APPENDIX J

Preliminary Services Borrow Source Site Investigation

(Pages J-1 to J-376)

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Dear Nick,

RE: Klamath River Renewal Project – Summary of Onsite Borrow Source Site Investigation – DRAFT Rev B

1.0 INTRODUCTION

The Klamath River Renewal Project (KRRP) underwent a Value Engineering (VE) Phase prior to moving the progressive design forward to the 90% design milestone. As part of the VE phase Knight Piésold (KP) completed an onsite assessment of potential borrow sources at each of the four dam sites. The proposed borrow sources were outlined in KP Work Plan 'VA20-00737'. This borrow source VE focused to identify possible erosion protection and some granular fill onsite borrow sources and was limited to surficial investigations with no subsurface excavations. The purpose of this letter is to summarize the site investigation findings including an approximate material classification at each site, and provide an estimated potential borrow source volume.

The site investigation was completed by two KP representatives between May 5 and May 8, 2020. Each of the evaluated borrow areas was visually assessed for material type and particle size. To supplement the visual and hand field particle size measurements, photogrammetry analysis was used to assist in the classification the material gradation within the borrow sources. Photographs were taken with 10-inch scale-balls placed on accessible talus and rock piles and were sent to Split Engineering for analysis. Finer grained soils sent for photogrammetry analysis were photographed with a ruler or tape measure as a scale. Relative hardness (strength) of the potential erosion protection materials encountered were obtained using a Schmidt rebound hammer. Erosion protection material samples were obtained at each potential borrow site in 5-gallon buckets. Samples of granular fill were obtained at each potential site in 1-gallon plastic bags. These samples were taken to the KP laboratory for additional testing.

Steep slopes, boulder fields with large voids and loose surface ground prohibited safe access in some potential site borrow areas. In these cases, an attempt was made to capture the general area with photographs and visually classify the material.

A summary of the sample inventory is presented in Appendix A - Table A.1. The samples were sent to KP's geotechnical laboratory in Denver, Colorado to coordinate with laboratories in the area for the following tests:

- Point Load – ASTM D5731
- Micro-Deval – ASTM D6928
- Magnesium Sulphate Soundness – ASTM C88
- Specific Gravity and Absorption – ASTM D6473

- X-Ray Diffraction (XRD)
- Modified Acid Base Accounting (ABA)
- Synthetic Precipitate Leaching Procedure (SPLP) – EPA 1312
- Particle Size Analysis (PSA) – ASTM D6913

Field Schmidt rebound hammer test values are summarized and presented in Appendix A - Table A.2. A summary of the approximate coordinates that bound each of the borrow sources investigated is included in Table A.3. A catalog of borrow assessment site visit photographs are presented in Appendix B.

2.0 POTENTIAL BORROW SOURCES FOR EROSION PROTECTION AND GRANULAR FILL

The following sections describe each of the assessed potential borrow sites. The boundaries of the potential borrow sources are denoted for each project location and borrow area on the respective area Figures below. The sites are classified as either a potential source for 'Erosion Protection Material' or 'Granular Fill'. Some borrow site locations are subdivided where the available material type and particle size differs significantly. Due to smaller gradations of clean rock found at some potential erosion protection borrow sites, and similarities between smaller particle size erosion protection, and desired bedding, the bedding materials were considered when assessing the erosion protection sites.

2.1 IRON GATE WORKER'S ACCOMMODATION AREA

The Iron Gate Worker's Accommodation borrow site is located on the right bank of the Klamath River approximately 1,000 ft downstream the Iron Gate dam. The material on the cut face to the north of the workers accommodation was the primary focus of the investigation, as shown in Figure 2.1, and comprised a potential granular fill potential source, with some limited erosion protection material present adjacent to a rock outcrop.

Granular fill potential source

- Observed gradation of the two Sub-Areas identified:
  - Sub-area 1: ~10% 2-ft minus material, ~35% 1-ft minus material, ~30% 6-inch minus material, ~20% sand, <5% minus No. 200 (plastic fines), approximately 590 yd² based on aerial imaging.
  - Sub-area 2: Rock outcrop and limited talus present. Not a significant source of erosion protection material by volume. Basalt, moderately weathered, angular, strong to very strong, breaks with moderate to hard strikes with rock hammer, Schmidt Hammer strength values ranging from 12 to 41 ksi with no apparent sulfide mineralization.
- Approximately 2 ft of finer material exists on the lower 10 ft of exposed slope face of both Sub-Areas. A Split-NET gradation analysis of this material is presented in Appendix C - Figure C1. Results indicated a D_{85} = 1.4", D_{50} = 0.31" and D_{15} = 0.03".
- Granular Fill sample IGW-GF1 was obtained along the toe of the slope for sieve analysis and soil classification. Results indicate clayey gravel and sand, highly plastic, which generally agrees with the Split-NET analysis. Results are presented in Section 3.2 and Appendix E.
- Erosion Protection sample IGWA-EP1 was obtained for laboratory testing but was not tested as this area was deemed not an adequate source of erosion protection.
- Road surfacing material generally 1.5 inch minus consisting of silty gravel with sand.
  - Approximate surface area and thickness of 1,100 yd², 0.1 ft, respectively.

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Based on the results of the field assessment, there is potential for Sub-Area 1 to be processed to produce granular fill. The hillside would have to be mined further into the slope to generate larger quantities. There does not appear to be any surficial infrastructure or property boundary impediments to accomplishing this. This area is not considered an adequate source of erosion protection material.

Figure 2.1 Iron Gate Worker's Accommodation Potential Borrow Source

2.2 IRON GATE LAKEVIEW ROAD

The Iron Gate Lakeview Road borrow site is located adjacent to Lakeview Road, approximately 1,100 ft east of Lakeview Bridge as shown in Figure 2.2. The material primarily comprised smaller class erosion protection, or possibly bedding material.

Erosion protection potential source

- Basalt, slightly weathered, angular, very strong, difficult to break with rock hammer, Schmidt hammer strength values ranging from 16 to 33 ksi with no apparent sulfide mineralization.
- Very little organics are apparent, almost zero vegetation is in area.
- Observed Gradation: <1% 4-foot minus material, ~10% 2-ft minus, ~25% 1-ft minus, ~40% 6-inch minus, ~25% 3-inch minus.
- Three Split-NET gradation analyses were completed and are presented in Appendix C - Figures C.2, C.3, and C.4. Results indicated a D_{85} = 13.7", D_{50} = 7.1" and D_{15} = 1.2"; a D_{85} = 8.5", D_{50} = 3.25" and D_{15} = 0.46"; and D_{85} = 21.3", D_{50} = 4.1" and D_{15} = 0.1".
- Granular Fill sample LV-GF1 was obtained for sieve analysis and soil classification. Sample was taken from the existing lakeview road wearing course and shoulder. Results indicate a sand and gravel with trace silt. Results are presented in Section 3.2 and Appendix E.
- Erosion Protection sample IGLV-1 was obtained for laboratory testing. Results are presented in Section 3.1 and Appendix D.

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- Borrow source surface area approximately 825 yd² based on aerial imaging.
- Assume excavation invert will be limited to the adjacent ditch line of road to avoid allowing water to pool.

Based on the results of the field assessment, the assessed area is appropriate for smaller size erosion protection or bedding material. The dashed area located to the east of the main borrow source may be suitable for use as granular fill, however a gradation of the material is difficult to estimate from a visual assessment without trenching or probing.

Figure 2.2 Iron Gate Lakeview Road Potential Borrow Source

2.3 IRON GATE DAM DOWNSTREAM FACE

The Iron Gate Dam Downstream Face has existing Erosion Protection placed from the dam crest to the fish hatchery at the dam toe. The dam face was sub-divided into three separate sub-areas based on the apparent surface erosion protection particle size, as shown on Figure 2.3.

Erosion protection potential source

- Basalt is slightly weathered, angular, very strong, and difficult to break with rock hammer; Schmidt hammer strength values range from 35 to 39 ksi with no apparent sulfide mineralization.
- Observed gradation of the three sub-areas assessed on the downstream face:
  - Sub-area 1: D_{50} = ~28”, D_{85} = 40”, approximately 2,980 yd² based on aerial imaging. Split-NET gradation analysis was completed and is presented in C.5. Results indicated a D_{85} = 36”, D_{50} = 18” and D_{15} = 3.4”.
  - Sub-area 2: D_{50} = ~20”, approximately 1,950 yd² based on aerial imaging. Split-NET gradation analysis was completed and is presented in C.6. Results indicated a D_{85} = 26”, D_{50} = 12” and D_{15} = 1.4”, which were smaller than the observed average gradation.

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- Sub-area 3: D_{50} = ~9", D_{85} = 12", D_{15} = 3" approximately 5,900 yd² based on aerial imaging. Split-NET gradation analysis was completed and is presented in C.7. Results indicated a D_{85} = 10", D_{50} = 3.5" and D_{15} = 0.4", which are smaller than the field observed average gradation.

- Erosion Protection sample IGDDS-1 was obtained for laboratory testing across lower half of embankment surface. Results are presented in Section 3.1 and Appendix D.
- The downstream dam face has a minimum erosion protection thickness of 5 ft, as per historic as-built drawing 5407-A-111.

The observed material quality and durability within all 3 sub-areas of the downstream shell are similar, however the material size varies across each sub-area. Sub-area 1 had the largest material, followed by Sub-areas 2, then Sub-area 3. Based field assessment results, this site can be used as a source for Erosion Protection of varying sizes.

Figure 2.3 Iron Gate Downstream Dam Face

2.4 COPCO NO. 1 ACCESS ROAD

The Copco No. 1 Access Road potential borrow source is located along the existing Copco No. 1 right bank access road and along the proposed future road alignment shown on drawing C2510. The access road construction will produce a surplus material, of which some is expected to be used as source of erosion protection or granular fill. This investigation, however, was limited to surface observations and was unable to ascertain the gradation and material type of the proposed bulk excavation. Two areas that had visible erosion protection material on surface were investigated, as shown on Figure 2.4.

Erosion protection potential source

- Fine-grained basalt, some vesicular, angular, lightly weathered, very strong, breaks with hard strikes from rock hammer, Schmidt hammer strength values ranging from 19 to 33 ksi with no apparent sulfide mineralization.
- Observed gradation of two Sub-areas assessed on the Copco No. 1 Access Road:
  - Sub-area 1: D_{50} = ~15”, <10% 3-inch minus material, approximately 365 yd^2 based on aerial imaging.
  - Sub-area 2: Not considered an adequate source. Localized erosion protection material available.
- Two Split-NET gradation analyses were completed in Sub-area 1 and are presented in Appendix C - Figures C.8, and C.9. Results indicated a D_{85} = 18”, D_{50} = 9” and D_{15} = 1.6”, and a D_{85} = 15”, D_{50} = 7” and D_{15} = 1.8”, respectively, which are smaller than the field observed average gradation.
- Erosion Protection sample CRBR-1 obtained for laboratory testing in Sub-area 1. Results are presented in Section 3.1 and Appendix D.

Figure 2.4 Copco No. 1 Access Road Potential Borrow Source

Based on the results of the investigation, Sub-area 1 may be an acceptable source of small size Erosion Protection, Riverbed, or Bedding Material. The surface material at Sub-area 2 does not have adequate coverage of large sized rocks to be a reliable borrow source.

2.5 COPCO NO. 1 VILLAGE

Copco No. 1 Village potential borrow source is located the north of the Copco No. 1 Dam Right Abutment and lies adjacent to an existing historic borrow source, as shown in Figure 2.5. The material was assessed as a potential source of granular fill.

Granular fill potential source

- USCS, SC, 1 to ½" minus, silty sand and gravel. Two Split-NET gradation analyses were completed and are presented in Figures C.10, and C.11 in Appendix C. Results indicated a D_{85} = 0.9", D_{50} = 0.2" and D_{15} = 0.03", and a D_{85} = 0.6", D_{50} = 0.2" and D_{15} = 0.03", respectively.
- Granular Fill sample C1V-1 obtained for sieve analysis and soil classification. Results indicate a silty gravel with some sand, which agrees well with the Spilt-Net Analysis shown on Figure C.10. Results are presented in Section 3.2 and Appendix E.
- Approximately 2,070 yd² based on aerial imaging.

Area may be possible source for finer grained granular fill.

Figure 2.5 Copco No. 1 Village Potential Borrow Source

2.6 COPCO NO. 2 DOWNSTREAM RIGHT BANK

The Copco No. 2 downstream right bank potential borrow source is a talus slope located approximately 250 ft downstream of the Copco No. 2 diversion dam, as shown on Figure 2.6. The talus comprises erosion protection material.

Erosion protection potential source

- Fine-grained basalt, some vesicular, angular, slightly weathered, very strong, difficult to break with rock hammer, Schmidt hammer strength values ranging from 25 to 42 ksi with no apparent sulfide mineralization.
- Observed gradation: D_{50} value ~ 48 inches, 20% 7-ft minus, 20% 5-ft minus ft, 50% 4-ft minus, 10% 1-ft minus.

  - o In the areas denoted by the orange boundaries in Figure 2.6, the D_{50} was observed to be smaller, approximately 32” to 36”.
- Two Split-NET gradation analyses were completed and are presented in Appendix C - Figures C.12, and C.13. Results indicated a D_{85} = 46”, D_{50} = 32” and D_{15} = 14”, and a D_{85} = 44”, D_{50} = 28” and D_{15} = 5”, respectively. The results of the analysis are suspected to be smaller than the field observed gradations due to the inability to place both scaling balls in the photograph to account for depth of field.
- Erosion Protection sample C2DSR-1 obtained for laboratory testing. Results are presented in Section 3.1 and Appendix D.
- No Granular Fill samples obtained at this site.
- Approximately 3,000 yd² based on aerial imaging.

The material found within the right bank talus pile is among the largest onsite sized boulders available and is appropriate for the large erosion protection sizes specified at the Copco No. 1 and No. 2 locations.

Figure 2.6 Copco No. 2 Downstream Right Bank Potential Borrow Source

2.7 COPCO NO. 2 DOWNSTREAM LEFT BANK

The Copco No. 2 downstream left bank potential borrow source is a talus slope located approximately 300 ft downstream of the Copco No. 2 diversion dam, as shown on Figure 2.7. The talus comprises erosion protection material.

Erosion protection potential source

- Fine-grained basalt, some vesicular, angular, slightly weathered, very strong, difficult to break with rock hammer, Schmidt hammer strength values ranging from 23 to 25 ksi with no apparent sulfide mineralization.

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- Observed Gradation: $D_{50} = 40$”, general material is 6-ft minus.
- Two Split-NET gradation analyses were completed and are presented in Appendix C -Figure C.14 and C.15. Results indicated a $D_{85} = 44$”, $D_{50} = 28$”, and $D_{15} = 15$”, and a $D_{85} = 60$”, $D_{50} = 33$”, and $D_{15} = 7.5$”, respectively. The two photographs are of the same area but at different setback distances. Figure C.15 photograph was taken further back, and the results were closer to the field observed gradation.
- Erosion Protection sample C2LB-1 was obtained for laboratory testing. Results are presented in Section 3.1 and Appendix D.
- No Granular Fill samples was obtained at this site.
- Approximately 1,940 square yards based on aerial imaging.

The material found within the talus pile on the left bank is among the largest sized boulders available onsite and is appropriate for the large erosion protection classes specified at the Copco No. 2 location.

Figure 2.7 Copco No. 2 Downstream Left Bank Potential Borrow Source

2.8 COPCO NO. 2 WOOD-STAVE PENSTOCK

The Copco No. 2 Wood-Stave Penstock is located to the south of the Wood-Stave Penstock and Tunnel #2 Inlet Portal along the Copco No. 2 Water Conveyance system. The area has possibly been previously used as borrow source or material storage site. The area was divided into three distinct materials, as shown in Figure 2.8.

Granular fill potential source

- Three distinct materials, working west to east:
  - Sub-area 1: USCS, GC, 3-inch minus brown, clayey gravel with sand, occasional cobbles, approximately 990 yd² based on aerial imaging. A Split-NET gradation analysis was completed and is presented in C.16. Results indicated a $D_{85} = 1.25$”, $D_{50} = 0.2$” and $D_{15} = 0.01$”.

- o Sub-area 2: USCS, GP, grey sandy gravel, approximately 230 yd² based on aerial imaging.
- o Sub-area 3: USCS, GP, 6-inch minus, 75-80% passing 3-inch screen, 50% > 1.5 inches, 20% passing 1-inch screen, approximately 240 yd² based on aerial imaging. A Split-NET gradation analysis of Sub-Area 3 is presented in Appendix C – Figure C.17. Results indicate a D_{85} = 3.5”, D_{50} = 1.2” and D_{15} = 0.14”.

- Granular Fill samples C2WP-1, C2WP-2 AND C2WP-3 was obtained for sieve analysis and soil classification. Results indicate C2WP-1 is a clayey gravel with some sand, highly plastic, and both C2WP2 and C2WP-3 are gravel, which all agrees well with the Split-Net Analysis. Results are presented in Section 3.2 and Appendix E.
- The coarse material in Sub-area 2 and 3, as shown in Figure 2.9, appear to be remnants of processed material that was stockpiled in this area. Without further excavation into the slope the confirmed depth of this coarse material was limited to 2 ft.

Figure 2.8 Copco No. 2 Wood-Stave Penstock Potential Borrow Source

Figure 2.9 Wood-Stave Penstock Sub-Area 3 Coarse Granular Fill

2.9 J.C. BOYLE DOWNSTREAM OF DAM

The area directly downstream of the J.C. Boyle was assessed for possible sources of erosion protection material. Five distinct sub-areas were investigated, as shown in Figure 2.10.

Erosion protection potential source

- Coarse-grained basalt, some vesicular, angular, lightly weathered, very strong, difficult to break with most specimens requiring multiple blows from rock hammer, Schmidt hammer strength values ranging from 15 to 34 ksi with no apparent sulfide mineralization.
- Observed gradations for the five Sub-areas assessed downstream of the J.C. Boyle dam:
  - Sub-area 1: D_{50} = ~9”, D_{max} = ~3 ft, ~35% passing 6” screen, ~20% waste, approximately 850 yd². Two Split-NET gradation analyses were completed and are presented in Appendix C - Figure C.18 and C.19. Results indicated a D_{85} = 12”, D_{50} = 2.4” and D_{15} = 0.03”, and a D_{85} = 26”, D_{50} = 8.4” and D_{15} = 0.03”, respectively.
  - Sub-area 2: D_{50} = 24”, approximately 250 yd². A Split-NET gradation analysis was completed and is presented in Figure C.20, in Appendix C. Results indicated a D_{85} = 33”, D_{50} = 19” and D_{15} = 4”.
  - Sub-area 3: not a significant source of material.
  - Sub-area 4: not a significant source, localized piles of approximately D_{50} = 36” material (see Figure 2.11).
  - Sub-area 5: D_{50} = 24”, D_{max} = 48”, approximately 2,020 yd² based on aerial imaging.
- Erosion Protection sample JCBEP-1 obtained for laboratory testing.
- No Granular Fill samples obtained at this site.

- The downstream dam face (Sub-area 1) has a minimum erosion protection thickness of 2 ft, as per historic as-built drawing AA 78084.

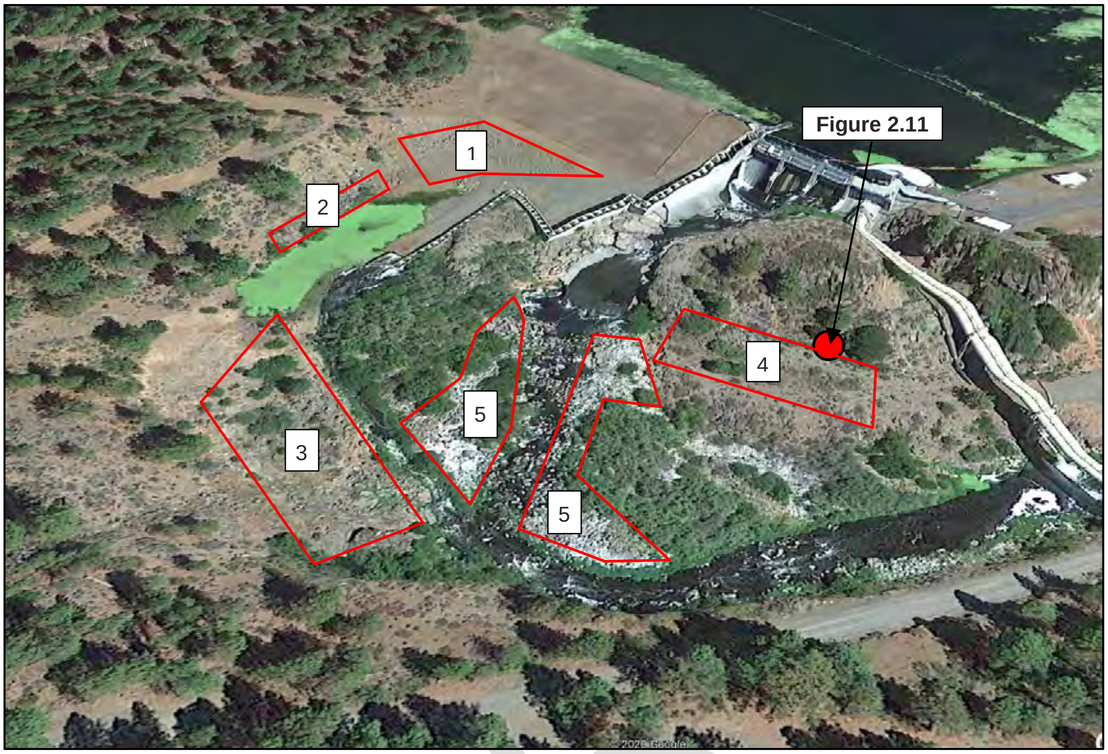

Figure 2.10 J.C. Boyle Downstream of Dam Potential Borrow Source

Figure 2.11 Sub-area 4 Downstream, Left Slope coarse particles are scattered and bedded

2.10 J.C. BOYLE FOREBAY

The granular surfacing material at the J.C. Boyle Forebay access road and parking area was identified as a possible granular fill source for the access road realignment. The areas shown in Figure 2.12 were assessed.

Potential granular fill source

- Road course and parking lot generally 1-inch nominal with trace cobbles and boulders, zero to low plasticity, silty sand, and gravel, black in color when moistened. A Split-NET gradation analysis was completed and is presented in Appendix C - Figure C.21. Results indicated a D_{85} = 0.75", D_{50} = 0.2" and D_{15} = 0.02".
- Approximately 0.2 ft in depth within gravel surfacing.
- Material adjacent to road covered areas, gravel with sand, 10-20% cobbles, low to medium plasticity, likely oxidized native material, reddish brown in color when moistened. Material with similar properties exists in access roads below road surfacing gravel (See Figure 2.13).
- Road surfacing area is approximately 2,800 square yards based on aerial imaging, however due to limited thickness of the pavement, there is limited salvageable road coarse material.
- No samples were obtained in this area.

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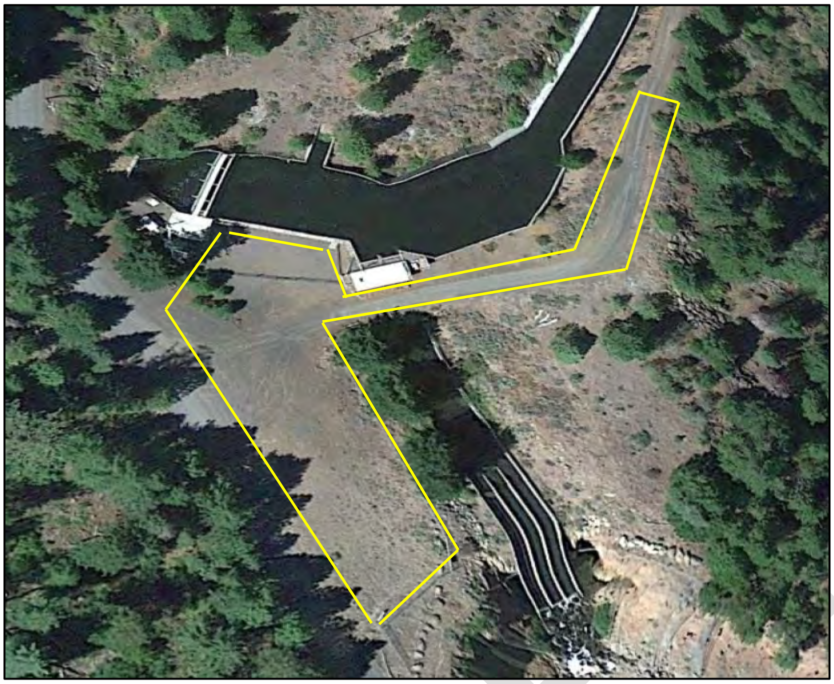

Figure 2.12 J.C. Boyle Forebay Potential Borrow Source

Figure 2.13 Evidence of little to no gravel surfacing along access roads. Coarse fraction in subgrade include cobble to boulder sized particles

2.11 J.C. BOYLE POWERHOUSE

The material adjacent to the J.C. Boyle Powerhouse and Penstocks was assessed to determine if any significant volume of areas of possible granular fill or erosion protection materials were present. The area was sub-divided based on material type, as shown in Figure 2.14.

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Potential granular fill source

- Sub-area 1: Variable material, typically clayey sand, and gravel to clayey gravel with sand, 1-foot minus with boulders and cobbles. Localized concentrated cobble to boulder sized particles present on surface adjacent to road (see JCB Powerhouse Photo 11 in Appendix B). Localized pile was analyzed using Split-NET, as shown in Appendix C - Figure C.22. Results indicated a D_{85} = 14”, D_{50} = 8.” and D_{15} = 1.5”.
- Sub-area 2: Road surfacing gravel nominal size nominal 1-inch; grey sandy gravel; 0.05 to 0.1 ft. in thickness, approximately 3,700 yd², however due to limited thickness of the pavement, there is limited salvageable road coarse material. A Split-NET analysis was complete on the road material, as shown in Appendix C – Figure C.23, however the large cobbles in the top of created unrepresentative results.

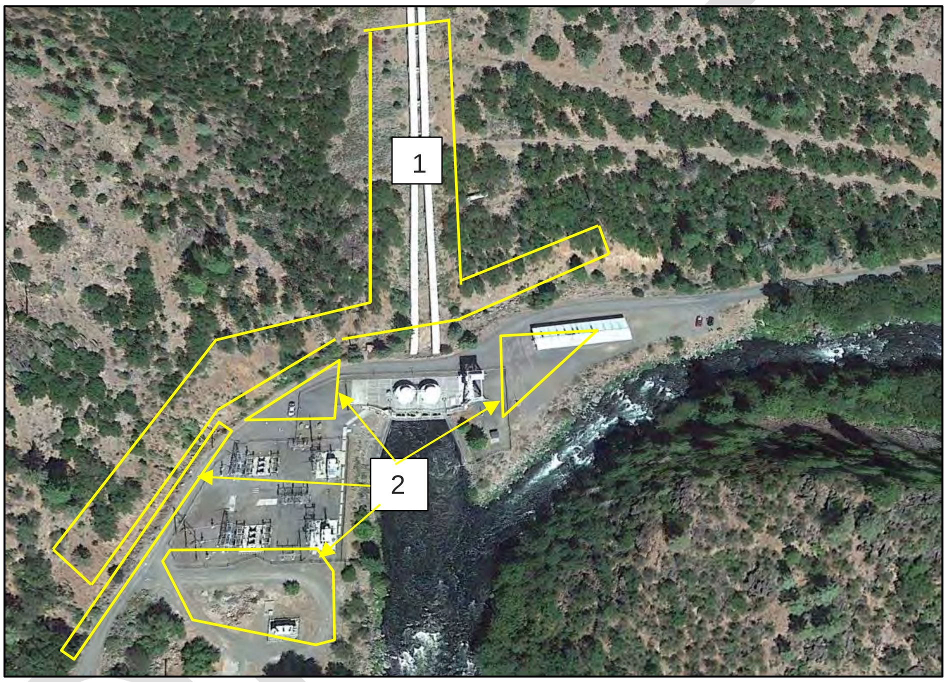

Figure 2.14 J.C. Boyle Powerhouse

Figure 2.15 J.C. Boyle Powerhouse Road Surfacing Material

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3.0 LABORATORY RESULTS

3.1 EROSION PROTECTION

A series of standard laboratory testing was completed to help determine the suitability of the various erosion protection potential borrow sources. The tests focused on the durability, strength, clay content and geochemistry and are discussed in the sections below.

3.1.1 DURABILITY AND STRENGTH TESTING

Durability and Strength testing was completed by Advance Terra Testing and Kumar and Associates in Denver Colorado. Tests were completed to compare the potential borrow source material with the recommended durability and strength limits for erosion protection material, as provided in the National Cooperative Highway Research Program Report 568 (NCHRP, 2006), which are as follows:

- Specific Gravity > 2.50
- Absorption < 1% (average)
- Magnesium Sulphate Soundess < 17.5% Loss
- Micro-Deval (for riverine applications) < 20% Loss

Results from the laboratory testing are summarized below in Table 3.1 and are presented in Appendices D1, D2 and D3.

Table 3.1 Erosion Protection Material Durability and Strength Laboratory Testing Results

Sample Location and Testing ID	Correlated UCS from Point Load (ksi)[1]	Micro-Deval (% Loss)	Magnesium Sulphate Soundness (% Loss)	Apparent Specific Gravity[2]	Absorption[2] (%)
	ASTM D5731	ASTM D6928	ASTM C88	ASTM D6473	ASTM D6473
Iron Gate Downstream Dam Face (IGDDS)	8 – 48 (Avg = 27)	8.3	0.15	2.80	0.31
Iron Gate Lakeview Road (IGLV)	2 – 34 (Avg = 21)	15.7	3.19	2.81	0.74
Copco No. 1 Access Road (CRBR)	25 – 41 (Avg = 33)	10.6	0.86	2.81	0.69
Copco No. 2 Downstream Right Bank (C2DSR)	6 – 42 (Avg = 31)	31.3	34.3	2.83	0.63
		55.3	55.7		
Copco No. 2 Downstream Left bank (C2LB)	15 – 23 (Avg = 17)	12.7	1.02	2.76	1.60
J.C. Boyle Downstream of Dam (JCBEP)	7 – 48 (Avg = 33)	16.1	2.65	2.67	0.73

NOTES:

1. UCS VALUES CALCULATED USING BIENIAWSKI (1975) CORRECTED POINT LOAD STRENGTH INDEX ($I_{S(50)}$) CORRELATION. ALL TESTS INCLUDED IN RANGE, SEE TABLE A.4 FOR A FULL SUMMARY OF RESULTS. AVERAGE VALUES REPORTED IN TABLE REMOVE THE TWO HIGHEST AND TWO LOWEST VALUES COLLECTED FROM THE POINT LOAD TESTS PER SAMPLE LOCATION.
2. SIX SPECIMENS WERE TESTED PER SAMPLE LOCATION, THE HIGHEST AND LOWEST VALUES WERE REMOVED TO CALCULATE THE PRESENTED AVERAGES. SEE TABLE A.5 FOR FURTHER DETAILS.

In general, the erosion protection material tested meets all recommendations except for two samples, which are discussed below. The correlated UCS strengths based on the point load tests varied greatly, which is

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typical. The averages do not account for the different failure modes reported in Table A.4 and in Appendix D1. Without unconfined compressive tests to correlated results or a larger testing sample base, these values should be considered approximate and only used for classifying the rock mass, which is considered to be ‘Strong’ rock based on the test results. The Schmidt hammer predicted strengths on the PLT samples were found to be typically higher than the actual results.

Unacceptable degradation was reported in the first sample sent for magnesium sulphate soundness and micro-deval testing for Copco No. 2 Downstream Right Bank, so a second test was completed, which confirmed the results. It is suspected this sample is not representative of the durable basalt observed in this location. The observed durability is supported by the results of the point load, specific gravity, and absorption tests completed on other specimens from the same location. Pumice and other altered rocks with excessive voids and vugs exist within the talus slopes and it is assumed one of these rocks of lesser quality was used for the durability tests. Operators will have to avoid the lower quality rocks when selecting pieces for erosion protection. To ensure the borrow source is acceptable, additional testing should be completed on more representative samples of the basalt once the contractor has access to the site.

The average absorption on the Copco No. 2 Left Bank is higher than the recommended 1%. According to the NCHRP report, however, other jurisdictions suggest an absorption up to 2% is acceptable. The higher absorption may also be caused by similar issues with altered basalt and the presence of vugs in some rocks, which based on photographs occur on the left bank, similar to the right bank. Given the results of the other tests and the low consequence environment, and the possibility of a lower quality sample, this material is deemed acceptable for use. Lower quality rocks will have to be avoided when selecting erosion protection material from this borrow source. Additional testing should be considered on better representative samples once the contractor has access to the site.

3.1.2 X-RAY DEFRACTION ANALYSIS

XRD tests were completed by The Mineral Lab, in Golden Colorado, on samples from each of the six erosion protection potential borrow sources. The results are provided in Appendix D4. The XRD tests determined the clay content in each sample and the breakdown of different types of clay. The primary concern for clay content is smecite clay, which in high concentrations can indicate a propensity for the erosion protection to degrade.

All samples had less than 1% clay content, and a smectite specific content ranging from 0 to 0.2%. This low presence of clay and smectite in the samples is not a concern for rock degradation.

3.1.3 GEOCHEMICAL TESTING

The six erosion protection potential borrow sources samples were tested to determine if the proposed material has adverse geochemical constituents for in-water placement. The samples were tested at ACZ Laboratories in Steamboat Springs, Colorado. Testing included Modified Acid Base Accounting and the Synthetic Precipitate Leaching Procedure (SPLP) (EPA 1312). SPLP was used to determine if the samples were A) acid generating, and B) if the samples leached metals of concern that could potentially affect the use of the material.

Results of the laboratory test are included in Appendix D5. The laboratory testing concluded that none of the samples were acid generating and in fact had excess neutralization potential indicating that the samples will not readily leach metals. The SPLP leachate analyses support this with pHs ranging from 7.97-8.89, indicating readily soluble neutralizing minerals. There was a small amount of aluminum leached from all the samples in the milligram per liter range (low of 0.58 mg/L with a high of 1.48 mg/L). However, at the pHs measured in the SPLP leachates the aluminum is in particulate not dissolved form, as dissolved aluminum only occurs at these concentrations at pH less than 4. No other metals or metalloids were present in the leachates at levels of concern.

3.2 GRANULAR FILL

PSA and Atterberg limits tests for overburden grab samples taken from each of the granular fill potential borrow sources were completed by KP in Elko, Nevada. The results are presented in Appendix E1 and are summarized in Table 4.3. The PSA results have been compared below on Figure 3.1 through Figure 3.3 to the relevant project granular fill material types as shown on Drawing G0050. The project material types that the samples are interpreted to fall within the gradation limits of, or close to, are summarized in Table 4.3 and discussed in Section 4.2.

