

November 1, 2021 Project No. 123-93309-10

#### **Kevin O'Hara**

Ohio Environmental Protection Agency Division of Environmental Response and Revitalization Southeast District Office 2195 Front Street Logan, OH 43138

# WORKPLAN FOR DECOMMISSIONING MONITORING WELL RBH-02 SATRALLOY SITE (JEFFERSON COUNTY, OHIO)

Dear Mr. O'Hara:

On behalf of Cyprus Amax Minerals Company (CAMC), Golder is submitting this workplan for the decommissioning of Monitoring Well RBH-02. The purpose of this well, combined with RBH-01 and RBH-03, was to vertically profile bedrock at the Site as described in the Draft Remedial Investigation Report (RI Report) submitted (June 28, 2021). Because the well is located on property not owned by CAMC and can no longer be accessed, RBH-02 will be decommissioned.

### 1.0 SCOPE OF WORK

## 1.1 Well Decommissioning

RBH-02 will be decommissioned in accordance with the OEPA Division of Drinking and Ground Waters Technical Guidance Manual (TGM) for Hydrogeologic Investigations and Ground Water Monitoring, Chapter 9, Sealing Boreholes and Decommissioned Monitoring Wells (September 2016). RBH-02 was drilled and constructed by Golder in October 2013, as described in the Draft RI Report (June 2021). A copy of the drilling log and well construction log is provided in Attachment 1. The well is constructed with one 4.5' vertically screened interval in a single aquifer with solid casing and a pressure grouted annulus from approximately182 feet below ground to the surface. Well construction was visually observed on June 30, 2021 and found to be in good condition.

RBH-02 will be sealed in-place as follows:

- The PVC well casing will be pressure grouted using a pump and tremie tube (i.e., from the bottom up) to approximately 20 below ground surface.
- After the grout is set according to the manufacturer recommendations, the upper 20 feet of the unconsolidated and weathered bedrock original borehole will be over drilled with 10-inch diameter sonic casing, shallow PVC well casing removed, and the borehole backfilled with a cement/bentonite grout. All surface elements (bollards, concrete, etc.), will be removed.

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Ohio Environmental Protection Agency

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The ground surface will be graded with existing surface materials.

#### 1.2 Report

A Golder geologist will monitor well decommissioning and prepare a letter report summarizing the work. This report will include:

- Photo documentation.
- A copy of the well decommissioning report prepared by the driller for submittal to the Ohio Department of Natural Resources.

#### **CLOSING** 2.0

We request your expedited review of this workplan in order to ensure the timely initiation of well decommissioning scheduled to begin the week of November 8, 2021. If you have any questions, please contact Barbara Nielsen at (480) 313-2895.

Sincerely yours,

Golder Associates Inc.

tu lat Holder Lee K. Holder, PE

Associate Engineer, Project Manager

LKH/ND/sb

Attachments: Attachment 1: Record of Borehole (RBH-2)

Barbara Nielsen, Cyprus Amax Minerals Company cc:

https://golderassociates.sharepoint.com/sites/143623/project files/5 technical work/130 - work plan/final/satralloy-l-rev0-rbh-2 decommissioning plan phase 2\_110121.docx



## **ATTACHMENT 1**

Record of Borehole (RBH-2)

PROJECT: Satralloy PROJECT NUMBER: 12393309 SHEET 1 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 RECORD OF BOREHOLE RBH-2 START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy DATUM: OH St. PL. North PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic TOC ELEVATION: 994.9 DRILL RIG: 8140LC ROCK TYPE DOWNHOLE HYDROLOGY R ISRM STRENGTH RI INDEX ∽w¹ ISRM WEATHERIN →w5 INDEX LABORATORY DEPTH (ft) DRILL METHOD P00 WELL CONSTRUCTION AND WATER LEVELS TEST AND DRILLING TEST RESULTS CORE FRAC-TURES PER FOOT **GAMMA** ELEV. RUN NO. RQD % LOG TEST NOTES DESCRIPTION NOTES DEPTH RBH-2 8998 (ft) RBH02 (0-0.5) 0.0 - 0.5 Slag 991.7 0.5 - 3.9 Slag: broken white Stickup: fragments, dry 988.3 3.9 - 9.8 Silty Clay - 5 RBH02 (4.25-5.83) RBH02 (6-7) 982.4 Sonic 9.8 - 14.0 9.8 - 10 // Weathered bedrock primarily silt texture SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16 // // // 978.2 14.0 - 15.0 14.0 Weathered bedrock -primarily silt texture 977.2 15 15.0 - 20.0 15.0 Siltstone: tan to brown 20 Log continued on next p DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah Golder RBH-2 ssociates DRILLER: Dave S. CHECKED DATE: 8/29/2016

