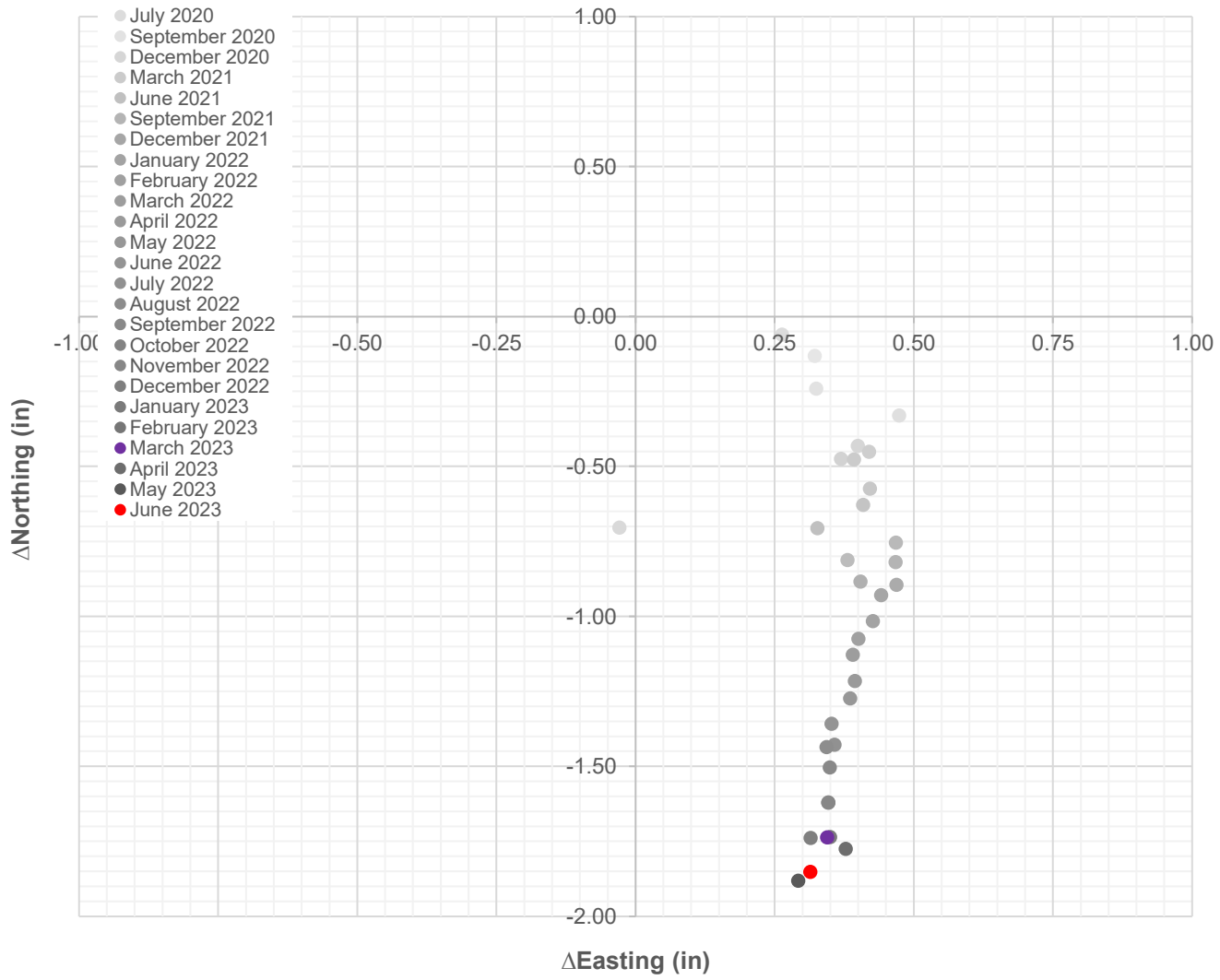
YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE INCREMENTAL SUBSURFACE DEFORMATION DRILLHOLE DH19-S5 (JULY 2020 THROUGH JUNE 2023)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-126/29	VA23-01198

FIGURE B.7 REV 0



NOTES:
1. COLLAR WANDER IS MONITORED USING GNSS INSTRUMENTATION INSTALLED AT THE INCLINOMETER COLLAR LOCATION.
2. THE PLOT ABOVE PRESENTS COLLAR POSITION BASED ON NORTH AND EAST CHANGE RELATIVE TO A JULY 1, 2020 BASELINE GNSS SURVEY.
3. NO DATA ARE AVAILABLE FOR NOVEMBER, 2020 WHILE THE INSTRUMENTATION WAS OFFLINE DUE TO A POWER

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH19-S5 GNSS-BASED INCLINOMETER COLLAR WANDER (JULY 1, 2020 THROUGH JUNE 30, 2023)

Knight Piésold CONSULTING

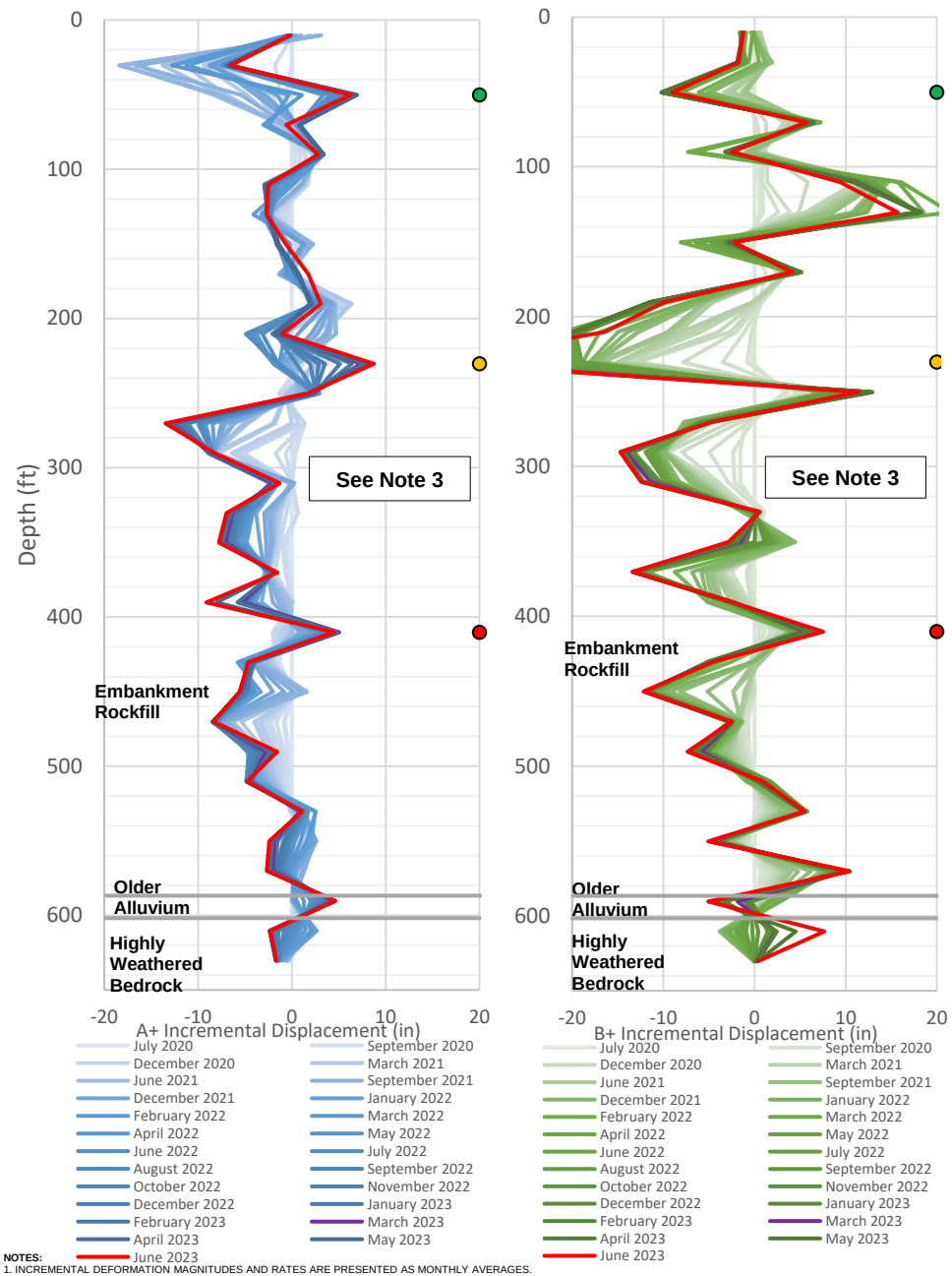
P/A NO. VA101-126/29

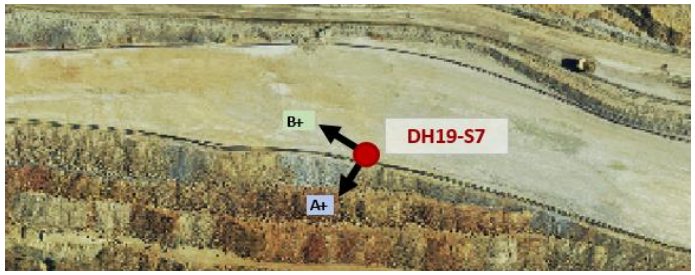
REF. NO. VA23-01198

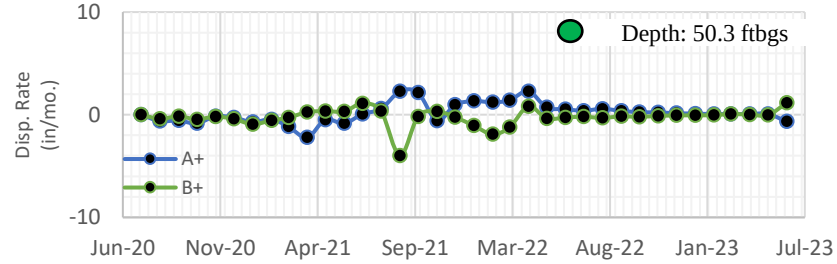
FIGURE B.8

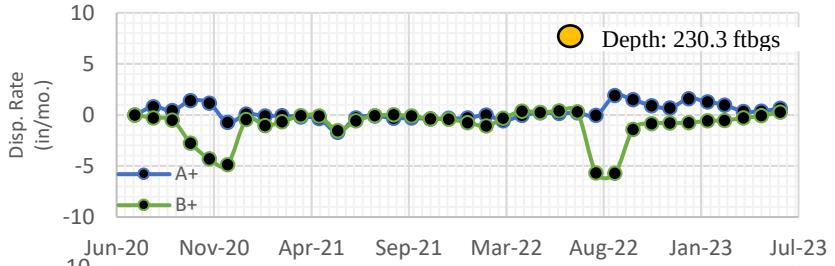
REV 0

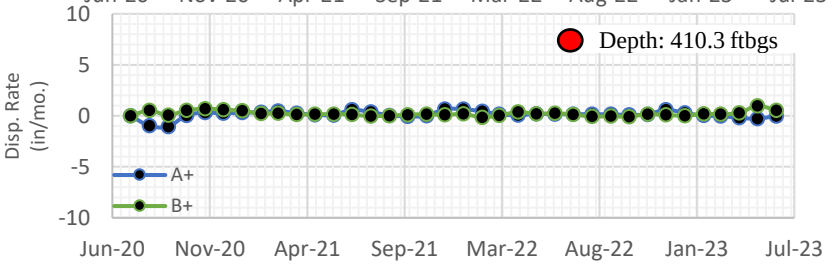
REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	30JUN'23	ISSUED WITH LETTER	SY3	KTD











NOTES:
1. INCREMENTAL DEFORMATION MAGNITUDES AND RATES ARE PRESENTED AS MONTHLY AVERAGES.
2. POSITIVE A+ AND B+ DEFORMATIONS INDICATE SOUTHWARD AND WESTWARD DISPLACEMENTS, RESPECTIVELY.
3. DEFORMATION DATA THROUGHOUT THE EMBANKMENT ROCKFILL ARE INTTERPRETED TO RESULT PREDOMINANTLY FROM SETTLEMENT-DERIVED CASING DISTORTION WITHIN THE ROCKFILL AND ARE NOT REPRESENTATIVE OF IN-SITU LATERAL DISPLACEMENT.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

MONTHLY AVERAGE INCREMENTAL SUBSURFACE DEFORMATION DRILLHOLE DH19-S7 (JULY 2020 THROUGH JUNE 2023)

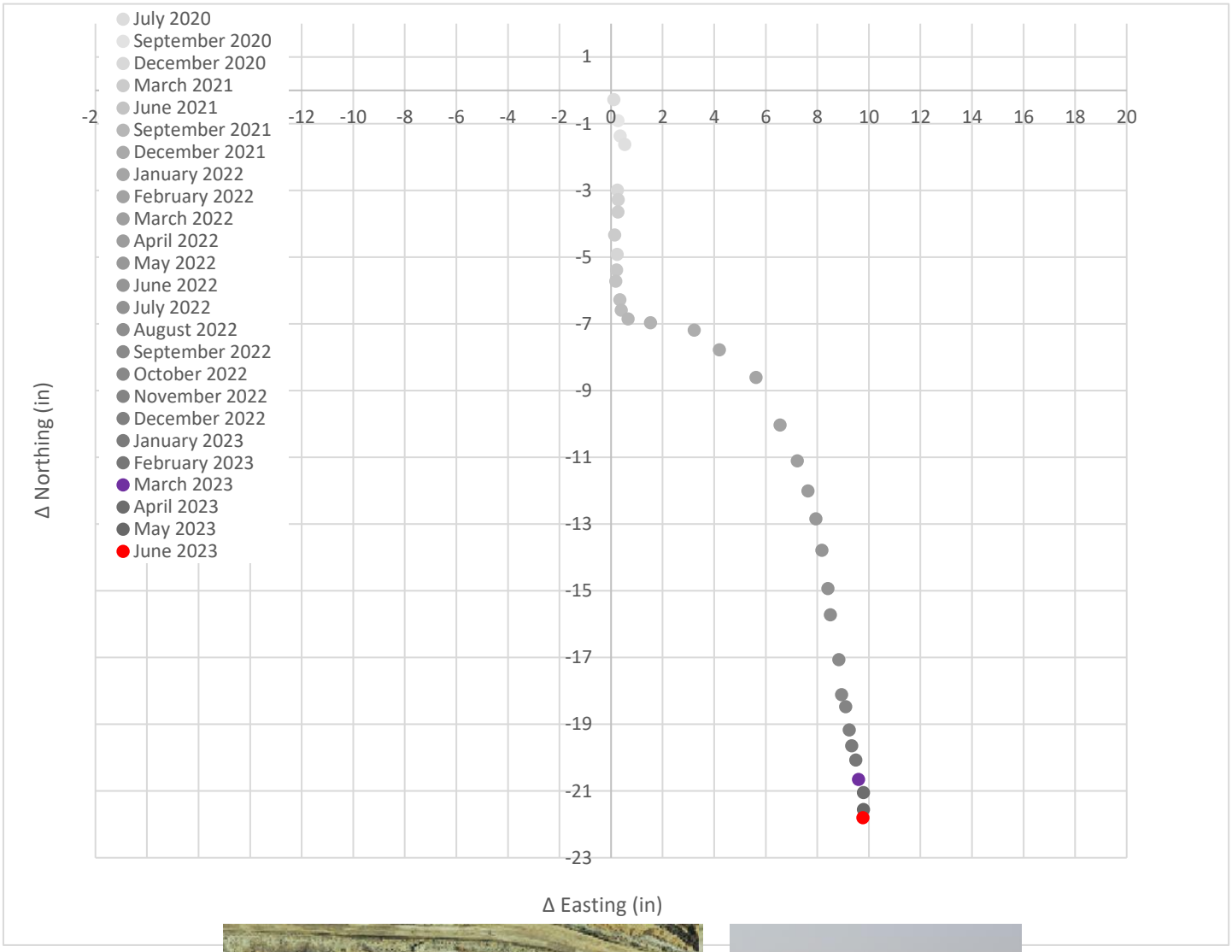
Knight Piésold CONSULTING

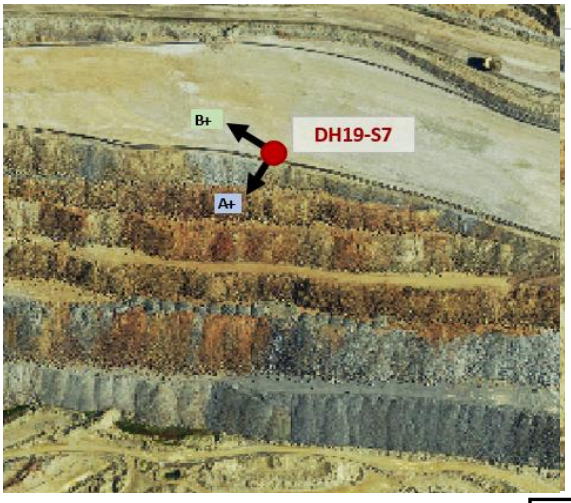
P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE B.9

REV 0





NOTES:
1. COLLAR WANDER IS MONITORED USING GNSS INSTRUMENTATION INSTALLED AT THE INCLINOMETER COLLAR LOCATION.
2. THE PLOT ABOVE PRESENTS COLLAR POSITION BASED ON NORTH AND EAST CHANGE RELATIVE TO A JULY 1, 2020 BASELINE GNSS SURVEY.
3. NO DATA ARE AVAILABLE FOR NOVEMBER, 2020 WHILE THE INSTRUMENTATION WAS OFFLINE DUE TO A POWER MANAGEMENT ISSUE.