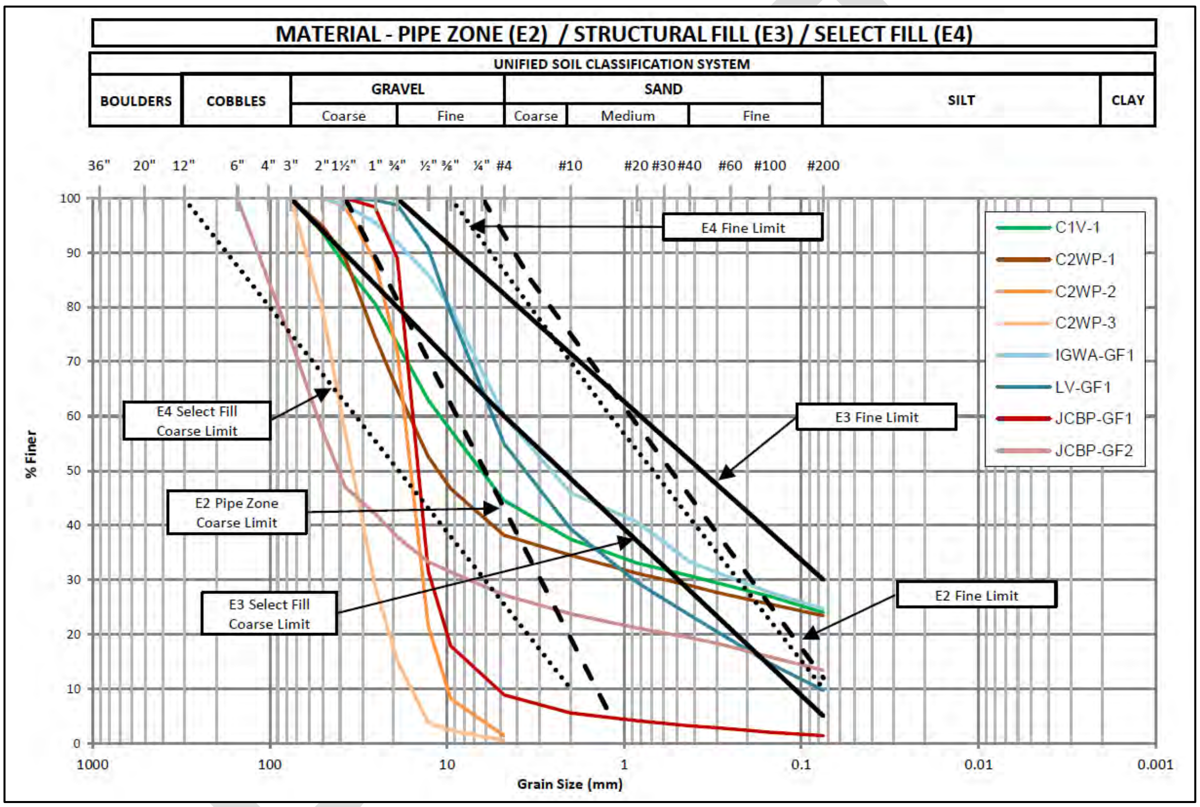

Figure 3.1 Granular Fill PSA Results Compared to Pipe Zone, Structural Fill and Select Fill

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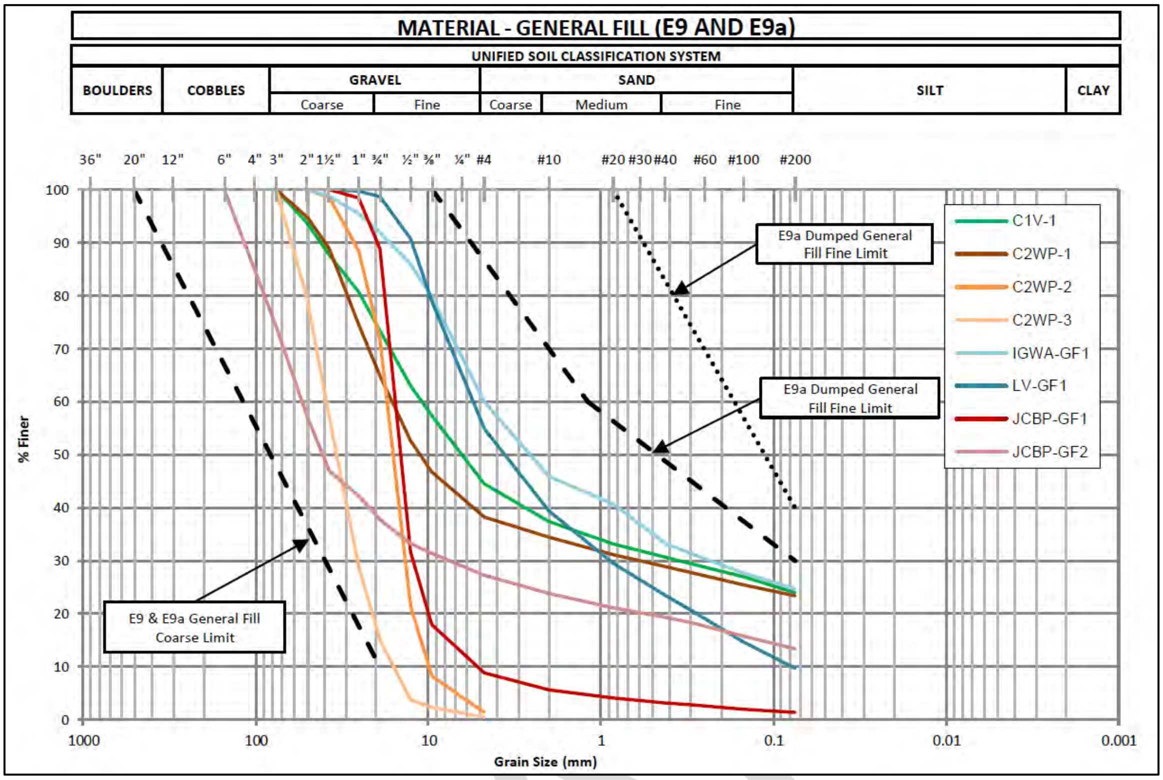

Figure 3.2 Granular Fill PSA Results Compared to General Fill

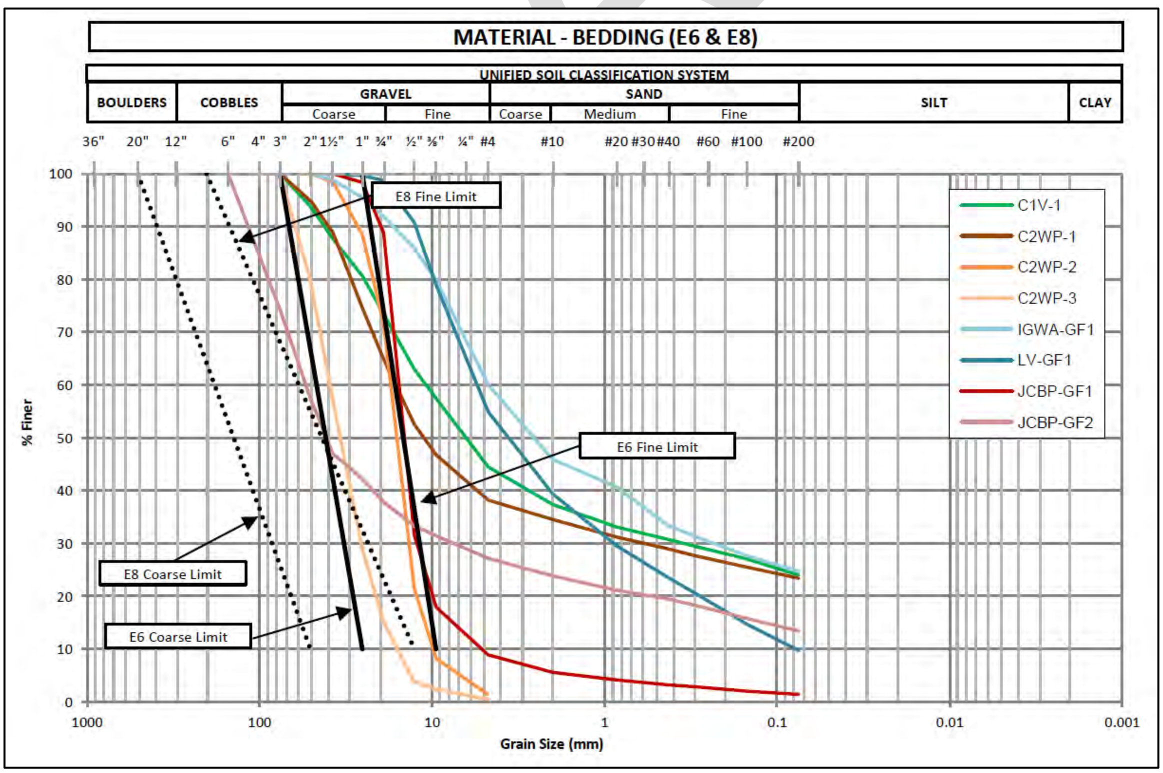

Figure 3.3 Granular Fill PSA Results Compared to Bedding Material

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4.0 CONCLUSIONS

4.1 EROSION PROTECTION AND BEDDING MATERIAL

A summary of the potential erosion protection, and bedding material identified onsite at the investigated potential borrow sources is included below in Table 4.1. The table includes an approximate gradation of the material, surficial area of the source and an assumed depth of material. The following assumptions were used to determine the depth of each of the sources:

- Iron Gate Downstream Face: Historic construction drawings (5407-A-111).
- Iron Gate Lakeview Road: Assumed invert excavation limit equal to ditch adjacent to road.
- Copco No. 1 Access Road: Visual assessment.
- Copco No. 2 Downstream Right Bank: Visual assessment.
- Copco No. 2 Downstream Left Bank: Visual assessment.
- J.C. Boyle Downstream Dam Sub-area 1: Historic construction drawings (AA 78084) and historic photographs.
- J.C. Boyle Downstream Dam Sub-areas 2 and 5: Visual Assessment.

The approximate gradations in Table 4.1 were selected based on the observed and field measured particle sizes. Split-NET results were considered when selecting a representative gradation, however, were in general found to produce smaller gradations than what was observed in the field, and therefore the results were not taken verbatim.

The suitability of the erosion protection material at the borrow sites has mostly been validated through laboratory testing. Some additional testing is required at Copco No. 2 Downstream Right and Left Bank, as discussed in Section 3.1.1 to clarify some abnormal results.

Table 4.1 Identified Erosion Protection Borrow Sources Summary

Borrow Source	Approximate Gradation	Surface Area (yd²)[1]	Assumed Depth (yd)	Expected Volume (CY)
Iron Gate Dam Downstream Face Sub-area 1 Figure 2.3	D_{50} = 28” D_{85} = 40”	2,980	1.67	4,400 – 4,800
Iron Gate Dam Downstream Face Sub-area 2 Figure 2.3	D_{50} = 20”	1,950	1.67	2,900 – 3,200
Iron Gate Dam Downstream Face Sub-area 3 Figure 2.3	D_{15} = 3” D_{50} = 9” D_{85} = 12”	5,900	1.67	9,000 – 9,800
Iron Gate Lakeview Road Figure 2.2	D_{15} = 1” D_{50} = 6” D_{85} = 14”	825	2 – 4	1,600 – 3,200
Copco No. 1 Access Road Sub-area 1 Figure 2.4	D_{15} = 3” D_{50} = 15” D_{85} = 28”	365	0.5 – 2	200 – 700
Copco No. 2 Downstream Right Bank Figure 2.6	D_{15} = 36” D_{50} = 48” D_{85} = 72”	3,000	2 – 5	9,000 – 18,000[2]
Copco No. 2 Downstream Left Bank Figure 2.7	D_{15} = 12” D_{50} = 40” D_{85} = 60”	1,940	1 – 3	2,000 – 6,000[2]
J.C. Boyle Downstream of Dam Sub-area 1 Figure 2.10	D_{15} = 1” D_{50} = 9” D_{85} = 20”	850	0.5 – 2	500 – 1,500
J.C. Boyle Downstream of Dam Sub-area 2 Figure 2.10	D_{15} = 8” D_{50} = 24” D_{85} = 36	250	0.5 – 1.5	150 - 400
J.C. Boyle Downstream of Dam Sub-area 5 Figure 2.10	D_{50} = 24”	2,020	0.5 – 1.5	1,000 – 1,500

NOTES:

1. SURFACE AREAS CALCULATED THROUGH GOOGLE EARTH PROJECTIONS.
2. TO ACHIEVE THE UPPER VOLUME ESTIMATIONS OF CERTAIN SIZE MATERIAL THE CONTRACTOR MAY NEED TO EXCAVATE FURTHER DOWNSTREAM INTO ADJACENT TALUS PILES.

Table 4.2 presents a summary of the required erosion protection, riverbed and bedding material volumes required at each of the dam sites. All bedding material may require some site processing to achieve the proper gradation. Some of the smaller class erosion protection may require site processing. The ‘Adequate Source Volume’ commentary considers the source material gradation, the required gradation of fill, and the lower bound volumes to conclude if there is adequate borrow material volumes present to fulfill the design volume requirements.

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Table 4.2 Erosion Protection Requirements by Dam Site

Material Type	Design D_{50} (in)	Neat Line Required Volume (CY)	Anticipated Borrow Source	Adequate Source Volume
J.C. Boyle				
Erosion Protection - E7a	D_{50} = 9	630	JCB Downstream Dam Sub-Area 2 JCB Downstream Dam Sub-Area 5	Yes
Bedding – E8		630	JCB Downstream Dam Sub-Area 1 JCB Downstream Dam Sub-Area 5	Yes
Bedding – E6		200	JCB Downstream Dam Sub-Area 1 with site processing	Yes
Copco No. 1				
Erosion Protection – E7	D_{50} = 60	1,190	Copco No. 2 Downstream Right Bank	Yes[1]
Copco No. 2				
Riverbed Material[2]		3,640	Copco No. 2 Downstream Right Bank Copco 1 Access Road Sub-Area 1	Yes[1]
Erosion Protection – E7	D_{50} = 21	1,190	Copco No. 2 Downstream Right Bank Copco No. 2 Downstream Left Bank	Yes[1]
Erosion Protection – E7	D_{50} = 42	2,120	Copco No. 2 Downstream Left Bank	Yes[1]
Bedding – E8		600	Iron Gate Downstream Dam	Yes
Iron Gate				
Erosion Protection – E7a[3]	D_{50} = 9	2,450	IG DS Dam Face Sub-Area 2 IG DS Dam Face Sub-Area 3	Yes
Erosion Protection – E7b[3]	D_{50} = 21	2,450	IG DS Dam Face Sub-Area 1	Yes
Bedding – E6		500	Iron Gate Lake View Road IG DS Dam Face Sub-Area 3 with site processing	Yes

NOTES

1. PENDING EXPANSION OF WORK LIMITS FROM 60% DESIGN.
2. SEE DRAWING C3234 FOR A DESCRIPTION OF RIVERBED MATERIAL. MATERIAL NOT LIMITED TO BE SOURCED FROM THE ANTICIPATED BORROW SOURCES LISTED IN THE TABLE. MAY ALSO COME FROM OTHER SOURCES NOT CONSIDERED IN THIS LETTER.
3. VOLUME ONLY INCLUDES EROSION PROTECTION TO BE PLACED ON NATIVE GROUND AND EXCLUDES EROSION PROTECTION PLACED IN DISPOSAL SITES.

4.2 GRANULAR FILL

A summary of the granular fill potential borrow source is presented below in Table 4.3. Possible fill types are based on the gradation plots shown in Section 3.2. Material types that may be possible with some processing are denoted in the table, however, it is at the contractor's discretion if processing material is a viable option. The values in Table 4.3 should be considered preliminary and approximate. The site investigation was limited to surficial investigations only and without the ability to complete more extensive subsurface investigations at each of the borrow sources, the information collected is considered high level and may not be representative of the entire borrow source.

The following assumptions were used to determine the area and depth of each of the sources:

- Iron Gate Downstream Workers Accommodation: Assumed based on geometry of slope.
- Copco No. 1 Village: Assumed based on geometry of area and an assumed excavation cut of 1.5H:1V.

- Wood-Stave Penstock Sub-area 1: Modelled volume, as shown on drawing C3300.
- Wood-Stave Penstock Sub-area 2 and 3: Visual Assessment.
- J.C. Boyle Forebay Area: Visual Assessment.
- J.C. Boyle Powerhouse Area Sub-area 1: Assume minimal excavation will occur on steep slopes. Due to the large footprint and variability in surficial material, assume only 50% of area is viable borrow material.
- J.C. Boyle Powerhouse Area Sub-area 2: Visual Assessment.

Note that the sample from Lakeview road is not reported below as it was sourced from the road wearing course and shoulder, which is not expected to be a borrow source.

Borrow sources selected for inspection were based on direction from Kiewit. The granular fill sites selected for inspection represent a limited number of the potential borrow sources on site and does not include other areas that have been investigated for separate geotechnical site investigations. Additional sites could be investigated if material types and quantities required for the project are not covered by the materials in Table 4.3 below.

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Table 4.3 Identified Granular Fill Potential Borrow Sources Summary

Borrow Source	Visual USCS Description	PSA Results[1]	Surface Area (yd^2)[2]	Assumed Depth (yd)	Expected Volume (CY)	Possible Fill Types
Iron Gate Dam Workers Accommodation Sub-area 1 & 2 Figure 2.1	Boulders and Cobbles, some Gravel and Sand, trace fines	IGWA-GF1 G: 40% S: 35% F: 25% PL: 25 LL: 59	590	0.67 - 1	400 - 600	E2* E3* E4* E9
Copco No. 1 Village Figure 2.5	Silty Sand and gravel	C1V-1 G: 56% S: 20% F: 24% PL: 30 LL: 34	2,070	3 - 6	6,000 – 12,000	E2* E4* E9
Copco No. 2 Wood-Stave Penstock Sub-area 1 Figure 2.8	Clayey Gravel, some Sand, trace Cobbles	C2WP-1 G: 62% S: 15% F: 23% PL: 21 LL: 52	990	volume based on modelled excavation on C3300	2,860	E4* E9
Copco No. 2 Wood-Stave Penstock Sub-area 2 Figure 2.8	Sandy Gravel	C2WP-2 G: 99% S: 1% F: 0%	230	0.5 – 1	120 – 230	E6 E9
Copco No. 2 Wood-Stave Penstock Sub-area 3 Figure 2.8	Sandy Gravel	C2WP-3 G: 100% S: 0% F: 0%	240	0.5 – 1	120 – 240	E6 E9
J.C. Boyle Forebay Area Figure 2.12	Silty Sand and Gravel	-	2,800	0.2	560	E2+ E3+ E4+ E9+
J.C. Boyle Powerhouse Sub-area 1	Clayey Gravel, some Sand	JCBP-GF2 +3": 26% G: 47% S: 14% F: 13% PL: 20 LL: 33	3,500	0.5 - 1	1,750 – 3,500	E4* E9
J.C. Boyle Powerhouse Sub-area 2	Gravel	JCBP-GF1 G: 91% S: 8% F: 1% PL: NP LL: NP	3,700	0.05 – 0.1	190 – 370	E6 E9

NOTES:

1. PARTICLE SIZE ANALYSIS (PSA) LIMITED TO 3-INCH MINUS MATERIAL.
2. SURFACE AREAS CALCULATED THROUGH GOOGLE EARTH PROJECTIONS.
3. '*' DENOTES FILL WOULD REQUIRE PROCESSING TO ACHIEVE GRADATION LIMITS.
4. '+' DENOTES POSSIBLE FILL TYPE BASED ON VISUAL DESCRIPTION.

4.3 SCOPE OF REPORTING AND FUTURE WORK

The scope of this site investigation was to determine if there were surficial borrow sources close to the dam sites that could produce the material required for the project, primarily the erosion protection material. The

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site investigation was not intended to fully quantify the potential borrow areas and this summary does not address subsurface in situ material. Ground disturbance was limited to collection of free and loose material at the surface either by hand. Topographical data was not collected other than obtaining GPS coordinates while sampling. The estimates provided are based on visual observations, aerial imaging and historic drawings and photographs, and the accuracy of the presented gradations and volumes must reflect these limitations. KP recommends that narrow and focused investigations be conducted within the actual potential borrow sources Kiewit is proposing to use. This will increase confidence for volumes and gradations available at each site. KP has not assessed the feasibility of each site beyond establishing the material type and approximate gradation. Borrow source access, cultural resources and slope stability concerns were not considered in this analysis.

5.0 CLOSURE

We trust the information contained herein meets your needs at this time. Please contact any of the undersigned if you have any questions or comments.

Yours truly,
Knight Piésold

Prepared: Craig Nistor
For: Brad Hill

Prepared: Craig Nistor
For: Samuel Bush

Reviewed: Cory Vos
Cory Vos

Reviewed: N Bishop
Norman Bishop

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

Attachments:

Appendix A	Report Tables
Appendix B	Site Photographs
Appendix C	Split-NET Analysis Results
Appendix D	Erosion Protection Laboratory Results
Appendix E	Granular Fill Particle Size Analysis and Atterberg Limit Laboratory Results

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References:

Google Earth, 2020. Imagery taken from Google Earth Pro, https://earth.google.com.

National Cooperative Highway Research Program (NCHRP) 2006, *Report 568 Riprap Design Criteria, Recommended Specifications and Quality Control,* Transportation Research Board, Washington, D.C.

Copy To: Erik Esparza, Gary Jara

APPENDIX A

Report Tables

(Tables A.1 to A.5)

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TABLE A.1

KIEWIT INFRASTRUCTURE WEST CO.
KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SAMPLE SUMMARY

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Location	Sample ID	Sample Potential		Sample Type	No. of Pieces	Approx. Weight, lbs	PLT Samples	Notes
		Erosion	Granular					
J.C. Boyle								
Downstream of Dam	JCBEP-1	x		EP	4	230	3	Sampled from Sub-Area 2
Powerhouse Area	JCBP-GF1		x	SD	2	12	-	Sampled from Sub-Area 1
Powerhouse Area	JCBP-GF2		x	LD	1	40	-	Sampled from Sub-Area 2
Copco No. 1								
Access Road	CRBR-1	x		EP	4	230	3	Sampled from Sub-Area 1
Copco Village	C1V-1		x	SD	3	20		
Copco No. 2								
Downstream Right Bank	C2DSR-1	x		EP	4	230	3	
Downstream Left Bank	C2LB-1	x		EP	4	230	3	
Wood-Stave Pennstock	C2WP-1		x	SD	3	20	-	Brown overburden Sampled from Sub-Area 1
Wood-Stave Pennstock	C2WP-2		x	LD	1	40	-	Grey 1 inch minus Sampled from Sub-Area 2
Wood-Stave Pennstock	C2WP-3		x	LD	1	40	-	Brown 3 inch minus Sampled from Sub-Area 3
Iron Gate								
Dam Downstream Face	IGDDS-1	X		EP	4	230	3	Sampled from Sub-Areas 1 and 2
Lakeview Road	LV-GF1		x	LD	1	40	-	Sampled from road surface
Lakeview Road	IGLV-1	x		EP	4	230	3	Sampled from west area
Worker's Accommodation Area	IGW-GF1		x	LD	1	40	-	Sampled from Sub-Area 1
Worker's Accommodation Area	IGWA-EP1	x		EP	4	230	3	Sampled from Sub-Area 2
TOTAL:					41	1862	21	

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NOTES:

SD: BAG SAMPLE

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	036AUG'20	ISSUED WITH LETTER VA20-01037	BH	CAV

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TABLE A.2

KIEWIT INFRASTRUCTURE WEST CO.
KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SCHMIDT HAMMER SUMMARY

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Location	Schmidt Hammer Readings (R)			Average R	Bulk Specific Gravity[1]	UCS² (MPa)	UCS (ksi)	Notes
J.C. Boyle								
Downstream of Dam	52	52	56	53	2.67	168	24	Readings taken on boulders in field
	58	58	56	57	2.67	207	30	Readings taken on boulders in field
	58	58	60	59	2.67	231	34	Readings taken on boulders in field
	48	52	50	50	2.67	143	21	Readings taken on PLT sample JCB-1
	50	54	52	52	2.67	159	23	Readings taken on PLT sample JCB-2
	46	45	45	45	2.61	104	15	Readings taken on PLT sample JCB-3
Copco No. 1								
Right Bank Road-Upper Road (Sub-Area 1)	45	46	46	46	2.81	130	19	Readings taken on boulders in field
	50	53	52	52	2.81	182	26	Readings taken on boulders in field
	55	60	52	56	2.81	228	33	Readings taken on boulders in field
	54	56	50	53	2.78	185	27	Readings taken on PLT sample CRBR-1
	50	52	60	54	2.81	204	30	Readings taken on PLT sample CRBR-2
	52	52	50	51	2.81	172	25	Readings taken on PLT sample CRBR-3
Copco No. 2								
Right Bank Downstream	49	50	54	51	2.83	174	25	Readings taken on boulders in field
	54	54	60	56	2.83	230	33	Readings taken on boulders in field
	50	52	54	52	2.83	184	27	Readings taken on boulders in field
	52	51	56	53	2.83	195	28	Readings taken on PLT sample C2DSR-1
	52	51	54	52	2.80	182	26	Readings taken on PLT sample C2DSR-2
	60	58	61	60	2.83	288	42	Readings taken on PLT sample C2DSR-3
Left Bank Downstream	48	48	55	50	2.76	157	23	Readings taken on boulders in field
	52	54	48	51	2.76	166	24	Readings taken on boulders in field
	48	54	50	51	2.76	166	24	Readings taken on boulders in field
	55	60	58	58	2.49	172	25	Readings taken on PLT sample C2LB-1
	48	52	50	50	2.76	157	23	Readings taken on PLT sample C2LB-2
	48	50	56	51	2.79	166	24	Readings taken on PLT sample C2LB-3
Iron Gate								
Downstream Face	59	55	57	57	2.80	241	35	Readings taken on boulders in field
	55	58	61	58	2.80	254	37	Readings taken on boulders in field
	61	60	57	59	2.80	269	39	Readings taken on boulders in field
	62	58	66	62	2.80	318	46	Readings taken on PLT sample IGDDS-1. Results from PLT suggest strength is too high, will discount readings
	62	66	66	65	2.76	359	52	Readings taken on PLT sample IGDDS-2. Results from PLT suggest strength is too high, will discount readings
	62	68	68	66	2.80	398	58	Readings taken on PLT sample IGDDS-3. Results from PLT suggest strength is too high, will discount readings
Lakeview Road	52	51	50	51	2.81	172	25	Readings taken on boulders in field
	56	59	58	57	2.81	241	35	Readings taken on boulders in field
	59	61	54	57	2.81	241	35	Readings taken on boulders in field
	58	56	54	56	2.70	206	30	Readings taken on PLT sample IGLV-1
	52	58	55	55	2.81	215	31	Readings taken on PLT sample IGLV-2
	57	61	66	61	2.81	301	44	Readings taken on PLT sample IGLV-3
Workers Accommodation Area	54	58	56	56	2.80³	228	33	Readings taken on boulders in field
	44	46	41	43	2.80³	110	16	Readings taken on boulders in field
	40	40	41	40	2.80³	93	13	Readings taken on boulders in field
	41	43	46	43	2.80³	110	16	Readings taken on PLT sample IGW-1
	33	34	32	36	2.80³	75	11	Readings taken on PLT sample IGW-2
	53	53	50	52	2.80³	182	26	Readings taken on PLT sample IGW-3

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NOTES:

1. ROCK SPECIFIC GRAVITIES ARE BASED ON AVERAGE VALUES PRESENTED IN TABLE 3.1, EXCEPT WHERE A SPECIFIC GRAVITY RESULT IS AVAILABLE FOR A PLT SAMPLE.
2. UCS VALUES CALCULATED USING BARTON ET AL. (1974) REBOUND NUMBER AND SPECIFIC GRAVITY CORRELATIONS.

B	036AUG'20	ISSUED WITH LETTER VA20-01037	BH	CAV
REV	DATE	DESCRIPTION	PREP'D	RVW'D

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TABLE A.3

KIEWIT INFRASTRUCTURE WEST CO.
KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
APPROXIMATE LOCATIONS OF POTENTIAL BORROW SOURCES

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KRRP Site	Borrow Source Location	Approximate Coordinates[1]	
		Easting (m)[3]	Northing (m)[3]
J.C. Boyle	Downstream of Dam	578,560	4,663,768
		578,479	4,663,895
	Powerhouse Area	576,909	4,660,758
		576,735	4,660,551
	Forebay Area	577,477	4,661,017
		577,615	4,660,968
Copco No. 1	Right Bank Access Road	554,895	4,647,654
		554,969	4,647,702
	Copco No. 1 Village	554,951	4,647,886
		554,970	4,647,839
Copco No. 2	Downstream Right Bank	554,587	4,647,744
		554,647	4,647,714
	Downstream Left Bank	554,602	4,647,642
		554,540	4,647,595
	Wood-Stave Penstock	553,628	4,647,420
		553,622	4,647,446
Iron Gate	Dam Downstream Face	546,702	4,642,682
		546,690	4,642,644
	Lakeview Road	546,511	4,642,152
		546,649	4,642,174
	Workers Accommodation Area	546,391	4,642,438
		546,458	4,642,453

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NOTES:

1. COORDINATES TAKEN FROM GOOGLE EARTH BASED ON BORROW SOURCE LOCATION FIGURES PRESENTED IN VA20-00737.

2. UTM ZONE 10 T

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TABLE A.4

KIEWIT INFRASTRUCTURE WEST CO.
KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SUMMARY OF POINT LOAD TESTING RESULTS

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Sample Location	Specimen	Schmidt Hammer Rebound	Laboratory Specific Gravity[1]	Approximate Compressive Strength (ksi)[2]	Test	Direction of Load with Respect to Fracture	Failure Mode	Corrected Point Load Strength Index $I_{s(50)}$ (psi)	Correlated Unconfined Compressive Strength[3] (ksi)	Average Correlated Unconfined Compressive Strength[4] (ksi)
IGDDS	PLT1	62	2.80	46	PLT-11	Normal	Substance	1953	48	27
					PLT-12	Normal	Substance	1146	30	
					PLT-13	Normal	Combination	1574	39	
					PLT-14	Normal	Combination	659	17	
	PLT2	65	2.76	52	PLT-21	Parallel	Combination	1217	32	
					PLT-22	Parallel	Combination	1192	31	
	PLT3	66	2.80	58	PLT-31	Parallel	Combination	702	18	
					PLT-32	Parallel	Combination	481	12	
					PLT-33	Parallel	Combination	297	8	
IGLV	PLT1	56	2.70	30	PLT-11	Normal	Substance	527	16	21
					PLT-12	Parallel	Combination	234	6	
					PLT-13	Parallel	Combination	76	2	
	PLT2	55	2.81	31	PLT-21	Normal	Combination	1120	26	
					PLT-22	Normal	Substance	494	13	
					PLT-23	Normal	Combination	292	7	
					PLT-24	Normal	Combination	1177	31	
					PLT-25	Normal	Combination	1285	34	
	PLT3	61	2.81	44	PLT-31	N/A	Substance	1174	32	
					PLT-32	N/A	Substance	1128	29	
CRBR	PLT1	53	2.78	27	PLT-11	Normal	Substance	1388	34	33
	PLT2	54	2.81	27	PLT-21	Normal	Combination	1622	36	
					PLT-22	Normal	Combination	1424	33	
					PLT-23	Normal	Substance	1256	32	
					PLT-24	Parallel	Combination	1234	32	
					PLT-25	Parallel	Combination	1115	25	
					PLT-26	Parallel	Combination	1398	34	
					PLT-27	Parallel	Combination	1694	41	
					PLT-28	Parallel	Combination	1340	33	
C2DSR	PLT1	53	2.83	28	PLT-11	Normal	Substance	1681	41	31
					PLT-12	Normal	Combination	763	18	
					PLT-13	Normal	Combination	1615	42	
					PLT-14	Normal	Combination	1631	40	
	PLT2	52	2.80	26	PLT-21	Normal	Combination	289	7	
					PLT-22	Normal	Combination	244	6	
					PLT-23	Normal	Combination	791	20	
	PLT3	60	2.83	42	PLT-31	Normal	Combination	1673	38	
					PLT-32	Normal	Combination	1112	27	
					PLT-33	Normal	Combination	1540	41	
C2LB	PLT1	58	2.49	25	PLT-11	Normal	Combination	595	16	17
					PLT-12	Normal	Combination	683	18	
					PLT-13	Normal	Combination	742	20	
					PLT-14	Normal	Combination	646	17	
	PLT2	50	2.76	23	PLT-21	Parallel	Combination	815	21	
					PLT-22	Parallel	Combination	766	18	
	PLT3	51	2.76	24	PLT-31	Normal	Combination	688	18	
					PLT-32	Normal	Substance	688	15	
					PLT-33	Normal	Combination	863	23	
					PLT-34	Normal	Combination	655	15	
JCBEP	PLT1	50	2.67	21	PLT-11	Normal	Combination	1887	48	33
					PLT-12	Normal	Combination	1660	38	
					PLT-13	Normal	Substance	1632	39	
					PLT-14	Normal	Substance	1434	36	
	PLT2	52	2.67	23	PLT-21	Normal	Combination	1706	36	
					PLT-22	Normal	Combination	1584	34	
					PLT-23	Normal	Substance	1266	28	
					PLT-24	Parallel	Fracture	1117	23	
	PLT3	45	2.61	15	PLT-31	Parallel	Fracture	332	7	
					PLT-32	Normal	Combination	995	21	

NOTES:

1. ROCK SPECIFIC GRAVITIES ARE BASED ON AVERAGE VALUES PRESENTED IN TABLE 3.1, EXCEPT WHERE A SPECIFIC GRAVITY RESULT IS AVAILABLE FOR A PLT SAMPLE.
2. UCS VALUES CALCULATED USING BARTON ET AL. (1974) REBOUND NUMBER AND SPECIFIC GRAVITY CORRELATIONS.
3. UCS VALUES CALCULATED USING BIENIAWSKI (1975) CORRECTED POINT LOAD STRENGTH INDEX ($I_{S(50)}$) CORRELATION.
4. AVERAGE UCS VALUES DO NOT INCLUDE THE TWO HIGHEST AND TWO LOWEST VALUES REPORTED FOR A SAMPLE LOCATION.

B	036AUG'20	ISSUED WITH LETTER VA20-01037	BH	CAV
REV	DATE	DESCRIPTION	PREP'D	RVW'D

Knight Piésold CONSULTING

TABLE A.5

KIEWIT INFRASTRUCTURE WEST CO.
KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SUMMARY OF SPECIFIC GRAVITY AND ABSORPTION RESULTS

Print Aug/06/20 14:38:22

Erosion Protection Sample	Parameter (Unit)	Sample ID[1,2]								Average of All Samples	Adjusted Average (Without Highest and Lowest Values)
		A	B	C	D	E	PLT-1	PLT-2	PLT-3		
JCBEP-1	Absorption (%)	0.41	0.42	1.81	1.24	0.37	-	-	0.84	0.85	0.73
	Specific Gravity	2.657	2.66	2.721	2.728	2.659	-	-	2.611	2.69	2.67
CRBR-1	Absorption (%)	0.91	1.04	0.39	0.42	0.71	0.71	-	-	0.70	0.69
	Specific Gravity	2.868	2.858	2.783	2.749	2.831	2.777	-	-	2.81	2.81
C2DSR-1	Absorption (%)	0.14	0.73	2.15	0.51	0.64	-	0.64	-	0.83	0.63
	Specific Gravity	2.82	2.843	2.809	2.837	2.845	-	2.796	-	2.83	2.83
C2LB-1	Absorption (%)	0.71	1.57	1.24	0.71	2.86	2.86	-	-	1.66	1.60
	Specific Gravity	2.795	2.793	2.804	2.779	2.681	2.491	-	-	2.72	2.76
IGDDS-1	Absorption (%)	0.25	0.24	0.31	0.20	0.43	-	0.43	-	0.29	0.31
	Specific Gravity	2.805	2.797	2.794	2.801	2.796	-	2.765	-	2.80	2.80
IGLV-1	Absorption (%)	0.26	0.62	0.39	0.30	1.66	1.66	-	-	0.82	0.74
	Specific Gravity	2.813	2.831	2.793	2.793	2.823	2.698	-	-	2.79	2.81

\\knightpiesold.local\VA-Prj$\1\03\00640\01\A\Correspondence\7_Letter\2020\VA20-01037 - VE Onsite Borrow Source SI\Rev B\Appendix A\[On Site Material Investigation Tables.xlsx]Table A5

NOTES:

1. HIGHEST AND LOWEST VALUES FOR EACH SAMPLE LOCATION HAVE BEEN HIGHLIGHTED GREY
2. SAMPLE ID PER ATT TESTING LABORATORY REPORT PRESENTED IN APPENDIX D2.

B	036AUG'20	ISSUED WITH LETTER VA20-01037	NWR	CAV
REV	DATE	DESCRIPTION	PREP'D	RVW'D

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APPENDIX B

Site Photographs

(Pages B-1 to B-94)

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 1.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, spillway, photo facing north.	

Photo No. 2.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, spillway, photo facing north.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 3.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing north.	

Photo No. 4.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing southeast.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 5.

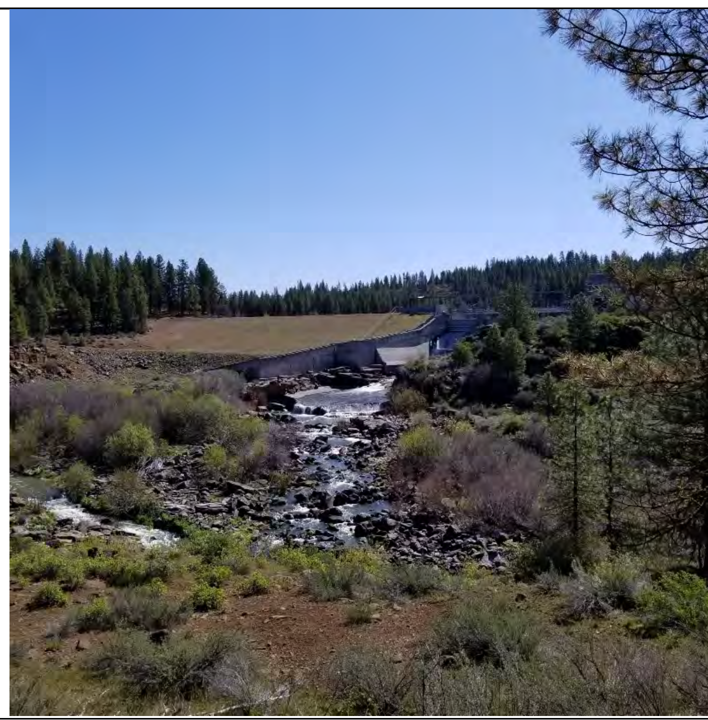
Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, photo facing northeast.

Photo No. 6.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, spillway, photo facing east.



Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 7.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, spillway, photo facing east.

Photo No. 8.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, spillway, photo facing east.

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 9.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, spillway, photo facing east.

Photo No. 10.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, spillway, photo facing east.

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 11.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, spillway, photo facing east.

Photo No. 12.

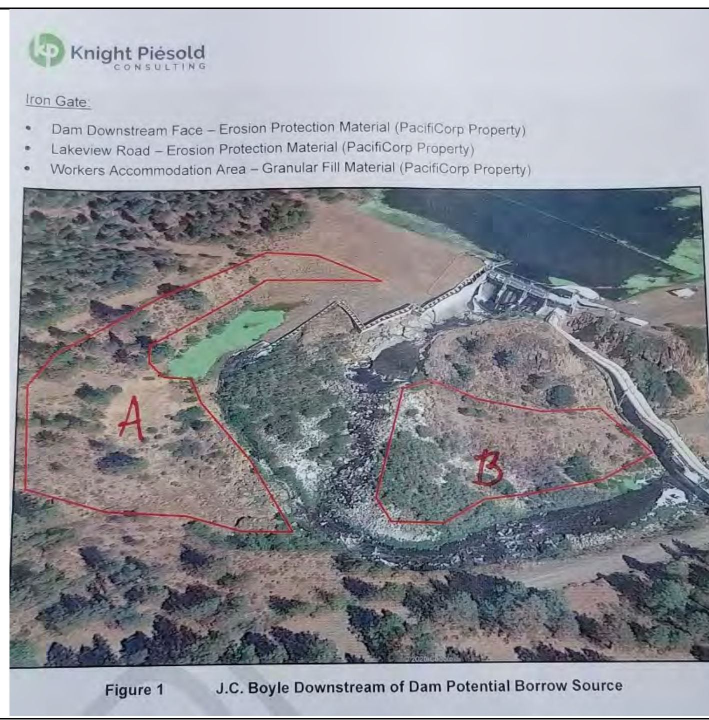
Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, spillway, photo facing east.