PROJECT: Satralloy PROJECT NUMBER: 12393309 RECORD OF BOREHOLE RBH-2 SHEET 2 of 10 30 DEPTH SOIL DRILL: 20 DATUM: OH St. PL. North START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy PHASE: RBH DEPTH ROCK CORE: 200 NORTHING: N: 240,816.60 LOCATION: Mid-way up ridge TOTAL DEPTH: 200 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic DRILL RIG: 8140LC TOC ELEVATION: 994.9 ROCK TYPE DOWNHOLE HYDROLOGY ST-Stepped I-Irregular P-Polished K-Slickensid SM-Smooth R-Rough VR-V.Rough Fr-Fracture R ISRM STRENGTH RI INDEX ∽w¹ ISRM WEATHERIN →w5 INDEX LABORATORY DEPTH (ft) DRILL METHOD P00 TEST AND DRILLING WELL CONSTRUCTION TEST RESULTS AND WATER LEVELS CORE FRAC-TURES PER FOOT **GAMMA** RQD % ELEV. Š LOG TEST NOTES DESCRIPTION TYPE AND SURFACE NOTES DEPTH RBH-2 8998 (ft) 20.0 - 22.2 20.0 Slightly weathered, thickly laminated, olive, ron stained rubble and corestone very fine-grained, weak to medium strong, SANDSTONE/SILTSTONE with iron stained (assumed core loss) bedding (assumed core loss) 970.0 22.2 - 23.2 22 2 Fresh-slightly weathered, thickly to Iron stained bed. Plan fractures 15° thinly laminated, dark 969.0 gray, weak, interlayered, SILTSTONE and 23.2 968.6 23.6 SHALE, with iron-stained bedding and joints 23 2 - 23 6 Fresh, thinly laminated, 9.00 9.80 1 - 25 weak, thinly interlayered, SILTSTONE and SHALE, transitional laver 23.6 - 37.8 Slightly weathered, thinly laminated, dark gray, SHALE, with iron-stained bedding and joints. Inferred missing interval 29.8-34.9' based on weak rock strength/moderate fractured rockmass Sore - 30 to 2 to 1 Rock <u>4.90</u> Iron stains 2 on bedding and fractures 35 ron stains as above 954.4 378-415 37.8 Fresh-slightly weathered, medium bedded, light gray, medium strong to strong, SHALE, w little fracturing 40 Log continued on next p DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah RBH-2 Golder DRILLER: Dave S. CHECKED DATE: 8/29/2016 ssociates

10/27/16

DUL.GOLDER.GDT

SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ

PROJECT: Satralloy PROJECT NUMBER: 12393309 RECORD OF BOREHOLE RBH-2 SHEET 3 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 DATUM: OH St. PL. North START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic TOC ELEVATION: 994.9 DRILL RIG: 8140LC ROCK TYPE DOWNHOLE HYDROLOGY ® ISRM STRENGTH INDEX ST-Stepped I-Irregular P-Polished K-Slickensid ∽w¹ ISRM WEATHERIN ∠w5 INDEX LABORATORY DEPTH (ft) DRILL METHOD P00 WELL CONSTRUCTION AND WATER LEVELS TEST AND DRILLING TEST RESULTS CORE FRAC-TURES PER FOOT **GAMMA** RUN NO. RQD % ELEV. LOG TEST NOTES DESCRIPTION NOTES DEPTH RBH-2 8998 (ft) 950.7 41.5 - 42.7 41.5 Light gray, strong, SANDSTONE 949.5 Iron stained 65° 42.7 - 46.0 42.7 Fresh-slightly weathered, medium bedded, light gray, medium strong to strong, SHALE, with moderate fracturing with iron staining Iron stained 75° Iron stained 45° 5.60 9.90 3 - 45 46.0 - 49.8 46.0 Inferred core loss Core 942 4 49.8 - 59.1 49.8 - 50 to 2 to 1 Rock SHALE/MUDSTONE, as above. non-laminated, thickly bedded, little fracturing, non-depositional color change to reddish gray from 51' to 59', weak SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16 reaction to HCL Pump test: 46.0'-59.8'. 0.2 L/min sustainable flow rate. 9.30 10.00 4 55 65° 59.1 - 59.8 59.1 Inferred core loss 932.4 60 Log continued on nex DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah RBH-2 Golder DRILLER: Dave S. CHECKED DATE: 8/29/2016 **Associates** 