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH19-S7 GNSS-BASED INCLINOMETER COLLAR WANDER (JULY 1, 2020 THROUGH JUNE 30, 2023)

Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE B.10

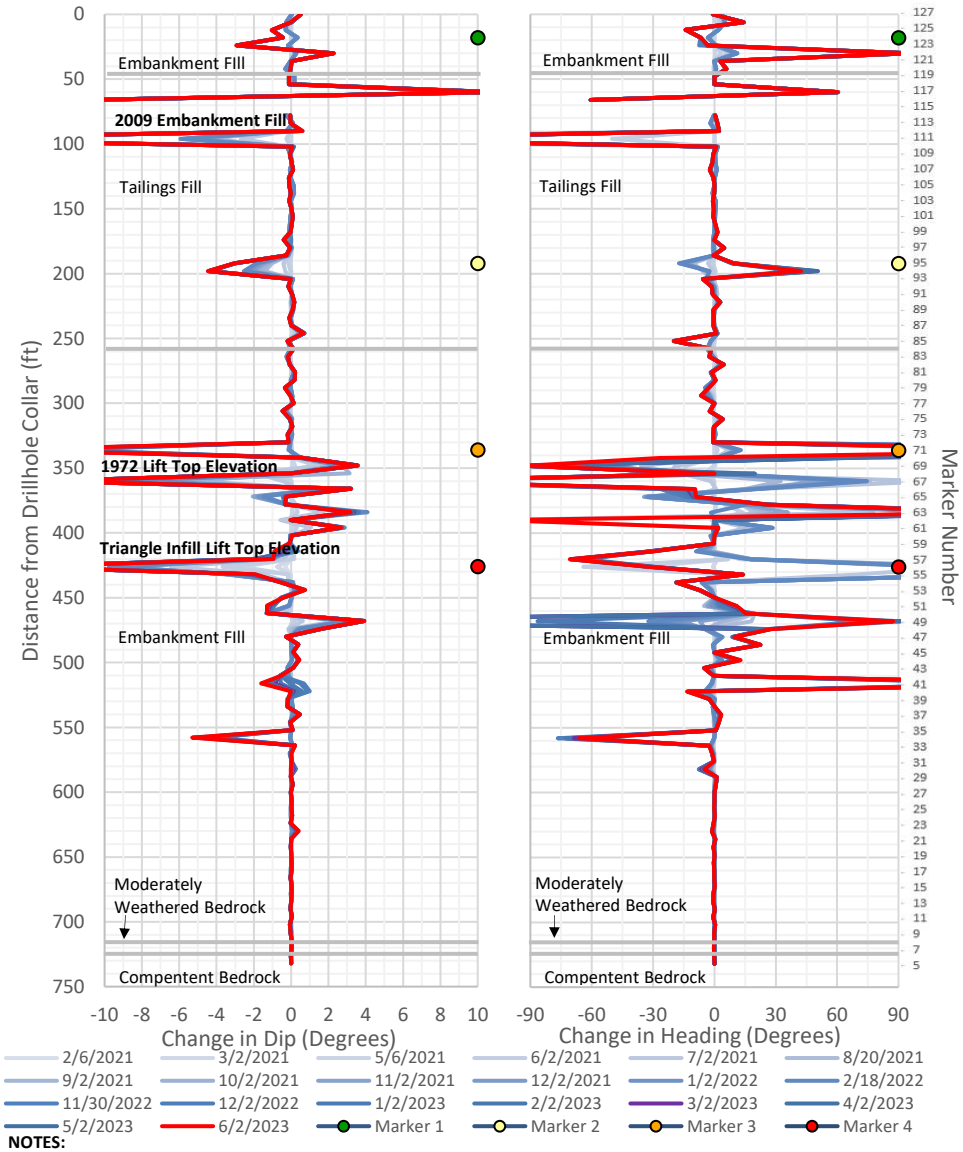
REV 0

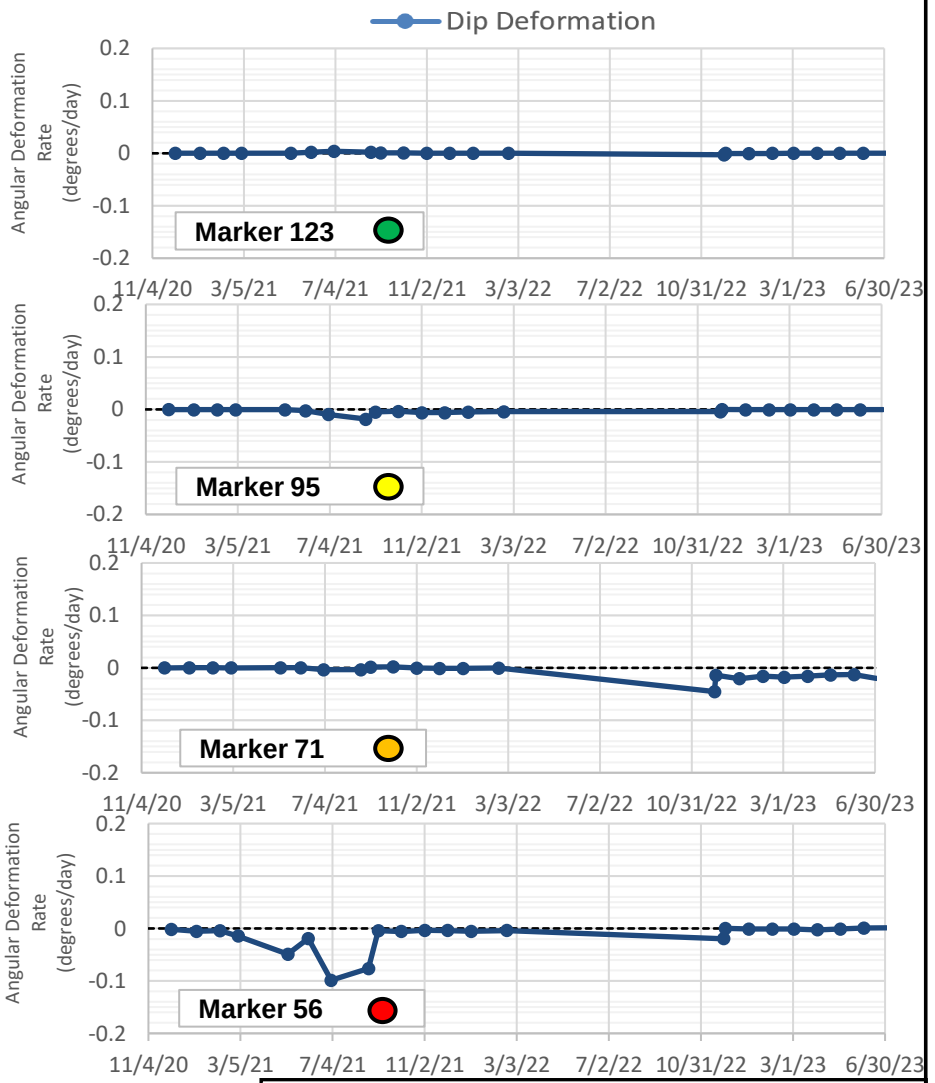
REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	12JUL'23	ISSUED WITH LETTER	SY3	KTD

APPENDIX C

Geo4Sight Deformation Plots

(Figures C.1 to C.2)





NOTES:

1. MONTHLY AVERAGE DEFORMATIONS ARE PRESENTED AND ARE RELATIVE TO A MONTHLY AVERAGE BASELINE FROM NOVEMBER 24, 2020 TO JUNE 30, 2023.
2. DIP IS MEASURED FROM THE HORIZONTAL GROUND SURFACE TO THE SENSOR'S Y-AXIS. NEGATIVE CHANGE-IN-DIP INDICATES A STEEPENING SENSOR ORIENTATION.
3. HEADING IS MEASURED CLOCKWISE (CW) FROM THE MAGNETIC NORTHING. POSITIVE CHANGE-IN-HEADING INDICATES CW ANG. DEFORMATION.
4. GEO4SIGHT INSTRUMENTATION IN DH20-S2 WAS OFFLINE BETWEEN MARCH 3 AND NOVEMBER 30, 2022 DUE TO A WATER DAMAGED DATALOGGER.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	23JUL'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH20-S2 GEO4SIGHT DIP AND HEADING ANGULAR DEFORMATION MAGNITUDES AND RATES (NOVEMBER 2020 TO JUNE 2023)

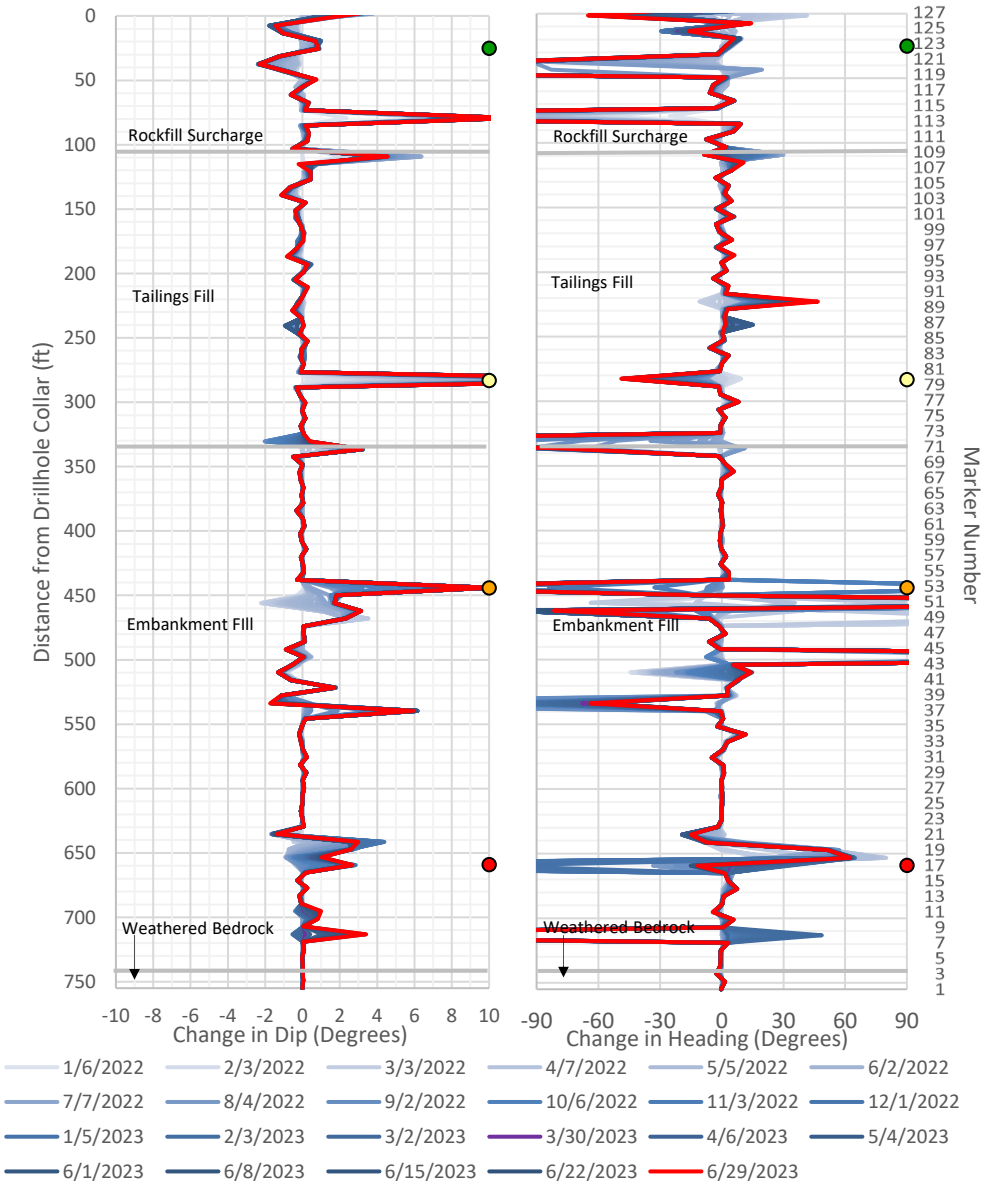
Knight Piésold CONSULTING

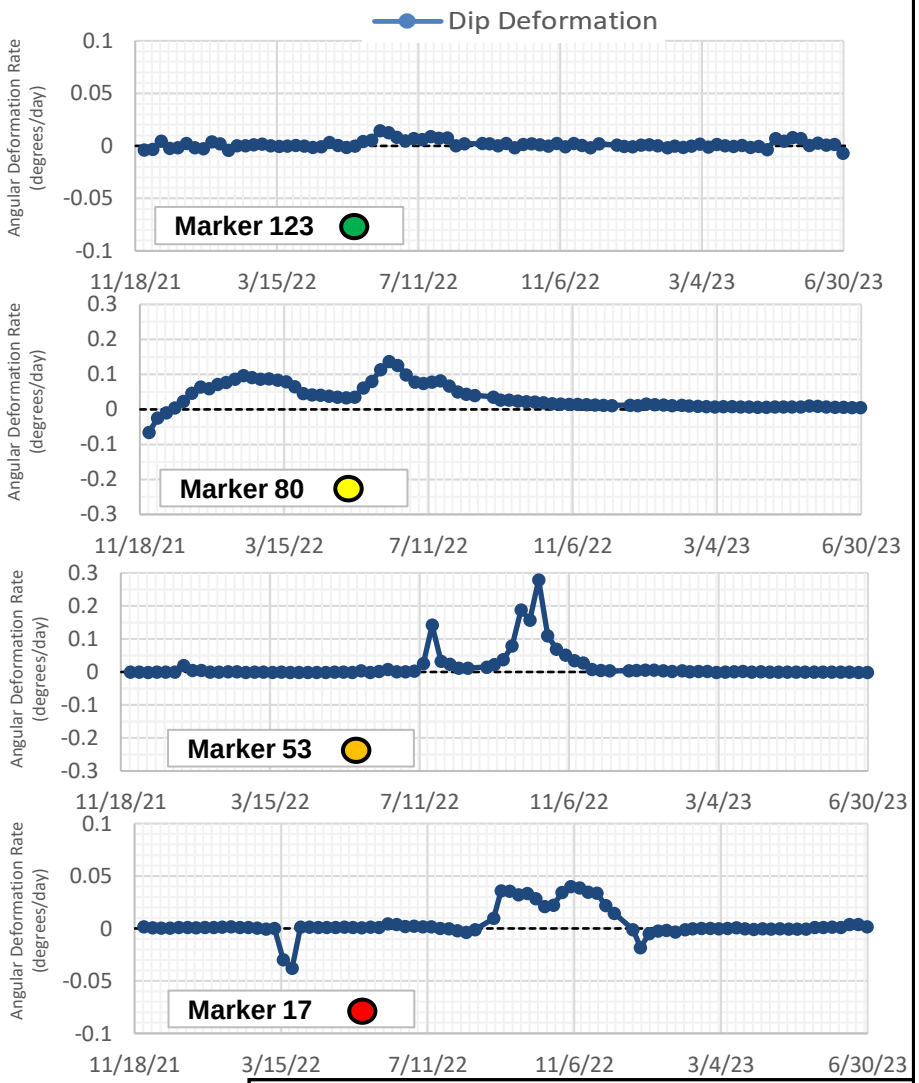
P/A NO. VA101-126/29

REF. NO. VA23-01198

FIGURE C.1

REV 0





NOTES:

1. MONTHLY AVERAGE DEFORMATIONS ARE PRESENTED AND ARE RELATIVE TO A WEEKLY AVERAGE BASELINE FROM NOVEMBER 18, 2021 TO JUNE 302023.
2. DIP IS MEASURED FROM THE HORIZONTAL GROUND SURFACE TO THE SENSOR'S X-AXIS. NEGATIVE CHANGE-IN-DIP INDICATES A STEEPENING SENSOR ORIENTATION.
3. HEADING IS MEASURED CLOCKWISE (CW) FROM THE MAGNETIC NORTHING. POSITIVE CHANGE-IN-HEADING INDICATES CW ANG. DEFORMATION.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	23JUL'23	ISSUED WITH LETTER	SY3	KTD

MONTANA RESOURCES, LLC.