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 13.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing east.	

Photo No. 14.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo of workplan figure.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 15.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing south.	

Photo No. 16.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing west.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 17.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing west.	

Photo No. 18.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing east.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 19.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing north.	

Photo No. 20.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 21.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, photo facing north.

Photo No. 22.

Date: May 6, 2020

Description:
J.C. Boyle Dam – Downstream, photo facing east.

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 23.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing east.	

Photo No. 24.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream.	

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 25.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream.	

Photo No. 26.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing north.	

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PHOTOGRAPHIC RECORD

KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE DAM-DOWNSTREAM

Photo No. 27.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, tape measure for scale.	

Photo No. 28.	
Date: May 6, 2020	
Description: J.C. Boyle Dam – Downstream, photo facing north.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 1.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing west.	

Photo No. 2.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing east.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 3.

Date: May 6, 2020

Description:
J.C. Boyle Bridge, photo facing northwest.

Photo No. 4.

Date: May 6, 2020

Description:
J.C. Boyle Bridge, photo facing north.

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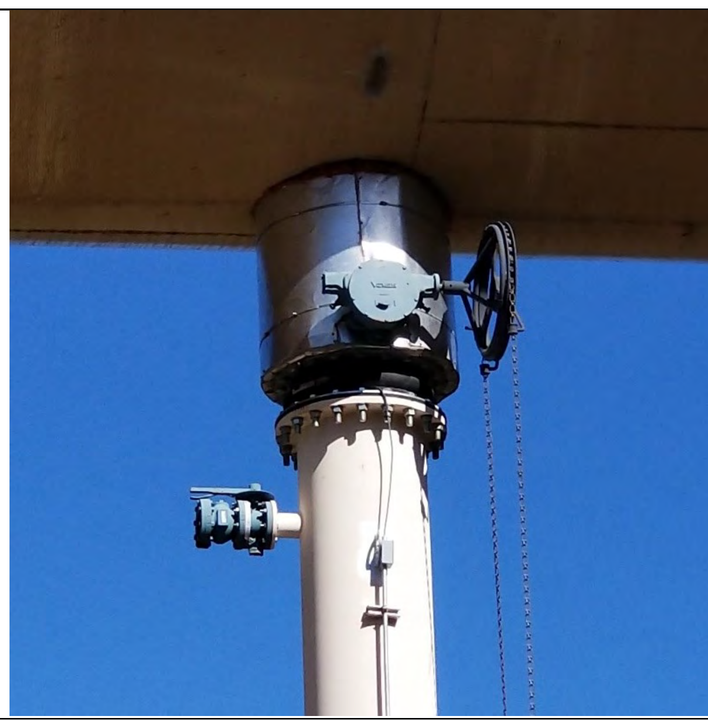
PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 5.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing norhtwest.	

Photo No. 6.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge.	

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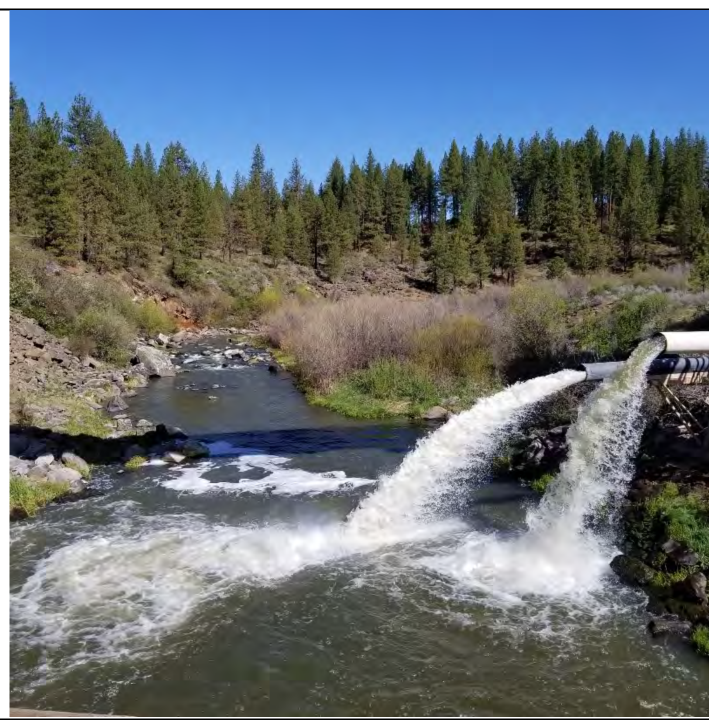
PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 7.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northeast.	

Photo No. 8.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 9.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing south.	

Photo No. 10.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing north.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 11. **Date:** May 6, 2020 **Description:** J.C. Boyle Bridge, old timber abutment.	

Photo No. 12. **Date:** May 6, 2020 **Description:** J.C. Boyle Bridge, photo facing west.	

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 13.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing west.	

Photo No. 14.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 15.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

Photo No. 16.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 17.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

Photo No. 18.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 19.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

Photo No. 20.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 21.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing west.	

Photo No. 22.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing west.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 23.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge.	

Photo No. 24.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing southwest.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 25.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing southwest.	

Photo No. 26.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing southwest.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 27.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing west.	

Photo No. 28.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing west.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 29.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northeast.	

Photo No. 30.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northeast.	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 31.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, old timber abutment.	

Photo No. 32.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northeast.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 33.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

Photo No. 34.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE BRIDGE

Photo No. 35.	
Date: May 6, 2020	
Description: J.C. Boyle Bridge, photo facing northwest.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 1.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing east.	

Photo No. 2.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing southwest.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 3.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing northeast.	

Photo No. 4.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing east.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 5.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing west.	

Photo No. 6.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing east.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 7.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing west.	

Photo No. 8.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, road wearing course, tape measure for scale.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 9.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, berm at side of road, tape measure for scale.	

Photo No. 10.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, slope north of road, tape measure for scale.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 11. **Date:** May 6, 2020 **Description:** J.C. Boyle Powerhouse, toe of slope north of road.	

Photo No. 12. **Date:** May 6, 2020 **Description:** J.C. Boyle Powerhouse, toe of slope north of road, photo facing west.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 13.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, parking area.	

Photo No. 14.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, parking area.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

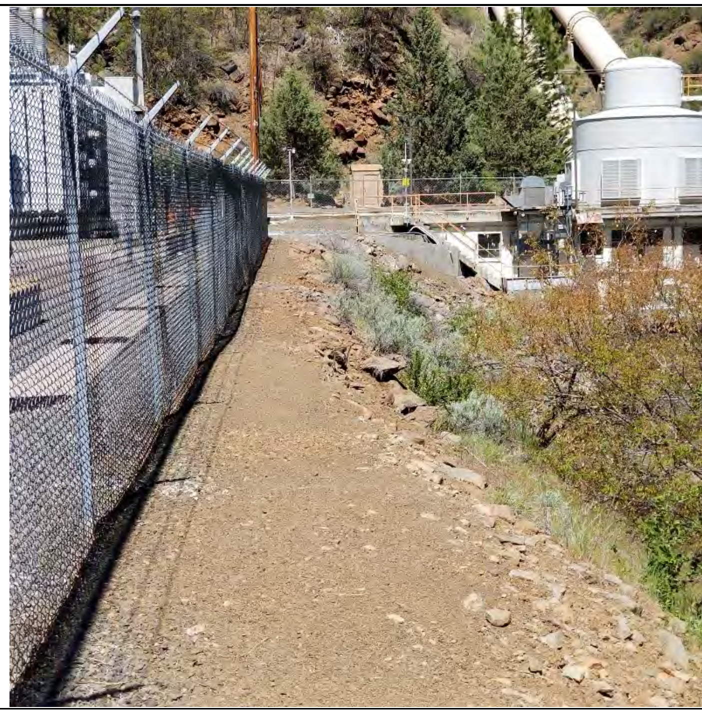
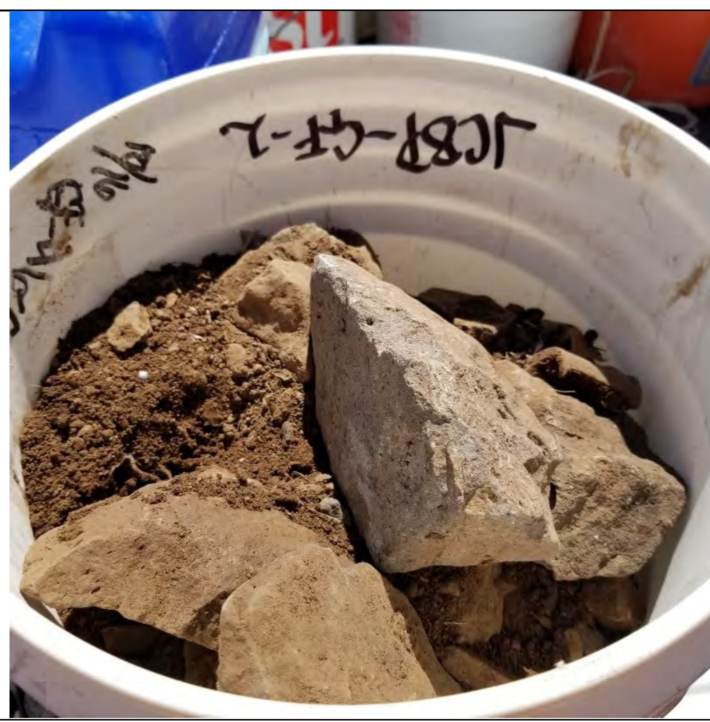
Photo No. 15.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing northeast.	

Photo No. 16.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, sample of berm north of road.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 17.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, sample of road wearing course.	

Photo No. 18.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing east.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 19.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, slope north of road.	

Photo No. 20.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing northeast.	

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
J.C. BOYLE POWERHOUSE

Photo No. 21.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing northeast.	

Photo No. 22.	
Date: May 6, 2020	
Description: J.C. Boyle Powerhouse, photo facing east.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 RIGHT BANK ROAD

Photo No. 1.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road – Zone 1	

Photo No. 2.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road – Zone 1	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 RIGHT BANK ROAD

Photo No. 3.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road	

Photo No. 4.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 RIGHT BANK ROAD

Photo No. 5.

Date: May 5, 2020

Description:

Copco 1 Right Bank road – Zone 2

Photo No. 6.

Date: May 5, 2020

Description:

Copco 1 Right Bank road – Zone 2

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 RIGHT BANK ROAD

Photo No. 7.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road – Zone 2	

Photo No. 8.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road – Zone 2, toe of slope	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 RIGHT BANK ROAD

Photo No. 9.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road	

Photo No. 10.	
Date: May 5, 2020	
Description: Copco 1 Right Bank road	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 RIGHT BANK ROAD

Photo No. 11. **Date:** May 5, 2020 **Description:** Copco 1 Right Bank road – Schmidt hammer testing	

Photo No. 12. **Date:** May 5, 2020 **Description:** Copco 1 Right Bank road – Point Load Testing (PLT) samples	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 VILLAGE

Photo No. 1.	
Date: May 5, 2020	
Description: Copco 1 Village facing NE	

Photo No. 2.	
Date: May 5, 2020	
Description: Copco 1 Village	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 1 VILLAGE

Photo No. 3.

Date: May 5, 2020

Description:

Copco 1 Village

Photo No. 4.

Date: May 5, 2020

Description:

Copco 1 Village – mid slope

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS RIGHT BANK

Photo No. 1.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream	

Photo No. 2.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS RIGHT BANK

Photo No. 3.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream	

Photo No. 4.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS RIGHT BANK

Photo No. 5.

Date: May 5, 2020

Description:

Copco 2, Right Bank Downstream

Photo No. 6.

Date: May 5, 2020

Description:

Copco 2, Right Bank Downstream – facing WNW

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS RIGHT BANK

Photo No. 7.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream	

Photo No. 8.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream – PLT sample 1	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS RIGHT BANK

Photo No. 9.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream **– PLT sample 2**	

Photo No. 10.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream – PLT sample 3	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS RIGHT BANK

Photo No. 11.	
Date: May 5, 2020	
Description: Copco 2, Right Bank Downstream – All 3 PLT samples	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS LEFT BANK

Photo No. 1.	
Date: May 5, 2020	
Description: Copco 2, Left Bank Downstream – PLT sample 1	

Photo No. 2.	
Date: May 5, 2020	
Description: Copco 2, Left Bank Downstream – PLT sample 2	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 DS LEFT BANK

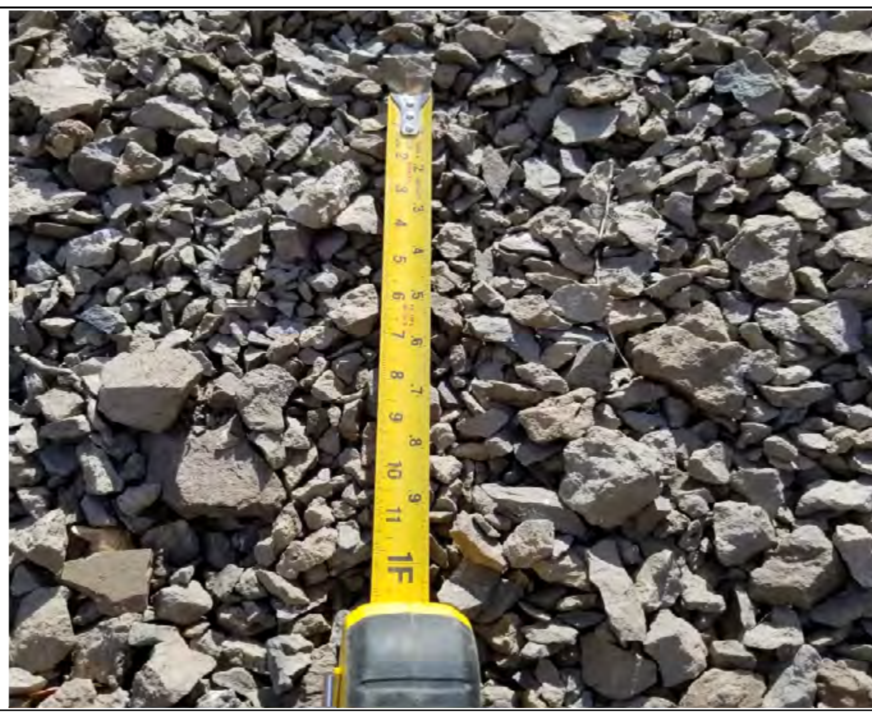
Photo No. 3.	
Date: May 5, 2020	
Description: Copco 2, Left Bank Downstream – PLT sample 3	

Photo No. 4.	
Date: May 5, 2020	
Description: Copco 2, Left Bank Downstream – PLT samples 1-3	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No. 1.	
Date: May 5, 2020	
Description: Copco 2 wood-stave Penstock – Zone 1	

Photo No. 2.	
Date: May 5, 2020	
Description: Copco 2 wood-stave Penstock – Zone 2	

Knight Piésold
CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No. 3.	
Date: May 5, 2020	
Description: Copco 2 wood-stave Penstock – Zone 3	

Photo No. 4.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock - Overview	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

<table>
<tr><td>Photo No. 5.</td><td rowspan="3"></td></tr>
<tr><td>Date: May 7, 2020</td></tr>
<tr><td>Description:

Copco 2 wood-stave Penstock</td></tr>
</table>

<table>
<tr><td>Photo No. 6.</td><td rowspan="3"></td></tr>
<tr><td>Date: May 5, 2020</td></tr>
<tr><td>Description:

Copco 2 wood-stave Penstock – Zone 2</td></tr>
</table>

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No. 7.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock	

Photo No. 8.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock – above Zone 1 looking west	

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PHOTOGRAPHIC RECORD

KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No. 9.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock	

Photo No. 10.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock - panorama	

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CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock	

Photo No. 11.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock – facing east	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No. 12.	 1
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock – facing west across upper part of Zone 1	

Photo No. 13.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No. 14.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock	

Photo No. 15.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD

KLAMATH RIVER RENEWAL PROJECT
COPCO 2 WOOD-STAVE PENSTOCK

Photo No. 16.	
Date: May 7, 2020	
Description: Copco 2 wood-stave Penstock - panorama	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

Photo No. 1.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – center of embankment	

Photo No. 2.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

Photo No. 3.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – facing upstream ENE	

Photo No. 4.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – west groin area	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

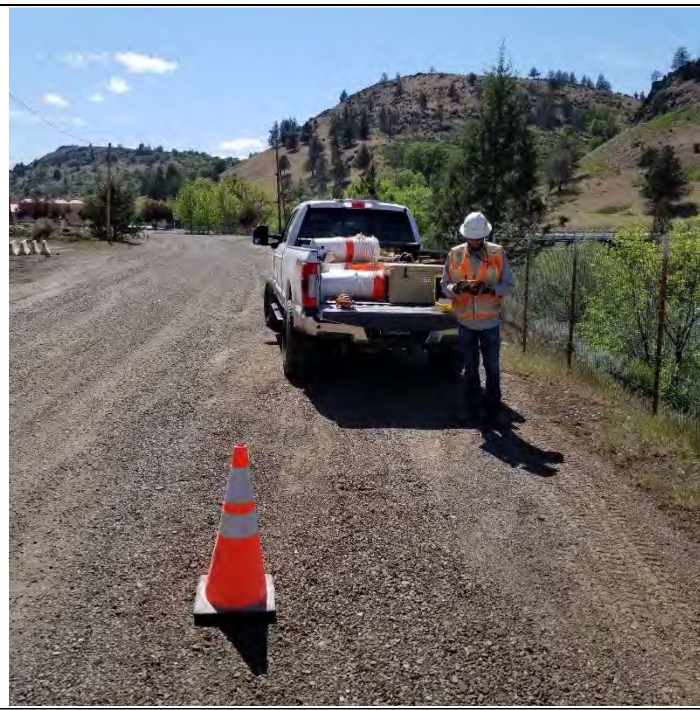
Photo No. 5.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – entrance road access	

Photo No. 6.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – facing north onto embankment downstream face	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

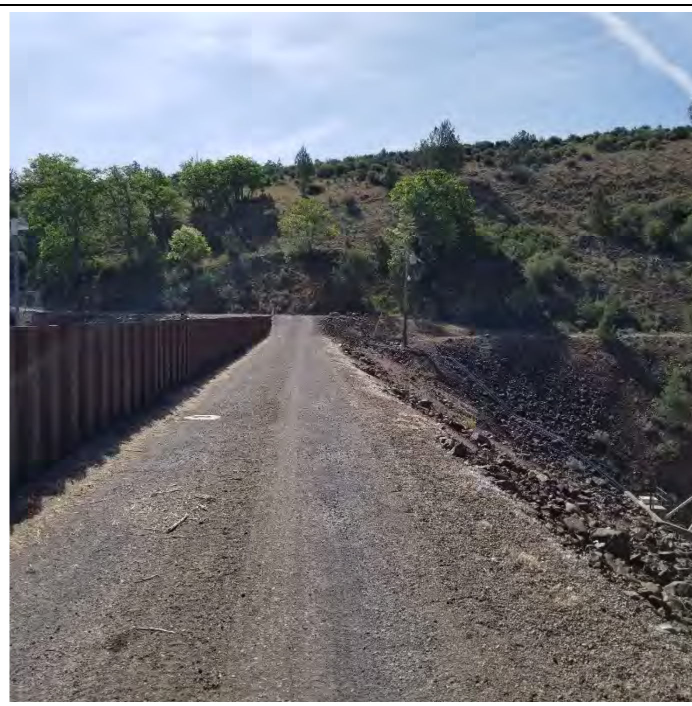
Photo No. 7.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – PLT sample	

Photo No. 8.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – PLT sample	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

Photo No. 9.	
Date: May 4, 2020	
Description: Iron Gate DS Dam Shell – PLT sample	

Photo No. 10.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell – along crest facing east	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

Photo No. 11.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell	

Photo No. 12.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

Photo No. 13.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell – facing downstream	

Photo No. 14.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell – Embankment crest looking west	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

Photo No. 15.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell – facing west along crest	

Photo No. 16.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE DS DAM SHELL

Photo No. 17.	
Date: May 7, 2020	
Description: Iron Gate DS Dam Shell – Zone 3, facing east	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE-LAKEVIEW ROAD

Photo No. 1.	
Date: May 4, 2020	
Description: Iron Gate – Lakeview Road PLT sample.	

Photo No. 2.	
Date: May 4, 2020	
Description: Iron Gate – Lakeview Road PLT sample.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE-LAKEVIEW ROAD

Photo No. 3.	
Date: May 4, 2020	
Description: Iron Gate – Lakeview Road PLT sample.	

Photo No. 4.	
Date: May 4, 2020	
Description: Iron Gate – Lakeview Road Erosion Protection samples.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

Photo No. 1.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area, facing north.	

Photo No. 2.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area, facing east.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

Photo No. 3.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area, material at toe of slope.	

Photo No. 4.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area erosion protection samples.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

Photo No. 5.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area, obtaining Schmidt Hammer reading.	

Photo No. 6.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area PLT sample.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

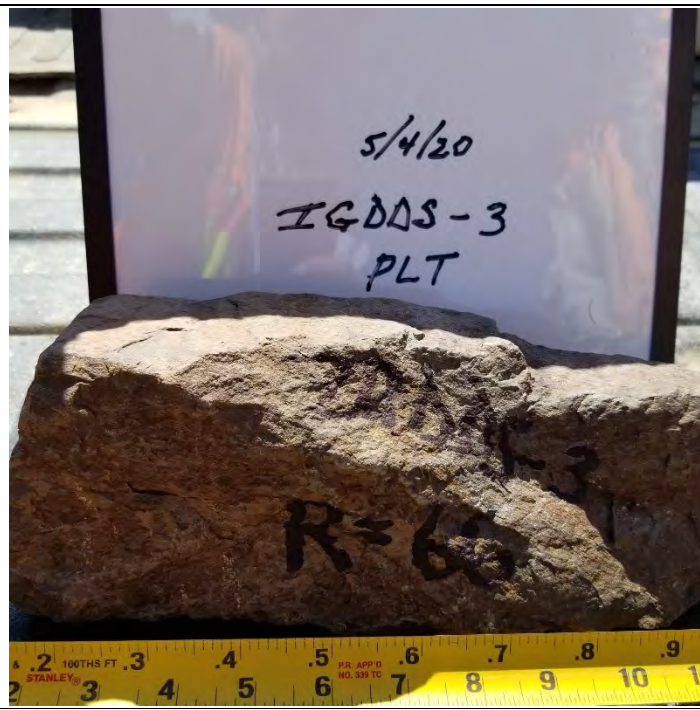
Photo No. 7.	
Date: May 4, 2020	
Description:	

Photo No. 8.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area PLT sample.	

Knight Piésold
CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

Photo No. 9.	
Date: May 4, 2020	
Description: Iron Gate Workers Accommodation Area PLT sample.	

Photo No. 10.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, road wearing course.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD

KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

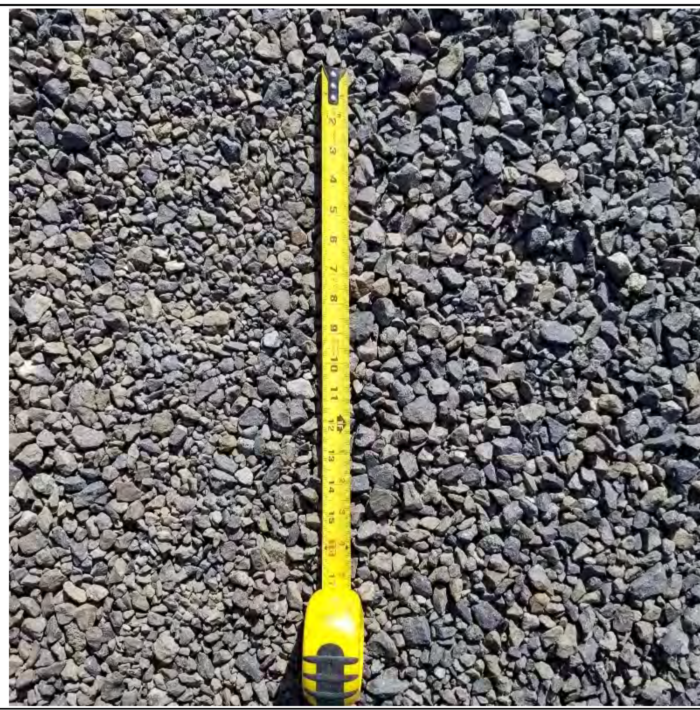
Photo No. 11.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, road wearing course.	

Photo No. 12.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, face of slope.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

Photo No. 13.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, facing north.	

Photo No. 14.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, facing north.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

Photo No. 15.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, face of slope.	

Photo No. 16.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, facing east.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD

KLAMATH RIVER RENEWAL PROJECT
IRON GATE WORKERS ACCOMMODATION AREA

Photo No. 17.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, facing west.	

Photo No. 18.	
Date: May 7, 2020	
Description: Iron Gate Workers Accommodation Area, face of slope.	

Knight Piésold CONSULTING

PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
FOREBAY

Photo No. 1.	
Date: May 6, 2020	
Description: Forebay road surface at entrance	

Photo No. 2.	
Date: May 6, 2020	
Description: Forebay road surface at entrance	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
FOREBAY

Photo No. 3.

Date: May 6, 2020

Description:

Forebay road surface

Photo No. 4.

Date: May 6, 2020

Description:

Forebay entrance

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
FOREBAY

Photo No. 5.	
Date: May 6, 2020	
Description: Forebay road surface	

Photo No. 6.	
Date: May 6, 2020	
Description: Forebay area	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
FOREBAY

Photo No. 7.	
Date: May 7, 2020	
Description: Forebay road surface	

Photo No. 8.	
Date: May 6, 2020	
Description: Forebay road surface	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
FOREBAY

Photo No. 9.	
Date: May 6, 2020	
Description: Forebay road surface – Dmax view	

Photo No. 10.	
Date: May 6, 2020	
Description: Forebay road surface	

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PHOTOGRAPHIC RECORD
KLAMATH RIVER RENEWAL PROJECT
FOREBAY

Photo No. 11. **Date:** May 6, 2020 **Description:** Forebay road surface – Northern portion of site access road	

Photo No. 12. **Date:** May 6, 2020 **Description:** Forebay road surface – exposed native soils on right side of photo	

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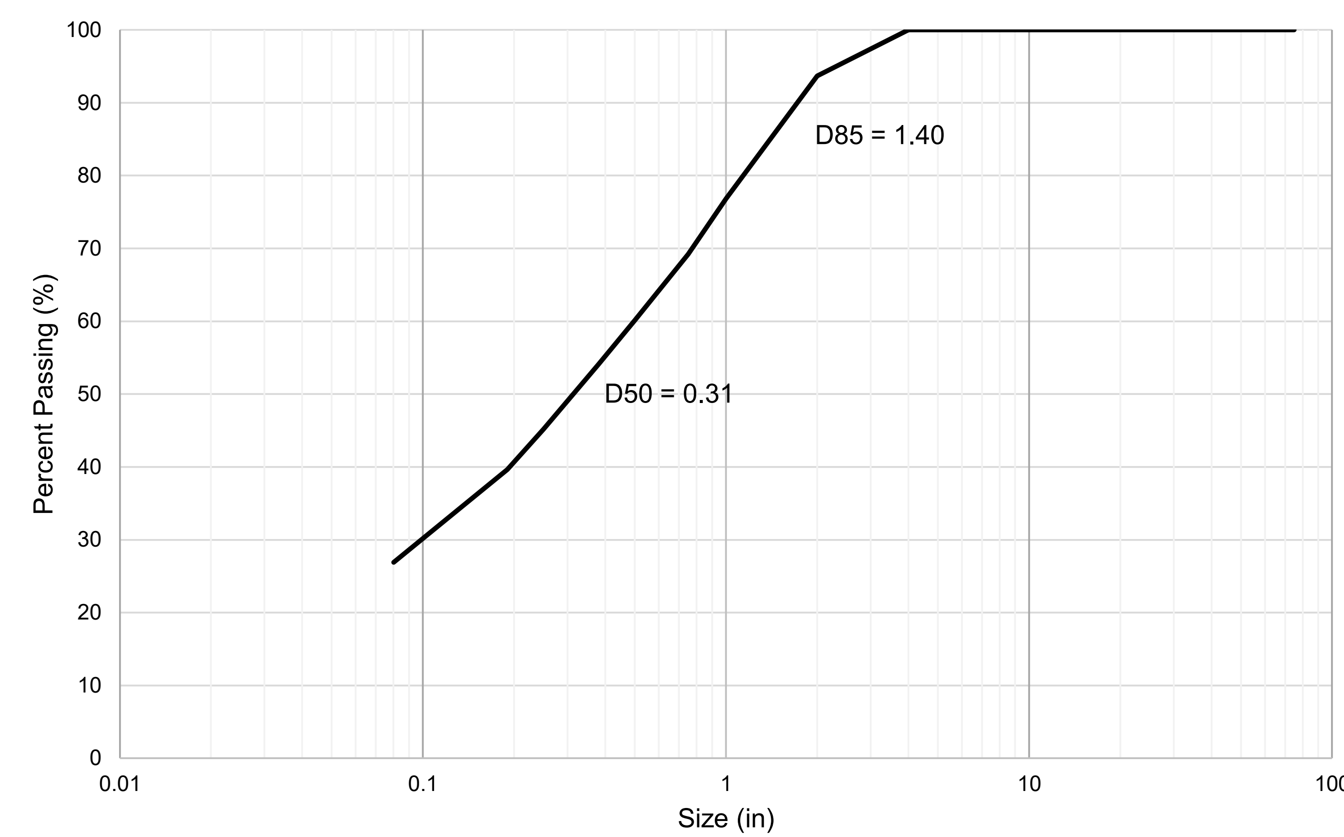
APPENDIX C

Split-NET Analysis Results

(Figures C.1 to C.23)

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	100.00
10	100.00
8	100.00
6	100.00
4	100.00
2	93.67
1	76.83
0.75	69.19
0.5	60.10
0.38	54.11
0.25	45.18
0.19	39.64
0.08	26.91

% Passing	Size[in]
F10	0.01
F20	0.04
F30	0.10
F40	0.19
F50	0.31
F60	0.50
F70	0.77
F80	1.13
F90	1.67
Topsize (99.95%)	3.41



NOTES:

1. TAPE MEASURE FOR SCALE
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
IRON GATE WORKERS ACCOMMODATION

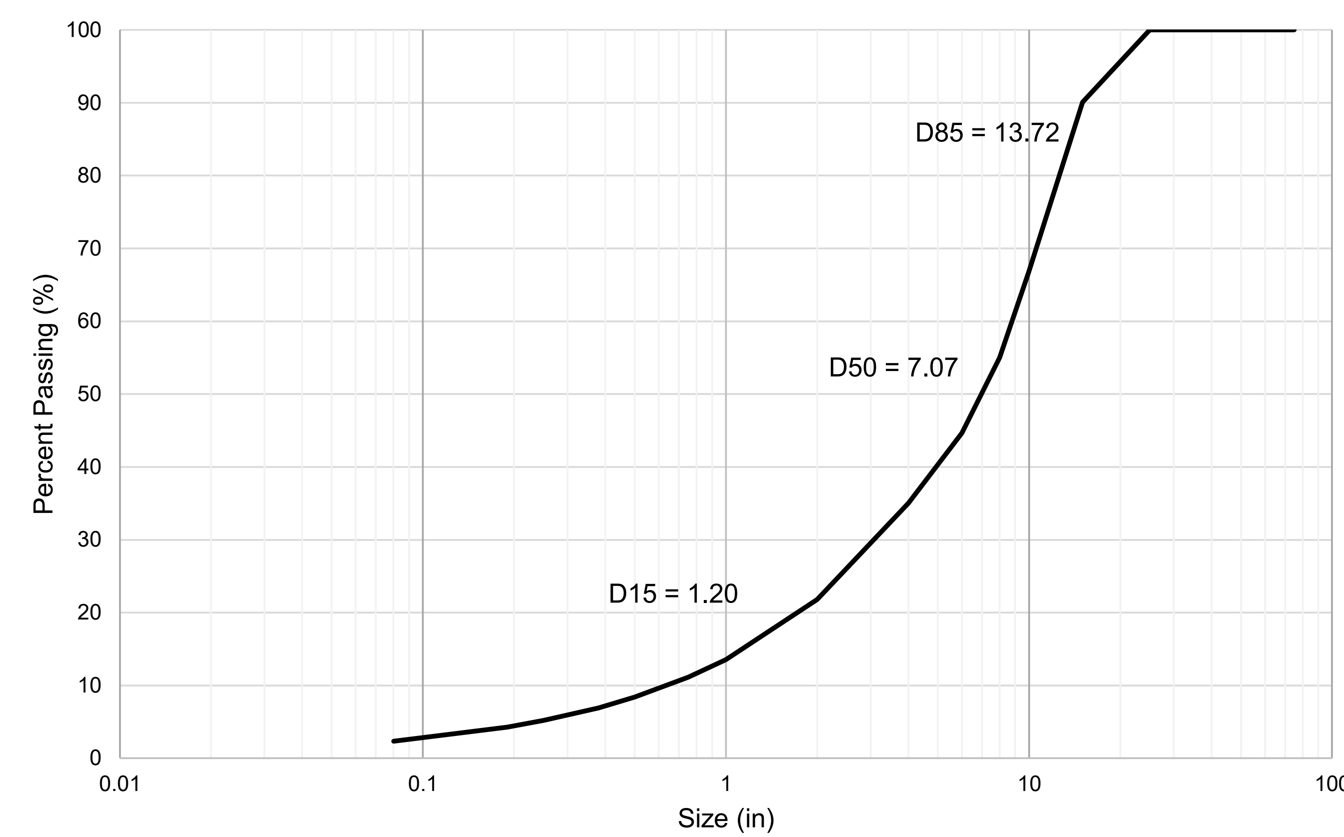
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA103-640/1	VA20-01037

FIGURE C.1 REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	90.06
10	66.92
8	55.01
6	44.65
4	35.04
2	21.81
1	13.56
0.75	11.12
0.5	8.41
0.38	6.90
0.25	5.21
0.19	4.26
0.08	2.34

% Passing	Size[in]
F10	0.64
F20	1.76
F30	3.19
F40	4.95
F50	7.07
F60	8.84
F70	10.53
F80	12.46
F90	14.98
Topsize (99.95%)	22.57



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
IRON GATE LAKEVIEW ROAD - 1

Knight Piésold CONSULTING

P/A NO. VA103-640/1

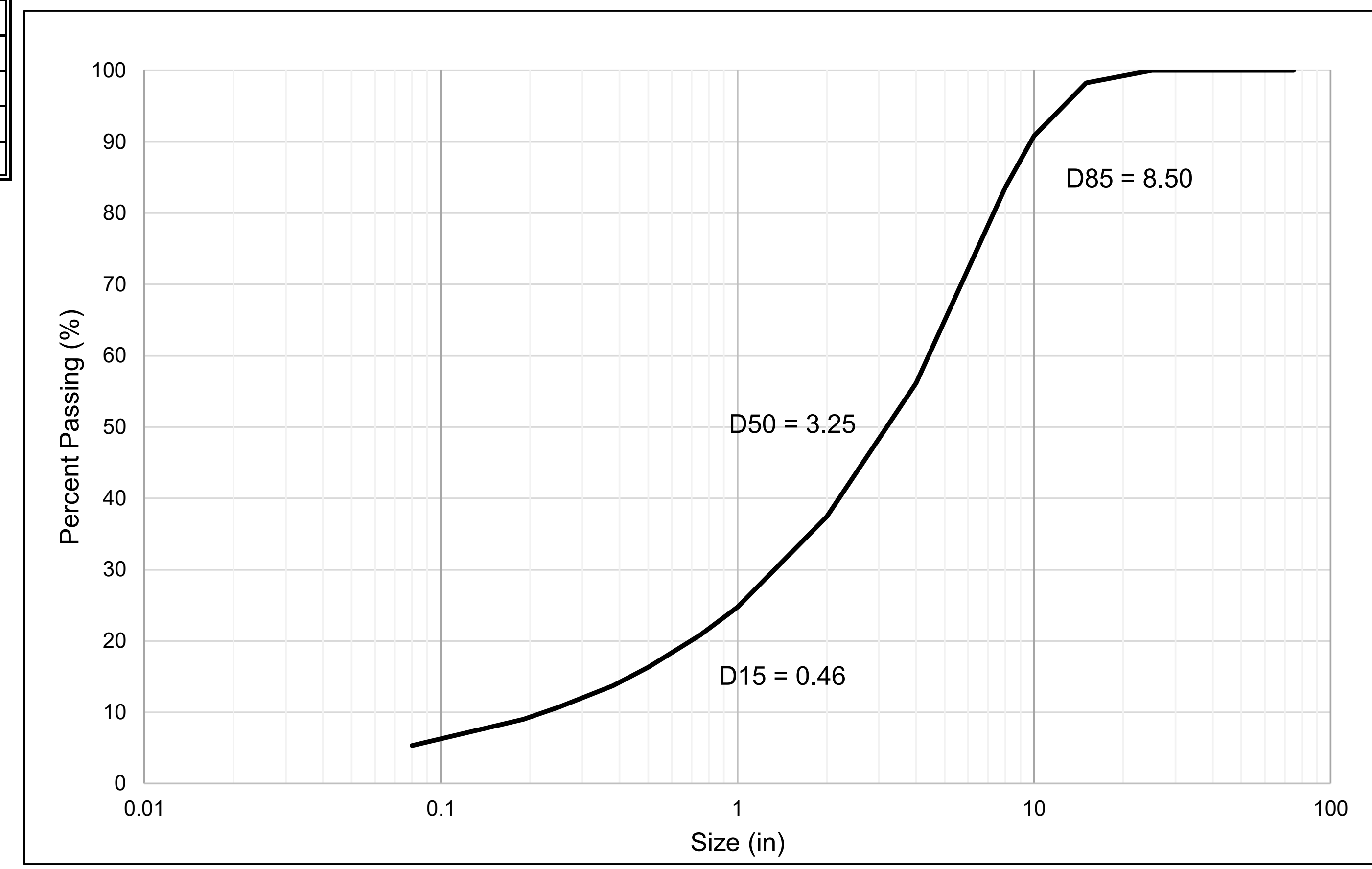
REF. NO. VA20-01037

FIGURE C.2

REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	98.25
10	90.77
8	83.61
6	72.16
4	56.15
2	37.46
1	24.75
0.75	20.83
0.5	16.32
0.38	13.72
0.25	10.74
0.19	9.01
0.08	5.33