PROJECT: Satralloy PROJECT NUMBER: 12393309 SHEET 4 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 RECORD OF BOREHOLE RBH-2 DATUM: OH St. PL. North START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic DRILL RIG: 8140LC TOC ELEVATION: 994.9 ROCK TYPE DOWNHOLE HYDROLOGY ST-Stepped I-Irregular P-Polished K-Slickensid SM-Smooth R-Rough VR-V.Rough Fr-Fracture R ISRM STRENGTH RI INDEX ∽w¹ ISRM WEATHERIN →w5 INDEX LABORATORY DEPTH (ft) ILL METHOD P00 TEST AND DRILLING WELL CONSTRUCTION TEST RESULTS AND WATER LEVELS CORE FRAC-TURES PER FOOT **GAMMA** RUN NO. RQD % ELEV. LOG TEST NOTES DESCRIPTION TYPE AND SURFACE NOTES DEPTH RBH-2 8898 60.0 - 68.0 SHALE/MUDSTONE, as above, weak from 60-61, then fresh surface medium strong to 68 ft, no indication of natural fracturing 6.70 8.20 5 - 65 68.0 - 70.0 Fresh, thickly bedded, Run 6 -driller notes last 6-8 68.0 light gray, strong, LIMESTONE, micritic, 1.20 1.80 softer. 6 reacts with HCL Sore - 70 to 2 to 1 Rock 70.0 - 71.5 Inferred core loss 70.0 920.7 SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16 71.5 - 77.5 SHALE/MUDSTONE, as above, from 61'-68', becoming laminated to thinly bedded below 75', no fractures. Texture becomes increasingly silty with few rip-up mud clasts below 76.5' Recovery 8.50 10.00 7 tests: 69.5'-79.8'. 75 No water produced. Driller notes hard material ~77'-79.8'. 77.5 - 79.8 77.5 Fresh, laminated, gray, strong, SILTSTONE, with possible bioturbation/biochem Recovery 80 Log continued DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah RBH-2 Golder DRILLER: Dave S. CHECKED DATE: 8/29/2016 ssociates

PROJECT: Satralloy PROJECT NUMBER: 12393309 RECORD OF BOREHOLE RBH-2 SHEET 5 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy DATUM: OH St. PL. North PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic TOC ELEVATION: 994.9 DRILL RIG: 8140LC ROCK TYPE DOWNHOLE HYDROLOGY ST-Stepped I-Irregular P-Polished K-Slickensid R ISRM STRENGTH RI INDEX ∽w¹ ISRM WEATHERIN →w5 INDEX LABORATORY DEPTH (ft) DRILL METHOD P00 WELL CONSTRUCTION AND WATER LEVELS TEST AND DRILLING TEST RESULTS CORE FRAC-TURES PER FOOT **GAMMA** RUN NO. RQD % ELEV. LOG TEST NOTES DESCRIPTION NOTES DEPTH RBH-2 8998 (ft) 79.8 - 81.4 Inferred core loss 79.8 69.5'-90'. No water produced. (Continued) 910.8 81.4 - 88.7 Fresh, laminated, gray, 81.4 weak, SHALE, becoming medium strong below 83.5', with little fractures Surface Seal: Bentonite chips 8.40 10.20 - 85 8 test: 69.5'-100'. No water produced. 903.5 88.7 - 106.0 Fresh, thickly laminated, massive, laminated, massive, gray, very fine-grained, medium strong, SANDSTONE, with abundant black silty rip-up clasts from 88.7 to 90.0°. Most bedding occurs at 85-88 Core - 90 to 2 to 1 Rock degrees with respect to core axis. Max 80 SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16 degrees, frequently thin black streaks below 90 degrees, micaceous, with no fractures - 95 9 100 Log continued DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah Golder RBH-2 DRILLER: Dave S. CHECKED DATE: 8/29/2016 ssociates