YANKEE DOODLE TAILINGS IMPOUNDMENT

DH21-S4 GEO4SIGHT ANALYSIS
ANGULAR DEFORMATION PROFILES AND RATES
(NOVEMBER 2021 TO JUNE 2023)

Knight Piésold CONSULTING

P/A NO. VA101-126/29

REF. NO. VA23-01198

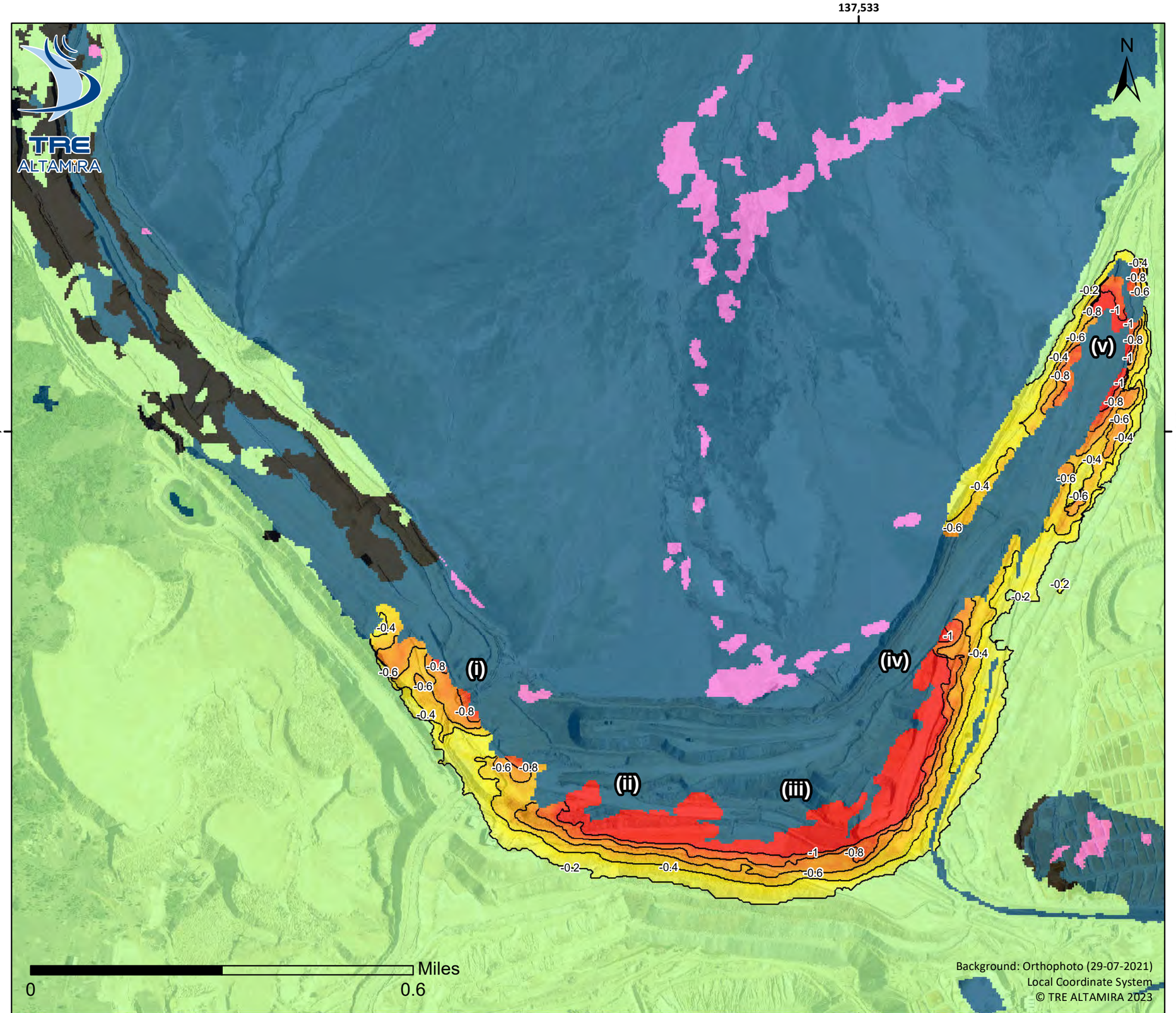
FIGURE C.2

REV 0

APPENDIX D

InSAR Bulletins

(Pages D-1 to D-3)



InSAR Bulletin

Yankee Doodle Tailings Impoundment

12 May 2023 - 03 Jun 2023

COMMENTS

Main areas of movement detected during the current 22-day period:

(i) West Embankment Up to -1.0 inches

East-West Embankment Up to **(ii)** -2.3 inches and **(iii)** -2.2 inches in the southern region

East Embankment Up to **(iv)** -1.7 inches in the southern region and **(v)** up to -1.3 inches in the northern region

Further possible motion observed on the West Embankment

PROCESSING DATA

Date range (UTC)	12 May 2023 - 03 Jun 2023
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	272 [ft]

LEGEND

LOS Displacement [in]

≤ -1 | -0.5 | 0 | +0.5 | ≥ +1

Displacement contour lines

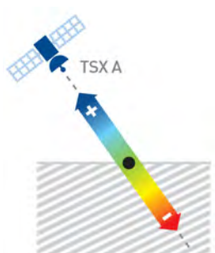
Visibility

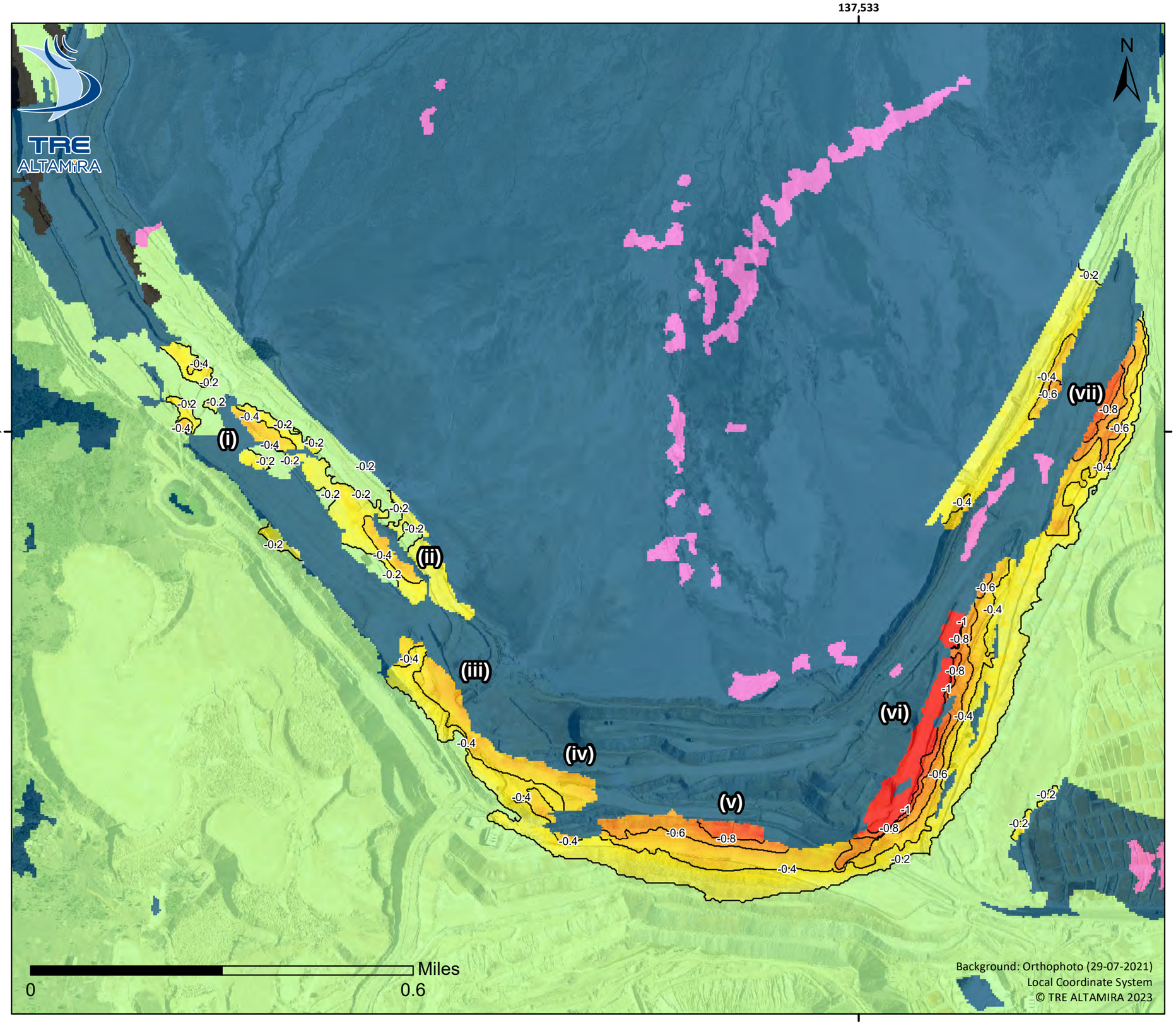
Surface variation

No Information

Possible motion

Movement Detection Threshold: ±0.2 in





InSAR Bulletin

Yankee Doodle Tailings Impoundment

23 May 2023 - 14 Jun 2023

COMMENTS

Main areas of movement detected during the current 22-day period:

West Embankment Up to **(i)** -0.6 inches, **(ii)** -0.6 inches, and **(iii)** -0.6 inches

East-West Embankment Up to **(iv)** -0.6 inches and **(v)** -1.0 inches in the southern region

East Embankment Up to **(vi)** -2.1 inches in the southern region and **(vii)** up to -1.0 inches in the northern region

Further possible motion observed on the West Embankment

PROCESSING DATA

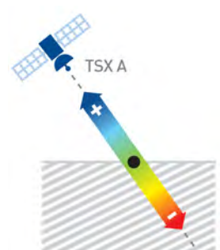
Date range (UTC)	23 May 2023 - 14 Jun 2023
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	39 [ft]

LEGEND

LOS Displacement [in]

≤ -1 | -0.5 | 0 | +0.5 | ≥ +1

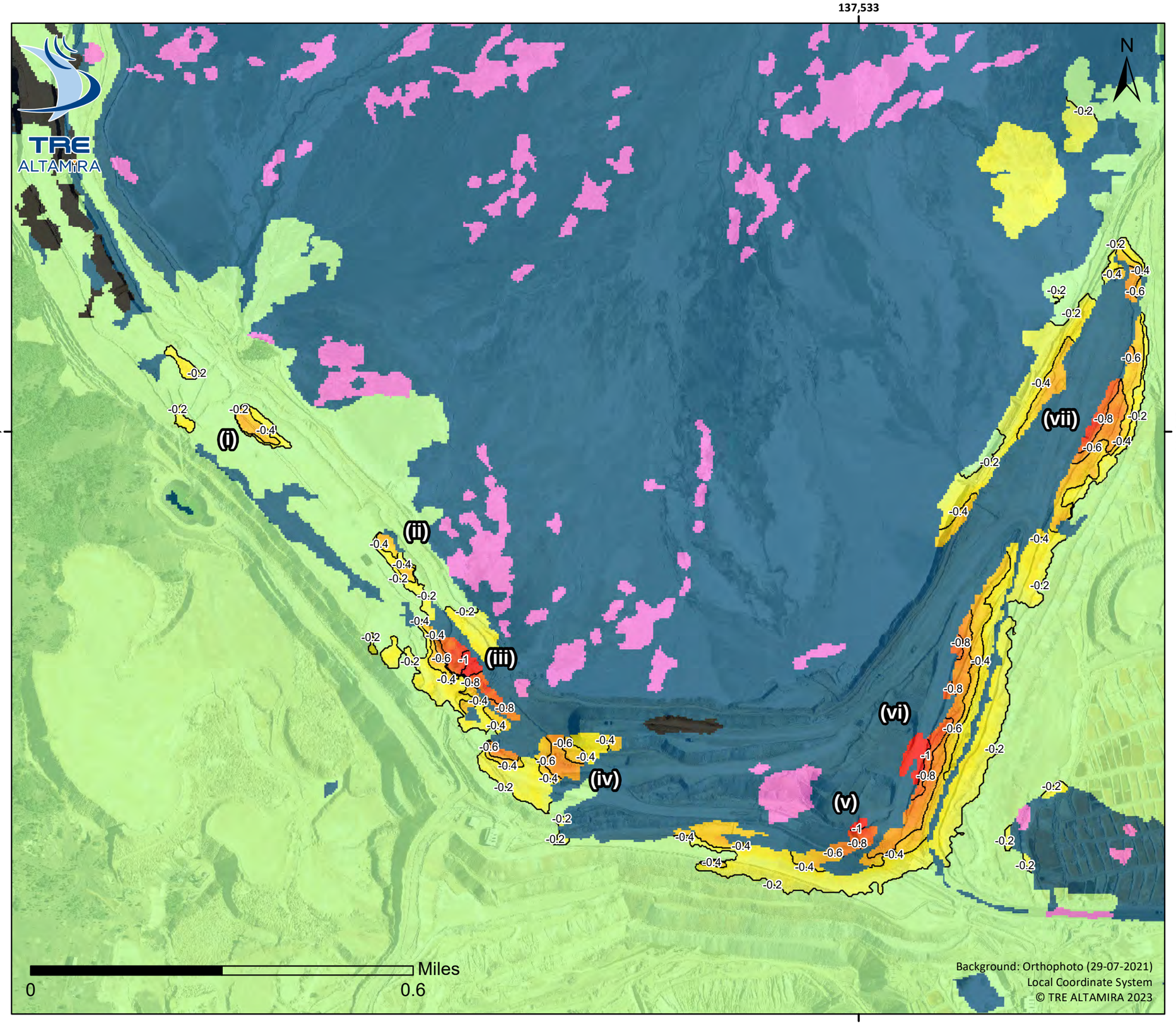
Displacement contour lines



Visibility

- Surface variation
- No Information
- Possible motion

Movement Detection Threshold: ±0.2 in



InSAR Bulletin

Yankee Doodle Tailings Impoundment

03 Jun 2023 - 25 Jun 2023

COMMENTS

Main areas of movement detected during the current 22-day period:

West Embankment Up to **(i)** -0.6 inches, **(ii)** -0.6 inches, and **(iii)** -1.4 inches

East-West Embankment Up to **(iv)** -0.8 inches and **(v)** -1.2 inches in the southern region

East Embankment Up to **(vi)** -1.4 inches in the southern region and **(vii)** up to -1.0 inches in the northern region

Further possible motion observed on the West Embankment and East-West Embankment

PROCESSING DATA

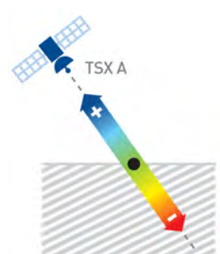
Date range (UTC)	03 Jun 2023 - 25 Jun 2023
Interval	22 days
Satellite (resolution)	TSX (10x10 ft)
Orbit (angle)	Ascending (θ=29°)
Normal Baseline	138 [ft]

LEGEND

LOS Displacement [in]

≤ -1 | -0.5 | 0 | +0.5 | ≥ +1

Displacement contour lines



Visibility

- Surface variation
- No Information
- Possible motion

Movement Detection Threshold: ±0.2 in

APPENDIX E

YDTI Performance Monitoring Overview & Level 1 Cracking Event (Presentation)

(Pages E-1 to E-41)

YDTI Performance Monitoring Overview & Level 1 Cracking Event

(Independent Review Panel Meetings – June 13, 2023)

Knight Piésold CONSULTING 1921-2021

Going further together

Outline

Summary of Q1/Q2 2023 Performance Monitoring

- Key Piezometric Monitoring Findings
- Key Deformation Monitoring Findings

Level 1 Cracking Event:

- MR Notification & Initial Observations
- Inspection & Monitoring Response & Findings
- Next Steps: Remediation & Post-Remedial Monitoring

Summary & Closing

Disclaimer

The material in this presentation is solely to support an internal project update discussion between Knight Piésold Ltd. and the 2023 Annual IRP Meeting attendees. The images, results, comments, etc. are an interim work product and are not to be relied on beyond the scope of this meeting.

Q1/Q2 2023 Performance Monitoring

Q1/Q2 2023 Performance Monitoring Summary

Overview

- KP continues to supports MR to routinely monitor hydrogeological and geotechnical conditions as part of their operational surveillance plan for the tailings facility, as described in the Tailings Operations, Maintenance and Surveillance (TOMS) Manual (MR/KP, 2022).
  - Near real-time piezometric data from instrumentation at select monitoring sites have designated Quantitative Performance Parameters (QPPs) within the TOMS Manual and are regularly evaluated relative to piezometric 'trigger elevations' to pre-emptively identify and respond to changing conditions.
  - Embankment deformation monitoring program continues, with data collection beginning in 2020-2021 to characterize and monitor surface and subsurface deformations using in-situ instrumentation and satellite-based remote sensing. No deformation QPPs are presently active; however, these are planned to be included in future TOMs revisions.
- Routine monitoring deliverables include:
  - Monitoring data are comprehensively reviewed on a quarterly basis to evaluate the performance of the YDTI in conjunction with observations made during periodic inspections (Q1 2023 letters available to the IRP)
  - Weekly monitoring of piezometric QPPs, with review emails sent to the EOR, MR, AR/AECOM, and KP.
  - Weekly and monthly construction piezometric and deformation monitoring, completed since the start of the EL 6,450 ft embankment construction cycle (June 2021 through present)

Q1/Q2 2023 Performance Monitoring Summary

Piezometric Monitoring

- No piezometric QPP or CPP exceedances occurred during Q1 2023. Key findings include:
  - QPP sites within the East-West Embankment generally exhibited slightly decreasing piezometric elevations during Q1 2023, continuing the previously observed long-term decreasing pore water pressure trend monitored beginning in 2017.
    - Non-QPP sensor DH19-S7 VW7 observed an increasing pore water pressure trend during Q1 2023 (approximately 11 ft), which is inferred to result from placement of the alluvium facing along the upstream face of the central rockfill surcharge during February and March 2023 (additional detail later in presentation)
  - QPP sites within the rockfill of the North-South Embankment generally monitored minor pore water pressure decreases during Q1 2023, as slightly elevated pressures resulting from Q4 2022 construction of the El. 6,450 ft embankment lift dissipated.
  - Non-QPP instruments within the tailings upstream of the North-South and East-West Embankments generally monitored stable or slightly decreasing pore water pressures during Q1 2023.
  - Relatively stable or slightly decreasing pore water pressures have been observed from late-Q3 2022 through Q1 2023 within the West Embankment foundation and West Embankment Drain