% Passing	Size[in]
F10	0.22
F20	0.70
F30	1.38
F40	2.23
F50	3.25
F60	4.45
F70	5.70
F80	7.26
F90	9.73
Topsize (99.95%)	19.06



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
IRON GATE LAKEVIEW ROAD - 2

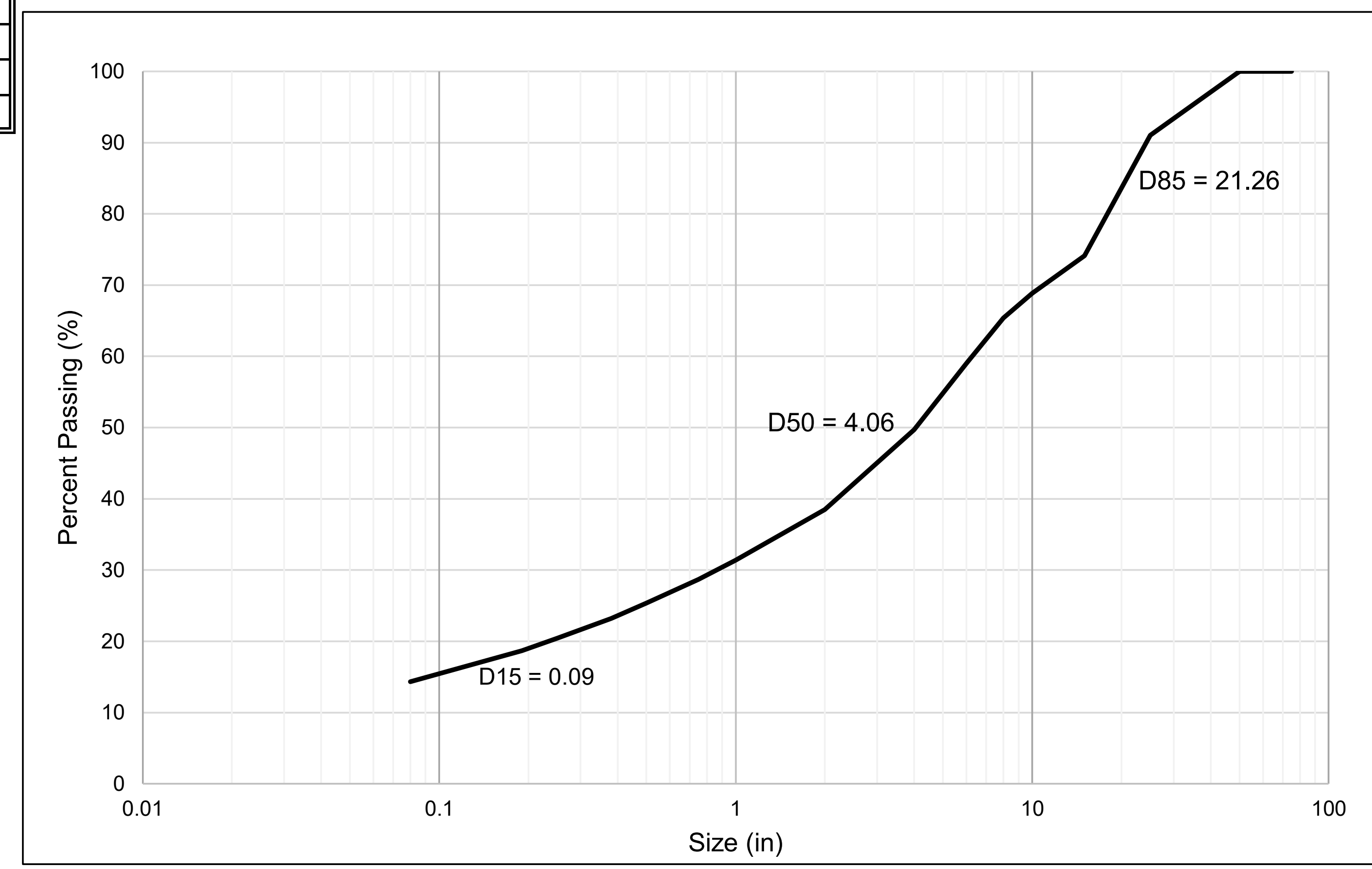
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA103-640/1	VA20-01037

FIGURE C.3 REV B

Size[in]	% Passing
75	100.00
50	100.00
25	91.05
15	74.14
10	68.87
8	65.37
6	58.99
4	49.71
2	38.49
1	31.36
0.75	28.71
0.5	25.34
0.38	23.19
0.25	20.45
0.19	18.70
0.08	14.33

% Passing	Size[in]
F10	0.02
F15	0.09
F20	0.23
F30	0.87
F40	2.24
F50	4.06
F60	6.25
F70	10.92
F80	18.59
F85	21.26
F90	24.22
Topsize (99.95%)	32.75



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

B	06AUG'20	ISSUED WITH LETTER	TB	CAV
REV	DATE	DESCRIPTION	PREP'D	RVW'D

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
IRON GATE LAKEVIEW ROAD - 3

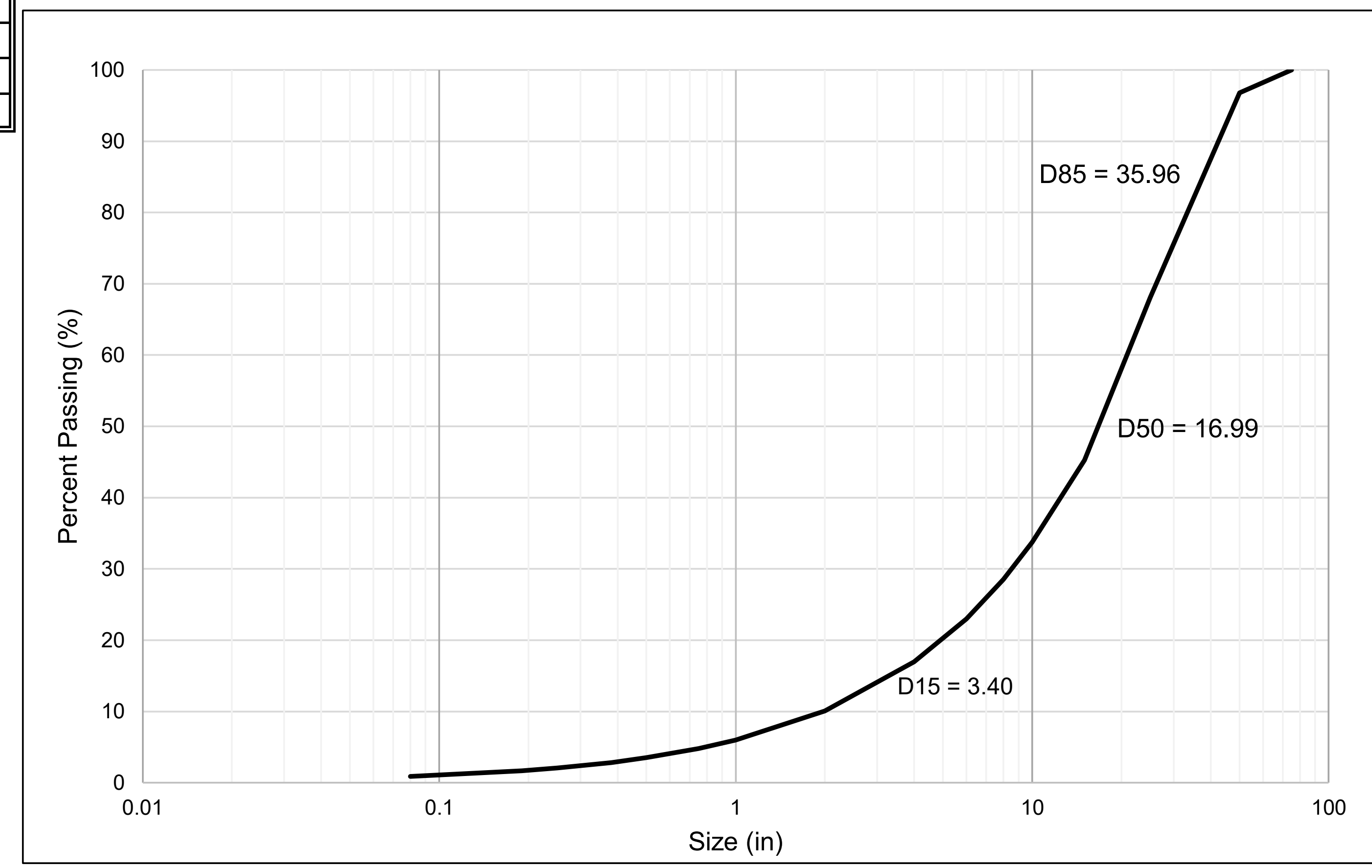
Knight Piésold CONSULTING

P/A NO. VA103-640/1 | REF. NO. VA20-01037

FIGURE C.4 | REV B

Size[in]	% Passing
75	100.00
50	96.80
25	68.09
15	45.28
10	33.75
8	28.54
6	23.00
4	16.95
2	10.06
1	5.97
0.75	4.80
0.5	3.54
0.38	2.84
0.25	2.09
0.19	1.68
0.08	0.87

% Passing	Size[in]
F10	1.98
F15	3.40
F20	4.98
F30	8.55
F40	12.63
F50	16.99
F60	21.20
F70	25.99
F80	32.05
F85	35.96
F90	40.61
Topsize (99.95%)	65.36



NOTES:
1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.
KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
IRON GATE DAM DOWNSTRAM FACE SUB-AREA 1

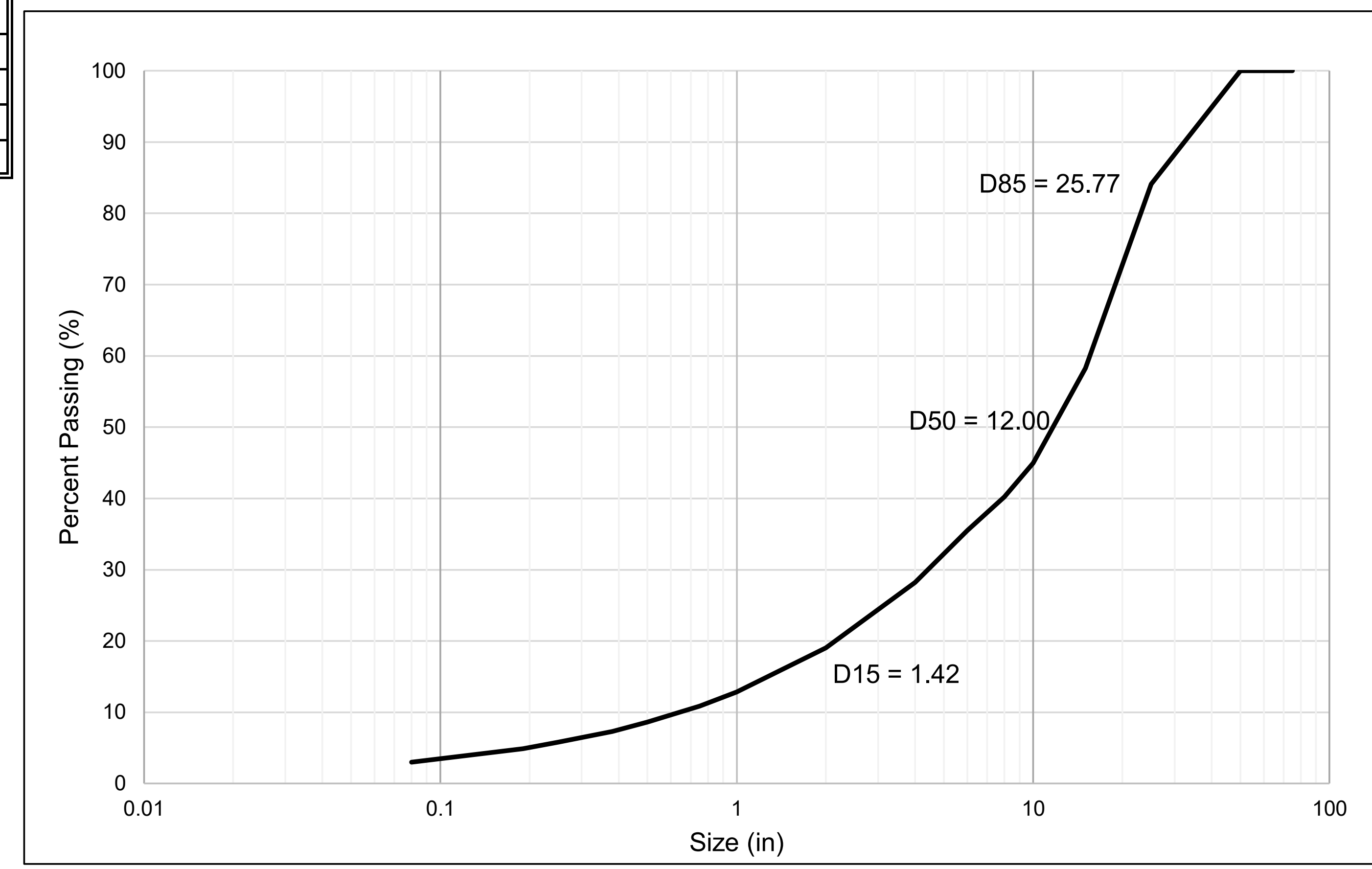
Knight Piésold CONSULTING

P/A NO. VA103-640/1 | REF. NO. VA20-01037

FIGURE C.5 REV B

Size[in]	% Passing
75	100.00
50	100.00
25	84.10
15	58.29
10	44.94
8	40.21
6	35.51
4	28.23
2	19.05
1	12.84
0.75	10.89
0.5	8.64
0.38	7.32
0.25	5.80
0.19	4.91
0.08	2.98

% Passing	Size[in]
F10	0.65
F20	2.18
F30	4.45
F40	7.91
F50	12.00
F60	15.63
F70	19.24
F80	23.14
F90	28.39
Topsize (99.95%)	44.87



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

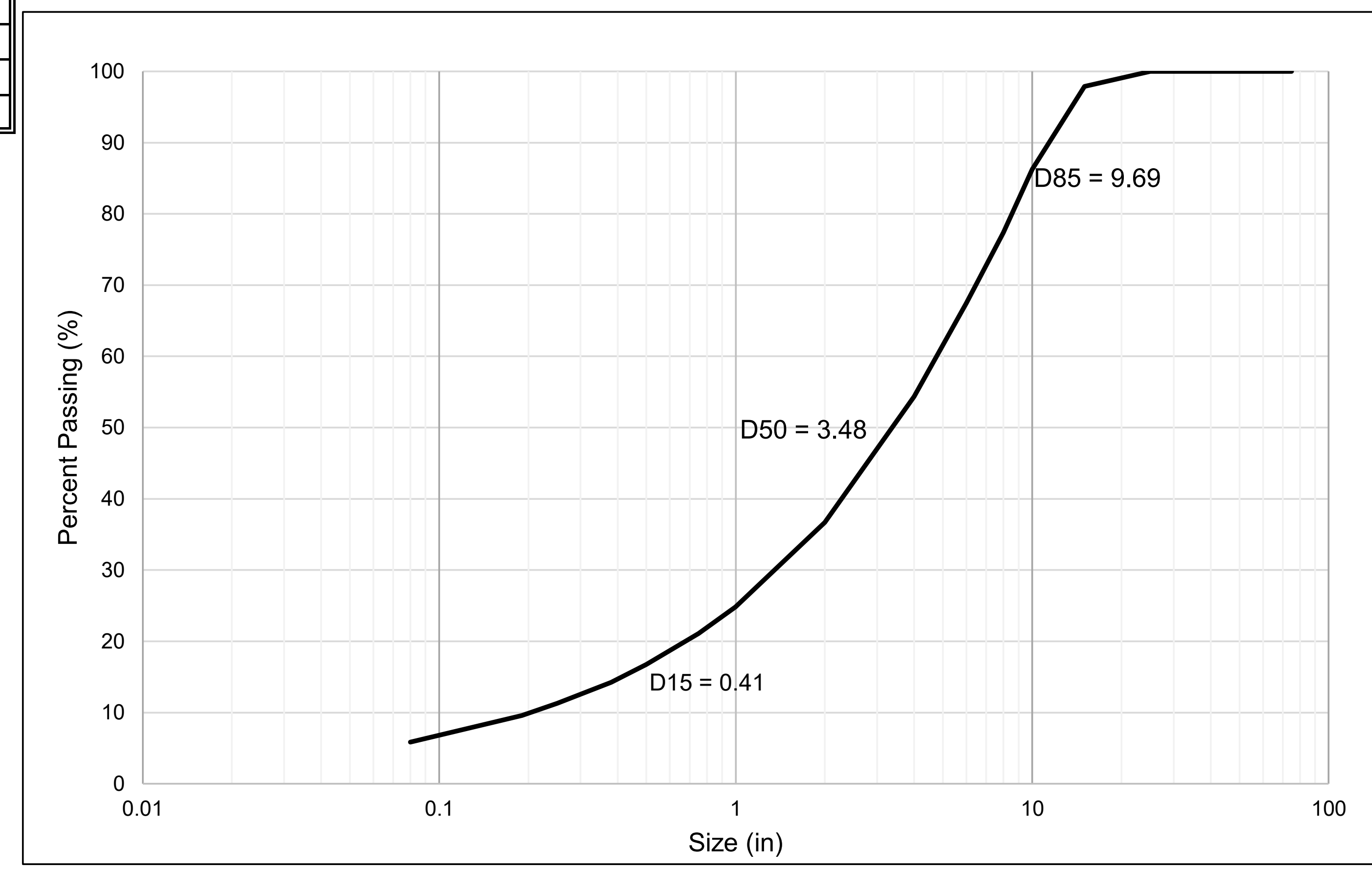
ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
IRON GATE DAM DOWNSTREAM FACE SUB-AREA 2

Knight Piésold CONSULTING

P/A NO.	REF. NO.	
VA103-640/1	VA20-01037	
FIGURE C.6		REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	97.89
10	86.27
8	77.39
6	67.51
4	54.36
2	36.69
1	24.82
0.75	21.09
0.5	16.76
0.38	14.23
0.25	11.30
0.19	9.57
0.08	5.84

% Passing	Size[in]
F10	0.20
F15	0.41
F20	0.68
F30	1.40
F40	2.34
F50	3.48
F60	4.78
F70	6.48
F80	8.57
F85	9.69
F90	11.05
Topsize (99.95%)	18.66



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
IRON GATE DAM DOWNSTREAM FACE SUB-AREA 3

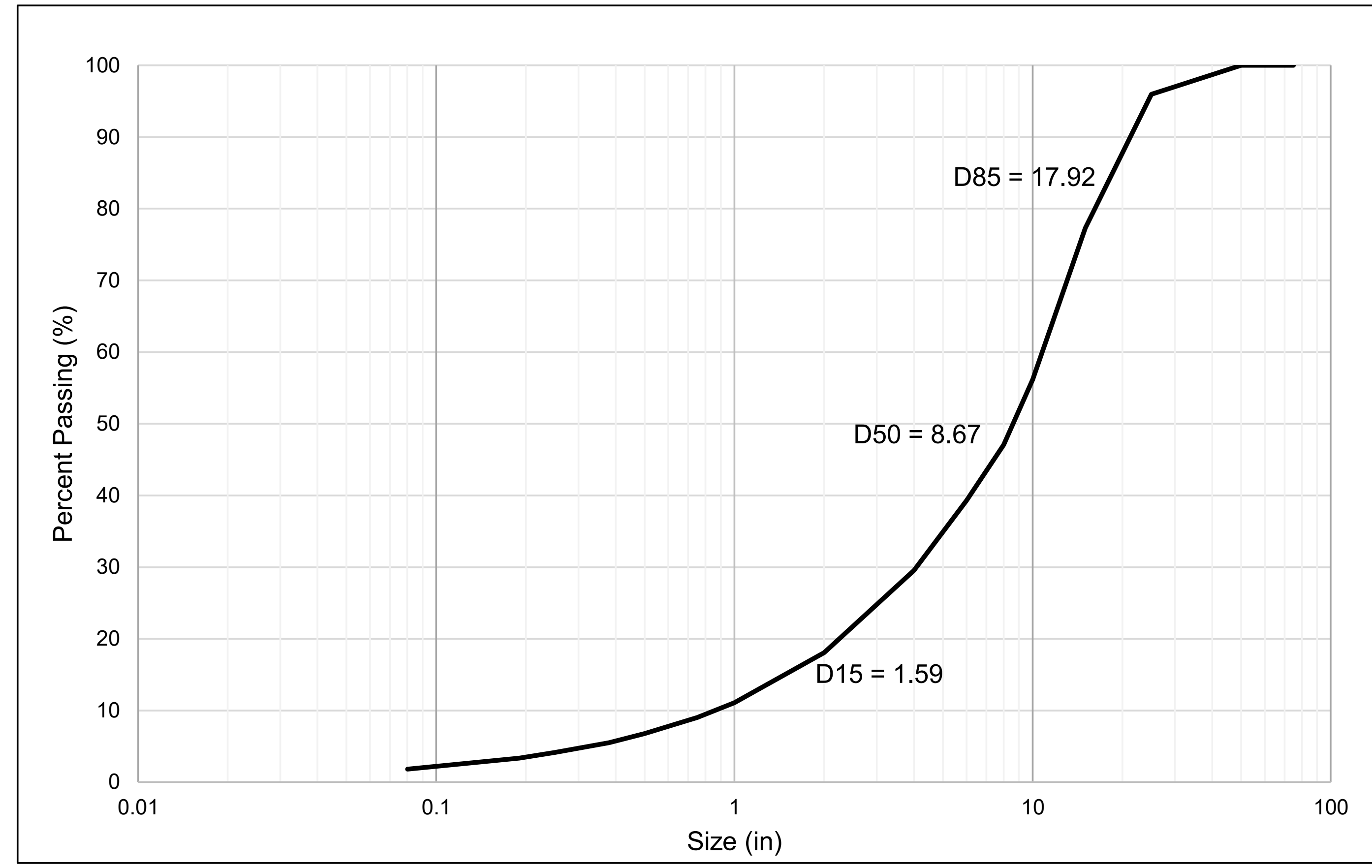
Knight Piésold CONSULTING

P/A NO. VA103-640/1 | REF. NO. VA20-01037

FIGURE C.7 | REV B

Size[in]	% Passing
75	100.00
50	100.00
25	95.98
15	77.28
10	56.17
8	47.08
6	39.30
4	29.52
2	18.09
1	11.07
0.75	9.03
0.5	6.77
0.38	5.51
0.25	4.13
0.19	3.35
0.08	1.80

% Passing	Size[in]
F10	0.87
F20	2.31
F30	4.09
F40	6.15
F50	8.67
F60	10.82
F70	13.09
F80	15.81
F90	20.02
Topsize (99.95%)	34.58



NOTES:
1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

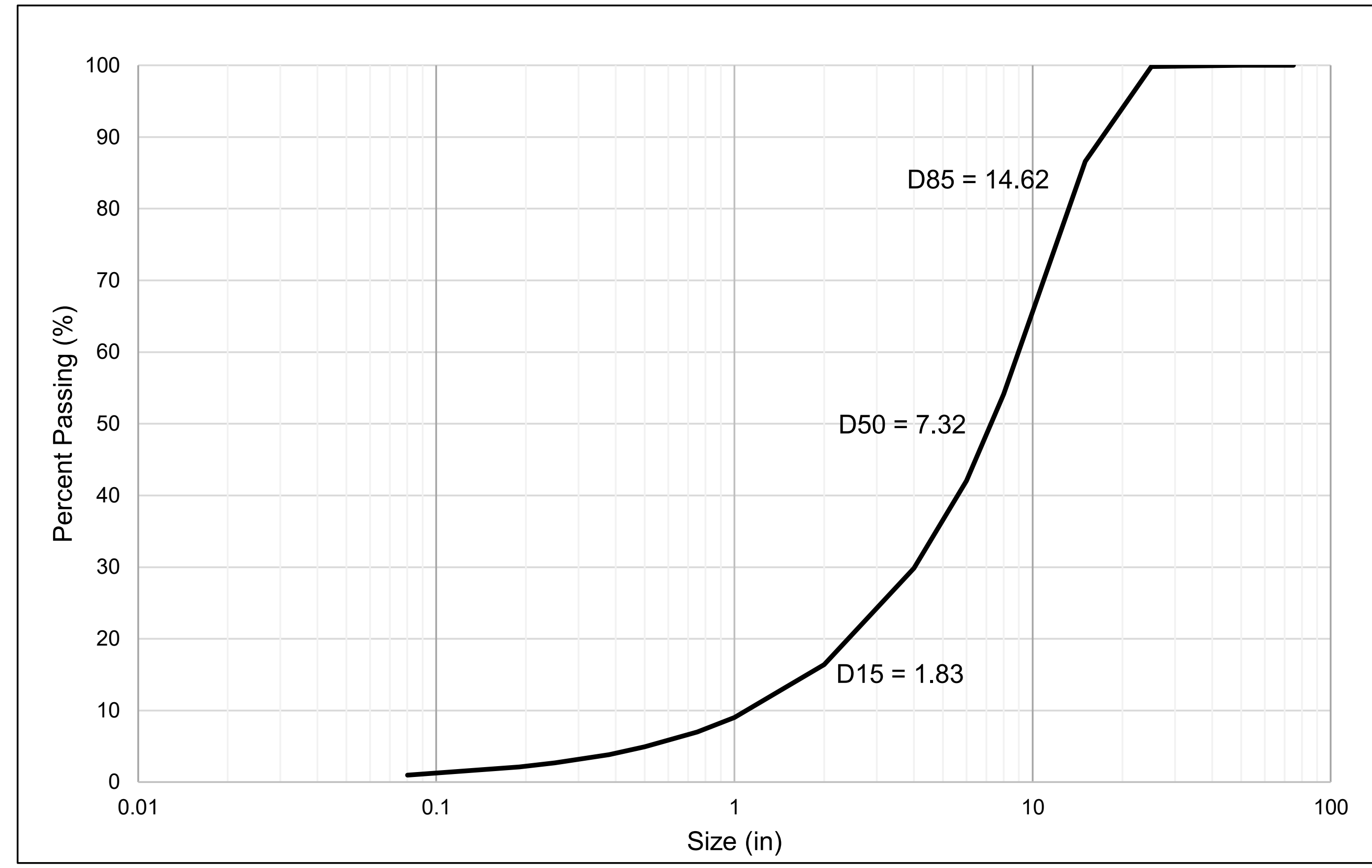
ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 1 ACCESS ROAD - 1

Knight Piésold CONSULTING

P/A NO.	REF. NO.	
VA103-640/1	VA20-01037	
FIGURE C.8		REV B

Size[in]	% Passing
75	100.00
50	100.00
25	99.82
15	86.61
10	65.63
8	54.14
6	42.07
4	29.83
2	16.40
1	9.01
0.75	7.02
0.5	4.94
0.38	3.85
0.25	2.71
0.19	2.11
0.08	0.99

% Passing	Size[in]
F10	1.13
F20	2.52
F30	4.03
F40	5.62
F50	7.32
F60	9.00
F70	10.82
F80	13.07
F90	16.16
Topsize (99.95%)	25.37



NOTES:
1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO.1 ACCESS ROAD - 2

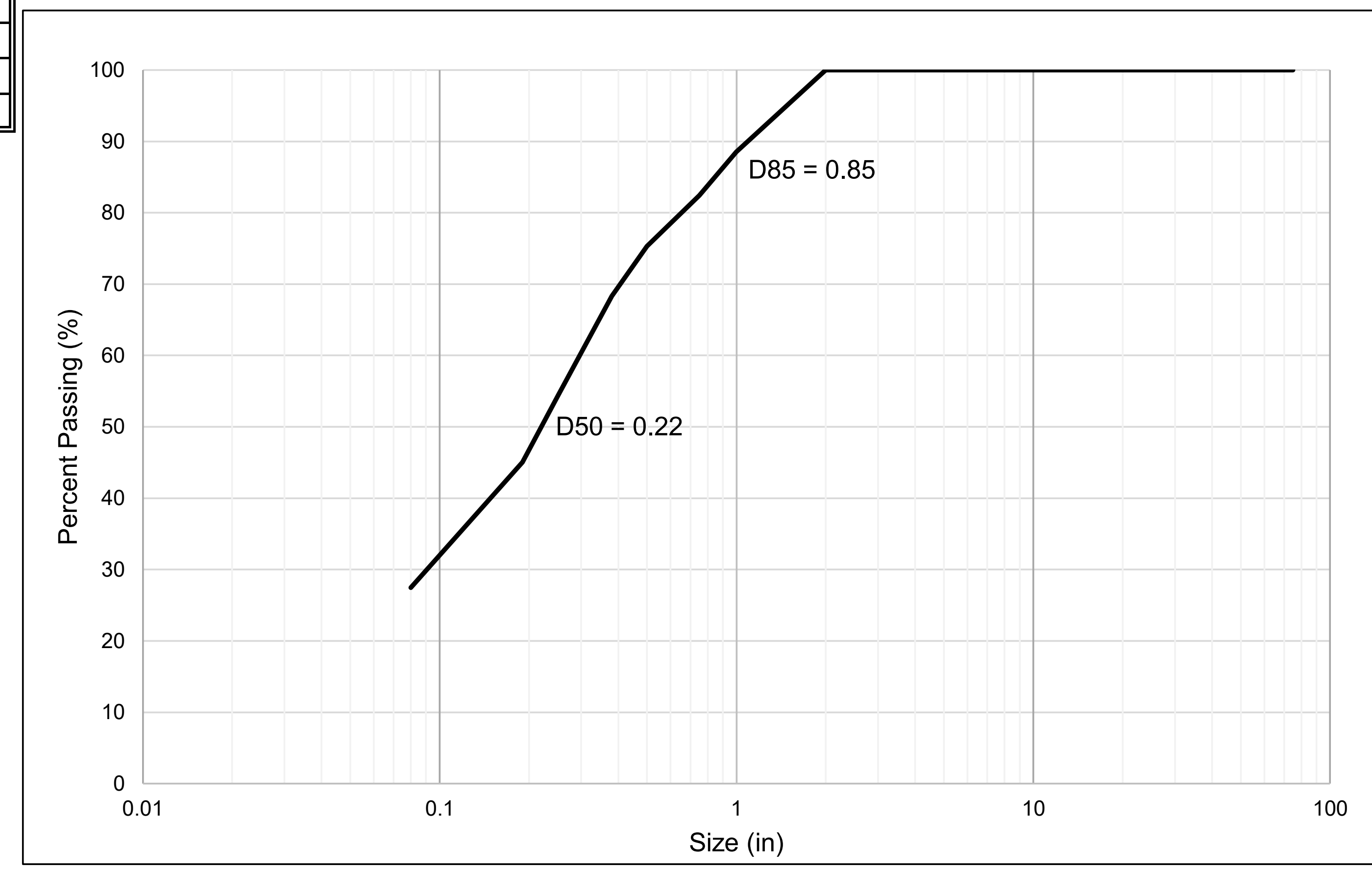
Knight Piésold CONSULTING

P/A NO. VA103-640/1 | REF. NO. VA20-01037

FIGURE C.9 | REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	100.00
10	100.00
8	100.00
6	100.00
4	100.00
2	99.98
1	88.54
0.75	82.42
0.5	75.30
0.38	68.34
0.25	54.36
0.19	45.06
0.08	27.46

% Passing	Size[in]
F10	0.01
F15	0.03
F20	0.05
F30	0.09
F40	0.15
F50	0.22
F60	0.29
F70	0.40
F80	0.65
F85	0.85
F90	1.07
Topsize (99.95%)	1.98



NOTES:

1. STANDARD TAPE MEASURE FOR SCALE
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 1 VILLAGE - 1

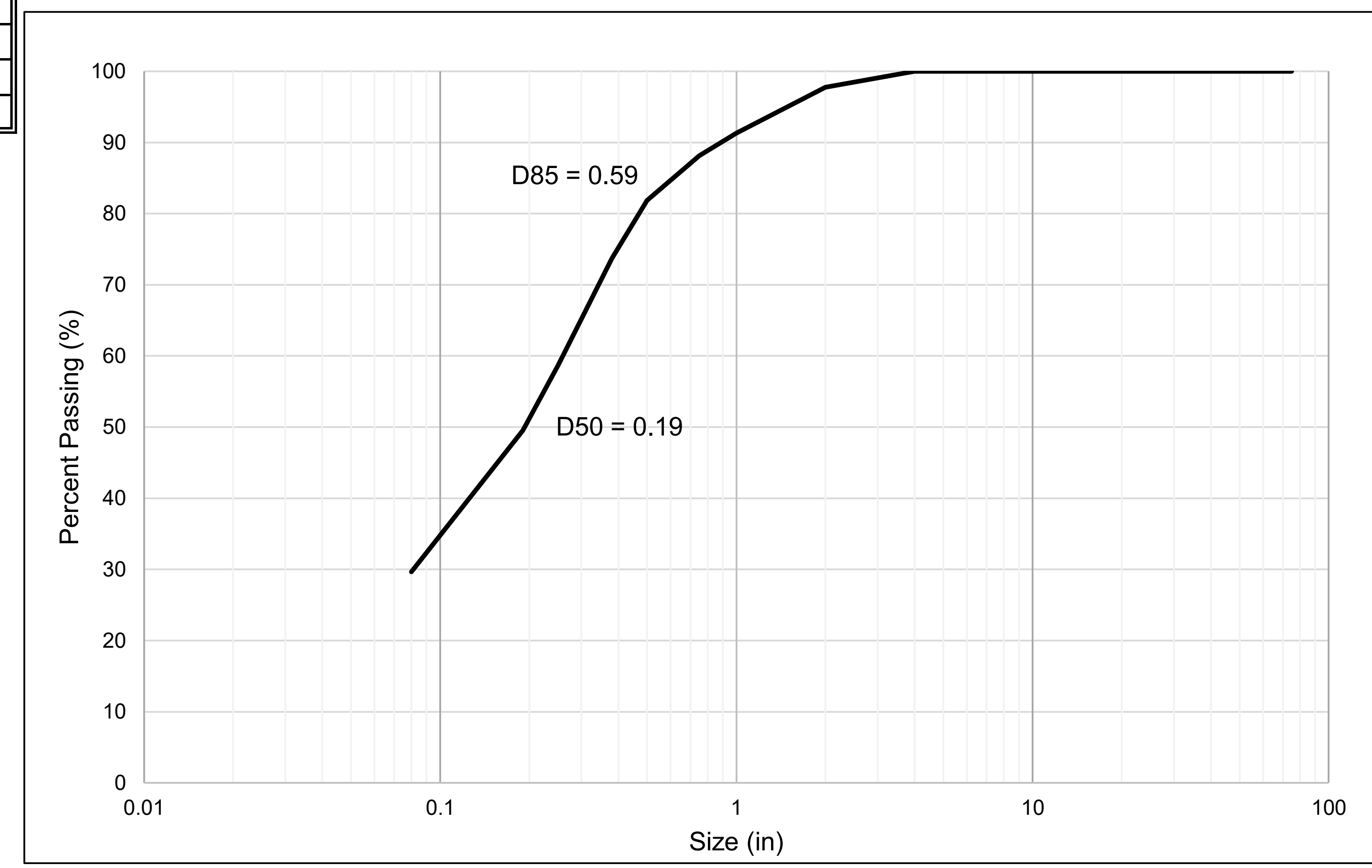
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA103-640/1	VA20-01037

FIGURE C.10 REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	100.00
10	100.00
8	100.00
6	100.00
4	100.00
2	97.78
1	91.28
0.75	88.12
0.5	81.84
0.38	73.71
0.25	58.69
0.19	49.50
0.08	29.65

% Passing	Size[in]
F10	0.01
F15	0.03
F20	0.04
F30	0.08
F40	0.13
F50	0.19
F60	0.26
F70	0.34
F80	0.46
F85	0.59
F90	0.88
Topsize (99.95%)	2.64



NOTES:

1. STANDARD TAPE MEASURE FOR SCALE
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 1 VILLAGE - 2

Knight Piésold CONSULTING

P/A NO. VA103-640/1

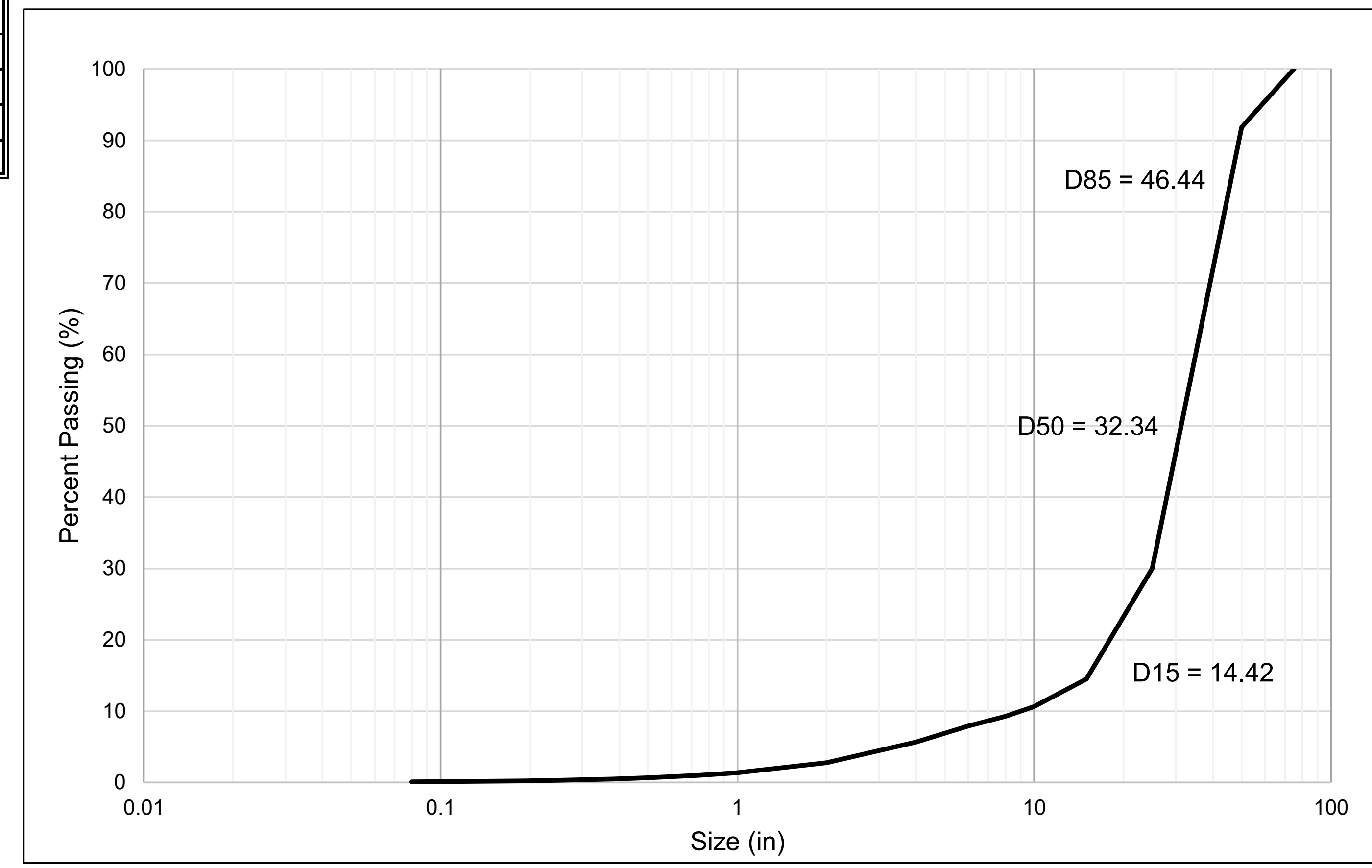
REF. NO. VA20-01037

FIGURE C.11

REV B

Size[in]	% Passing
75	100.00
50	91.83
25	30.04
15	14.50
10	10.67
8	9.27
6	7.92
4	5.67
2	2.80
1	1.39
0.75	1.04
0.5	0.69
0.38	0.51
0.25	0.34
0.19	0.25
0.08	0.10

% Passing	Size[in]
F10	9.03
F20	19.81
F30	24.98
F40	28.85
F50	32.34
F60	35.88
F70	39.68
F80	44.02
F90	48.86
Topsize (99.95%)	58.83



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING
3. DUE TO THE LARGE PARTICLE SIZES OF THE ROCKS, BOTH SCALING BALLS COULD NOT BE SHOWN IN THE PHOTOGRAPHS SENT FOR ANALYSIS. THE RESULTING ANALYSIS IS THEREFORE EXPECTED TO PRODUCE AN ARTIFICIALLY SMALLER PARTICLE SIZE CURVE DUE TO AN INABILITY TO DETERMINE THE DEPTH OF FIELD.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 2 DOWNSTREAM RIGHT BANK - 1

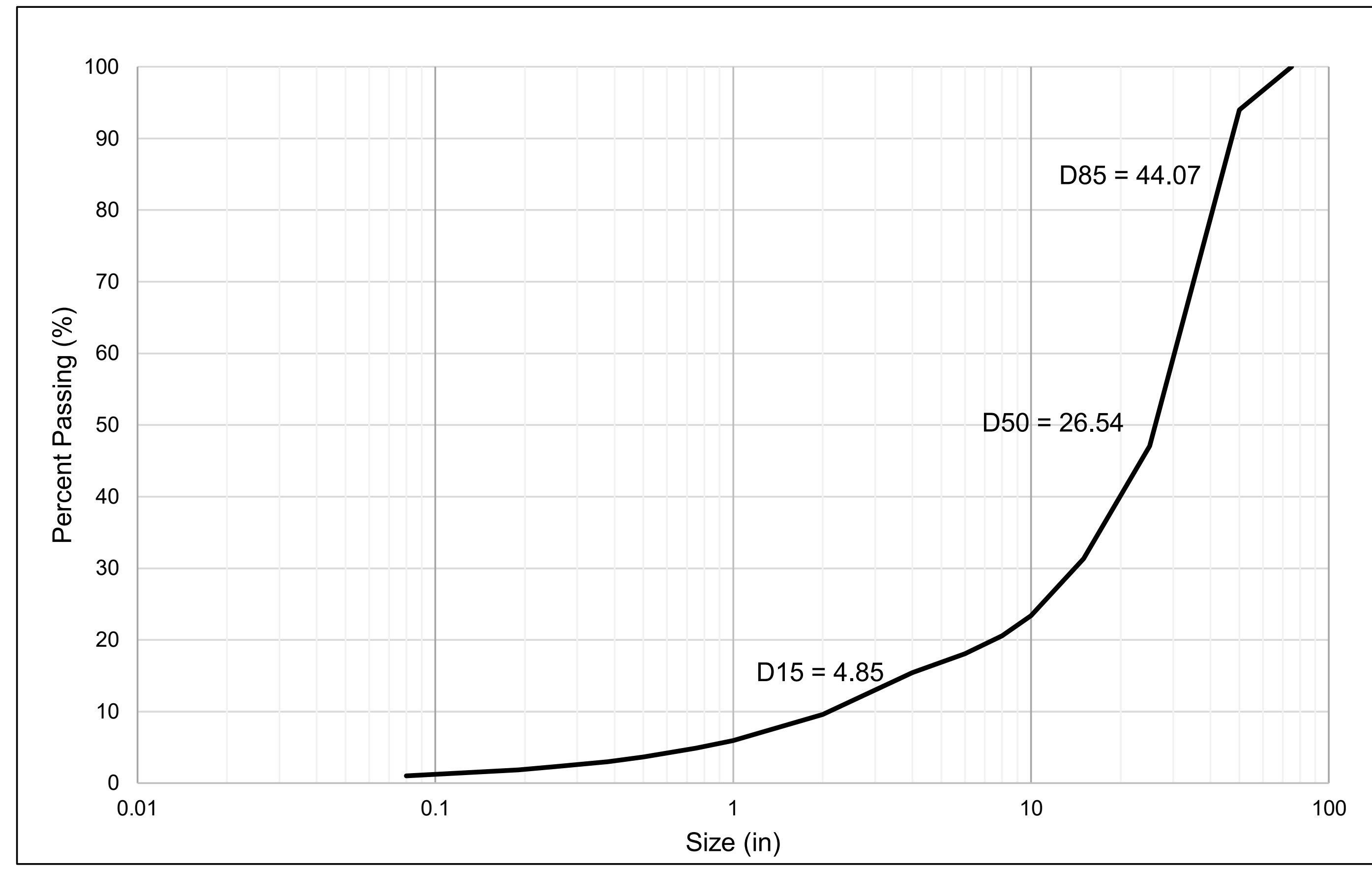
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA103-640/1	VA20-01037

FIGURE C.12 REV B

Size[in]	% Passing
75	100.00
50	93.97
25	47.08
15	31.32
10	23.41
8	20.57
6	18.09
4	15.44
2	9.59
1	5.95
0.75	4.88
0.5	3.68
0.38	3.02
0.25	2.28
0.19	1.86
0.08	1.02

% Passing	Size[in]
F10	2.13
F20	7.57
F30	14.17
F40	20.86
F50	26.54
F60	31.36
F70	35.74
F80	40.92
F90	47.21
Topsize (99.95%)	54.73



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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 2 DOWNSTREAM RIGHT BANK - 2

NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING
3. DUE TO THE LARGE PARTICLE SIZES OF THE ROCKS, BOTH SCALING BALLS COULD NOT BE SHOWN IN THE PHOTOGRAPHS SENT FOR ANALYSIS. THE RESULTING ANALYSIS IS THEREFORE EXPECTED TO PRODUCE AN ARTIFICIALLY SMALLER PARTICLE SIZE CURVE DUE TO AN INABILITY TO DETERMINE THE DEPTH OF FIELD.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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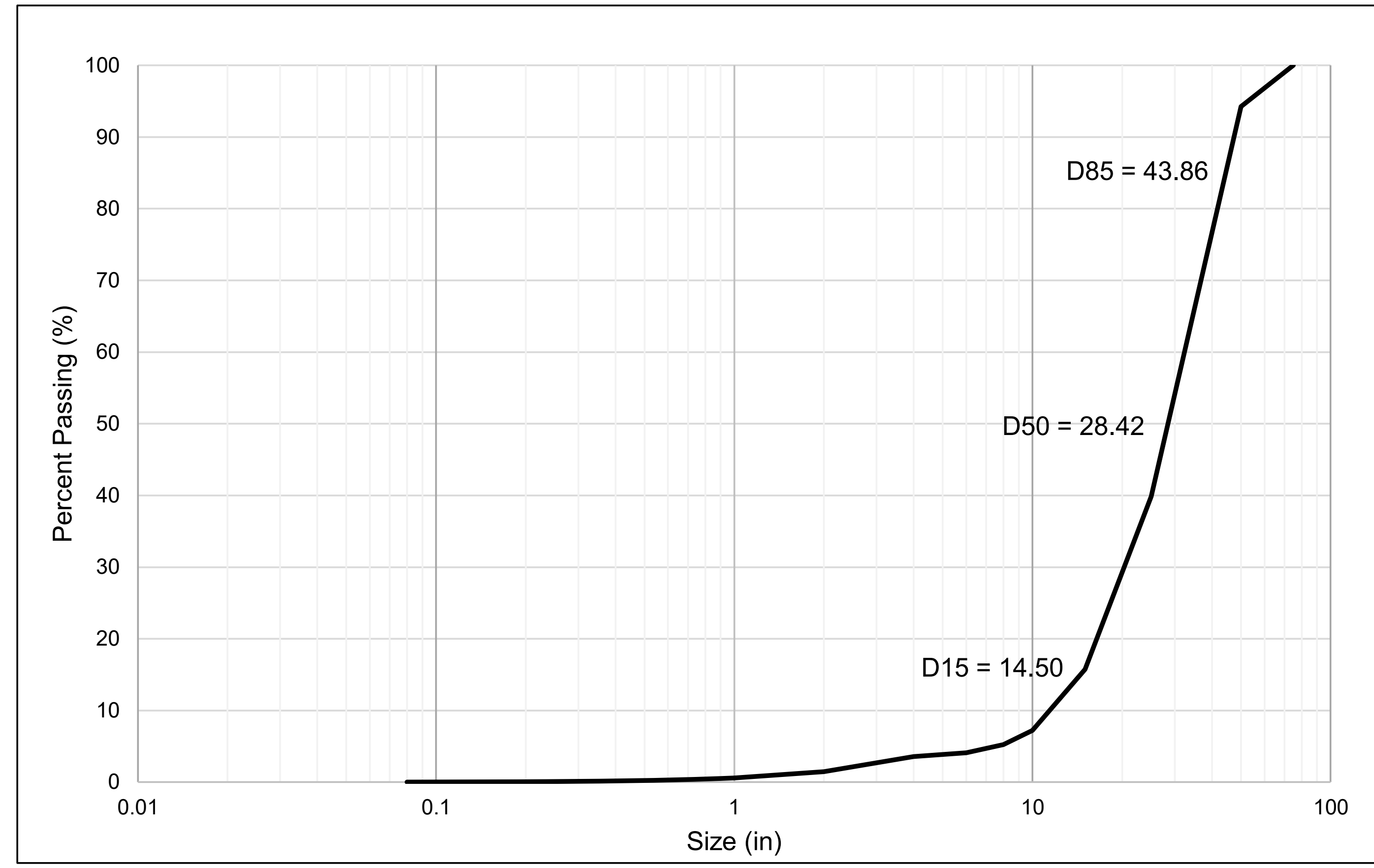
P/A NO.	REF. NO.
VA103-640/1	VA20-01037

FIGURE C.13 REV B

Size[in]	% Passing
75	100.00
50	94.25
25	39.87
15	15.75
10	7.22
8	5.23
6	4.12
4	3.58
2	1.46
1	0.58
0.75	0.40
0.5	0.23
0.38	0.16
0.25	0.09
0.19	0.06
0.08	0.02

% Passing	Size[in]
F10	11.96
F20	17.03
F30	21.27
F40	25.05
F50	28.42
F60	32.15
F70	36.23
F80	40.90
F90	46.82
Topsize (99.95%)	59.07



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 2 DOWNSTREAM LEFT BANK

Knight Piésold CONSULTING

P/A NO. VA103-640/1

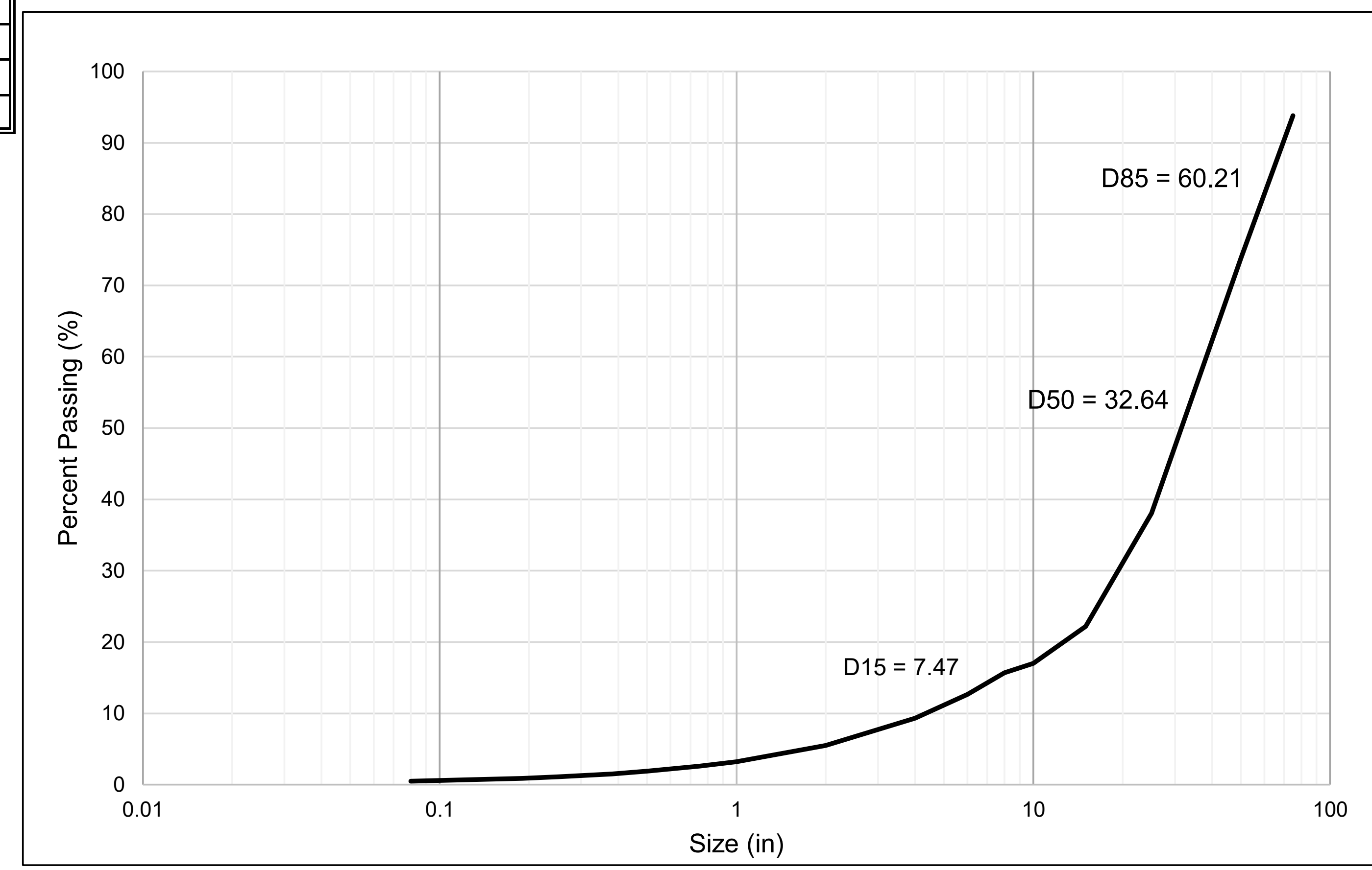
REF. NO. VA20-01037

FIGURE C.14

REV B

Size[in]	% Passing
75	93.79
50	73.82
25	38.04
15	22.20
10	17.01
8	15.71
6	12.68
4	9.31
2	5.48
1	3.23
0.75	2.59
0.5	1.90
0.38	1.52
0.25	1.11
0.19	0.89
0.08	0.46

% Passing	Size[in]
F10	4.39
F15	7.47
F20	13.16
F30	20.16
F40	26.16
F50	32.64
F60	39.26
F70	46.84
F80	55.48
F85	60.21
F90	67.31
Topsize (99.95%)	89.88



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 2 DOWNSTREAM LEFT BANK - 2

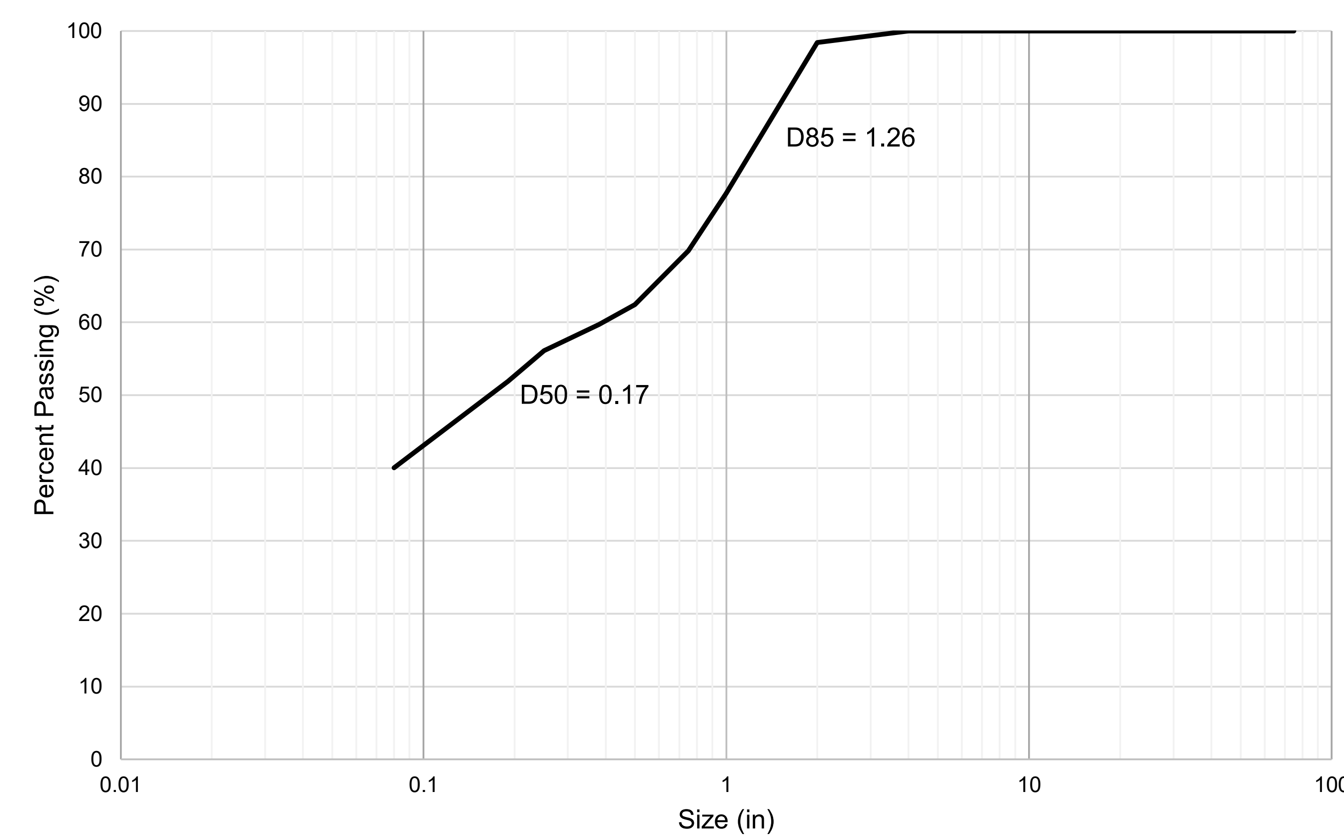
Knight Piésold CONSULTING

P/A NO. VA103-640/1 | REF. NO. VA20-01037

FIGURE C.15 REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	100.00
10	100.00
8	100.00
6	100.00
4	100.00
2	98.41
1	77.66
0.75	69.83
0.5	62.42
0.38	59.72
0.25	56.11
0.19	51.90
0.08	40.02

% Passing	Size[in]
F10	0.00
F15	0.01
F20	0.01
F30	0.03
F40	0.08
F50	0.17
F60	0.39
F70	0.76
F80	1.08
F85	1.26
F90	1.48
Topsize (99.95%)	2.18



NOTES:

1. STANDARD TAPE MEASURE FOR SCALE
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 2 WOOD-STAVE PENSTOCK SUB-AREA 1

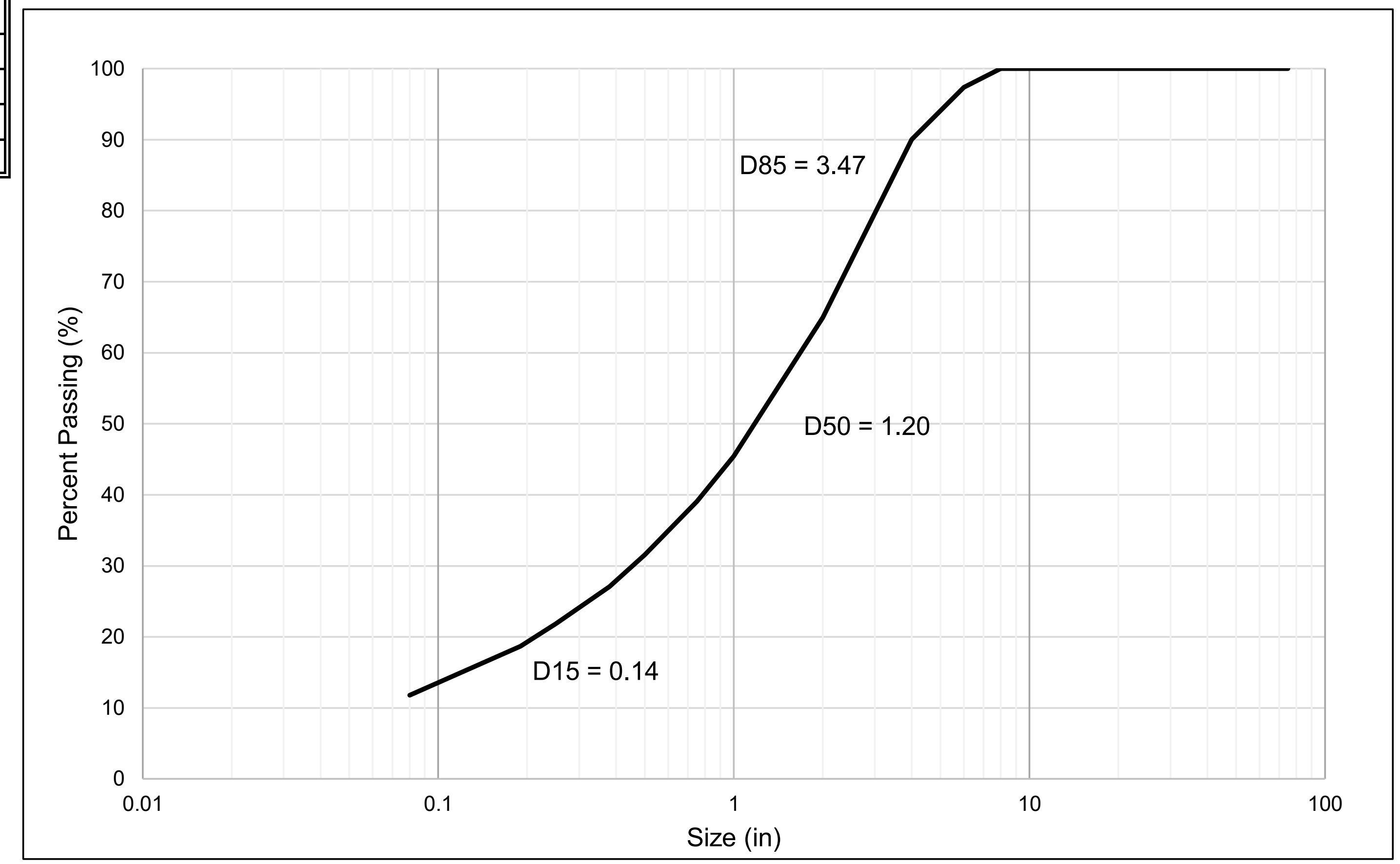
Knight Piésold CONSULTING

P/A NO. VA103-640/1 | REF. NO. VA20-01037

FIGURE C.16 | REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	100.00
10	100.00
8	100.00
6	97.36
4	90.02
2	64.97
1	45.46
0.75	39.07
0.5	31.54
0.38	27.08
0.25	21.83
0.19	18.71
0.08	11.80

% Passing	Size[in]
F10	0.06
F20	0.21
F30	0.45
F40	0.78
F50	1.20
F60	1.73
F70	2.29
F80	2.94
F90	4.00
Topsize (99.95%)	7.53



NOTES:
1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
COPCO NO. 2 WOOD-STAVE PENSTOCK SUB-AREA 3

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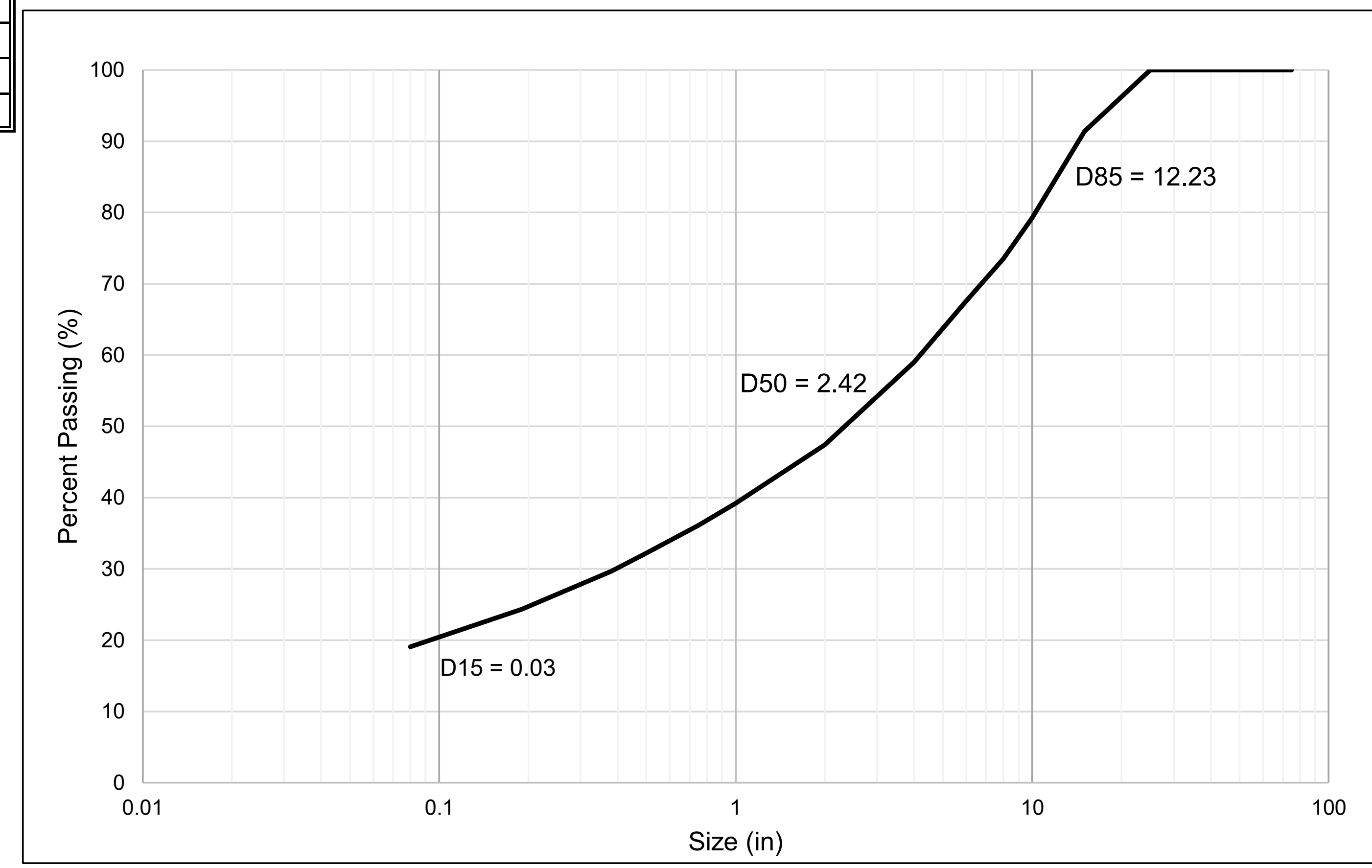
P/A NO. VA103-640/1 | REF. NO. VA20-01037

FIGURE C.17 | REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	91.41
10	79.27
8	73.52
6	67.62
4	59.01
2	47.41
1	39.20
0.75	36.13
0.5	32.21
0.38	29.67
0.25	26.44
0.19	24.34
0.08	19.05

% Passing	Size[in]
F10	0.01
F15	0.03
F20	0.09
F30	0.39
F40	1.07
F50	2.42
F60	4.20
F70	6.78
F80	10.27
F85	12.23
F90	14.32
Topsize (99.95%)	21.76



NOTES:
1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
J.C. BOYLE DOWNSTREAM DAM SUB-AREA 1 - 1

Knight Piésold CONSULTING

P/A NO. VA103-640/1

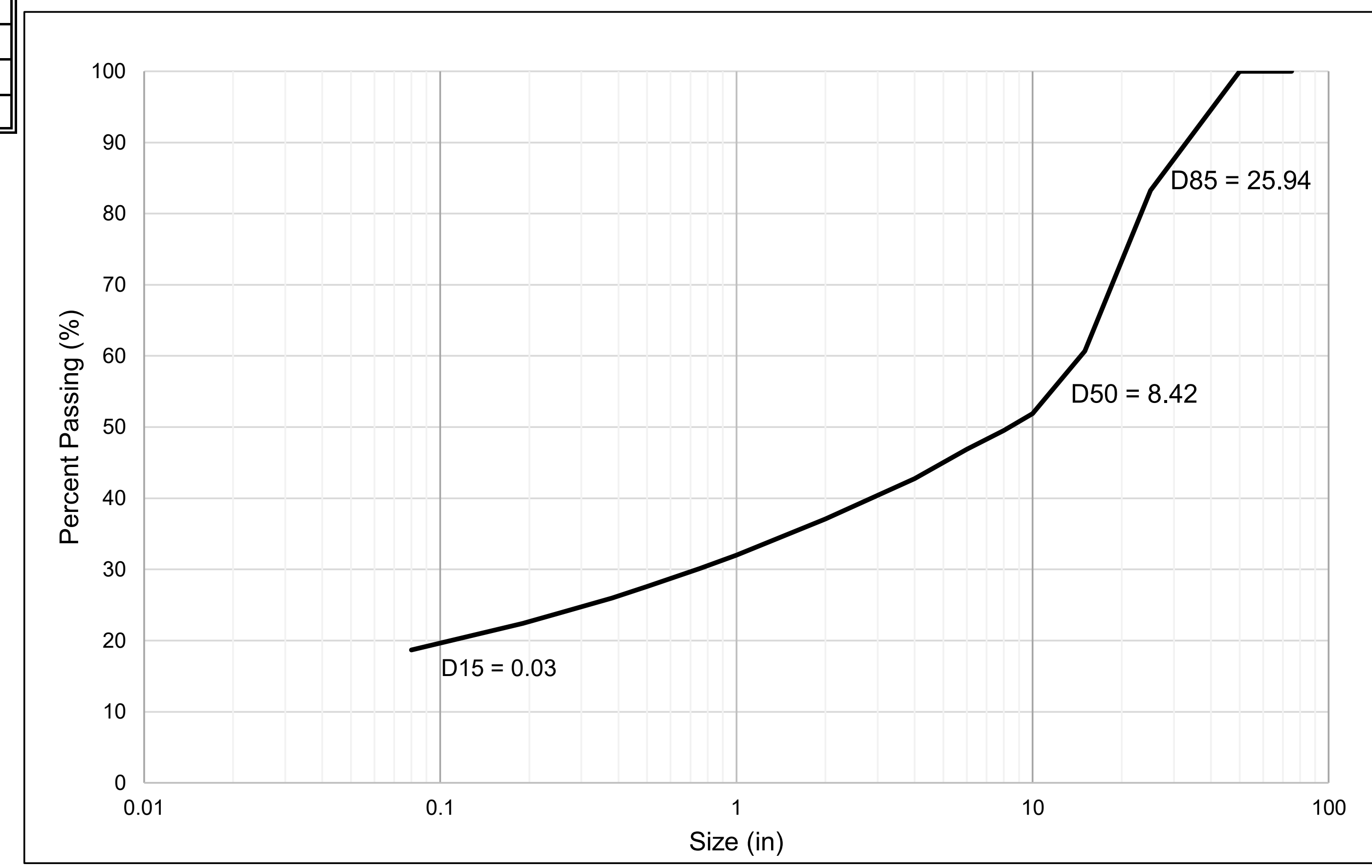
REF. NO. VA20-01037

FIGURE C.18

REV B

Size[in]	% Passing
75	100.00
50	100.00
25	83.27
15	60.67
10	51.91
8	49.51
6	46.88
4	42.74
2	37.07
1	32.01
0.75	30.11
0.5	27.62
0.38	25.98
0.25	23.83
0.19	22.41
0.08	18.67

% Passing	Size[in]
F10	0.01
F15	0.03
F20	0.11
F30	0.74
F40	2.92
F50	8.42
F60	14.68
F70	19.03
F80	23.40
F85	25.94
F90	29.26
Topsize (99.95%)	41.86



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

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KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
J.C. BOYLE DOWNSTREAM DAM SUB-AREA 1 - 2

Knight Piésold CONSULTING

P/A NO. VA103-640/1

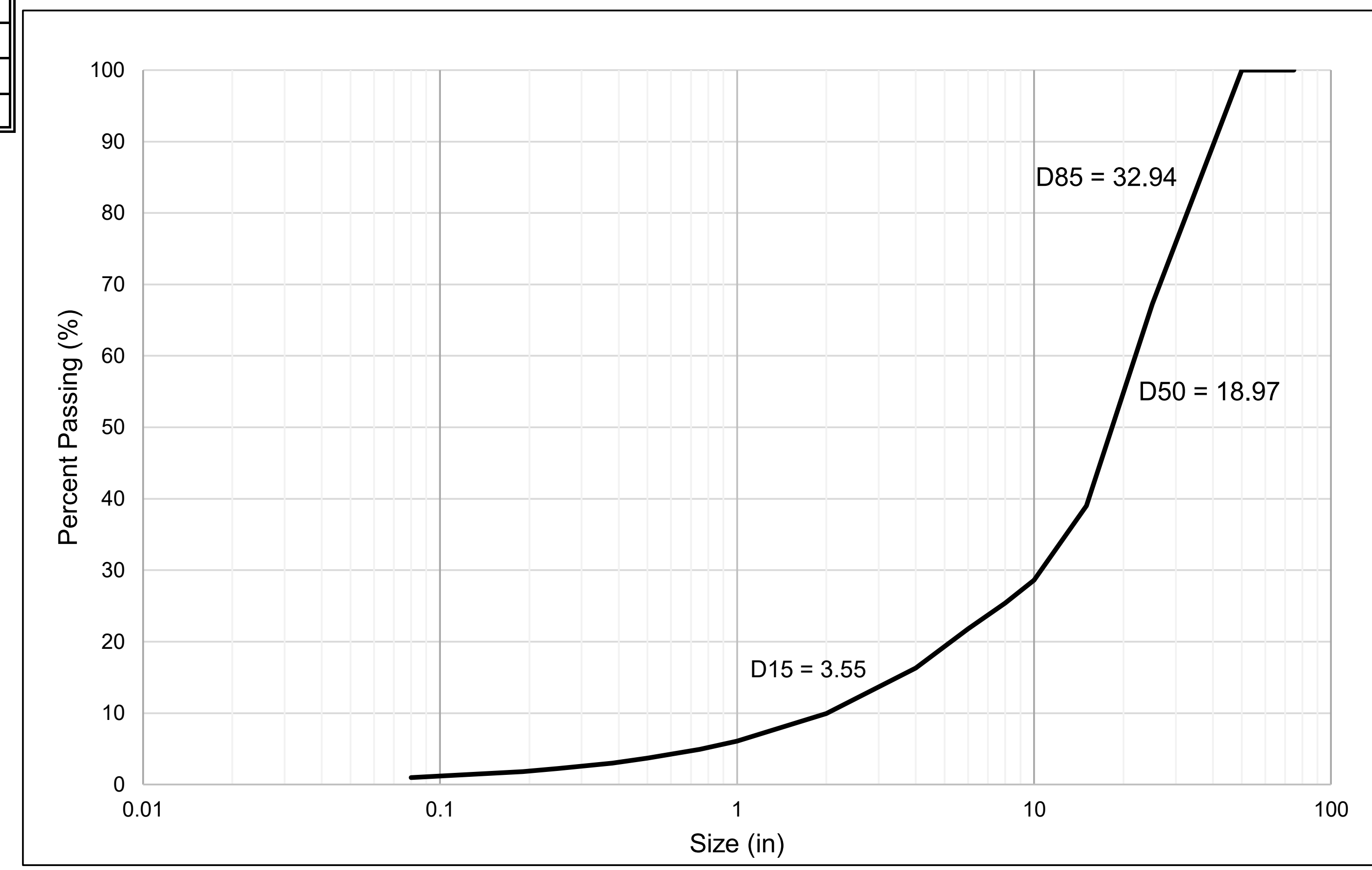
REF. NO. VA20-01037

FIGURE C.19

REV B

Size[in]	% Passing
75	100.00
50	100.00
25	67.26
15	39.01
10	28.62
8	25.42
6	21.81
4	16.33
2	9.95
1	6.06
0.75	4.93
0.5	3.68
0.38	2.99
0.25	2.23
0.19	1.81
0.08	0.97