RECORD OF BOREHOLE RBH-2 SHEET 6 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 PROJECT: Satralloy PROJECT NUMBER: 12393309 START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy DATUM: OH St. PL. North PHASE: RBH NORTHING: N: 240,816.60 LOCATION: Mid-way up ridge EASTING: E: 2,477,934.00 TOTAL DEPTH: 200 CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 GS ELEVATION: 992.23 DRILLING METHOD: Sonic DRILL RIG: 8140LC TOC ELEVATION: 994.9 ROCK TYPE DOWNHOLE HYDROLOGY ST-Stepped I-Irregular P-Polished K-Slickensid SM-Smooth R-Rough VR-V.Rough Fr-Fracture R ISRM STRENGTH RI INDEX ∽w¹ ISRM WEATHERIN →w5 INDEX LABORATORY DEPTH (ft) P00 LL METHO TEST AND DRILLING TEST WELL CONSTRUCTION AND WATER LEVELS CORE FRAC-TURES PER FOOT **GAMMA** RQD % ELEV. 8 LOG TEST NOTES DESCRIPTION RUN TYPE AND SURFACE NOTES DEPTH RBH-2 8898 100 SANDSTONE, same 100' stop for week, leave pressure transducer in fine-grained and with fewer black streaks below 99.7', micaceous 88.7 - 106.0 Fresh, thickly hole overnight. laminated, massive, gray, very fine-grained, medium strong, SANDSTONE, with abundant black silty rip-up clasts from 88.7 to 90.0'. Most bedding occurs at 85-88 degrees with respect to core axis. Max 80 degrees, frequently thin black streaks below 90 degrees, micaceous, with no fractures (Continued) 10 10.00 - 105 SANDSTONE, same as above, with thin COAL streak at 105.1', 886.2 occasional micaceous 106.0 parting 106.0 - 110.0 Fresh, thickly bedded, reddish brown. medium-grained, medium strong, SANDSTONE, with sharp color change gray to reddish-brown at 105.9-106.0', with no fractures Core - 110 to 2 to 1 Rock 110.0 - 119.0 110.0 SANDSTONE, same as above, with thin COAL streaks becoming frequent below 111.0' (3 to 6 inch intervals) and 1/4-inch COAL at 117.3'. Streaks commonly associated with lenticular reddish brown inclusions bedding is 85-88 degrees with respect to core axis 11 <u>9.00</u> 115 119.0 - 120.2 119.0 Inferred core loss 120 Log continued on next p DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah RBH-2 Golder DRILLER: Dave S. CHECKED DATE: 8/29/2016 ssociates

10/27/16

DUL.GOLDER.GDT

SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ

PROJECT: Satralloy PROJECT NUMBER: 12393309 SHEET 7 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 RECORD OF BOREHOLE RBH-2 START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEAT HER: 40Deg F Partly cloudy DATUM: OH St. PL. North PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic TOC ELEVATION: 994.9 DRILL RIG: 8140LC ROCK TYPE DOWNHOLE HYDROLOGY ® ISRM STRENGTH INDEX ST-Stepped I-Irregular P-Polished K-Slickenside ∽w¹ ISRM WEATHERIN ∠w5 INDEX LABORATORY DEPTH (ft) DRILL METHOD P00 TEST AND DRILLING NOTES WELL CONSTRUCTION AND WATER LEVELS TEST RESULTS CORE FRAC-TURES PER FOOT **GAMMA** ELEV. RUN NO. RQD % LOG TEST NOTES DESCRIPTION DEPTH RBH-2 8998 (ft) 120 872.0 120.2 120.2 - 144.4 Fresh, medium bedded, massive, light gray, fine-grained, medium strong, SANDSTONE, with minor thin COAL streaks between 122.2 and 123.6', with reddish brown lenses and coloration from 122.2-123.1' 12 <u>9.80</u> - 125 Core - 130 to 2 to 1 Rock SANDSTONE, same as above, with thin SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16 COAL streaks at 130.9 and 133.5' 13 10.50 10.00 135 SANDSTONE, as above without coal streaks 135.8 to 141.0' 140 Log continued on next DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah Golder RBH-2

CHECKED DATE: 8/29/2016

DRILLER: Dave S.

ssociates

PROJECT: Satralloy PROJECT NUMBER: 12393309 SHEET 8 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 RECORD OF BOREHOLE RBH-2 START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy DATUM: OH St. PL. North PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic TOC ELEVATION: 994.9 DRILL RIG: 8140LC ROCK TYPE DOWNHOLE HYDROLOGY ® ISRM STRENGTH INDEX ST-Stepped I-Irregular P-Polished K-Slickenside ∽w¹ ISRM WEATHERIN ∠w5 INDEX LABORATORY DEPTH (ft) DRILL METHOD P00 TEST AND DRILLING NOTES WELL CONSTRUCTION AND WATER LEVELS TEST RESULTS CORE FRAC-TURES PER FOOT **GAMMA** ELEV. RUN NO. RQD % LOG TEST NOTES DESCRIPTION DEPTH RBH-2 8998 140 120.2 - 144.4 Fresh, medium bedded, massive, light gray, fine-grained, medium strong, SANDSTONE, with minor thin COAL streaks between 122.2 and 123.6', with reddish brown lenses and coloration from 122.2-123.1 (Continued) SANDSTONE, as above, with thin COAL streak at 143.0' 847.8 144.4 - 167.5 Fresh, thickly bedded, gray, medium strong, SHALE, with possible bioturbation at 147.0 to 144.4 14 <u>9.10</u> - 145 S - 150 to 2 to 1 Rock SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16 15 8.70 10.00 155 160 Log continued DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah Golder RBH-2