Monitoring Region	QPP Instrumentation Site	Monitoring Site Type [1]	Piezometric Trigger Elevation (ft)	Maxiumum Piezometric Elevation Recorded Q1 2023 (ft)	End of Q1 2023 Piezometric Elevation (ft)	Exceeded Trigger Elevation During Q1 2023 (Yes/No)	Pore Pressure Change Q1 2023 (ft)	Comments
East-West Embankment	MW94-08	VWP Sensor	5,680	5,669	5,668	No	-0.10	
	MW94-11	VWP Sensor	5,693	5,673	5,672	No	-0.12	
	DH15-S3 VW1	VWP Sensor	5,690	5,664	5,664	No	-0.08	
	DH15-S4 VW1	VWP Sensor	5,740	5,712	5,711	No	-0.62	
	DH15-S4 VW2	VWP Sensor	5,800	5,771	5,768	No	-3.27	
	DH15-S5 VW2	VWP Sensor	5,890	5,854	5,853	No	0.29	Activated as a QPP on October 3, 2022 to replace DH15-S5 VW1 [5]
	DH17-S1 VW2	VWP Sensor	5,741	5,714	5,713	No	-0.62	
	DH18-S3 VW3	VWP Sensor	6,044	6,023	6,022	No	-0.58	
	DH19-S7 VW1	VWP Sensor	5,770	5,734	5,732	No	-2.38	Activated as a QPP on March 19, 2021 to replace DH17-S2 VW2 [4]
North-South Embankment	MW12-01	VWP Sensor	5,940	5,925	5,924	No	-0.79	
	MW12-05	VWP Sensor	6,200	5,987	6,198	No	-0.02	
	DH18-S1 VW2	VWP Sensor	6,010	5,987	5,986	No	-0.68	
	DH18-S2 VW2	VWP Sensor	6,029	6,011	6,010	No	-0.34	
West Embankment	VWP-DP1	VWP Sensor	6,374	6,341	6,341	No	-0.10	
	VWP-DP2	VWP Sensor	6,366	6,337	6,337	No	-0.04	
	DH15-12 VW1	VWP Sensor	6,372	6,350	6,349	No	-0.32	
	DH15-12 VW2	VWP Sensor	6,372	6,351	6,351	No	-0.24	
	DH15-12 VW3	VWP Sensor	6,372	6,351	6,351	No	-0.15	

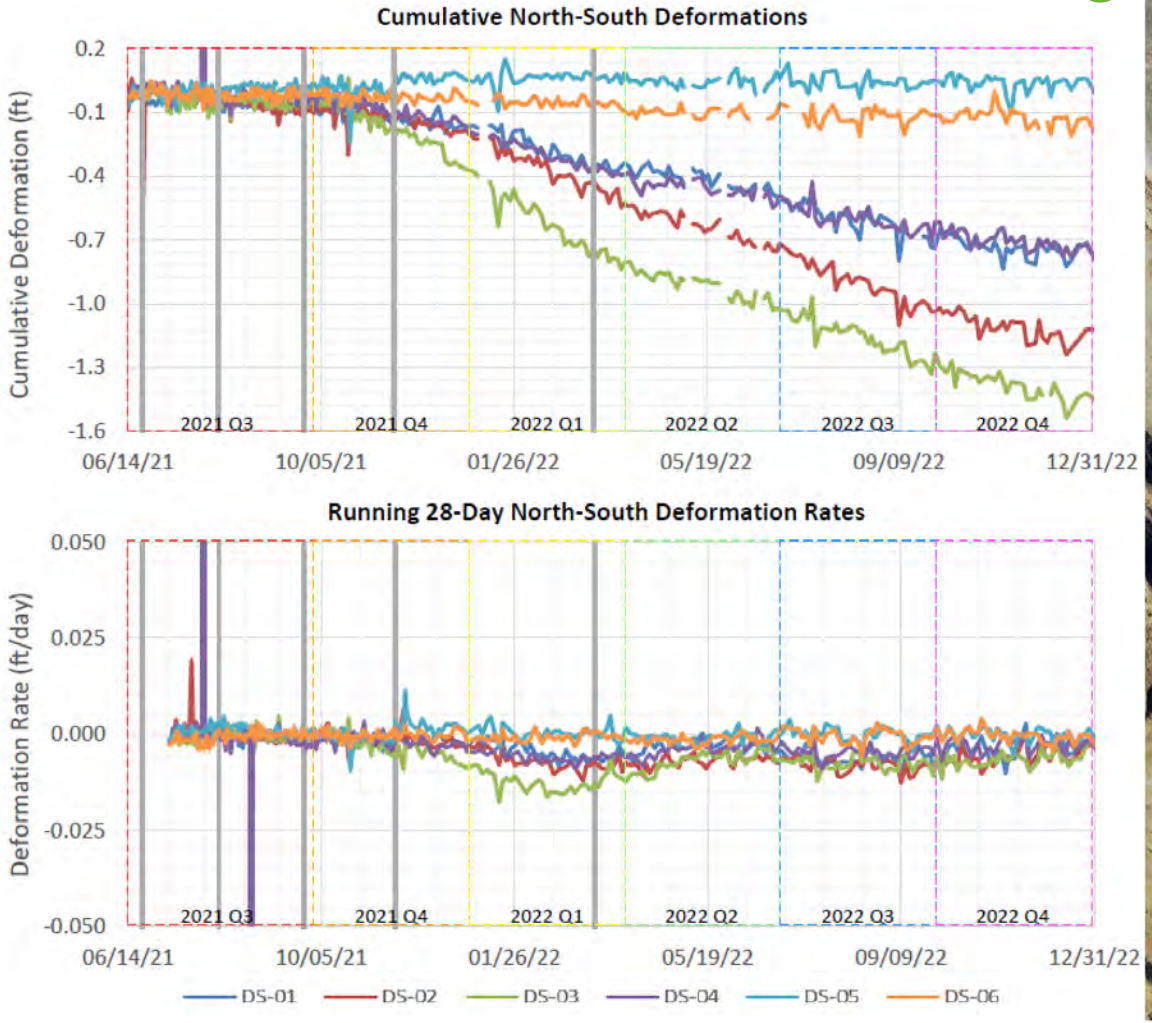
Q1/Q2 2023 Performance Monitoring Summary

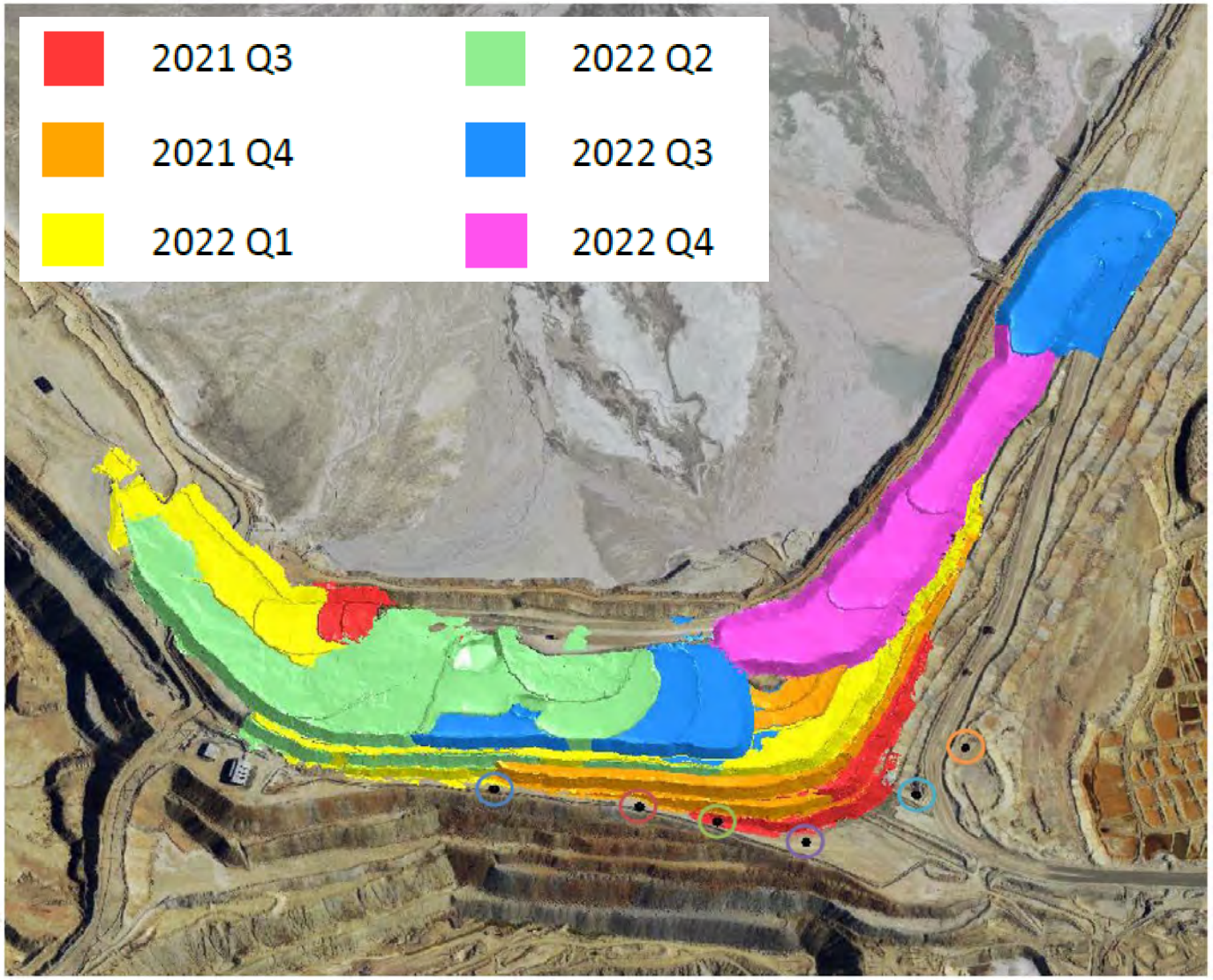
Deformation Monitoring

- Construction of the EL. 6,450 ft embankment raise within the Central Pedestal Area began in June 2021 and was largely completed in April 2023. Construction comprised:
  - Four embankment lifts (EL. 6,250, 6,300, 6,350, and 6,400 ft lifts) completed to infill a historical haul ramp and serve as a platform for the crest raise (2021 & 2022)
  - A final (EL. 6,450 ft) lift completed to raise the crest 50 ft along the East-West and North-South Embankments (2023)
- Monitoring observed localized, elevated deformation rates within and around the newly placed embankment lift and surcharge rockfill, as expected. The onset of elevated deformation rates corresponded with advancement of construction and rates generally slowed following rockfill placement. No evidence of progressive (accelerating) deformations has been observed following construction in a given area.
  - Findings were reviewed with the IRP in March 2023
- Observed deformation rates have generally continued to slow following EL. 6,450 ft lift construction. A high-level update regarding observed deformations is provided below:
    - East-West Embankment EL. 6,450 ft lift construction was completed in August 2022 and deformation monitoring data collected since (including during Q1 2023) indicate slowing surface and subsurface deformation rates.
    - North-South Embankment EL. 6,450 ft lift construction continued from Q3 2022 through March 2023. Elevated surface deformations have progressed along the embankment with construction and remain slightly elevated.

Q1/Q2 2023 Performance Monitoring Summary

E-W Deformation Monitoring

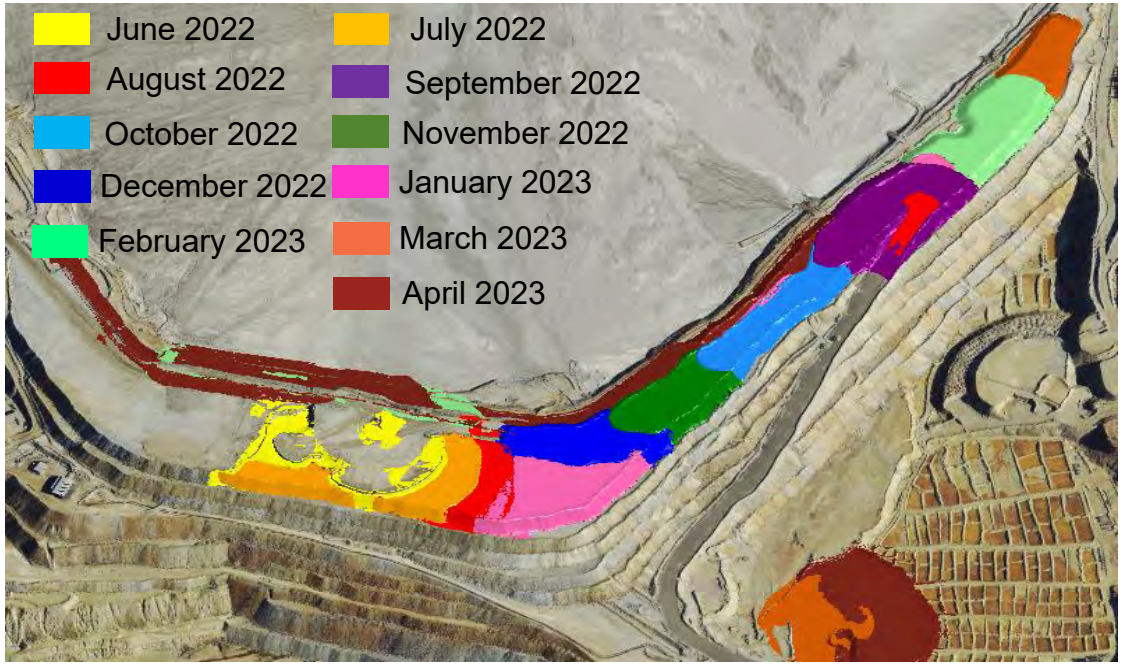


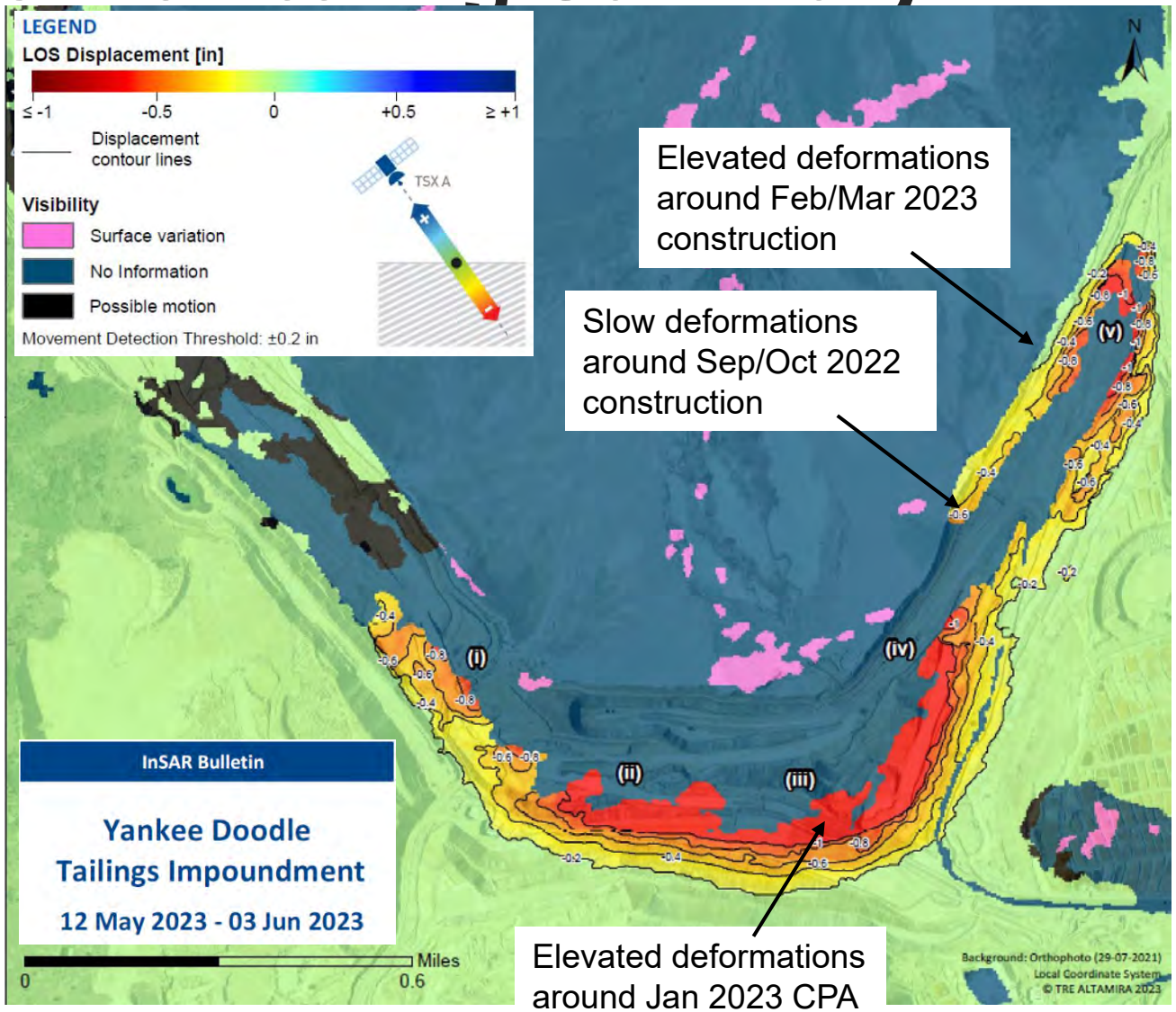


Q1/Q2 2023 Performance Monitoring Summary

N-S Deformation Monitoring

- InSAR monitoring recently reactivated following snowmelt and will continue to be used to track deformations following EL. 6,450 ft lift construction
  - Continues to show elevated deformation rates in areas of recent construction
  - Additional slowing is expected with time





Level 1 Cracking Event (April 28, 2023)