% Passing	Size[in]
F10	2.01
F15	3.55
F20	5.31
F30	10.78
F40	15.40
F50	18.97
F60	22.40
F70	26.04
F80	30.29
F85	32.94
F90	36.04
Topsize (99.95%)	48.90



NOTES:

1. SCALE BALL SIZE = 10"
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
J.C. BOYLE DOWNSTREAM DAM SUB-AREA 2

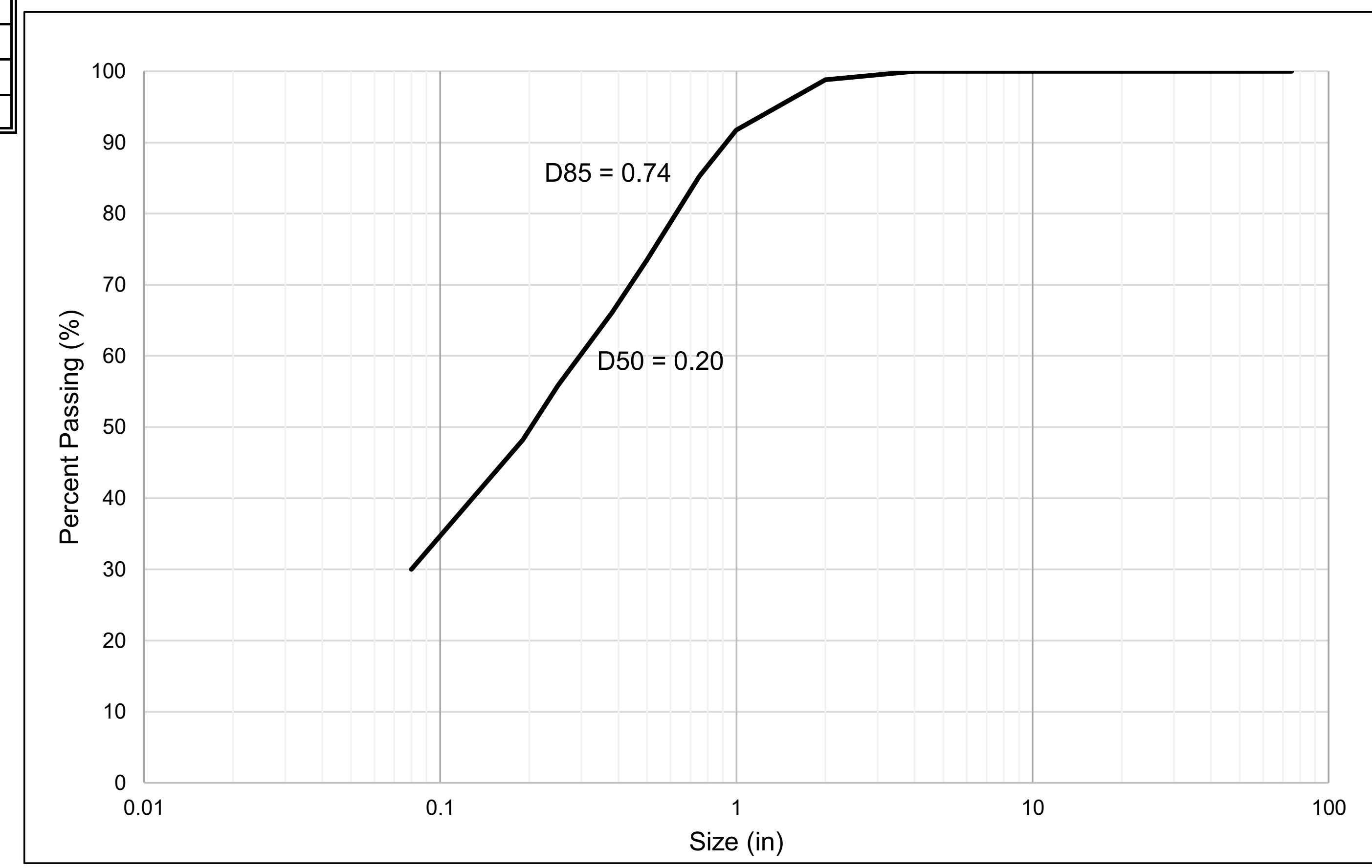
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA103-640/1	VA20-01037

FIGURE C.20 REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	100.00
10	100.00
8	100.00
6	100.00
4	100.00
2	98.83
1	91.72
0.75	85.23
0.5	73.52
0.38	66.08
0.25	55.91
0.19	48.19
0.08	30.01

% Passing	Size[in]
F10	0.01
F15	0.02
F20	0.04
F30	0.08
F40	0.13
F50	0.20
F60	0.29
F70	0.44
F80	0.62
F85	0.74
F90	0.91
Topsize (99.95%)	2.29



NOTES:

1. STANDARD TAPE MEASURE FOR SCALE
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
J.C. BOYLE FOREBAY - 1

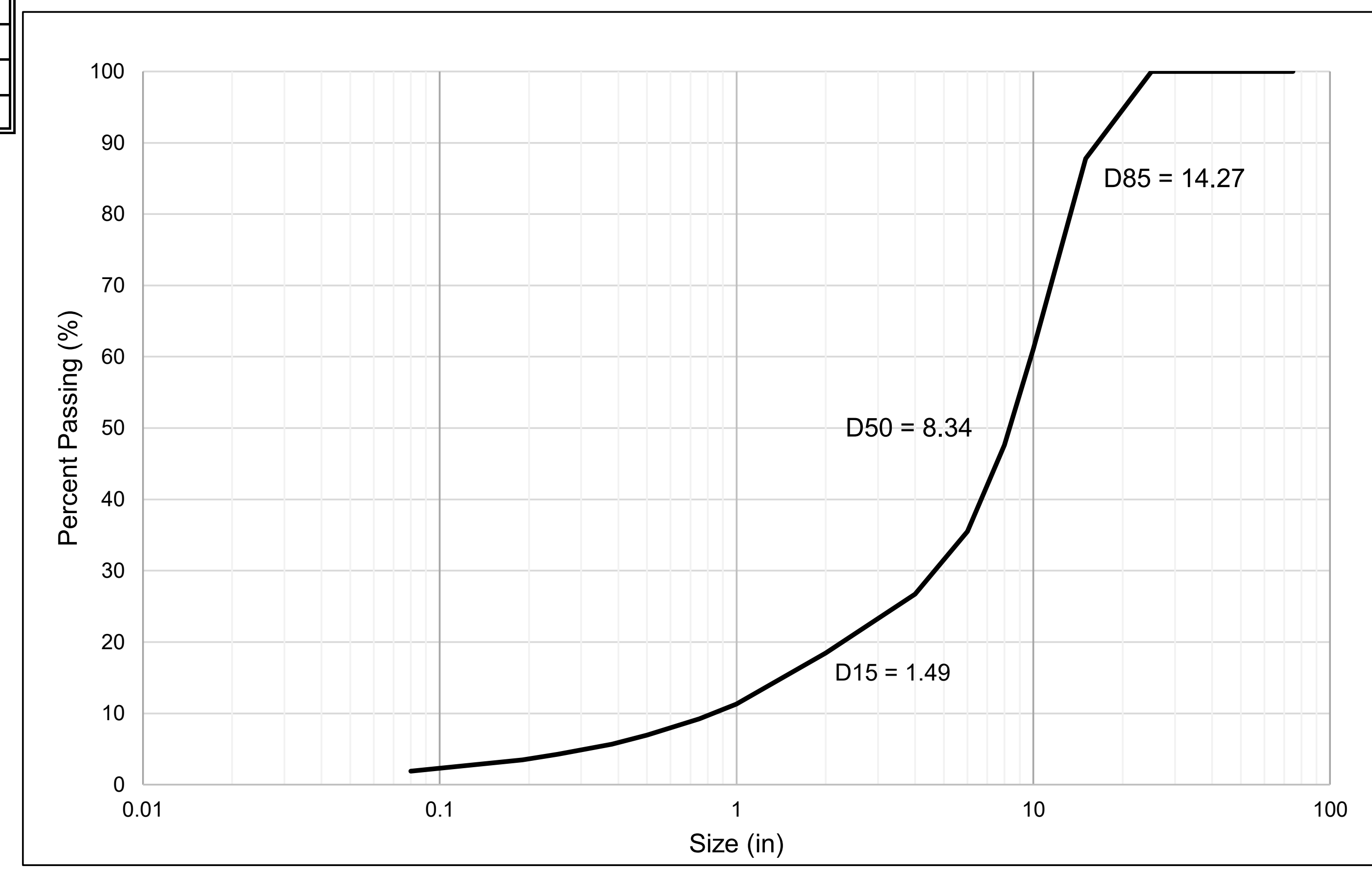
Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA103-640/1	VA20-01037

FIGURE C.21 REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	87.77
10	61.07
8	47.62
6	35.50
4	26.74
2	18.44
1	11.32
0.75	9.25
0.5	6.94
0.38	5.67
0.25	4.25
0.19	3.46
0.08	1.87

% Passing	Size[in]
F10	0.84
F15	1.49
F20	2.25
F30	4.82
F40	6.83
F50	8.34
F60	9.84
F70	11.37
F80	13.17
F85	14.27
F90	15.61
Topsize (99.95%)	19.28



NOTES:

1. STANDARD TAPE MEASURE FOR SCALE
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
J.C. BOYLE POWEROUSE SUB-AREA 1

Knight Piésold CONSULTING

P/A NO. VA103-640/1

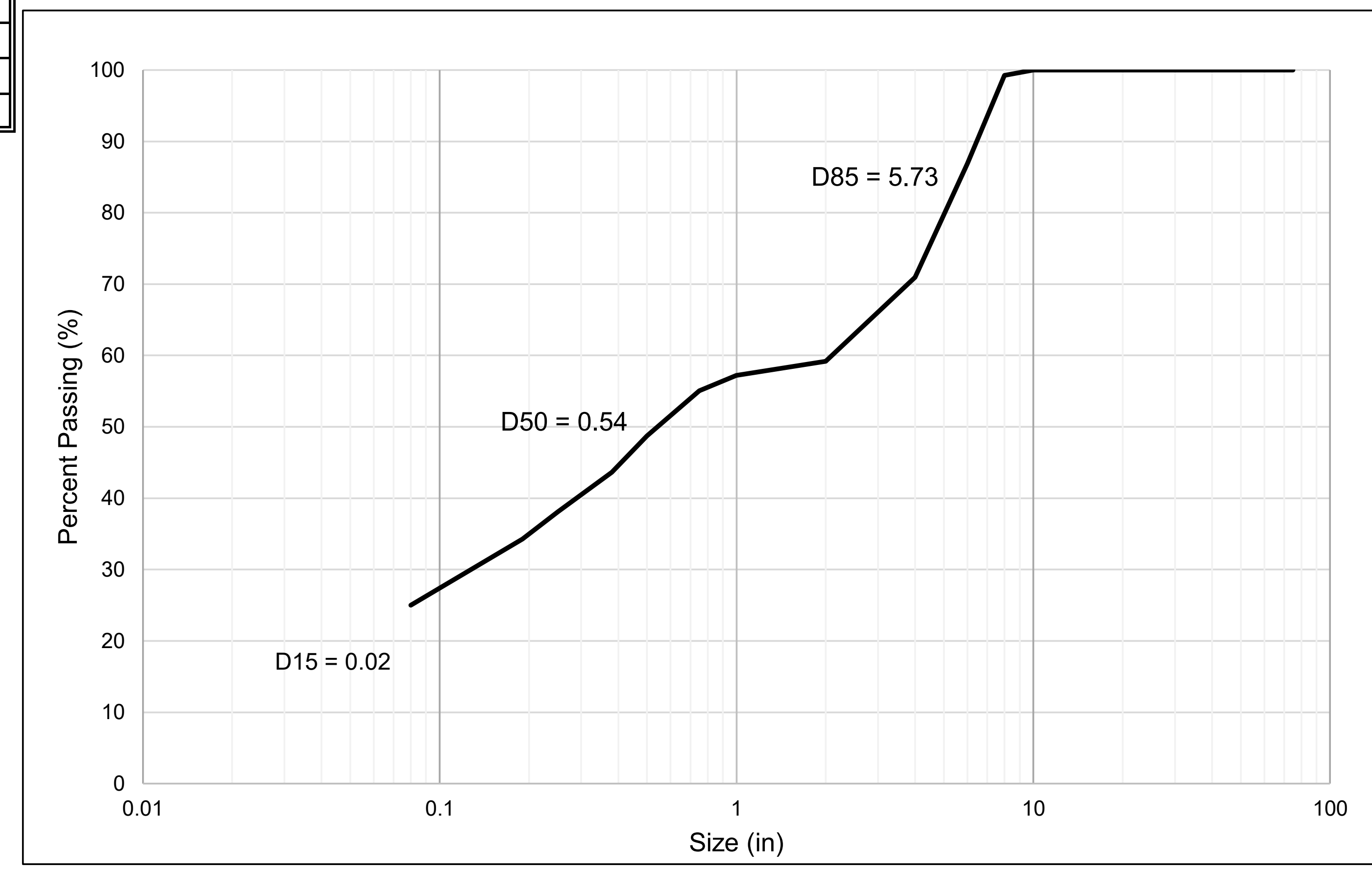
REF. NO. VA20-01037

FIGURE C.22

REV B

Size[in]	% Passing
75	100.00
50	100.00
25	100.00
15	100.00
10	100.00
8	99.26
6	86.90
4	70.98
2	59.18
1	57.19
0.75	55.04
0.5	48.72
0.38	43.64
0.25	38.11
0.19	34.29
0.08	25.01

% Passing	Size[in]
F10	0.01
F15	0.02
F20	0.04
F30	0.13
F40	0.29
F50	0.54
F60	2.23
F70	3.89
F80	5.03
F85	5.73
F90	6.45
Topsize (99.95%)	8.14



NOTES:

1. STANDARD TAPE MEASURE FOR SCALE
2. ANALYSIS CONDUCTED BY SPLIT ENGINEERING

REV	DATE	DESCRIPTION	PREP'D	RVW'D
B	06AUG'20	ISSUED WITH LETTER	TB	CAV

KIEWIT INFRASTRUCTURE WEST CO.

KLAMATH RIVER RENEWAL PROJECT

ONSITE BORROW SOURCE SITE INVESTIGATION
SPILT-NET PARTICLE SIZE ANALYSIS RESULTS
J.C. BOYLE POWERHOUSE SUB-AREA 2

Knight Piésold CONSULTING

P/A NO. VA103-640/1

REF. NO. VA20-01037

FIGURE C.23

REV B

Knight Piésold CONSULTING

APPENDIX D

Erosion Protection Laboratory Results

Knight Piésold CONSULTING

APPENDIX D1

Specific Gravity and Absorption Results

(Pages D1-1 to D1-65)

ATT
ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	IGDDS	IGDDS	IGDDS	IGDDS
DEPTH				
SAMPLE NO.	PLT-11	PLT-12	PLT-13	PLT-14
DATE SAMPLED				
DATE TESTED	06/24/20	06/24/20	06/24/20	06/24/20
TECHNICIAN	HN	HN	HN	HN
ROCK TYPE				
Distance Between Platens (in) - D:	1.612	1.974	1.636	1.685
Minimum Specimen Width (in) - W:	2.719	3.151	2.903	3.328
Equivalent Core Diameter (in^2) - De^2:	5.581	7.920	6.047	7.140
Minimum Failure Plane Area (in^2) - A:	4.383	6.220	4.749	5.608
Maximum Load (lbs):	10040	7729	8611	4099
Uncorrected Point Load Strength Index (psi):	1799.0	976.0	1424.0	574.0
Size Correction Factor - F:	1.086	1.174	1.105	1.147
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Normal
Failure Mode:	Substance	Substance	Combination	Combination
Corrected Point Load Strength Index (psi):	**1952.9**	**1146.3**	**1574.0**	**658.7**
Corrected Point Load Strength Index (kPa):	**13464.5**	**7903.2**	**10852.4**	**4541.3**
Approximate Compressive Strength (psi):	**44386**	**26105**	**35767**	**14980**

BORING NO.	IGDDS	IGDDS	IGDDS	IGDDS
DEPTH				
SAMPLE NO.	PLT-21	PLT-22	PLT-31	PLT-32
DATE SAMPLED				
DATE TESTED	06/24/20	06/24/20	06/24/20	06/24/20
TECHNICIAN	HN	HN	HN	HN
DESCRIPTION				
Distance Between Platens (in) - D:	1.843	1.580	1.497	1.608
Minimum Specimen Width (in) - W:	3.250	3.607	3.314	3.241
Equivalent Core Diameter (in^2) - De^2:	7.626	7.256	6.317	6.636
Minimum Failure Plane Area (in^2) - A:	5.990	5.699	4.961	5.212
Maximum Load (lbs):	7970	7510	3974	2826
Uncorrected Point Load Strength Index (psi):	1045.0	1035.0	629.2	425.8
Size Correction Factor - F:	1.165	1.152	1.116	1.129
Direction of Load with Respect to Fracture:	Parallel	Parallel	Parallel	Parallel
Failure Mode:	Combination	Combination	Combination	Combination
Corrected Point Load Strength Index (psi):	**1216.9**	**1191.9**	**702.3**	**480.6**
Corrected Point Load Strength Index (kPa):	**8390.6**	**8217.6**	**4842.3**	**3313.7**
Approximate Compressive Strength (psi):	**27699**	**27110**	**15960**	**10924**
NOTES				

Data entry by:	BFUTCH	Date:	6/25/2020
Checked by:	HN	Date:	6/26/2020
File name:	2061159_Point Load ASTM D5731_2.xlsm		

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	IGDDS
DEPTH	
SAMPLE NO.	PLT-33
DATE SAMPLED	
DATE TESTED	06/24/20
TECHNICIAN	HN
ROCK TYPE	
Distance Between Platens (in) - D:	1.953
Minimum Specimen Width (in) - W:	2.903
Equivalent Core Diameter (in²) - De²:	7.219
Minimum Failure Plane Area (in²) - A:	5.670
Maximum Load (lbs):	1863
Uncorrected Point Load Strength Index (psi):	258.1
Size Correction Factor - F:	1.150
Direction of Load with Respect to Fracture:	Parallel
Failure Mode:	Combination
Corrected Point Load Strength Index (psi):	**296.9**
Corrected Point Load Strength Index (kPa):	**2046.7**
Approximate Compressive Strength (psi):	**6752**

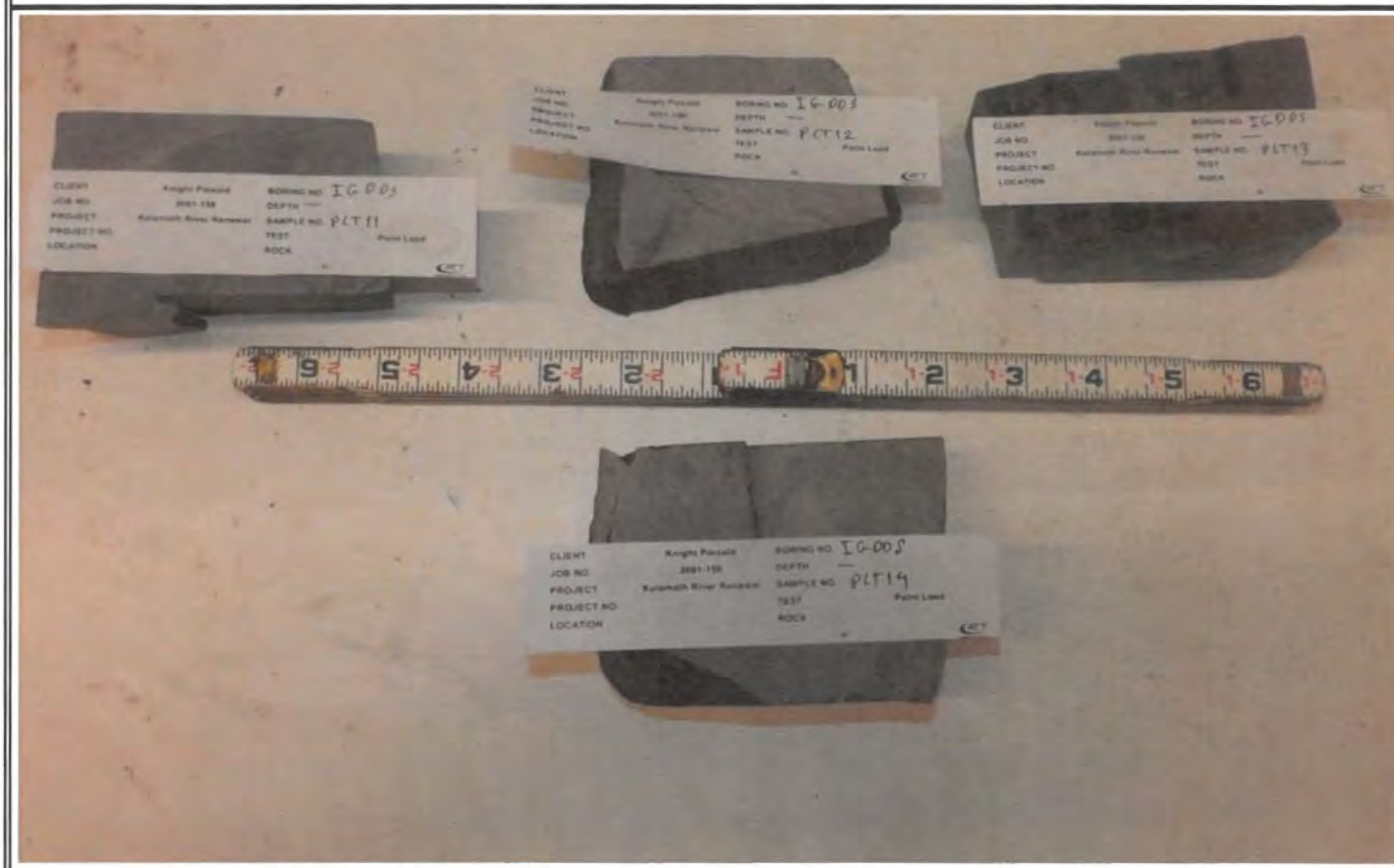
BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
DESCRIPTION	
Distance Between Platens (in) - D:	
Minimum Specimen Width (in) - W:	
Equivalent Core Diameter (in²) - De²:	
Minimum Failure Plane Area (in²) - A:	
Maximum Load (lbs):	
Uncorrected Point Load Strength Index (psi):	
Size Correction Factor - F:	
Direction of Load with Respect to Fracture:	
Failure Mode:	
Corrected Point Load Strength Index (psi):	
Corrected Point Load Strength Index (kPa):	
Approximate Compressive Strength (psi):	
NOTES	

Data entry by:	BFUTCH	Date:	6/25/2020
Checked by:	HN	Date:	6/26/2020
File name:	2061159_Point Load ASTM D5731_3.xlsm		

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_25_14_36_46

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES After test

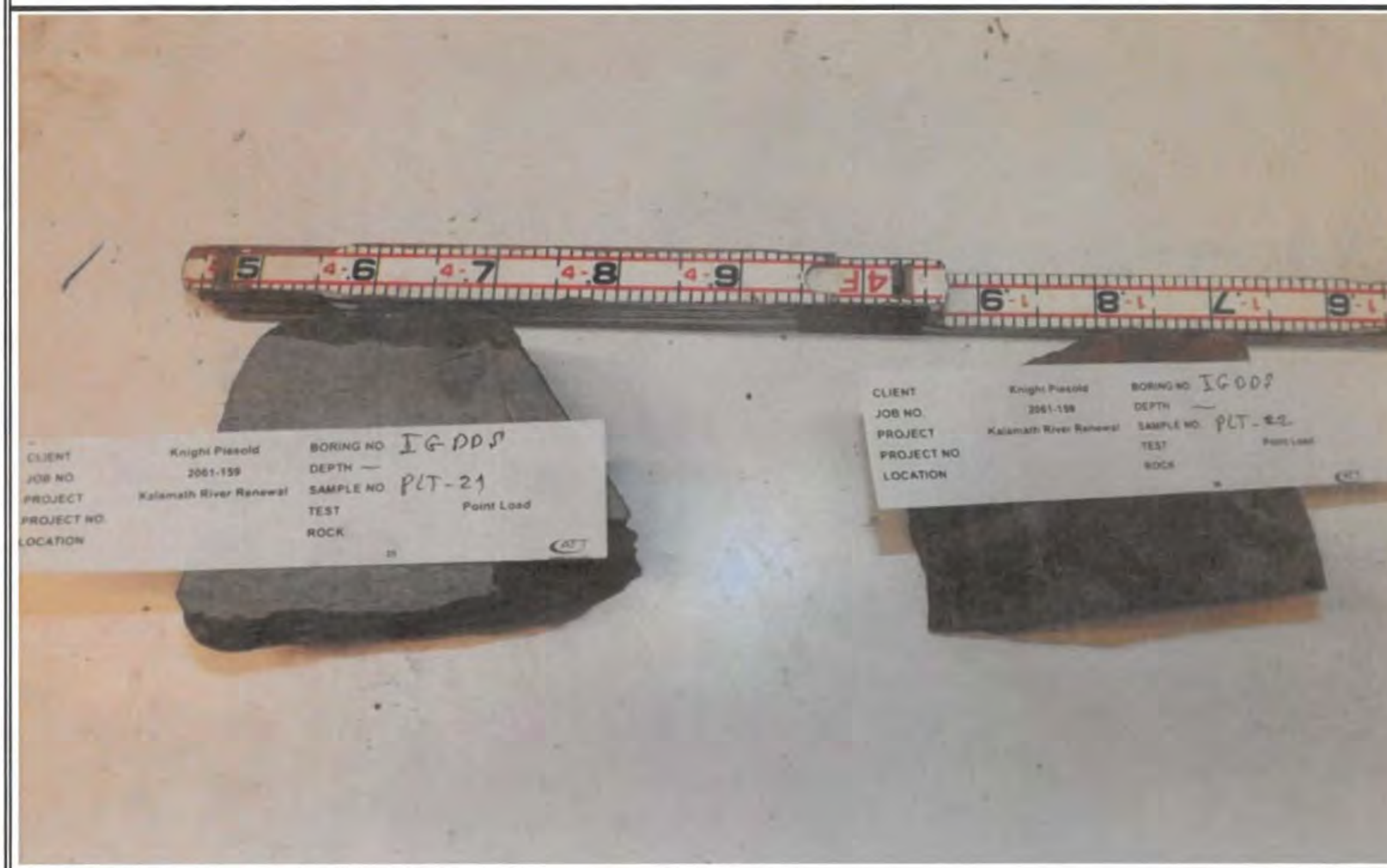
File name: 2061159__Image_20_06_25_14_37_46

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-21, 22
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_25_14_39_41

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-21, 22
PROJECT NO.	--	DATE SAMPLED	Point Load
LOCATION	--	Rock Type	

NOTES

File name: 2061159__Image_20_06_26_09_40_21

Image Attachment

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ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-31, 32, 33
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061159__Image_20_06_25_14_40_26

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Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-31, 32, 33
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES After test

File name: 2061159__Image_20_06_25_14_40_49

ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	–
PROJECT NO.	--		

BORING NO.	C2LB	C2LB	C2LB	C2LB
DEPTH				
SAMPLE NO.	PLT-11	PLT-12	PLT-13	PLT-14
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
ROCK TYPE				
Distance Between Platens (in) - D:	1.690	1.835	2.170	1.818
Minimum Specimen Width (in) - W:	3.650	3.560	3.390	3.261
Equivalent Core Diameter (in²) - De²:	7.854	8.318	9.366	7.548
Minimum Failure Plane Area (in²) - A:	6.169	6.533	7.356	5.928
Maximum Load (lbs):	3985	4782	5699	4198
Uncorrected Point Load Strength Index (psi):	507.4	574.9	608.4	556.1
Size Correction Factor - F:	1.172	1.188	1.220	1.162
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Normal
Failure Mode:	Combination	Combination	Combination	Combination
Corrected Point Load Strength Index (psi):	**594.8**	**682.7**	**742.1**	**646.2**
Corrected Point Load Strength Index (kPa):	**4100.8**	**4707.0**	**5116.4**	**4455.1**
Approximate Compressive Strength (psi):	**13543**	**15561**	**16962**	**14705**
BORING NO.	C2LB	C2LB	C2LB	C2LB
DEPTH				
SAMPLE NO.	PLT-21	PLT-22	PLT31	PLT32
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
DESCRIPTION				
Distance Between Platens (in) - D:	1.778	1.286	1.840	0.897
Minimum Specimen Width (in) - W:	3.300	2.993	3.349	2.352
Equivalent Core Diameter (in²) - De²:	7.471	4.901	7.846	2.686
Minimum Failure Plane Area (in²) - A:	5.867	3.849	6.162	2.110
Maximum Load (lbs):	5254	3558	4604	2008
Uncorrected Point Load Strength Index (psi):	703.2	726.1	586.8	747.5
Size Correction Factor - F:	1.159	1.054	1.172	0.921
Direction of Load with Respect to Fracture:	Parallel	Parallel	Normal	Normal
Failure Mode:	Combination	Combination	Combination	Substance
Corrected Point Load Strength Index (psi):	**815.2**	**765.5**	**687.7**	**688.3**
Corrected Point Load Strength Index (kPa):	**5620.4**	**5277.8**	**4741.5**	**4745.9**
Approximate Compressive Strength (psi):	**18549**	**17419**	**15659**	**15959**
NOTES				

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159 _ Point Load ASTM D5731_4.xlsm		

ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	C2LB	C2LB
DEPTH		
SAMPLE NO.	PLT-33	PLT-33
DATE SAMPLED		
DATE TESTED	06/26/20	06/26/20
TECHNICIAN	HN	HN
ROCK TYPE		
Distance Between Platens (in) - D:	1.804	1.269
Minimum Specimen Width (in) - W:	3.351	2.495
Equivalent Core Diameter (in²) - De²:	7.697	4.031
Minimum Failure Plane Area (in²) - A:	6.045	3.166
Maximum Load (lbs):	5693	2619
Uncorrected Point Load Strength Index (psi):	739.6	649.6
Size Correction Factor - F:	1.167	1.009
Direction of Load with Respect to Fracture:	Normal	Normal
Failure Mode:	Combination	Combination
Corrected Point Load Strength Index (psi):	**863.1**	**655.4**
Corrected Point Load Strength Index (kPa):	**5950.6**	**4518.6**
Approximate Compressive Strength (psi):	**19647**	**14969**

BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
DESCRIPTION	
Distance Between Platens (in) - D:	
Minimum Specimen Width (in) - W:	
Equivalent Core Diameter (in²) - De²:	
Minimum Failure Plane Area (in²) - A:	
Maximum Load (lbs):	
Uncorrected Point Load Strength Index (psi):	
Size Correction Factor - F:	
Direction of Load with Respect to Fracture:	
Failure Mode:	
Corrected Point Load Strength Index (psi):	
Corrected Point Load Strength Index (kPa):	
Approximate Compressive Strength (psi):	
NOTES	

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159_Point Load ASTM D5731_5.xlsm		

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061159__Image_20_06_27_16_47_24

Image Attachment

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ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061159__Image_20_06_27_16_48_35

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061159__Image_20_06_27_16_50_09

Image Attachment

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ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

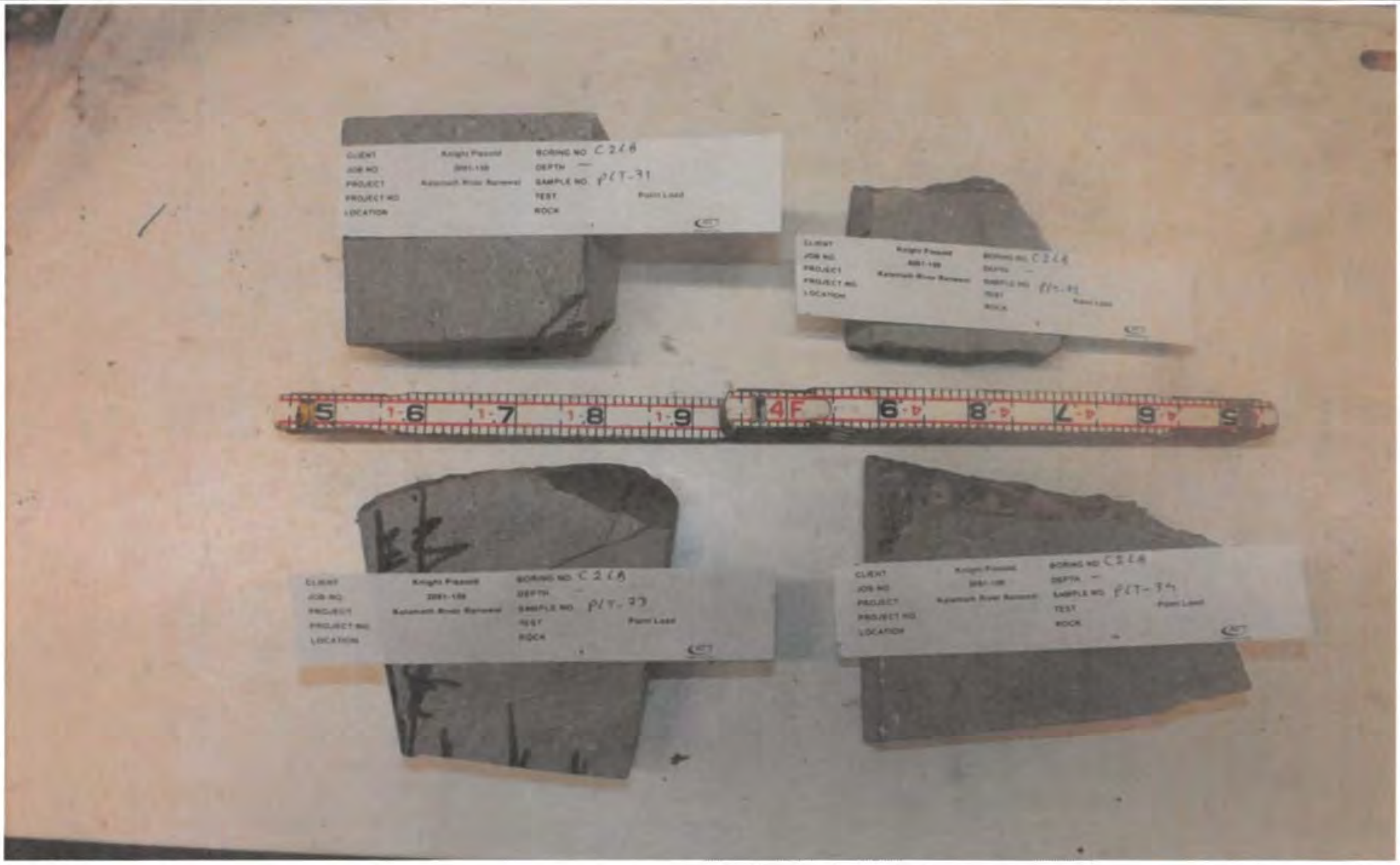
File name: 2061159__Image_20_06_27_16_50_34

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 31, 32, 33, 34
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