CHECKED DATE: 8/29/2016

DRILLER: Dave S.

ssociates

PROJECT: Satralloy PROJECT NUMBER: 12393309 SHEET 9 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 RECORD OF BOREHOLE RBH-2 START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy DATUM: OH St. PL. North PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic TOC ELEVATION: 994.9 DRILL RIG: 8140LC ROCK TYPE DOWNHOLE HYDROLOGY ® ISRM STRENGTH INDEX ST-Stepped I-Irregular P-Polished K-Slickensid ∽w¹ ISRM WEATHERIN →w5 INDEX LABORATORY DEPTH (ft) ILL METHOD P00 TEST AND DRILLING NOTES WELL CONSTRUCTION AND WATER LEVELS TEST RESULTS CORE FRAC-TURES PER FOOT **GAMMA** ELEV. RUN NO. RQD % LOG TEST NOTES DESCRIPTION DEPTH RBH-2 8998 160 144.4 - 167.5 Fresh, thickly bedded, gray, medium strong, SHALE, with possible bioturbation at 147.0 to 148.0' (Continued) 16 9.80 10.00 - 165 824.7 167.5 - 179.9 167.5 Fresh, very thinly bedded, massive, light gray, fine-grained, medium strong, SANDSTONE, with occasional micaceous parting, with bedding 82-85 degrees with respect to core axis Core - 170 to 2 to 1 Rock 4.30 5.00 17 175 Bentonite chips SANDSTONE, as above, with grayish streaks 176.0 to 178.0' Seal: 18 4.80 5.00 812.3 180 Log continued on next pa DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah RBH-2 Golder DRILLER: Dave S. ssociates CHECKED DATE: 8/29/2016

SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16

PROJECT: Satralloy PROJECT NUMBER: 12393309 SHEET 10 of 10 30 DEPTH SOIL DRILL: 20 DEPTH ROCK CORE: 200 TOTAL DEPTH: 200 RECORD OF BOREHOLE RBH-2 START DATE/TIME: 10/29/2013 / 13:30 END DATE/TIME: 11/07/2013 / 16:30 WEATHER: 40Deg F Partly cloudy DATUM: OH St. PL. North PHASE: RBH NORTHING: N: 240,816.60 EASTING: E: 2,477,934.00 GS ELEVATION: 992.23 LOCATION: Mid-way up ridge CLIENT: Cyprus Amax Minerals Company AZIMUTH: n/a INCLINATION: -90 DRILLING METHOD: Sonic TOC ELEVATION: 994.9 DRILL RIG: 8140LC ROCK TYPE DOWNHOLE HYDROLOGY R ISRM STRENGTH RI INDEX ∽w¹ ISRM WEATHERIN →w5 INDEX LABORATORY DEPTH (ft) ILL METHOD P00 TEST AND DRILLING NOTES WELL CONSTRUCTION AND WATER LEVELS TEST RESULTS CORE FRAC-TURES PER FOOT **GAMMA** ELEV. RUN NO. RQD % LOG TEST NOTES DESCRIPTION DEPTH RBH-2 8998 (ft) 179.9 - 183.9 179.9 Fresh, thinly laminated, massive, gray, weak, SHALE with light gray SILTSTONE laminations at 3-6 intervals (Continued) Screen: Schedule 80 PVC 0.010 slotted Filter Pack: Silica #5 sand 808.3 183.9 - 184.2 808.0 Black COAL 184.2 184.2 - 187.9 Fresh, thickly bedded, 19 <u>7.90</u> - 185 massive, gray, weak, SHALE 187.9 - 191.4 187.9 Inferred core loss Core 190 to 2 to 1 Rock 800.8 SATRA-ROCK+LAB+WLAB+WELL+HYDROTEST LOGS WIP.10.21.2016.GPJ DUL.GOLDER.GDT 10/27/16 191.4 - 200.0 191.4 Fresh, thickly bedded. massive, gray, weak, SHALE 20 <u>8.70</u> 195 200 DEPTH SCALE:1 in to 2.5 ft LOGGED: D. Regalbuto DRILLING CONTRACTOR: Sonic Drilling Services CHECKED: J. Nasrallah Golder RBH-2 DRILLER: Dave S. CHECKED DATE: 8/29/2016 ssociates