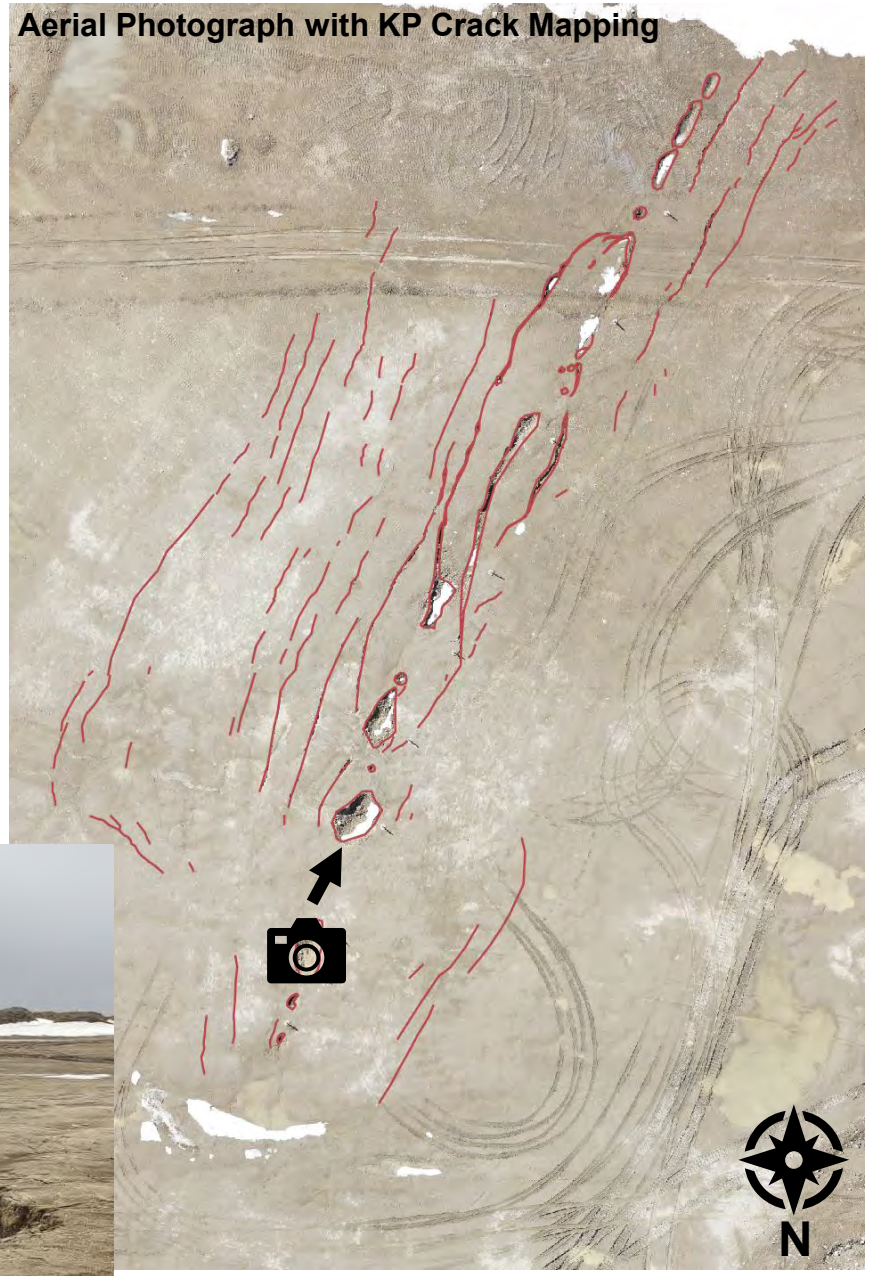
MR Notification & Initial Observations

Notification

MR Notification to the EOR

- Montana Resources notified KP on April 27, 2023 that new transverse cracking and depressions had been observed by a dozer operator along the EL 6,450 ft crest near Section 0+00. MR Observations:
  - The depressions/cracks run transverse to the downstream face around the Section 0+00 area but do not extend to the upstream face
  - The cracks appear to be in a low spot where significant amt. ponded water had infiltrated into the cracks
  - MR looked at the downstream face directly below the settlement and cracks and there was no evidence of water seepage along the face.
  - MR also drove along the pipe ramp to see any evidence of erosion or seepage was discernable, none was found.

Aerial Photograph with KP Crack Mapping



Observed Cracking and Depressions (photo provided by MR)

Notification & Response

TOMS Level 1 Unusual Occurrence

- Observed cracking constitutes a Level 1 Unusual Occurrence per the TOMS manual:

UNUSUAL OCCURRENCE	MONITORING AND MITIGATION
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

7.6.2 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, and monitoring will be intensified.
- The Vice President of Environmental Affairs will notify the EOR.

7.7.1 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.

Drone Photograph of Cracking (late-May)

MR Observations

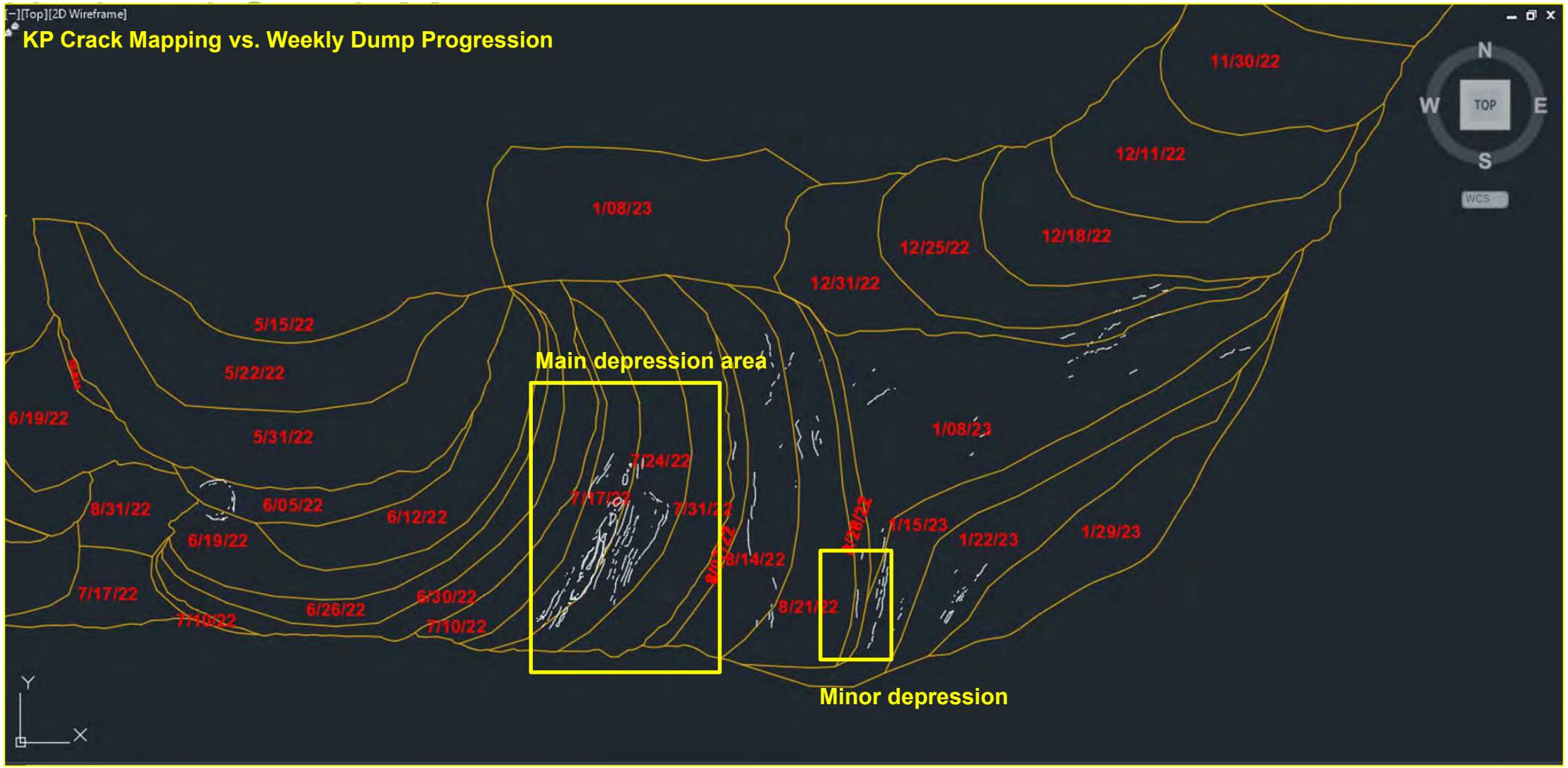
Review of Inspection Photographs

MR Observations

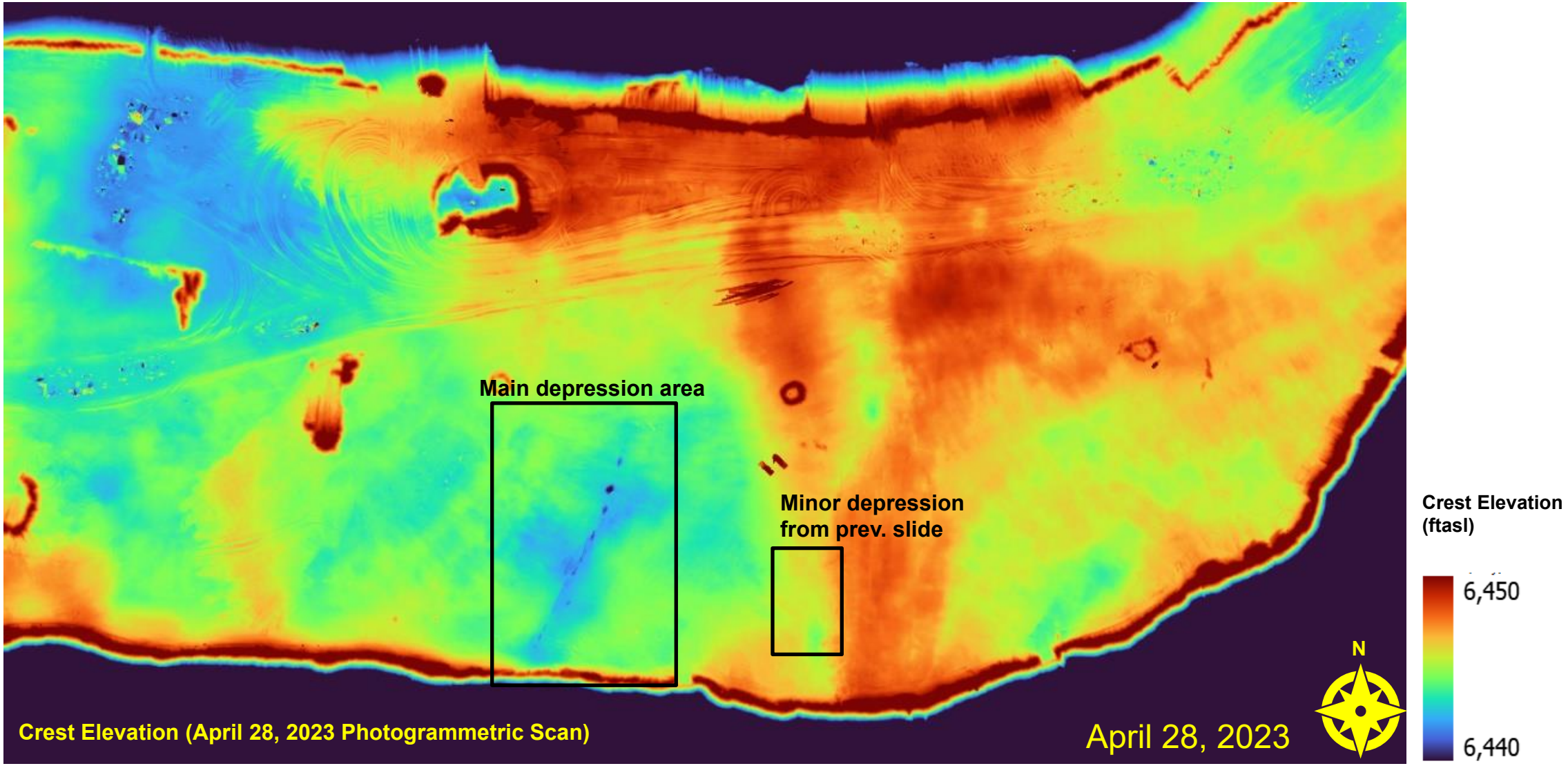
Crack Map

Aerial Photograph with KP Crack Mapping (updated through early-June)

Review of Cracking Observations



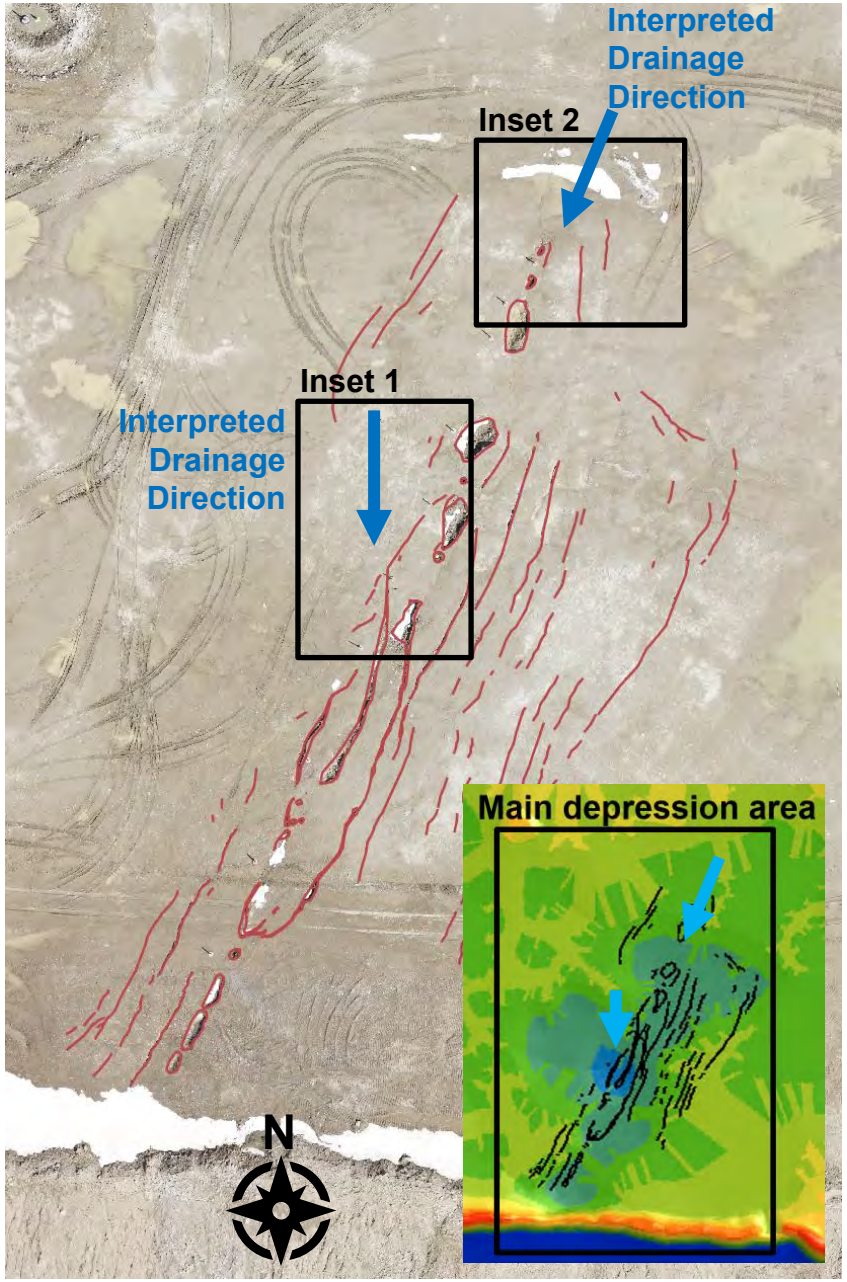
Embankment Crest Topography



Evidence of Drainage into Cracks

Visual Observations

- Surface expressions of drainage towards cracks to south visible in some areas



Potential Drainage Features; Main Cracking Area (April 28, 2023)

Review of Cracking Observations

Aerial Photos of DS Slope

- No discernable cracking or seepage discharge on DS embankment slope below cracking
  - MR inspections, review of aerial photographs, and KP on-site presence

Downstream Slope of CPA Embankment (April 28, 2023)

Review of Cracking Observations

Aerial Photos of US Surcharge Slope

- No discernable evidence of cracking or seepage through US rockfill surcharge slope
  - Cracking does not appear to extend to the US surcharge
  - Recently re-sloped and faced with alluvium

Upstream Slope of Rockfill Surcharge (April 28, 2023)

Level 1 Cracking Event

Historical Crack Observations

- Cracking of newly placed rockfill has been observed previously along the North-South Embankment:
  - Attributed to differential settlement within the 50 ft thick rockfill lifts
  - No significant crack progression/deformation observed

North-South Embankment Crest Cracking (2019)