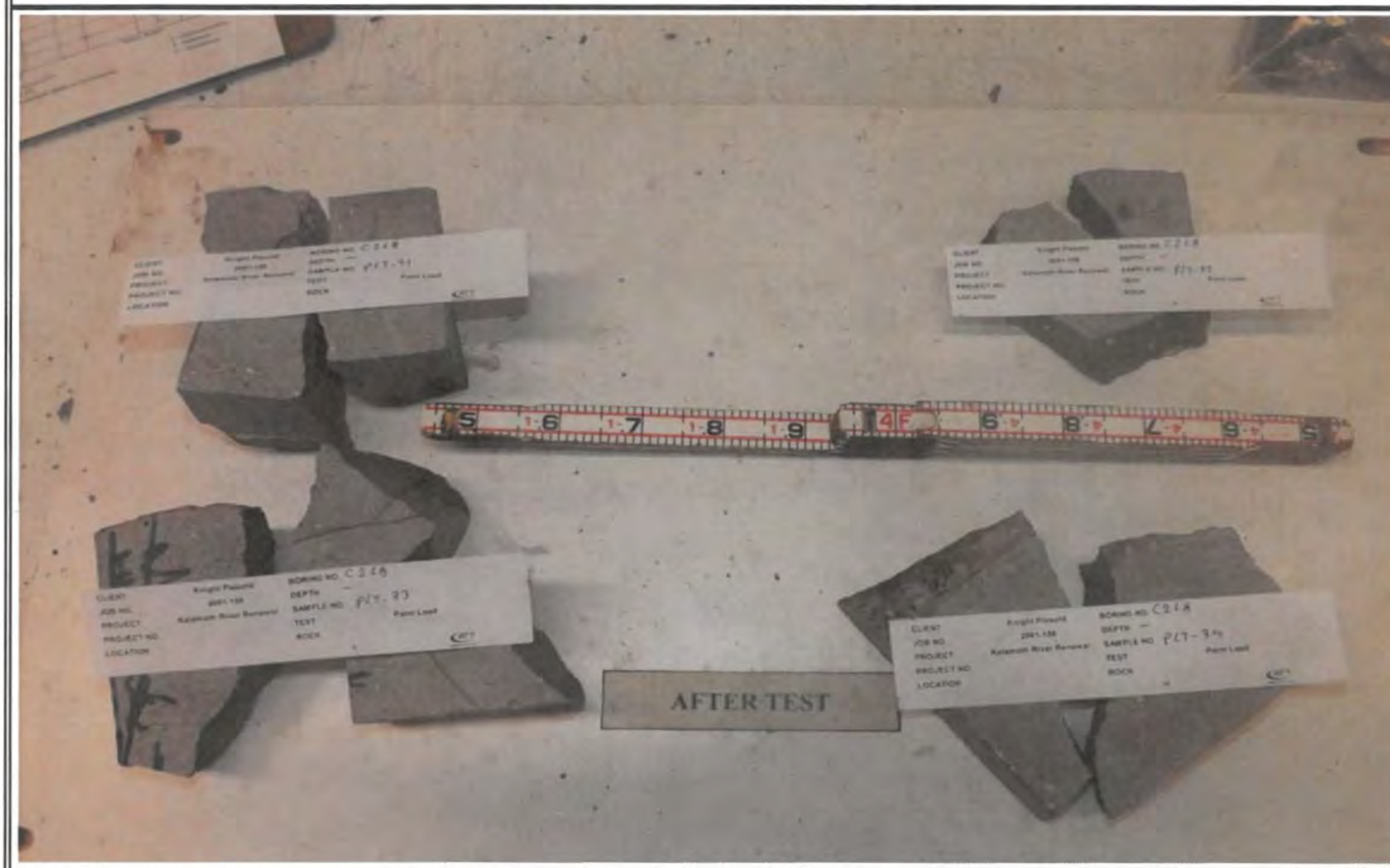
File name: 2061159__Image_20_06_27_16_51_51

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 31, 32, 33, 34
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_52_17

ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	C2DSR	C2DSR	C2DSR	C2DSR
DEPTH				
SAMPLE NO.	PLT-11	PLT-12	PLT-13	PLT-14
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
ROCK TYPE				
Distance Between Platens (in) - D:	1.345	1.201	1.569	1.289
Minimum Specimen Width (in) - W:	3.223	3.243	3.471	3.271
Equivalent Core Diameter (in²) - De²:	5.519	4.959	6.934	5.368
Minimum Failure Plane Area (in²) - A:	4.335	3.895	5.446	4.216
Maximum Load (lbs):	8566	3581	9824	8135
Uncorrected Point Load Strength Index (psi):	1551.9	722.1	1416.8	1515.4
Size Correction Factor - F:	1.083	1.057	1.140	1.076
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Normal
Failure Mode:	Substance	Combination	Combination	Combination
Corrected Point Load Strength Index (psi):	**1680.5**	**763.3**	**1615.0**	**1630.7**
Corrected Point Load Strength Index (kPa):	**11586.5**	**5263.1**	**11135.0**	**11243.3**
Approximate Compressive Strength (psi):	**38197**	**17368**	**36719**	**37073**

BORING NO.	C2DSR	C2DSR	C2DSR	C2DSR
DEPTH				
SAMPLE NO.	PLT-21	PLT-22	PLT-23	PLT-31
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
DESCRIPTION				
Distance Between Platens (in) - D:	1.210	1.879	1.535	1.354
Minimum Specimen Width (in) - W:	2.758	2.712	2.953	2.315
Equivalent Core Diameter (in²) - De²:	4.249	6.488	5.771	3.991
Minimum Failure Plane Area (in²) - A:	3.337	5.096	4.533	3.135
Maximum Load (lbs):	1201	1408	4175	6634
Uncorrected Point Load Strength Index (psi):	282.6	216.9	723.4	1662.3
Size Correction Factor - F:	1.021	1.123	1.094	1.007
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Normal
Failure Mode:	Combination	Combination	Combination	Combination
Corrected Point Load Strength Index (psi):	**288.5**	**243.6**	**791.3**	**1673.4**
Corrected Point Load Strength Index (kPa):	**1989.0**	**1679.7**	**5455.6**	**11537.7**
Approximate Compressive Strength (psi):	**6581**	**5537**	**17982**	**38231**
NOTES				

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159_Point Load ASTM D5731_10.xlsm		

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ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	C2DSR	C2DSR
DEPTH		
SAMPLE NO.		
DATE SAMPLED		
DATE TESTED	06/26/20	06/26/20
TECHNICIAN	HN	HN
ROCK TYPE		
Distance Between Platens (in) - D:	1.209	1.834
Minimum Specimen Width (in) - W:	3.214	3.565
Equivalent Core Diameter (in²) - De²:	4.947	8.325
Minimum Failure Plane Area (in²) - A:	3.886	6.538
Maximum Load (lbs):	5208	10791
Uncorrected Point Load Strength Index (psi):	1052.7	1296.3
Size Correction Factor - F:	1.057	1.188
Direction of Load with Respect to Fracture:	Normal	Normal
Failure Mode:	Combination	Combination
Corrected Point Load Strength Index (psi):	**1112.2**	**1539.6**
Corrected Point Load Strength Index (kPa):	**7668.2**	**10615.2**
Approximate Compressive Strength (psi):	**25305**	**35095**

BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
DESCRIPTION	
Distance Between Platens (in) - D:	
Minimum Specimen Width (in) - W:	
Equivalent Core Diameter (in²) - De²:	
Minimum Failure Plane Area (in²) - A:	
Maximum Load (lbs):	
Uncorrected Point Load Strength Index (psi):	
Size Correction Factor - F:	
Direction of Load with Respect to Fracture:	
Failure Mode:	
Corrected Point Load Strength Index (psi):	
Corrected Point Load Strength Index (kPa):	
Approximate Compressive Strength (psi):	
NOTES	

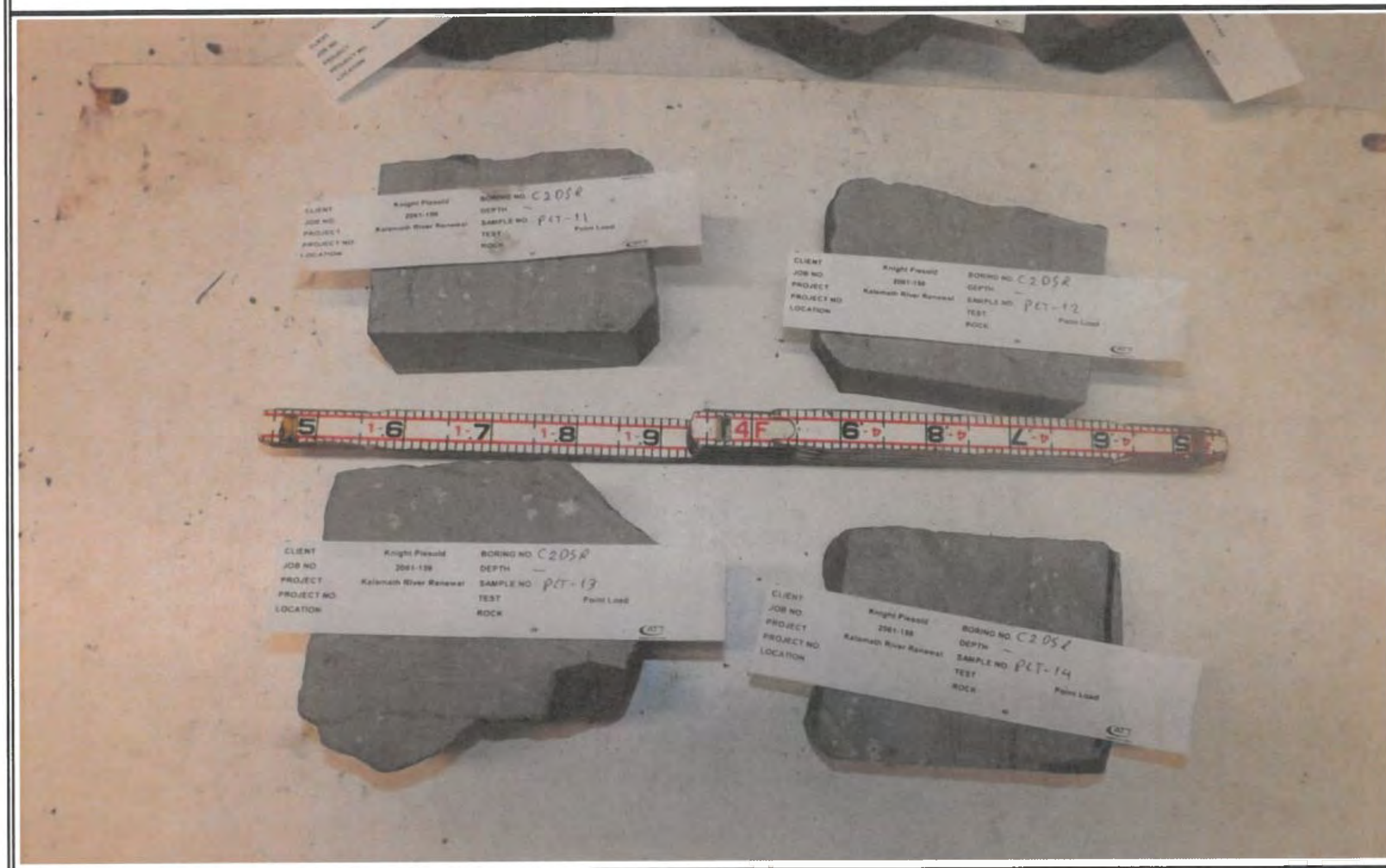
Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Point Load ASTM D5731_11.xlsm		

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

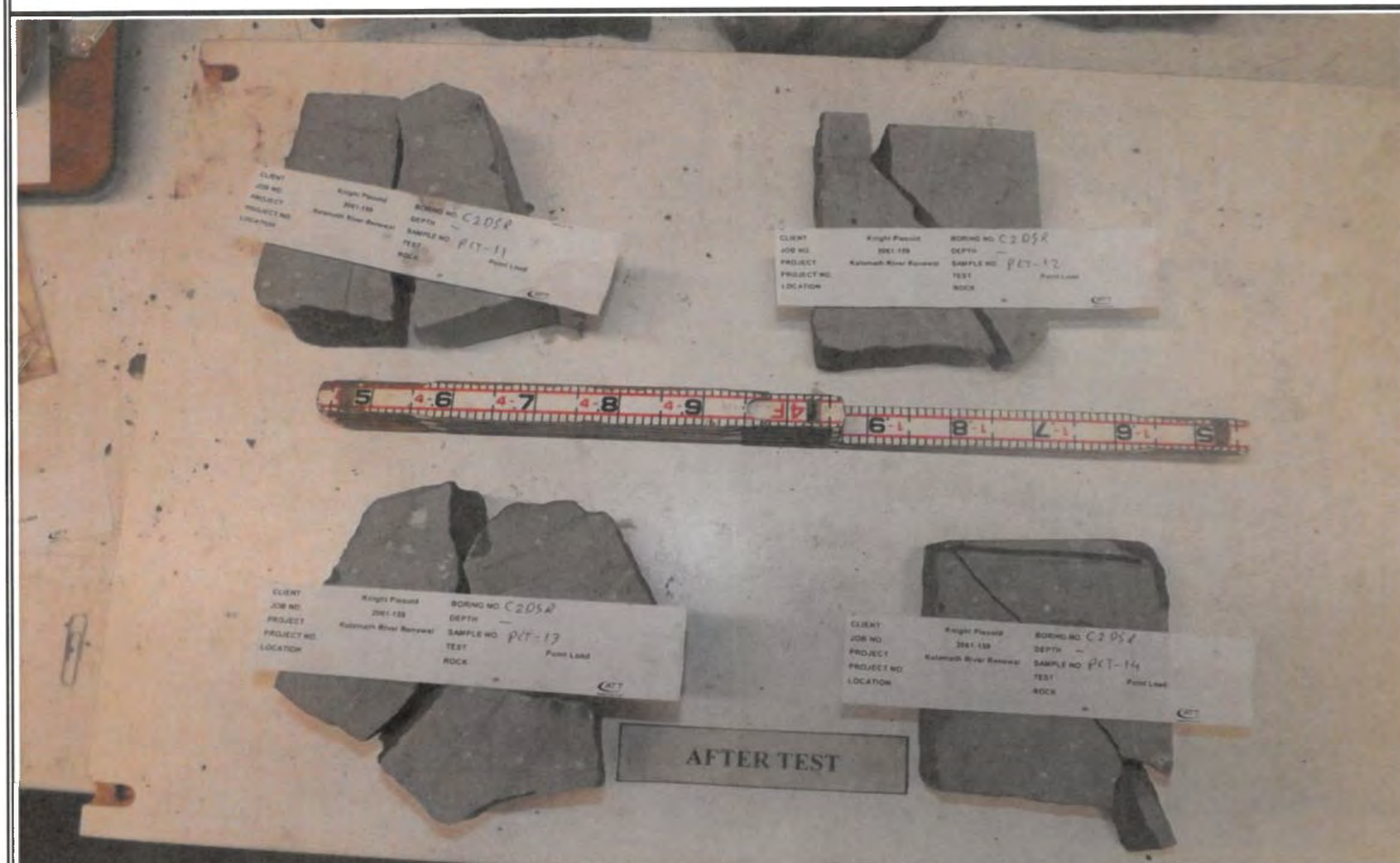
File name: 2061159__Image_20_06_27_16_55_04

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_55_38

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22, 23
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061159__Image_20_06_27_16_56_32

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22, 23
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

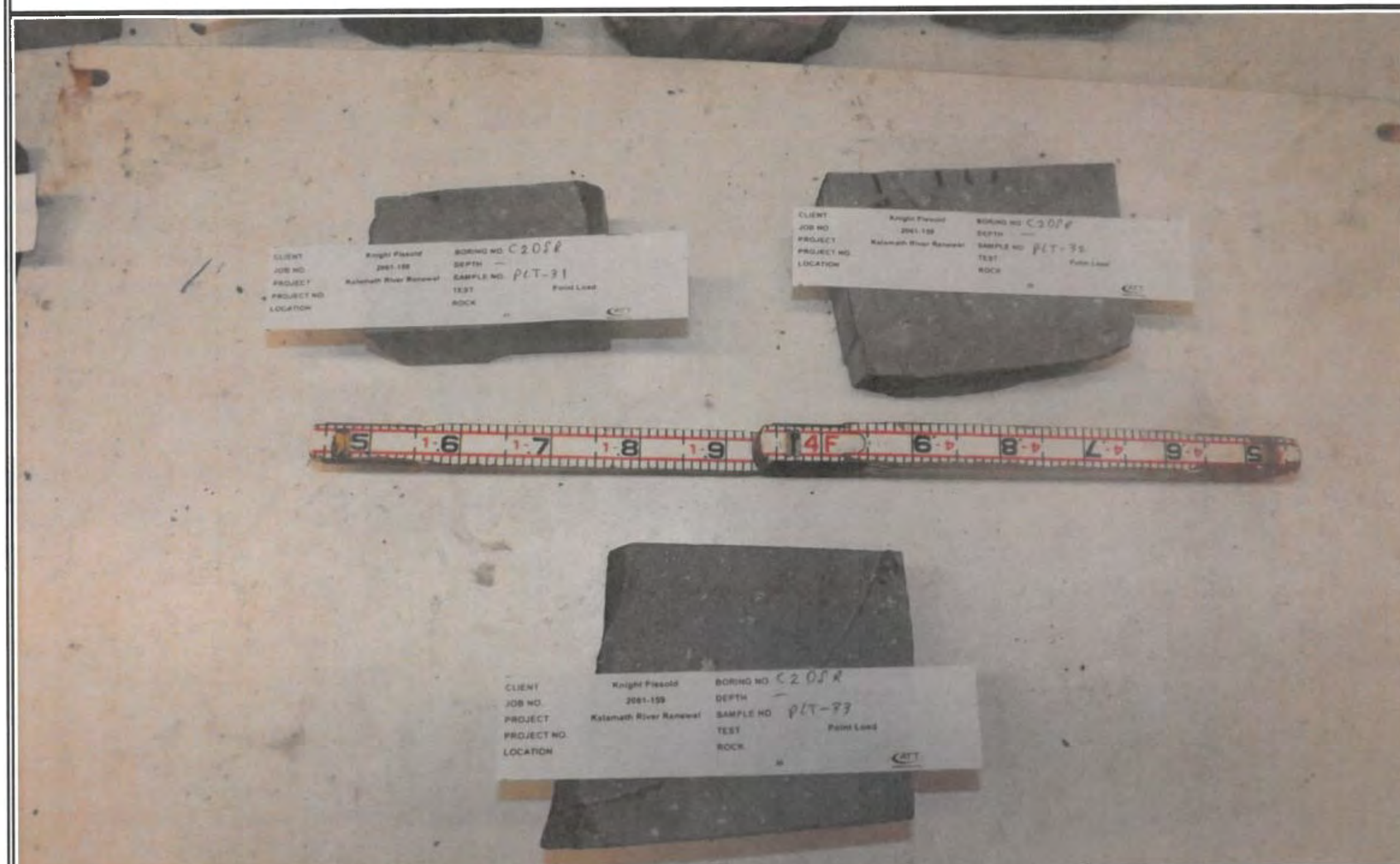
File name: 2061159__Image_20_06_27_16_56_56

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 31, 32, 33
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

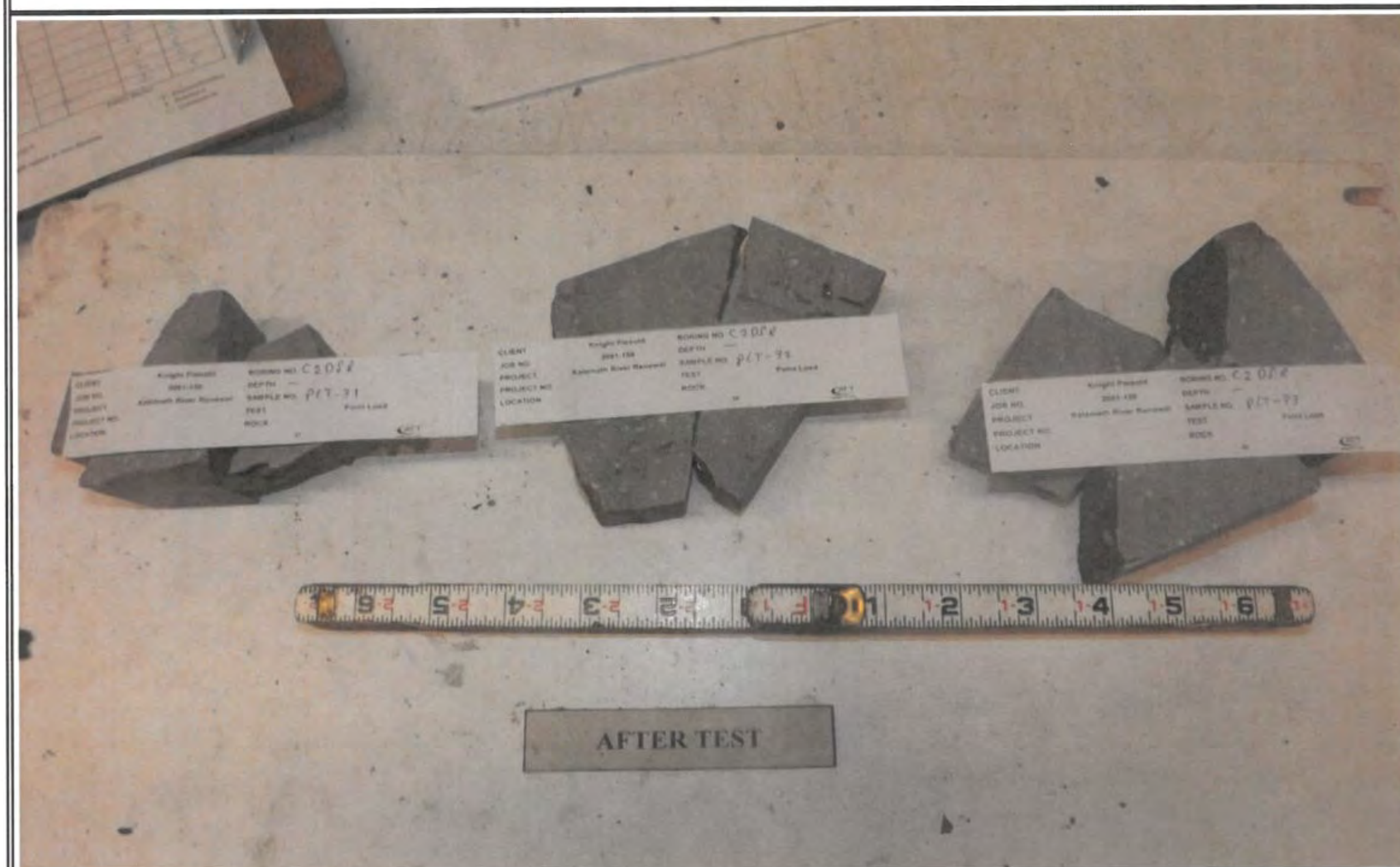
File name: 2061159__Image_20_06_27_16_58_17

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 31, 32, 33
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_58_39

ADVANCED TERRA TESTING

PRIVILEGED AND CONFIDENTIAL

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	IGLV	IGLV	IGLV	IGLV
DEPTH				
SAMPLE NO.	PLT-11	PLT-12	PLT-13	PLT-21
DATE SAMPLED				
DATE TESTED	06/19/20	06/19/20	06/19/20	06/19/20
TECHNICIAN	HN	HN	HN	HN
ROCK TYPE				
Distance Between Platens (in) - D:	1.754	1.621	1.532	1.156
Minimum Specimen Width (in) - W:	5.456	4.439	4.438	3.178
Equivalent Core Diameter (in²) - De²:	12.185	9.162	8.657	4.678
Minimum Failure Plane Area (in²) - A:	9.570	7.196	6.799	3.674
Maximum Load (lbs):	4960	1770	546	5022
Uncorrected Point Load Strength Index (psi):	407.0	193.2	63.1	1073.6
Size Correction Factor - F:	1.294	1.214	1.198	1.043
Direction of Load with Respect to Fracture:	Normal	Parallel	Parallel	Normal
Failure Mode:	Substance	Combination	Combination	Combination
Corrected Point Load Strength Index (psi):	**526.7**	**234.4**	**75.6**	**1120.0**
Corrected Point Load Strength Index (kPa):	**3631.7**	**1616.4**	**521.5**	**7722.4**
Approximate Compressive Strength (psi):	**12152**	**5356**	**1726**	**25504**

BORING NO.	IGLV	IGLV	IGLV	IGLV
DEPTH				
SAMPLE NO.	PLT-22	PLT-23	PLT-24	PLT-25
DATE SAMPLED				
DATE TESTED	06/19/20	06/19/20	06/19/20	06/19/20
TECHNICIAN	HN	HN	HN	HN
DESCRIPTION				
Distance Between Platens (in) - D:	1.568	1.308	1.568	1.470
Minimum Specimen Width (in) - W:	3.715	3.949	3.923	3.996
Equivalent Core Diameter (in²) - De²:	7.417	6.577	7.832	7.479
Minimum Failure Plane Area (in²) - A:	5.825	5.165	6.151	5.874
Maximum Load (lbs):	3167	1704	7866	8290
Uncorrected Point Load Strength Index (psi):	427.0	259.0	1004.3	1108.5
Size Correction Factor - F:	1.157	1.126	1.172	1.159
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Normal
Failure Mode:	Substance	Combination	Combination	Combination
Corrected Point Load Strength Index (psi):	**494.2**	**291.8**	**1176.6**	**1285.2**
Corrected Point Load Strength Index (kPa):	**3407.2**	**2011.8**	**8112.6**	**8861.2**
Approximate Compressive Strength (psi):	**11244**	**6632**	**26792**	**29245**
NOTES				

Data entry by:	BFUTCH	Date:	6/21/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Point Load ASTM D5731_0.xlsm		

ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	IGLV	IGLV
DEPTH		
SAMPLE NO.	PLT-31	PLT-32
DATE SAMPLED		
DATE TESTED	06/19/20	06/19/20
TECHNICIAN	HN	HN
ROCK TYPE		
Distance Between Platens (in) - D:	1.675	1.470
Minimum Specimen Width (in) - W:	4.064	3.690
Equivalent Core Diameter (in²) - De²:	8.667	6.906
Minimum Failure Plane Area (in²) - A:	6.807	5.424
Maximum Load (lbs):	8487	6841
Uncorrected Point Load Strength Index (psi):	979.2	990.6
Size Correction Factor - F:	1.199	1.139
Direction of Load with Respect to Fracture:	N/A	N/A
Failure Mode:	Substance	Substance
Corrected Point Load Strength Index (psi):	**1173.6**	**1128.1**
Corrected Point Load Strength Index (kPa):	**8092.0**	**7778.2**
Approximate Compressive Strength (psi):	**26775**	**25649**

BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
DESCRIPTION	
Distance Between Platens (in) - D:	
Minimum Specimen Width (in) - W:	
Equivalent Core Diameter (in²) - De²:	
Minimum Failure Plane Area (in²) - A:	
Maximum Load (lbs):	
Uncorrected Point Load Strength Index (psi):	
Size Correction Factor - F:	
Direction of Load with Respect to Fracture:	
Failure Mode:	
Corrected Point Load Strength Index (psi):	
Corrected Point Load Strength Index (kPa):	
Approximate Compressive Strength (psi):	
NOTES	

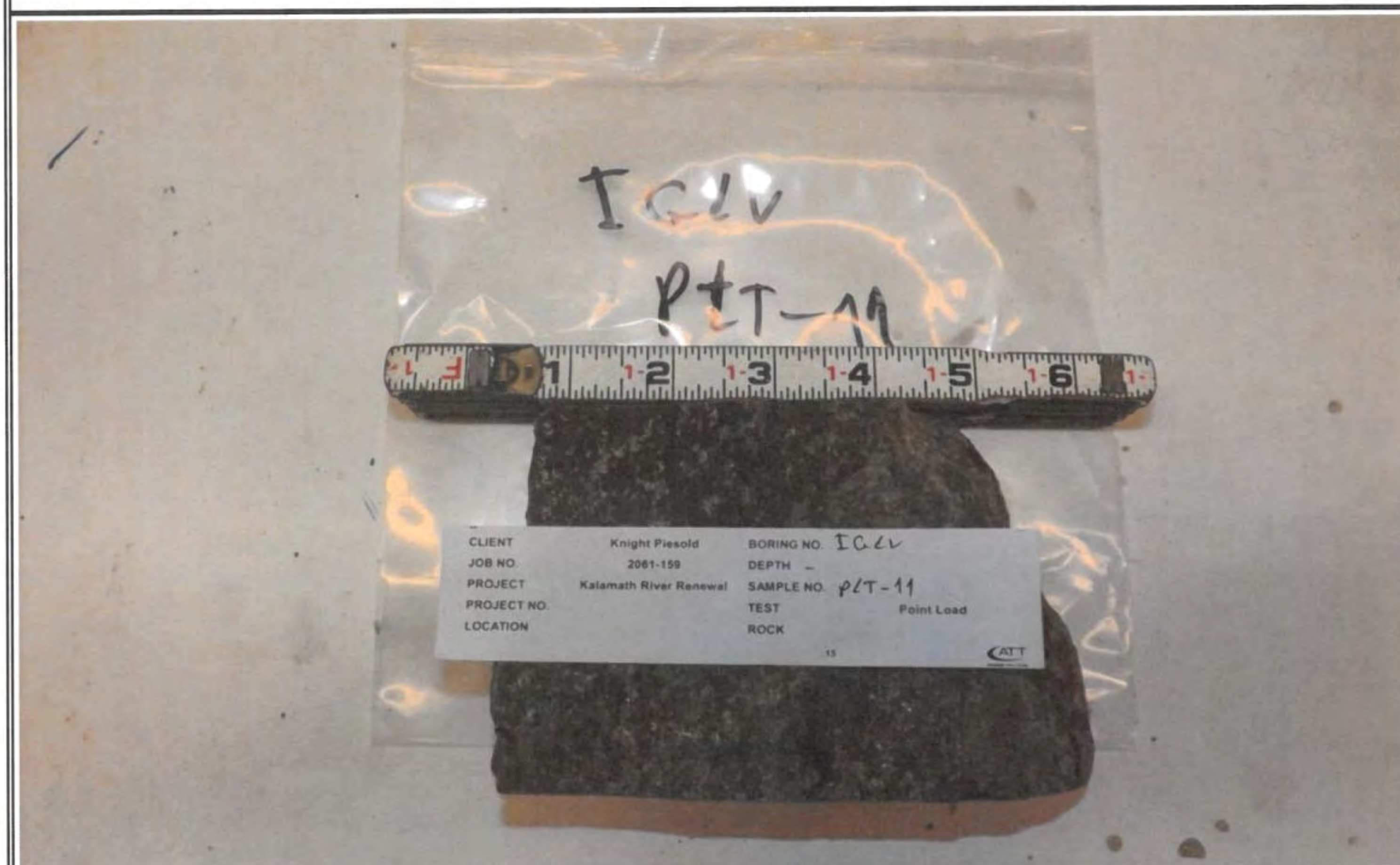
Data entry by:	BFUTCH	Date:	6/21/2020
Checked by:	____________	Date:	____________
File name:	2061159__Point Load ASTM D5731_1.xlsm		

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-11
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



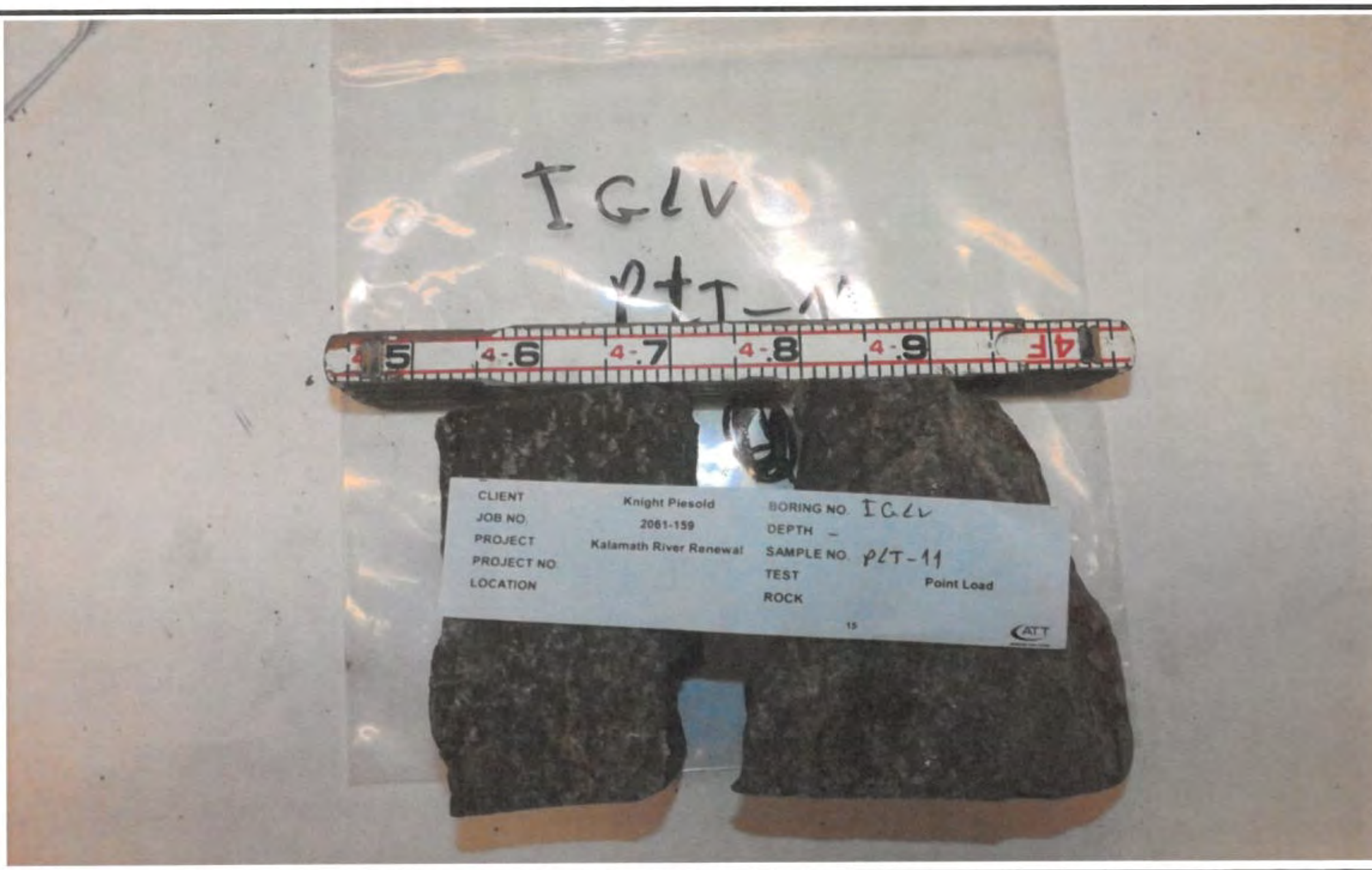
NOTES

File name: 2061159__Image_20_06_21_19_46_51

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-11
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

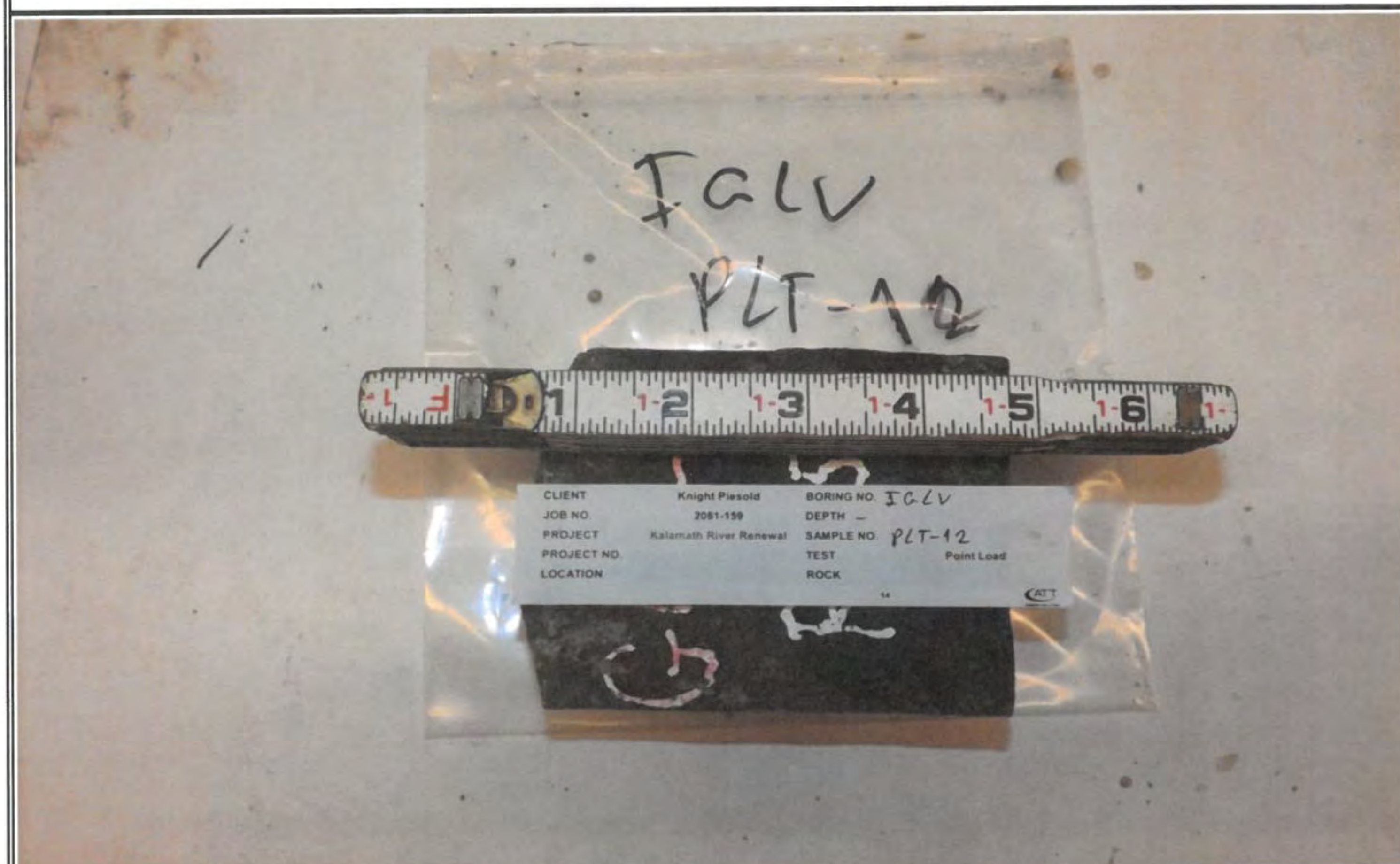
File name: 2061159__Image_20_06_21_19_48_42

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-12
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