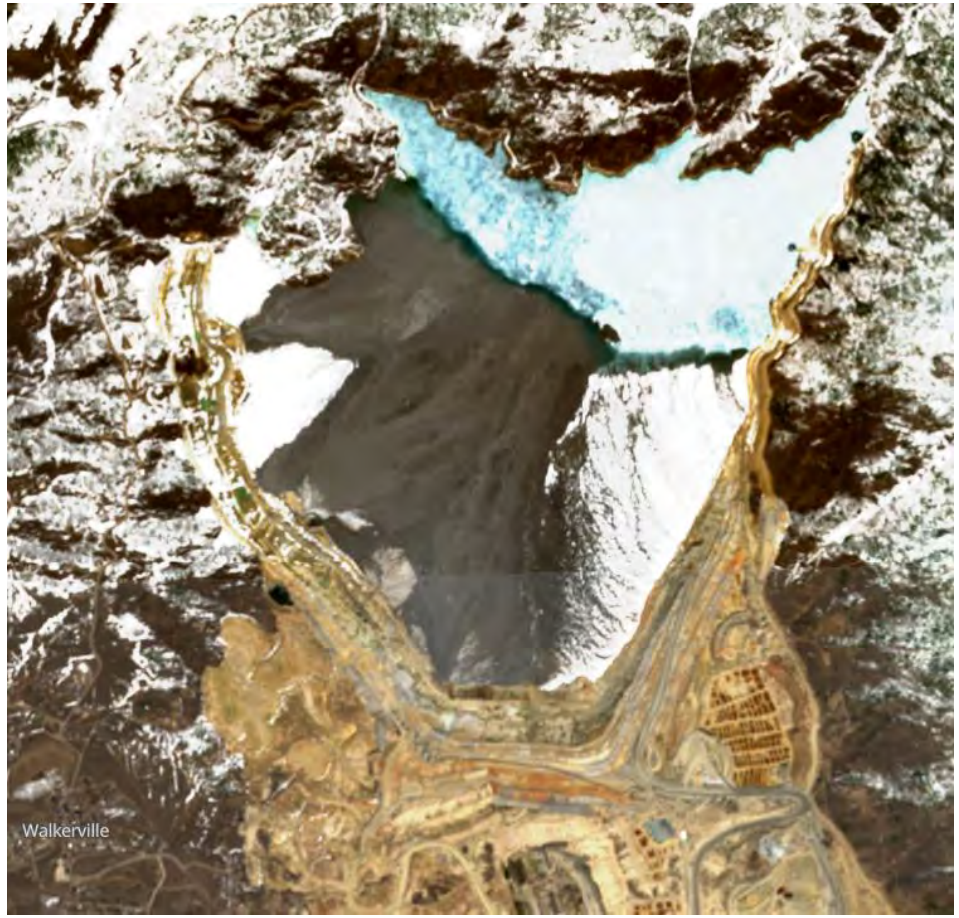
North-South Embankment Crest Cracking (2016)

North-South Embankment Crest Cracking (2015)

Requested Follow-Up Inspection & Monitoring

Summary of EOR/KP Request

- The EOR and KP requested the following follow-up inspection and monitoring activities to be completed by Montana Resources:
  - Provide crack survey data and photogrammetry/imagery from crest drone survey completed April 28, 2023
  - Initiate inspection and monitoring of cracking, including:
    - Daily inspection of known (photographs, inspection reports)
    - Paint and flag known cracks to monitor for length progression
    - Install pin extensometers and initiate monitoring for aperture and/or offset progression
  - Provide minimum 3x per week DGPS data from existing survey-monuments within the Central Pedestal Area (CPA) to monitor deformations/scree for signs of instability in proximity and downstream of the main cracking area.
  - Complete a MapTek scan of the downstream East-West CPA embankment slope to screen for unexpected deformation of the downstream slope
  - Complete updated drone photogrammetric surveys of the embankment crest and downstream embankment slope at two-week intervals (approximately) to provide updated topography and imagery for additional photo-reconnaissance
  - Investigate the source of fill material placed in the CPA lifts between approximately July 17 and 31, 2022, including providing any available information on geology / alteration of the material.



Sentinel-2 L2A Image – April 30, 2023

Monitoring & Inspection Response

Monitoring Response following Notification

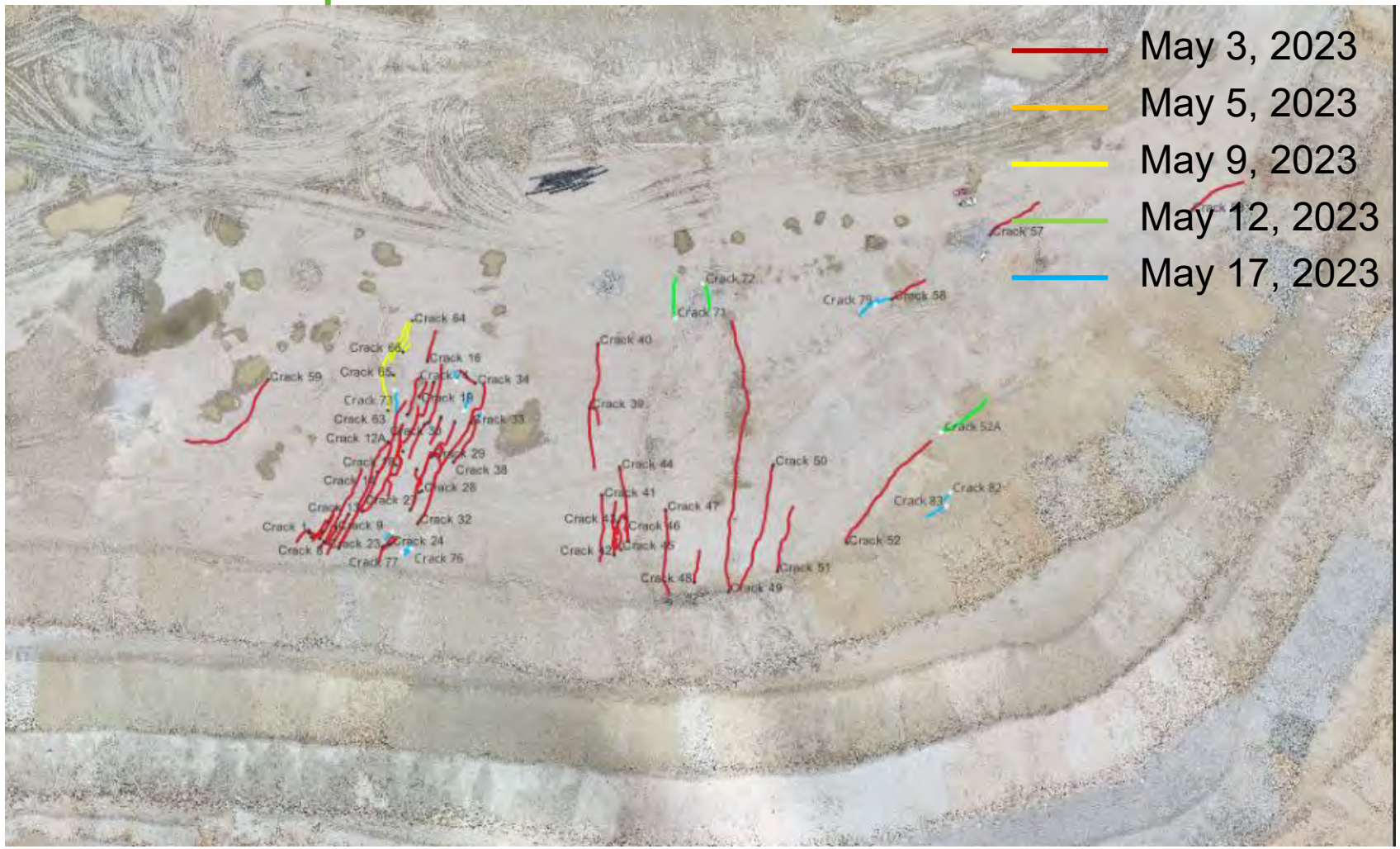
Summary

- Differential settlement is interpreted to have resulted in initial cracking. Recharge from ponding present on the embankment crest is inferred to have exacerbated the cracking, resulting in localized collapse features
- Monitoring data collected since the April 27, 2023 observation do not appear to indicate progression of crest cracking or deformation. Supporting findings are:
  - Visual inspections of main cracking area do not indicate discernable spreading or lengthening of cracks or expansion of collapse features (aside from minor precipitation-driven erosion)
  - Pin extensometers installed across select cracks have not monitored increasing apertures or vertical offsets
  - DGPS and GNSS survey-monuments have continued to monitor slowing surface deformation rates throughout May 2023; interpreted to signify diminishing influence from EL 6.450 ft lift construction.
  - Comparison of three photogrammetric scans (April 28, May 15, May 30) do not indicate development of large settlements (crest) or displacement (downstream slope).
  - Pore pressure instrumentation remains within the Acceptable-Risk TARP classification.

Monitoring Response

Cracking – Updated Crack Map

- Inspections have identified some additional cracking that was not surveyed initially.
- These appear to be minor cracks or those outside of the main area
- Do not appear to indicate progression



Monitoring Response

Main Cracking Area

- Visual inspections have not identified significant progression of cracking/depressions within the Main Cracking Area
  - Minor precipitation-driven erosion of existing cracks and depressions
  - No discernable lengthening or development of increasing vertical offsets (consistent with pin extenso.)

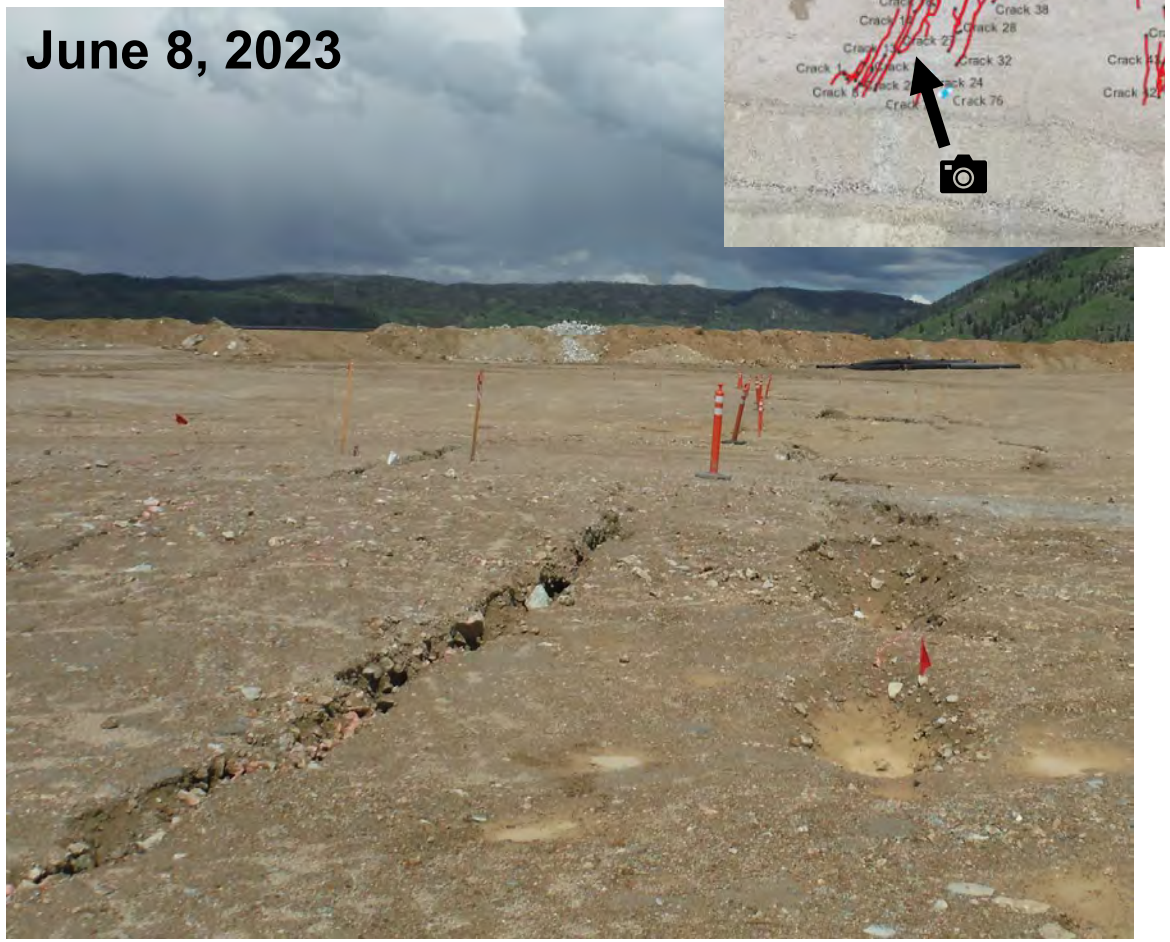
Monitoring Response

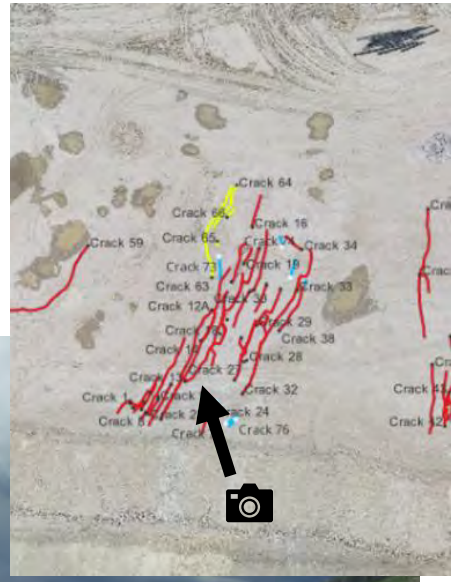
Main Cracking Area

May 16, 2023

Review of Cracking Observations

Main Cracking Area





Monitoring Response

Main Cracking Area

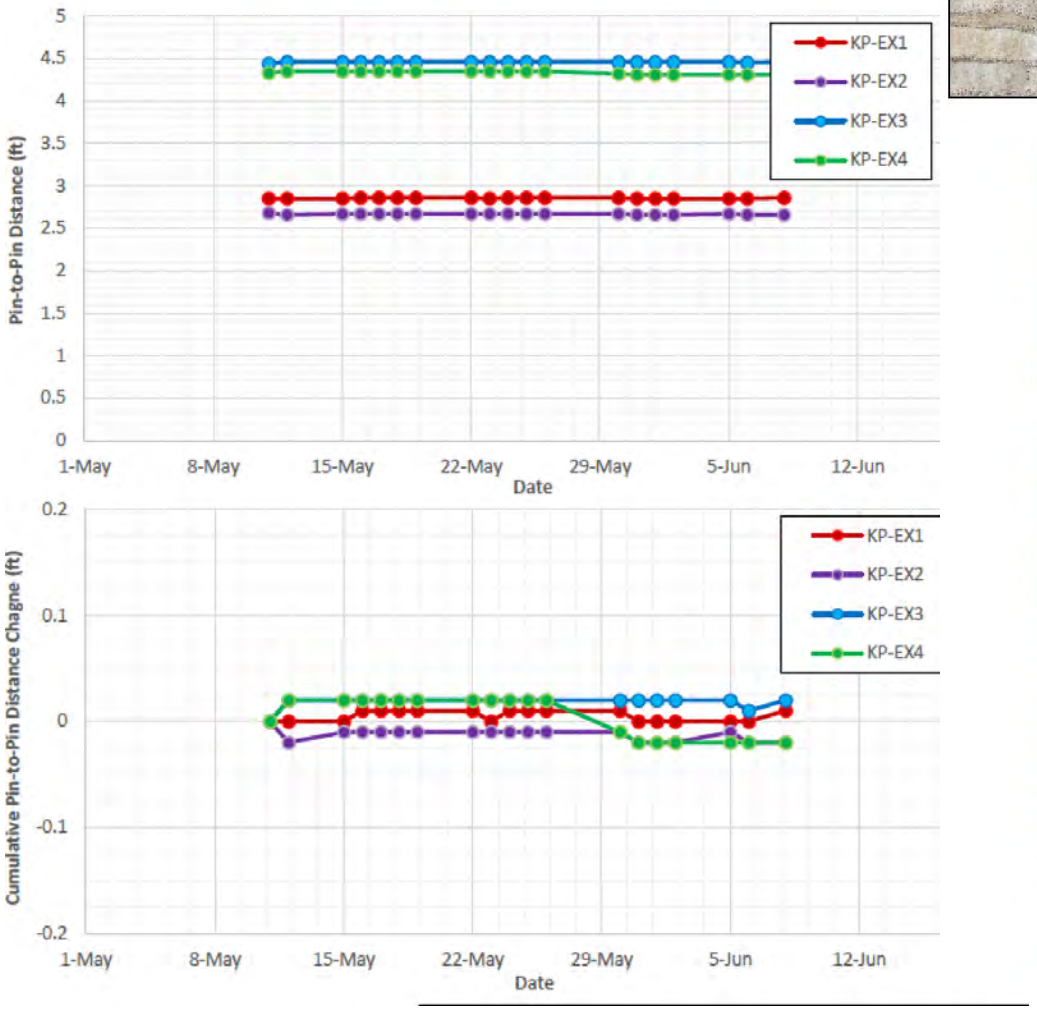
June 8, 2023

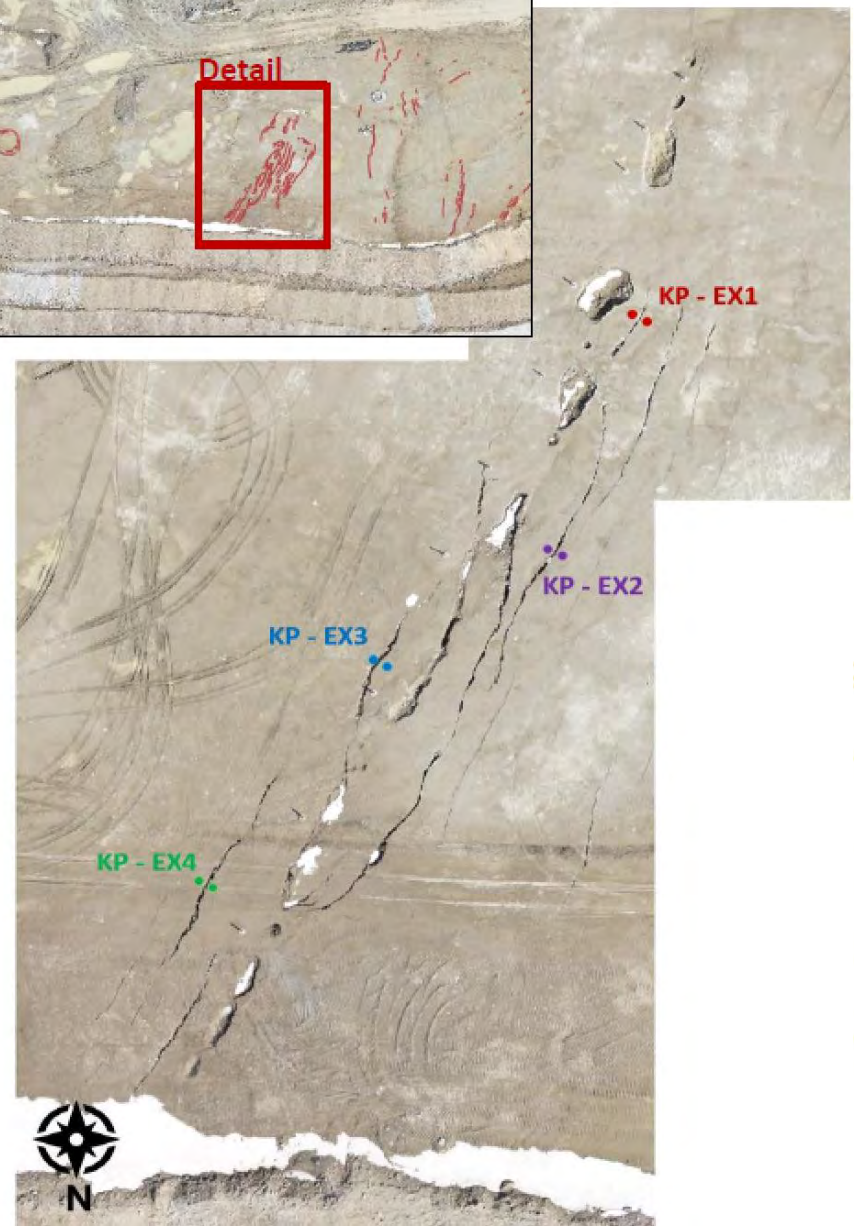
May 9, 2023

Monitoring Response

Crack Pin Extensometers

- No significant progression identified.

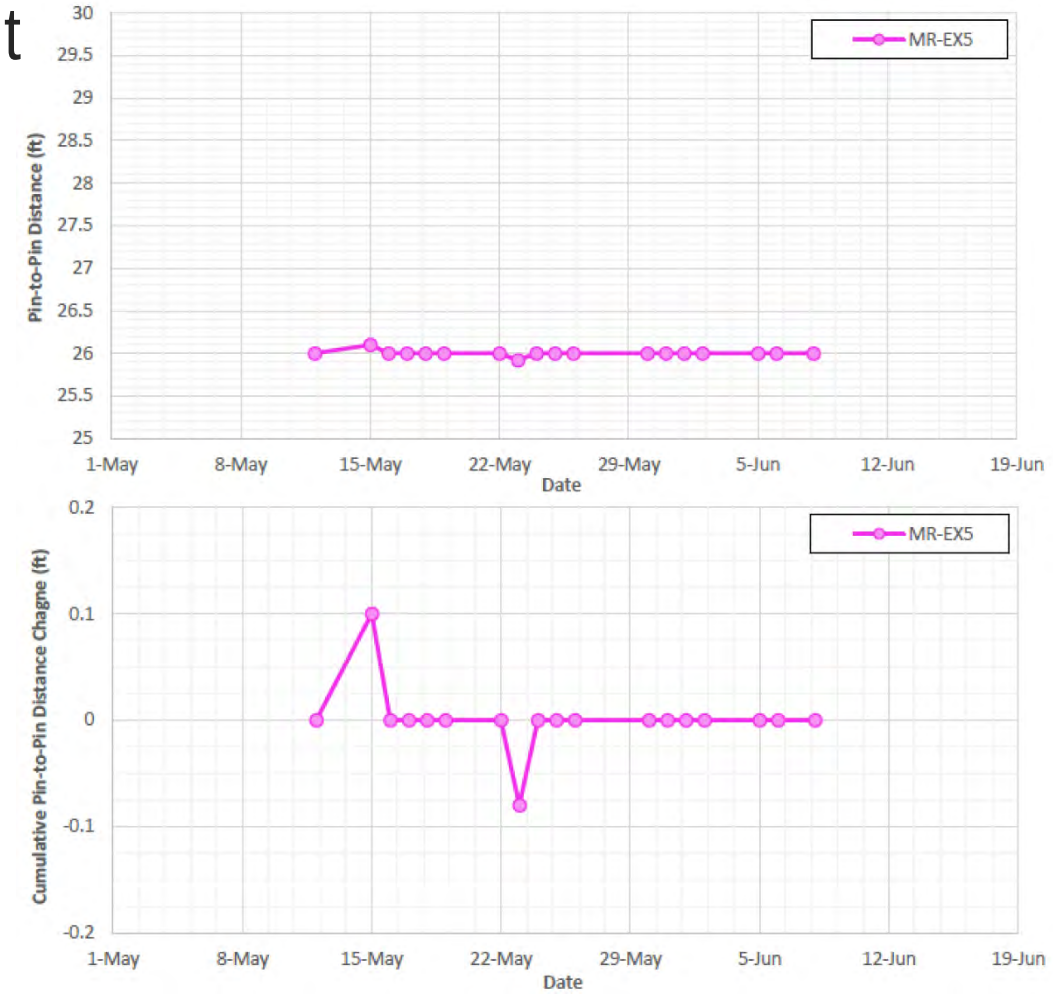


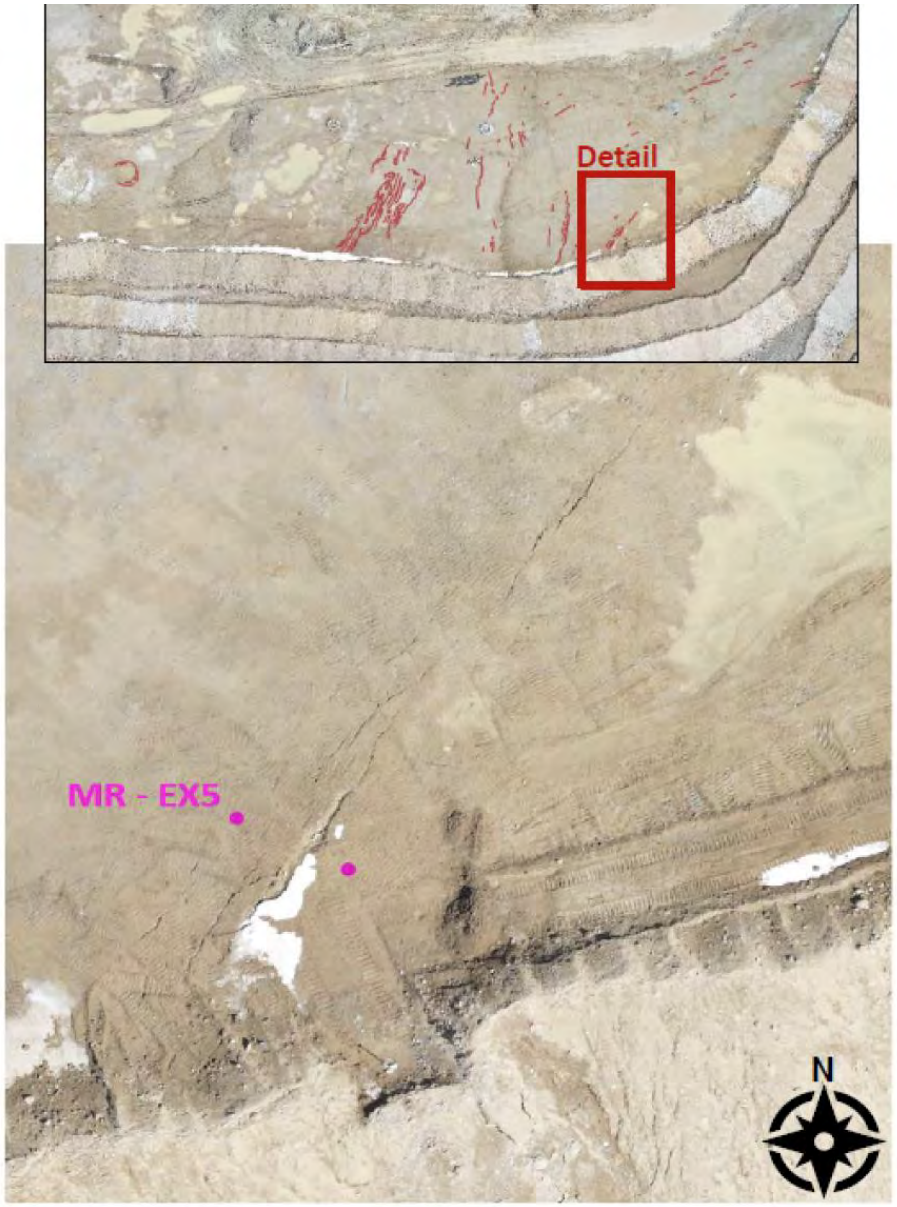


Monitoring Response

Crack Pin Extensometers

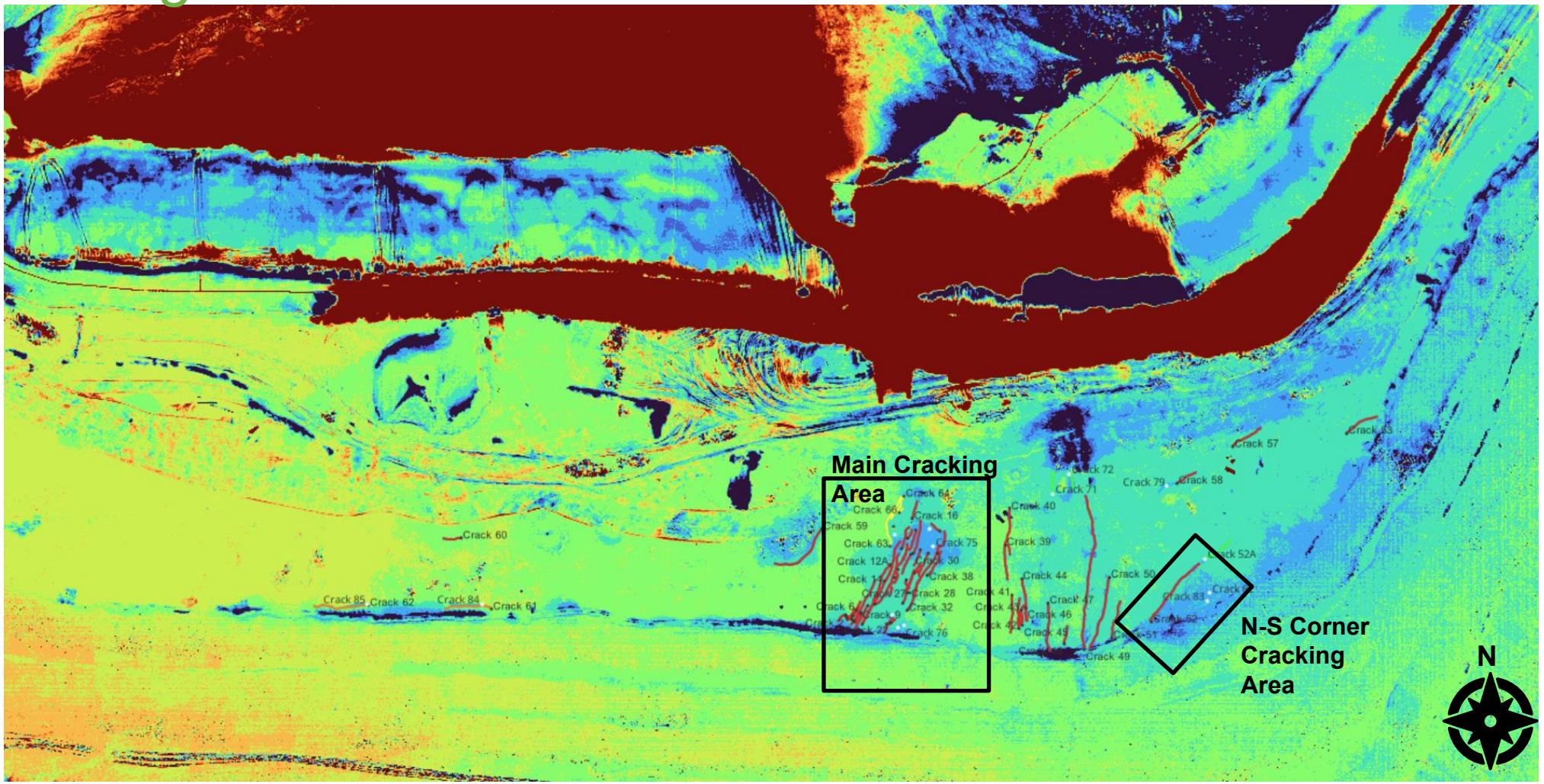
- No significant progression identified.





Monitoring Response

Photogrammetric Surface Subtraction

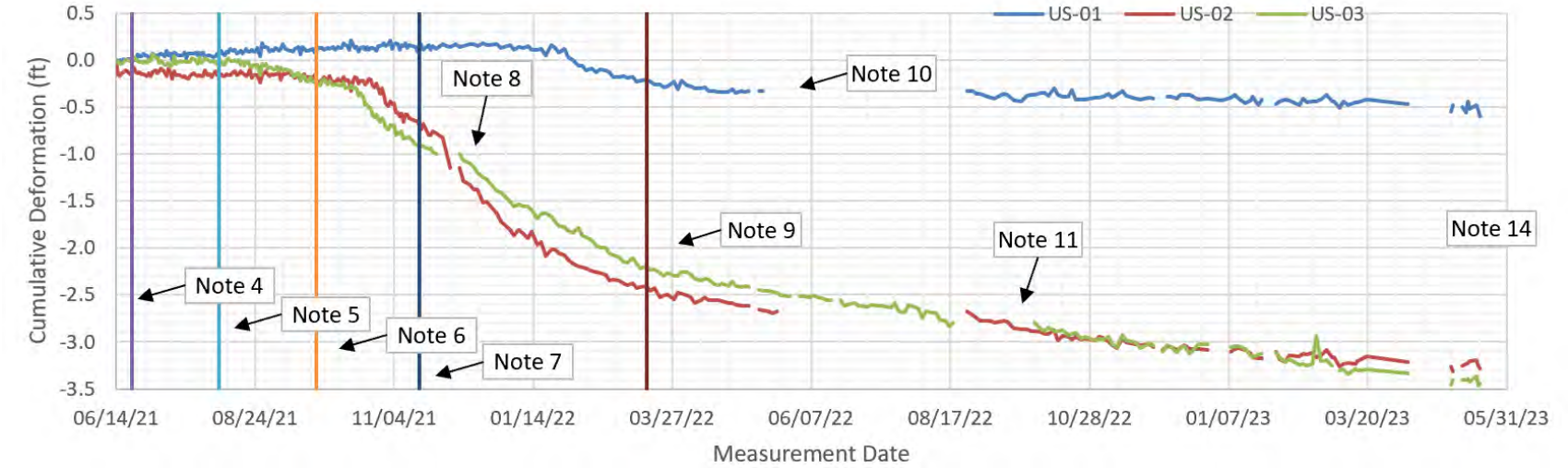


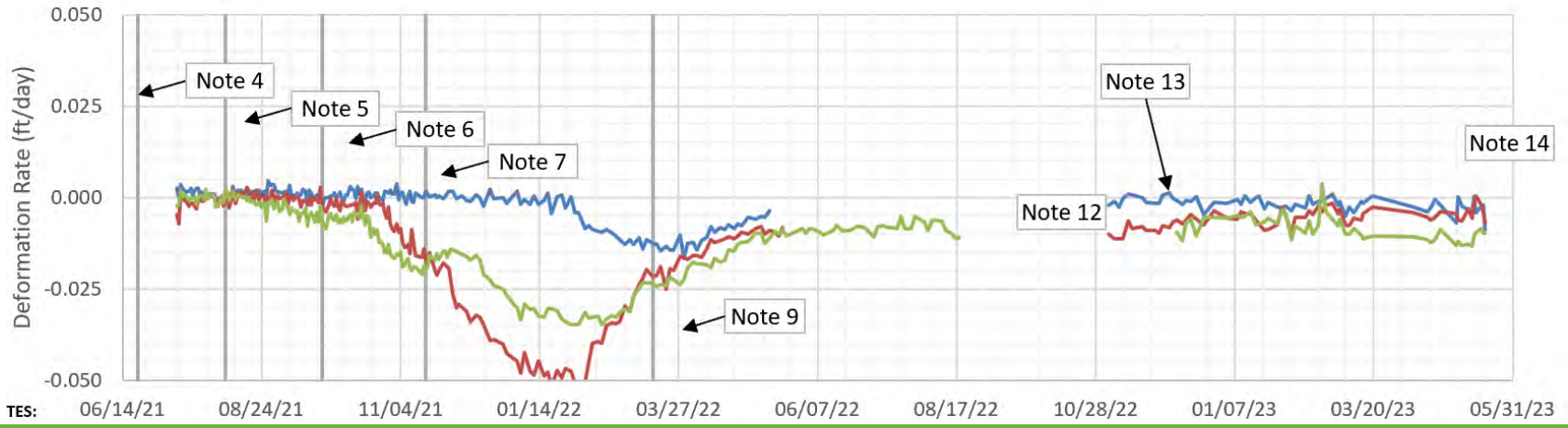
Settlements calculated between April 28 and May 30 flyovers

Monitoring Response

Surface Displacement – DGPS (Crest)

- Crest DGPS monument displacements have remained stable or slowed slightly.





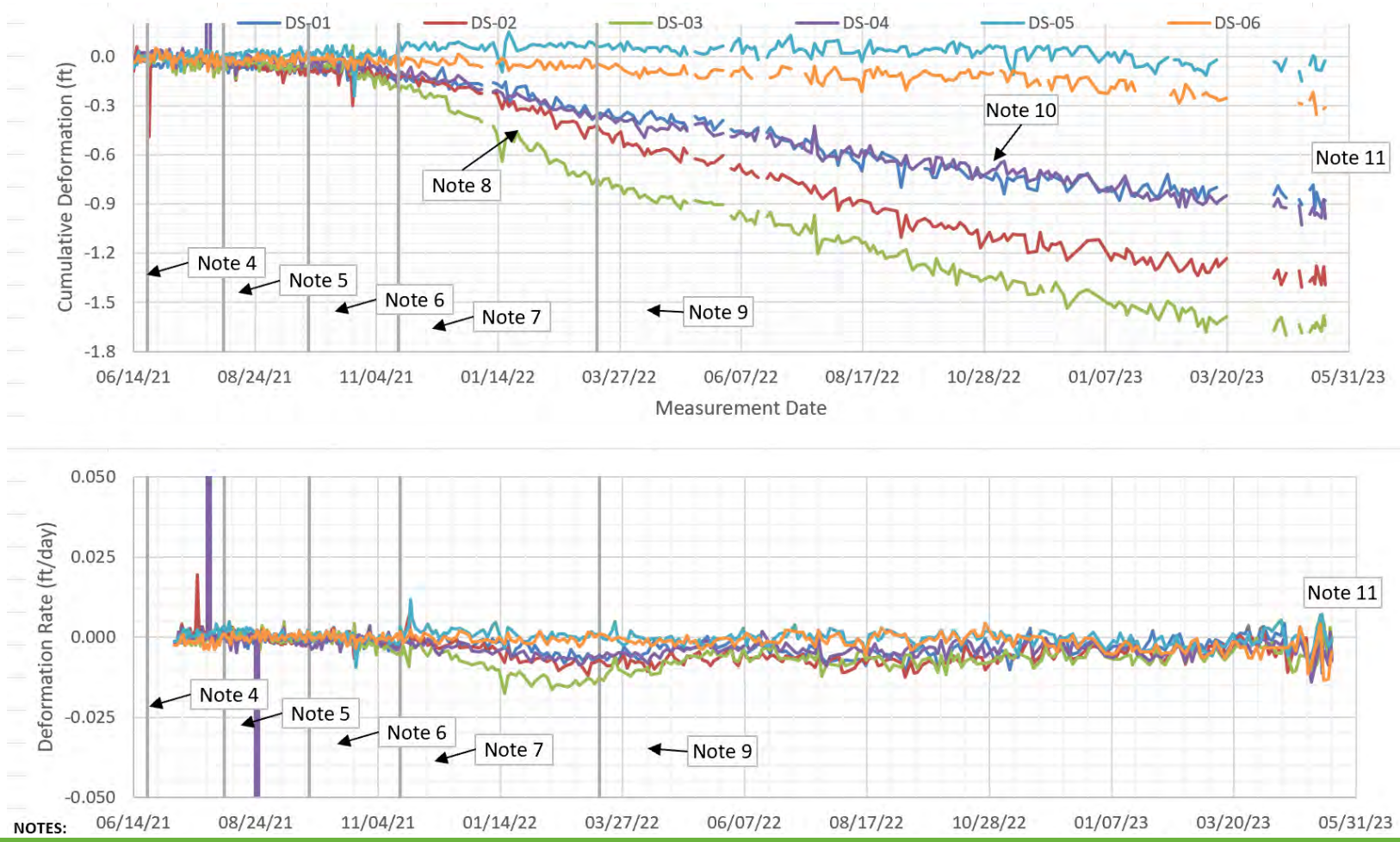
TES:

Fig. 13 – DGPS N-S Displacement Data; Pipeline Ramp (May 17, 2023)

Monitoring Response

Surface Displacement – DGPS (Pipeline Ramp)

- Tailings Pipeline Ramp DGPS monument deformations have continued to slow



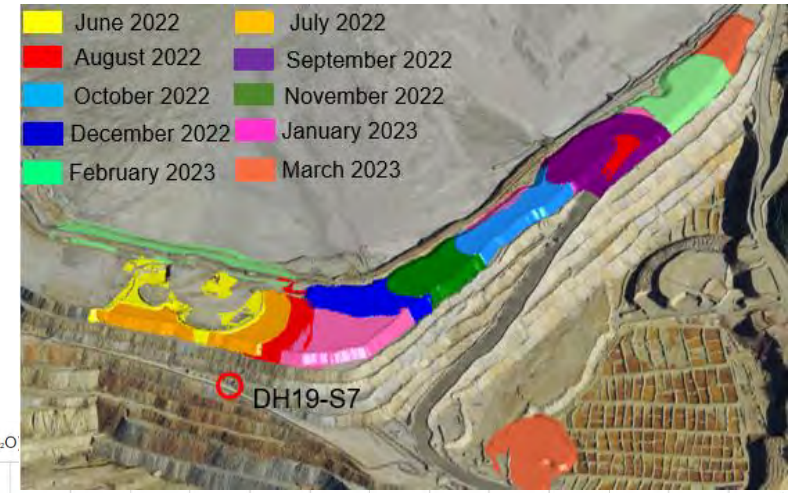
NOTES:

Fig. 13 – DGPS N-S Displacement Data; Pipeline Ramp (May 17, 2023)

Monitoring Response

Pore Water Pressure – DH19-S7

- Pore water pressures within DH19-S7 VW7 increased during March 2023; has continued to increase slightly during May 2023
  - Sensor installed within the historical 1982 lift-top interval
  - Previously observed a pore water pressure increase during EL. 6,450 ft lift, followed by dissipation
  - Recent increase (approx. 25 ft) occurred after large-scale completion of EL. 6,450 ft lift.
    - Primarily inferred to be associated with alluvial facing along the upstream central rockfill surcharge
    - Precipitation and snowmelt may also contribute



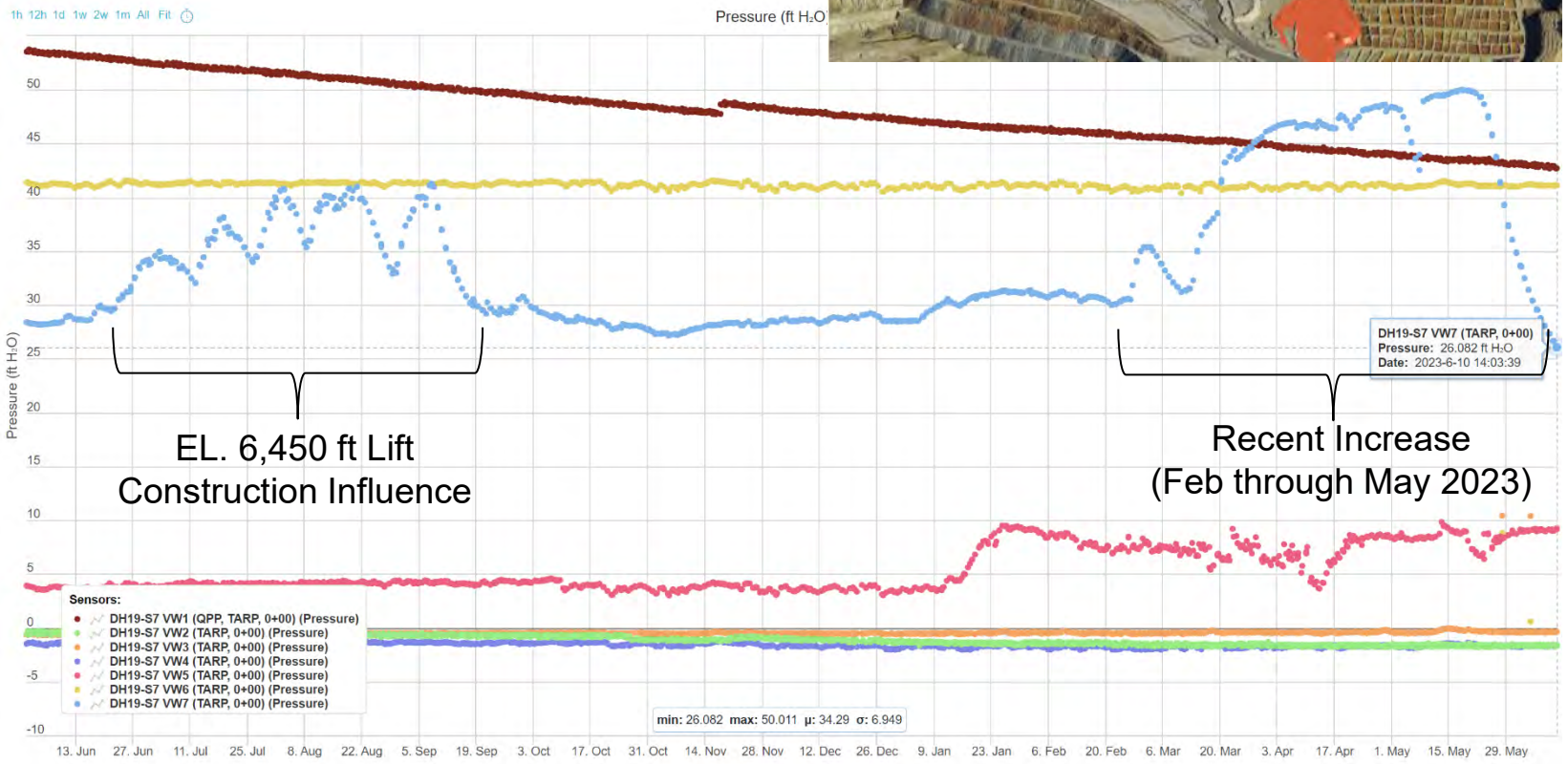
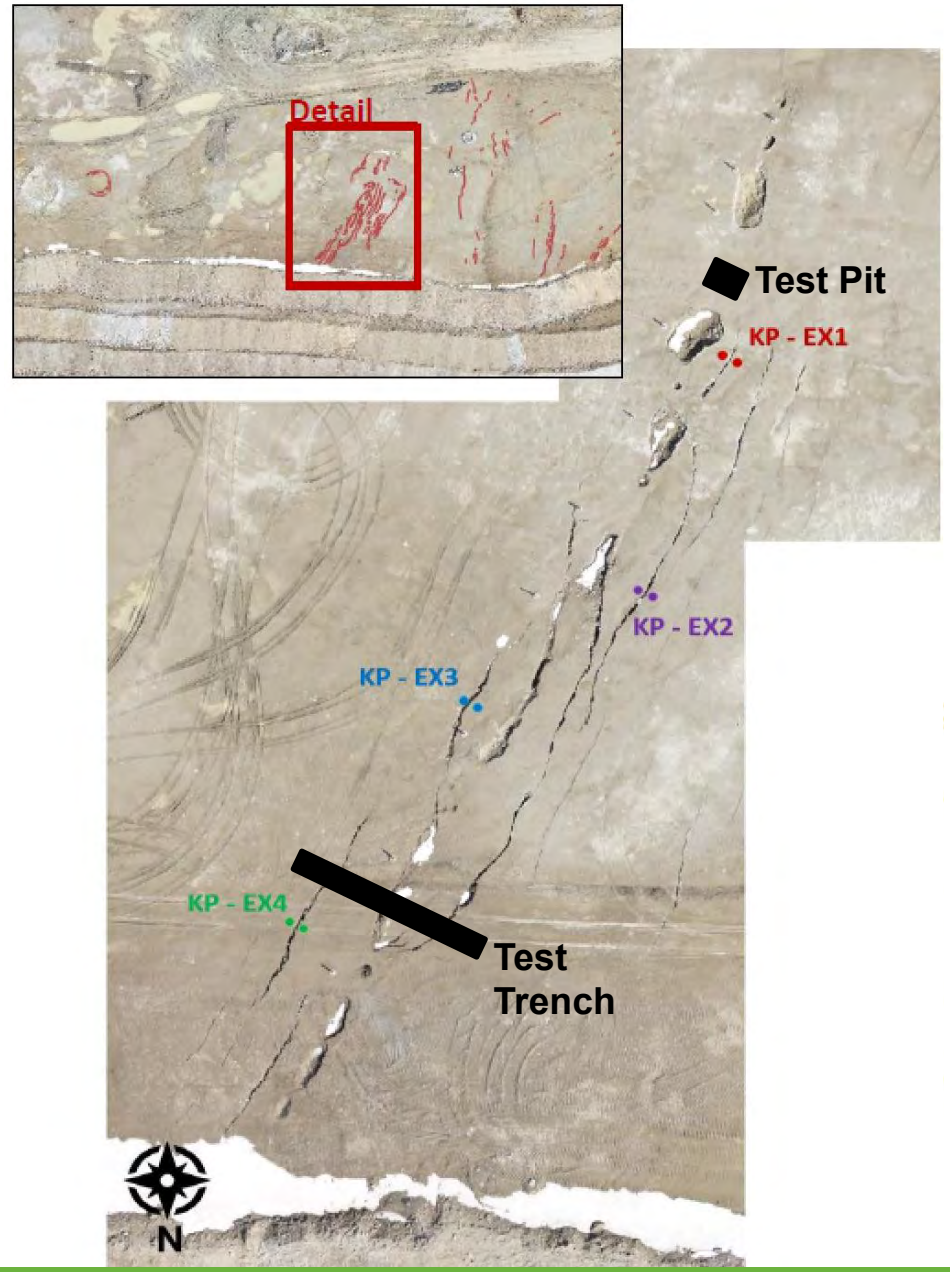


Fig. 15 – DH19-S7 Pore Water Pressure (June 10, 2023)

Monitoring Response

Test Pitting & Trenching



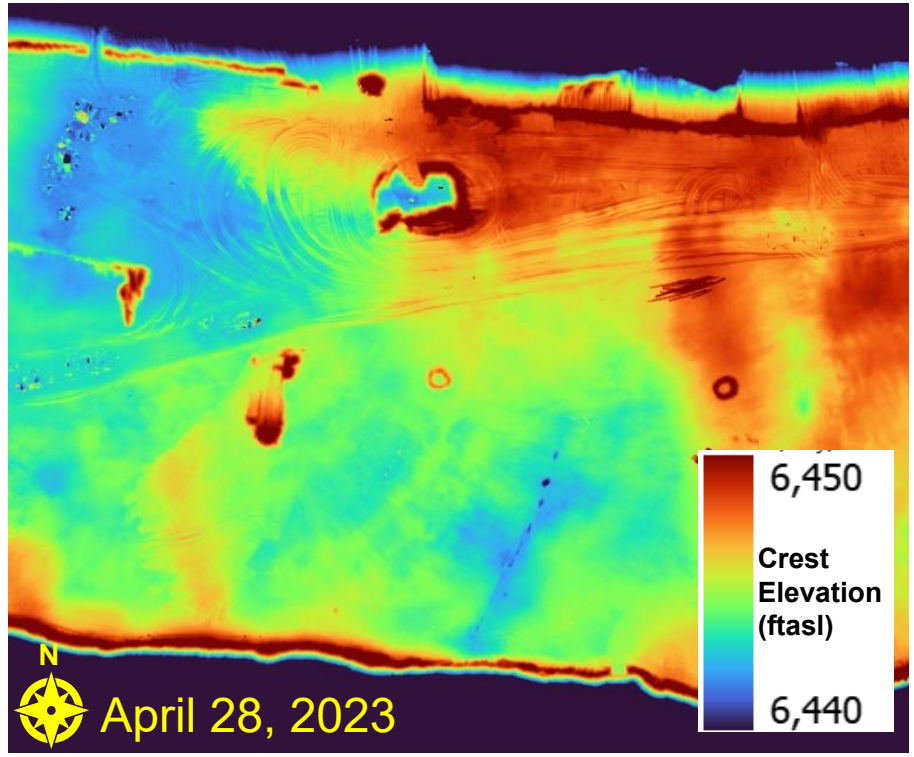
Monitoring Response

Test Pitting & Trenching

Level 1 Cracking Event

Response Summary & Next Steps

- The April 28, 2023 Level 1 Cracking Event response comprises the following phases:
  - Initial notification from MR (completed April 28)
  - Initial inspection & monitoring response (completed April 28 - June 11)
    - No discernable crack progression
    - No discernable accelerating embankment deformations
  - Test pit/trench investigation of crack depth (completed June 12)
    - Test pit and test trench were completed
    - Rockfill typical of 50 ft lift top material; minor cracks visible in trench (1-3 ft depth)
  - Remediation & continued monitoring (to be initiated imminently)
    - KP are evaluating remedial measures, which will generally comprise:
      - Ripping/shallow excavation of existing cracked surface
      - Leveling/infilling low areas on embankment crest to reduce potential ponding
    - Additional inspection of the main cracking area following remediation to screen for re-expression of cracking
    - Significant embankment crest areas are presently low of the design elevation and will be infilled to achieve a minimum 6,450 ft crest elevation, with grading to reduce potential for ponding on the embankment crest.



Summary & Closing

Summary & Closing

Summary of Key Findings

- YDTI performance monitoring continues to indicate that the facility is operating as intended and no QPP/CPP exceedances have occurred during 2023.
- Embankment deformations (surface and subsurface) continue to slow following completion of East-West and North-South Embankment EL. 6,450 ft lift construction, in August 2022 and March 2023, respectively.
- Significant cracking and depressions were observed along Section 0+00 of the EL. 6,450 ft embankment crest on April 27, 2023, which triggered a Level 1 Unusual Occurrence response.
  - Differential settlement is interpreted to have resulted in initial cracking. Recharge from ponding present on the embankment crest is inferred to have exacerbated the cracking, resulting in localized collapse features
  - Available monitoring data since identification of the cracks does not indicate crack progression or accelerating deformations.
  - Planning for remediation of the main cracking area is underway and will be completed ASAP. Additional monitoring and periodic inspection will be completed to screen for re-expression of cracking.

Thank You

Kevin Davenport
kdavenport@knightpiesold.com
+1 (604) 685-0543