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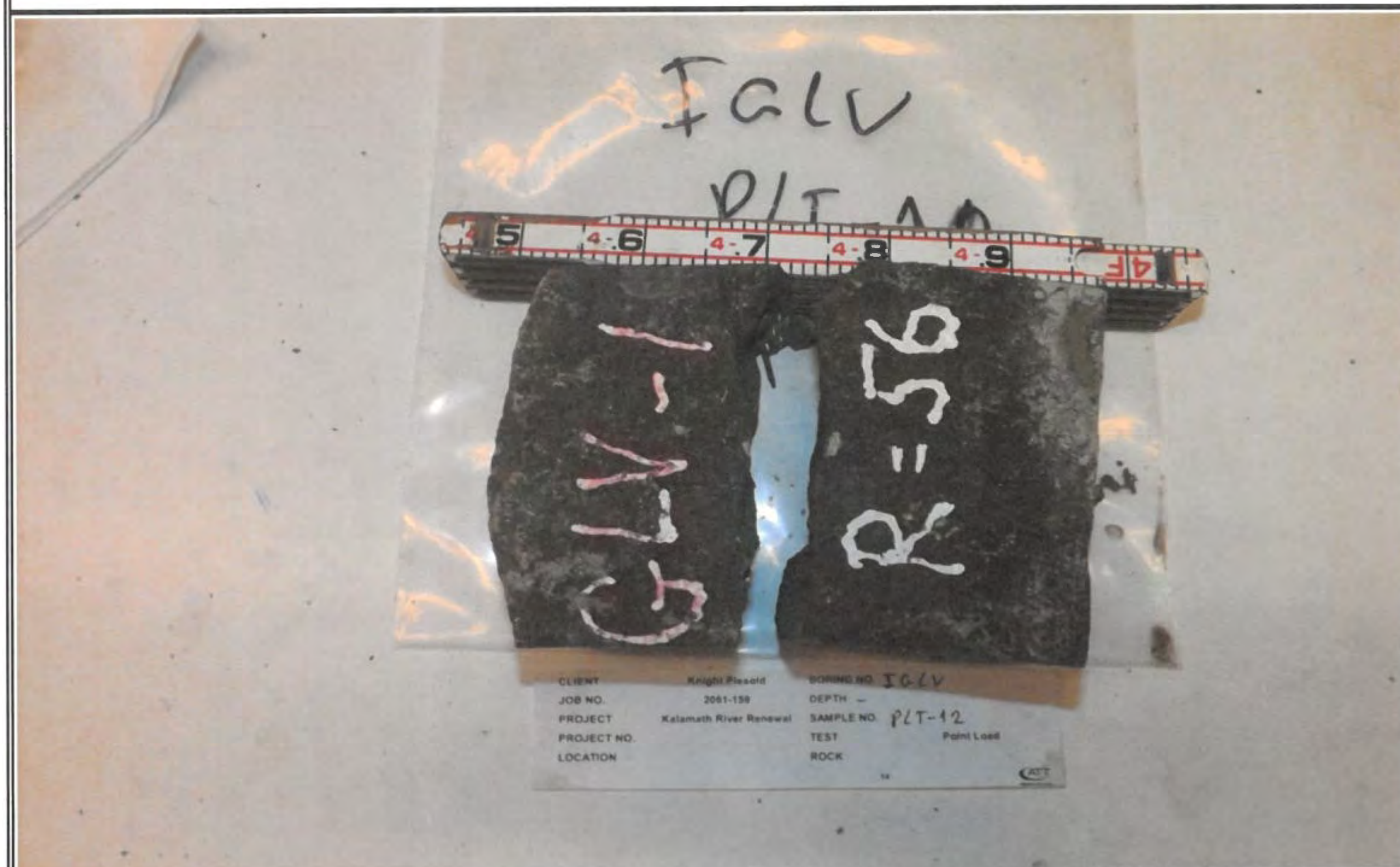
Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-12
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

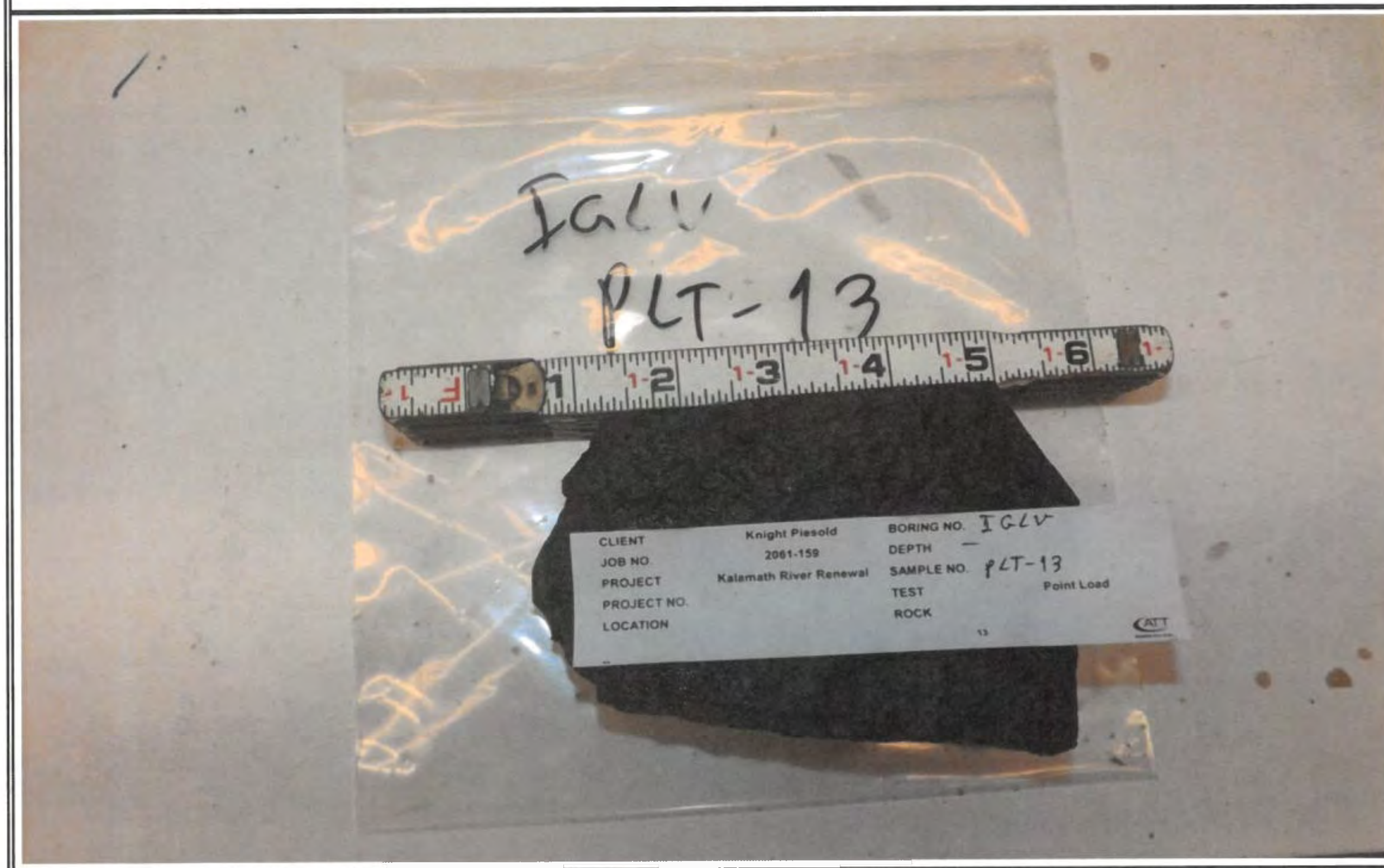
File name: 2061159__Image_20_06_21_19_49_17

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-13
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

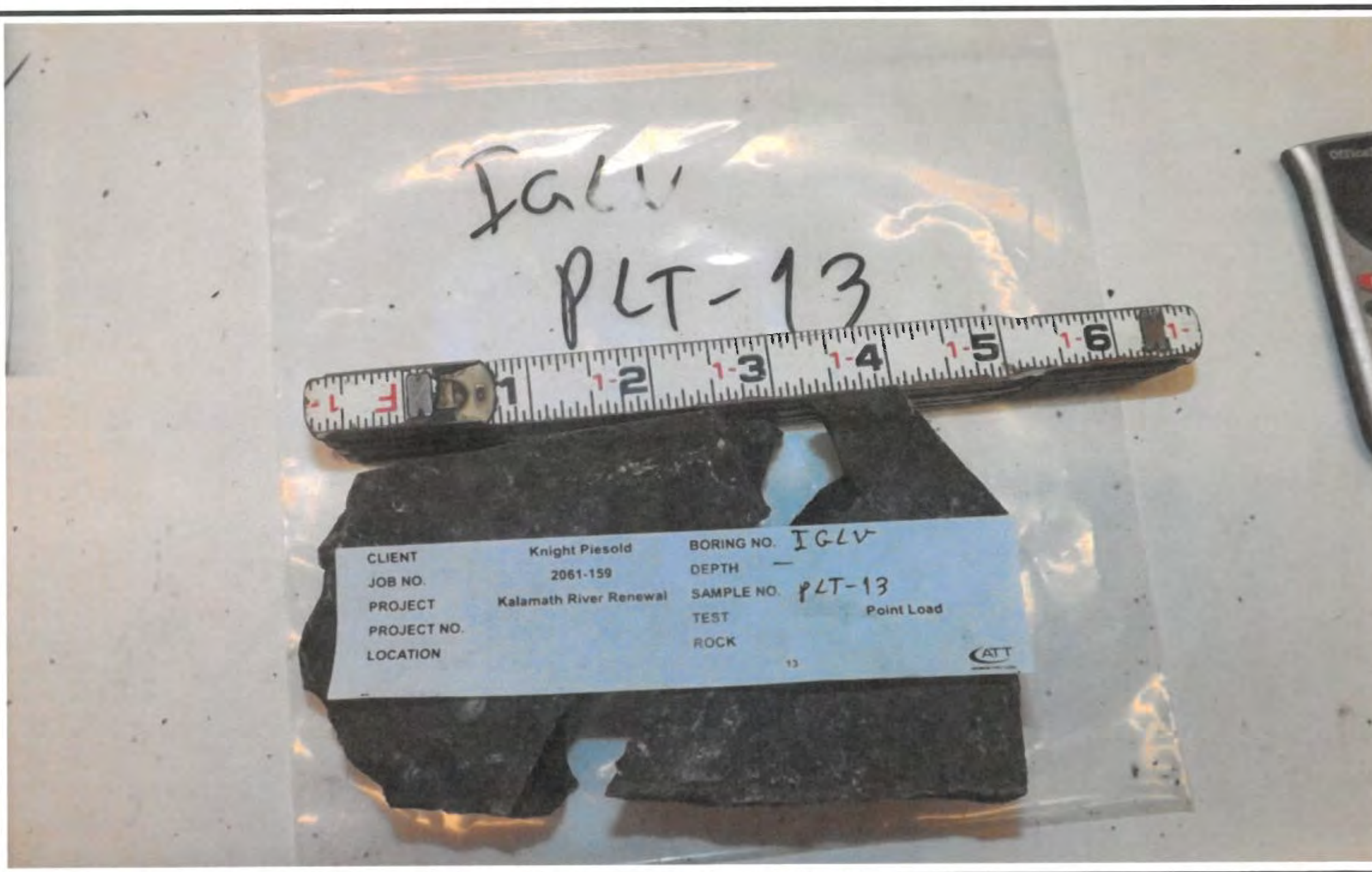
File name: 2061159__Image_20_06_21_19_45_39

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-13
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

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Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-21
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

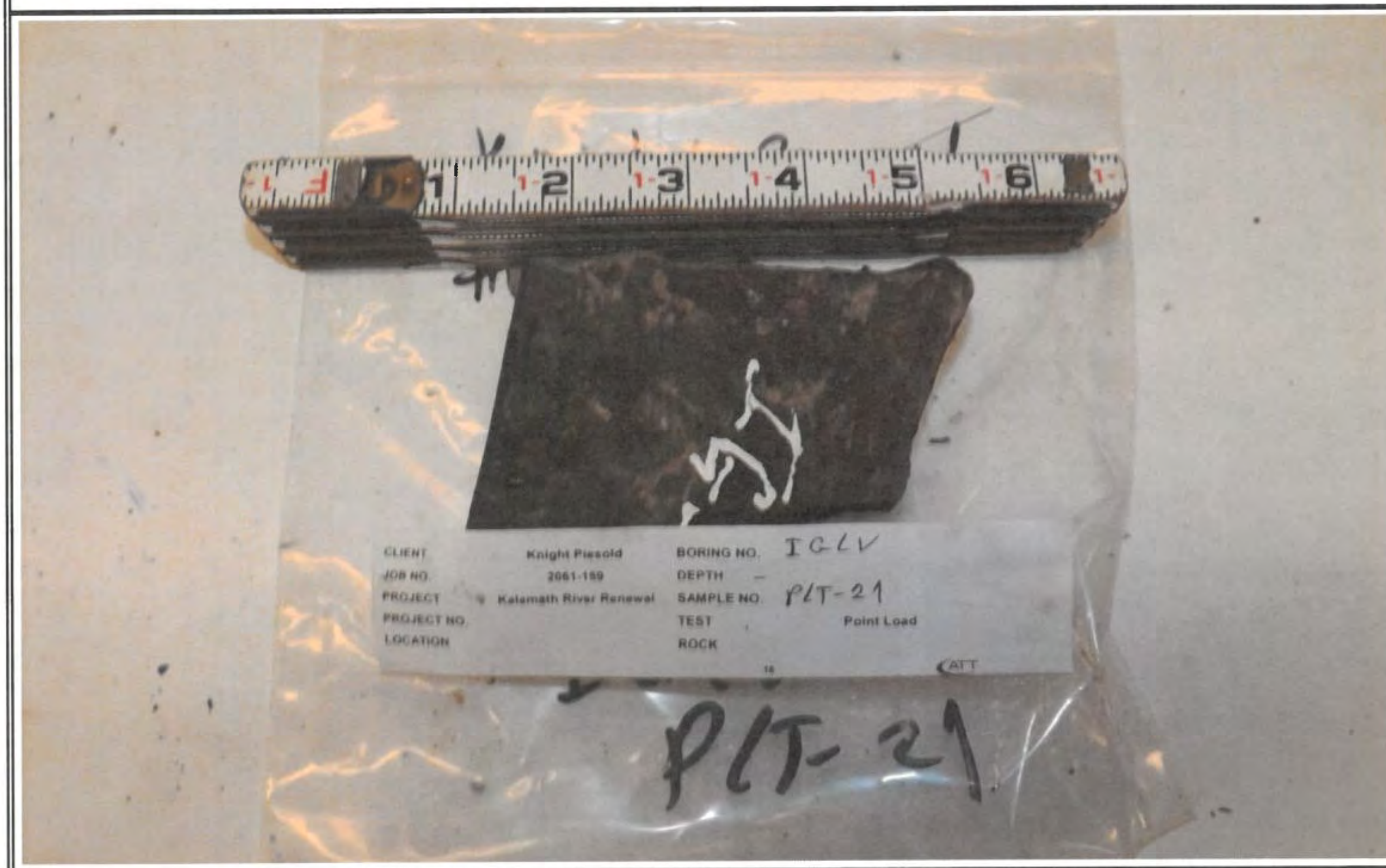
NOTES

File name: 2061159__Image_20_06_21_19_45_05

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-21
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

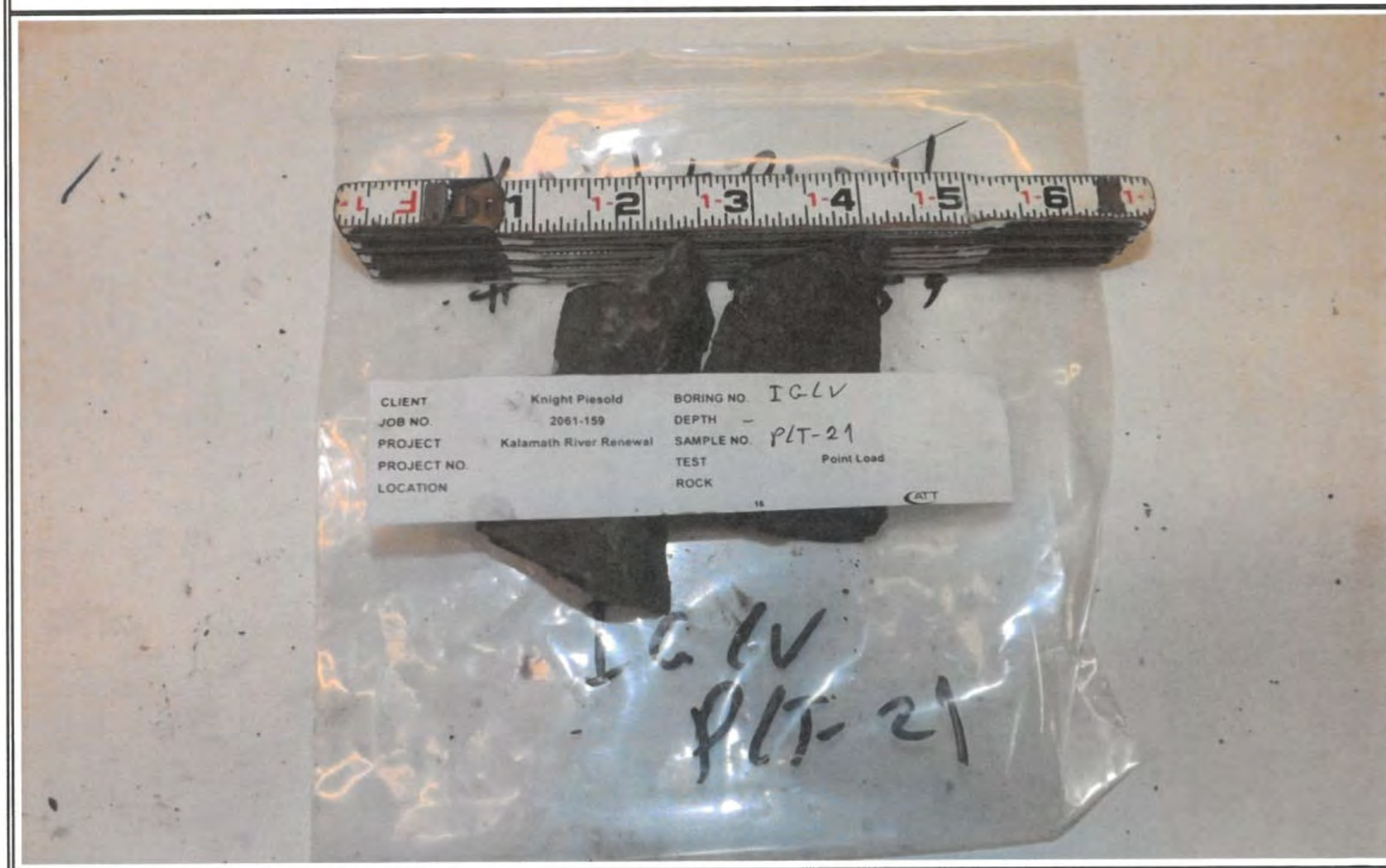
File name: 2061159__Image_20_06_21_19_51_38

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-21
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



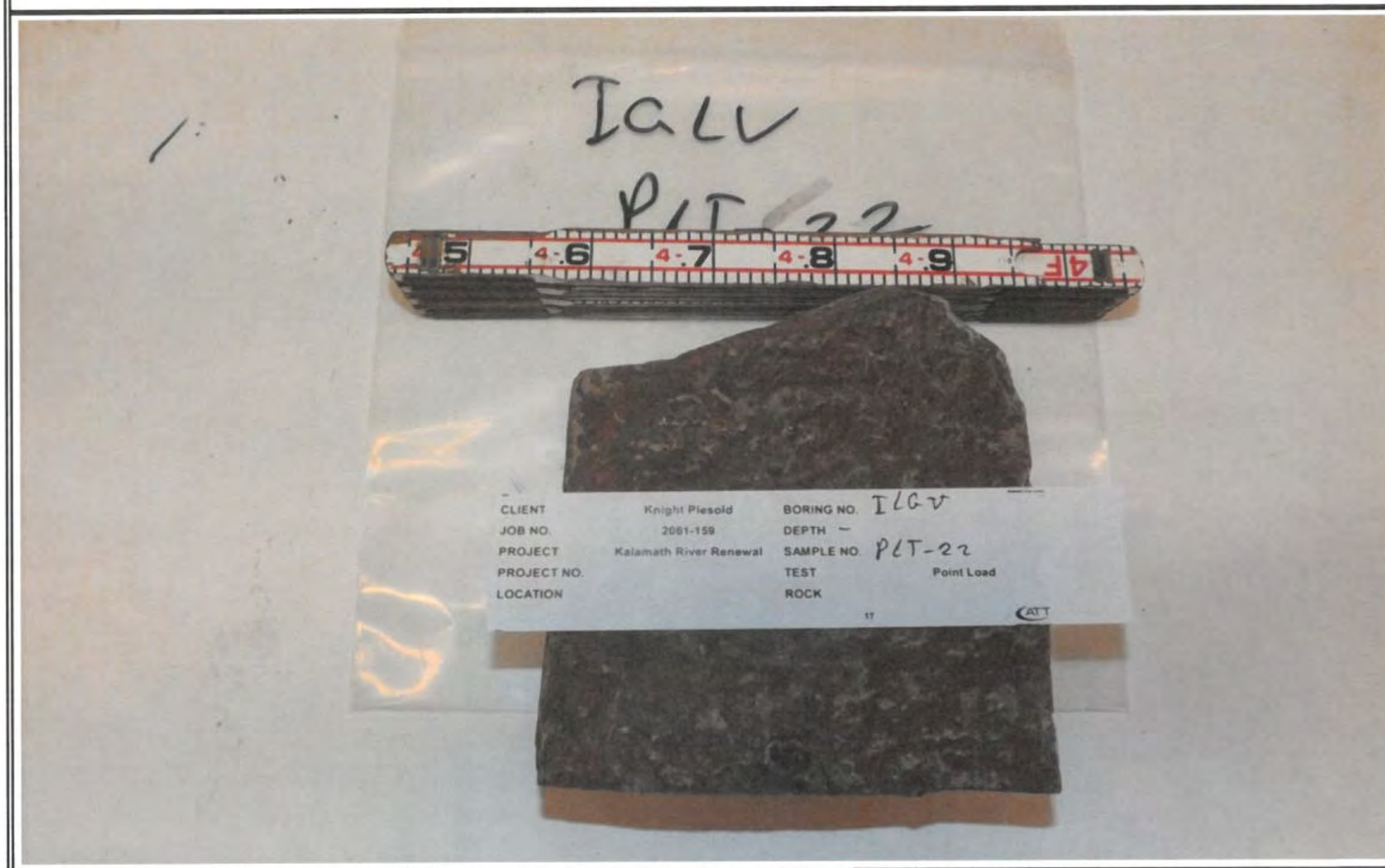
NOTES

File name: 2061159__Image_20_06_21_19_55_02

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-22
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_21_19_44_12

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-22
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

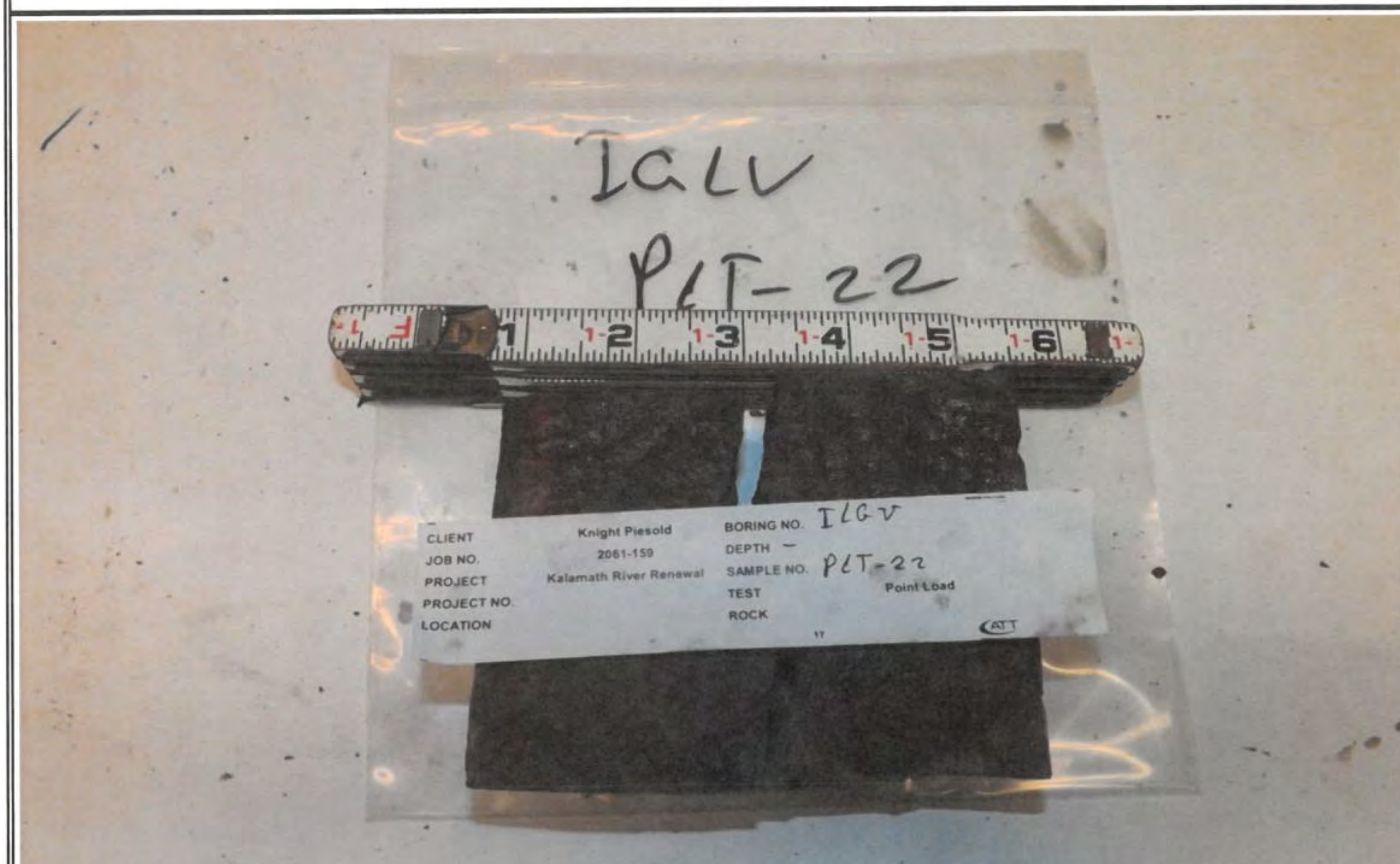
File name: 2061159__Image_20_06_21_19_52_11

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-22
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

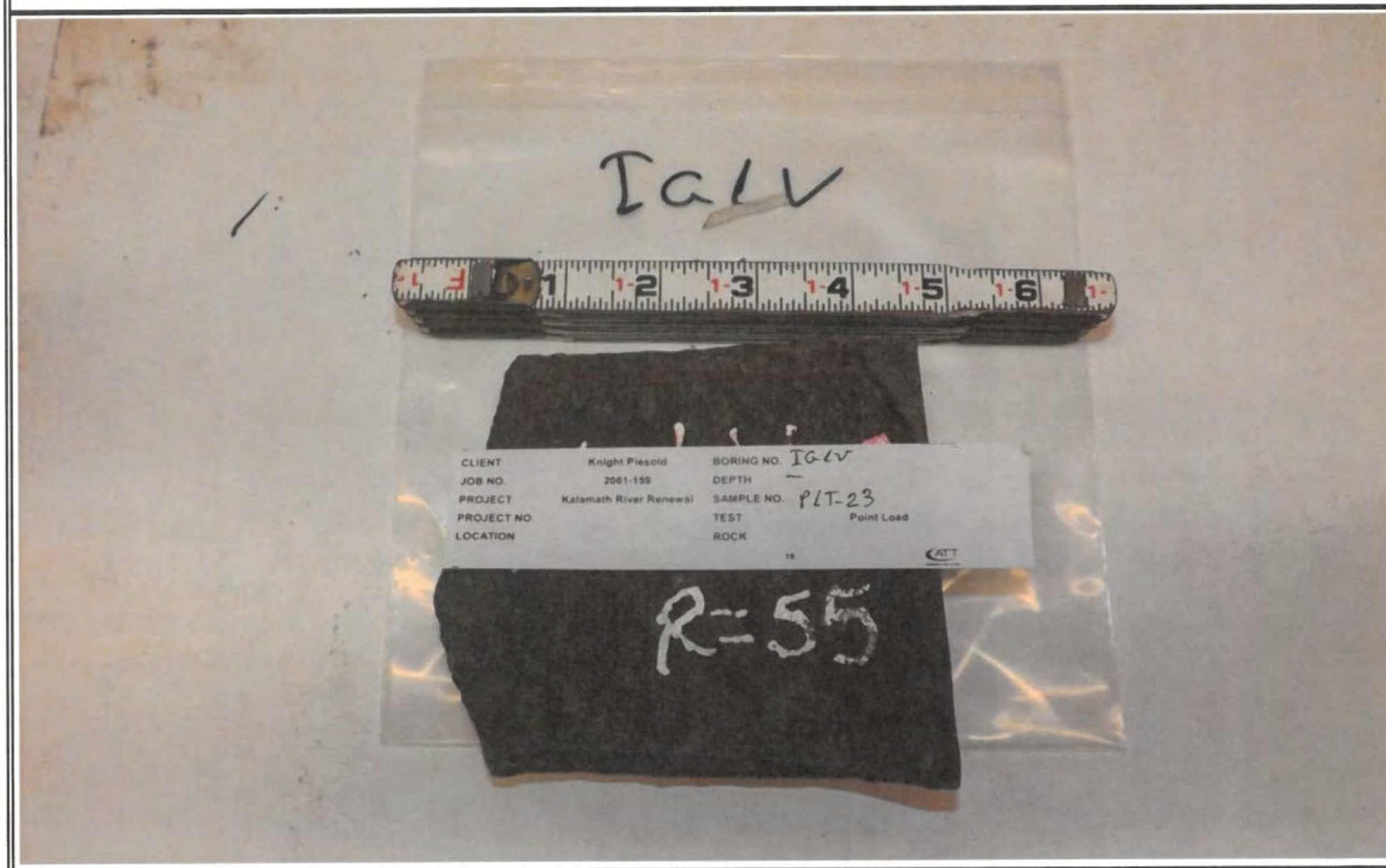
File name: 2061159__Image_20_06_21_19_55_28

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-23
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

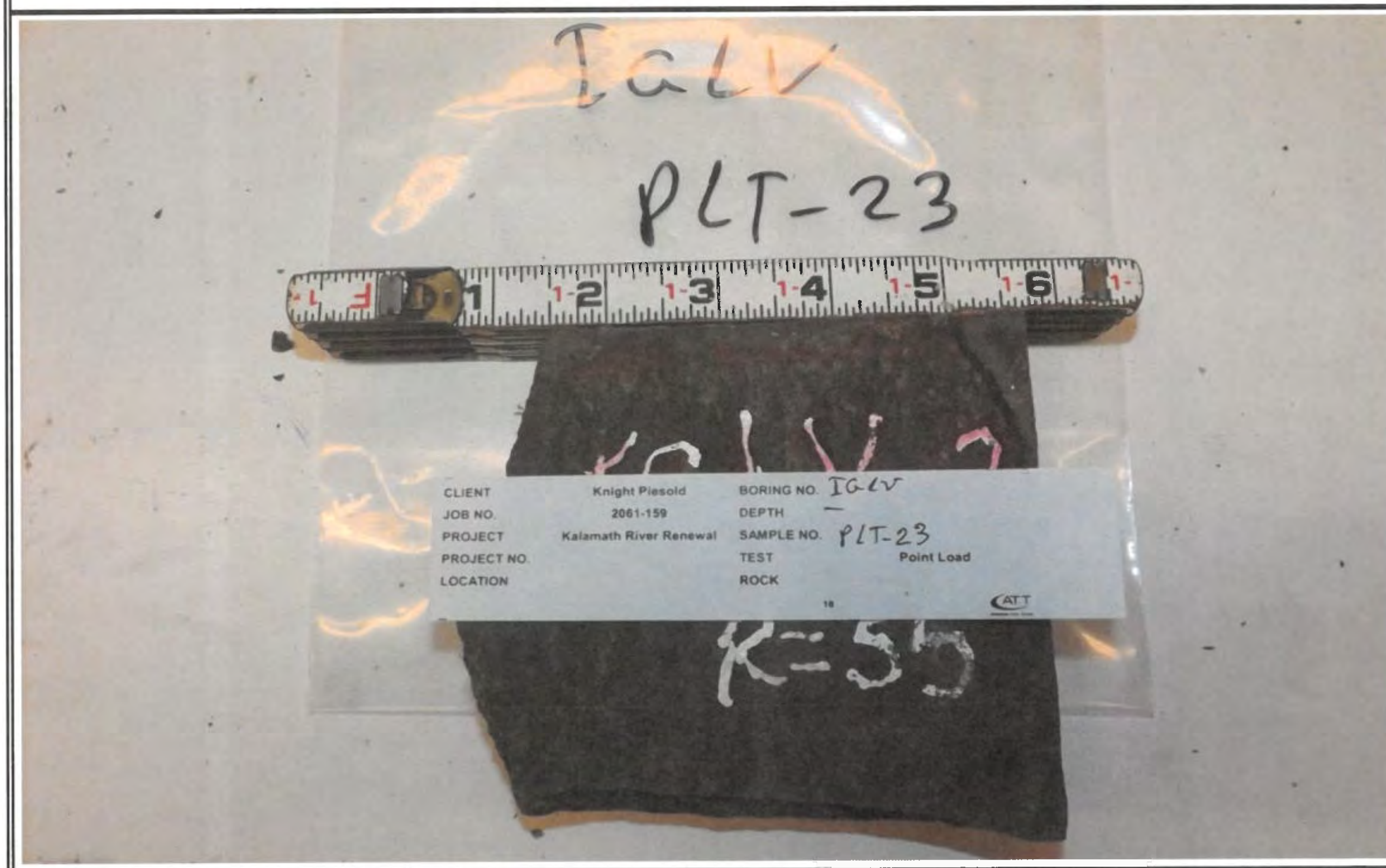
File name: 2061159__Image_20_06_21_19_43_46

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-23
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



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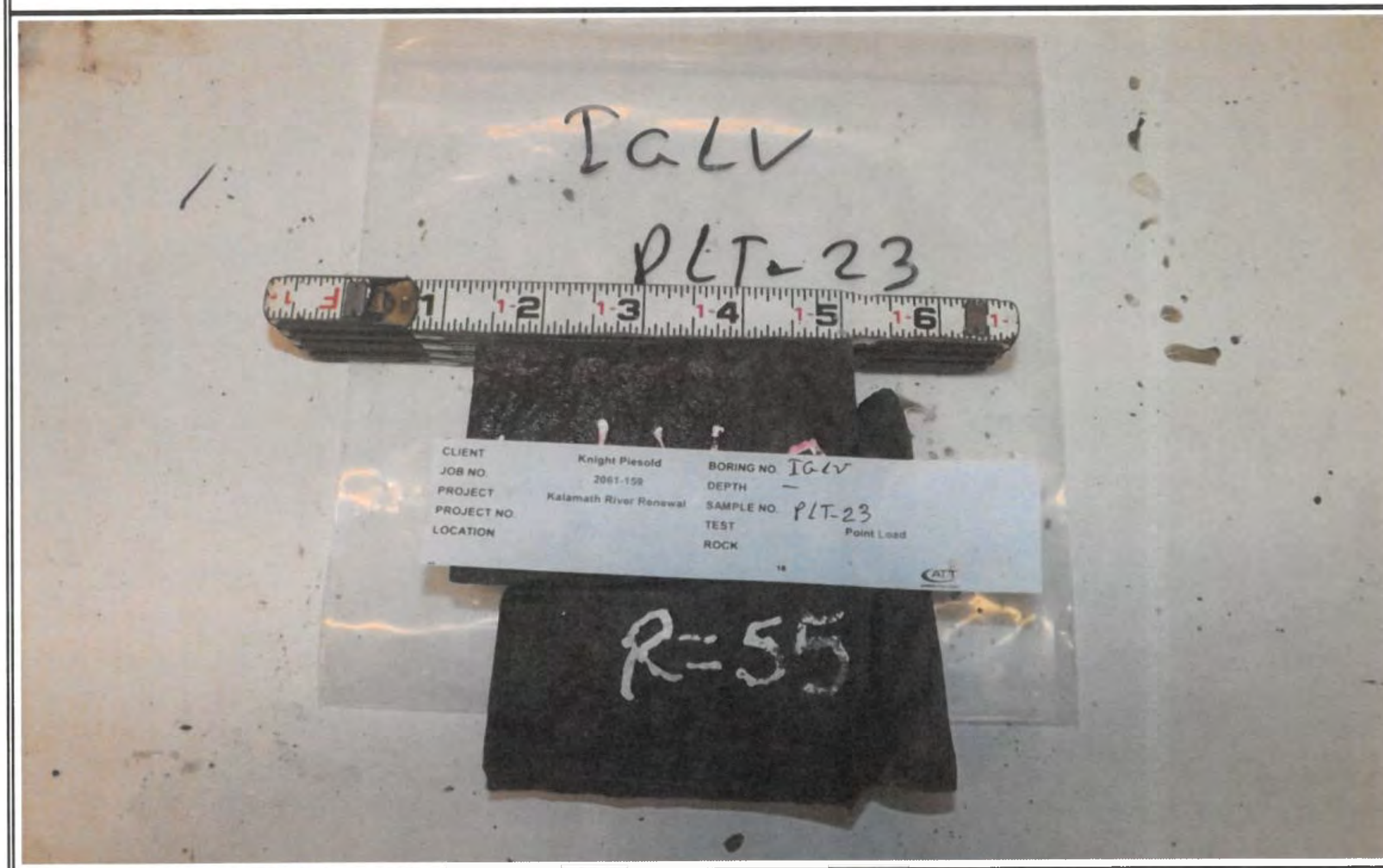
ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-23
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_21_19_56_49

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-24
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

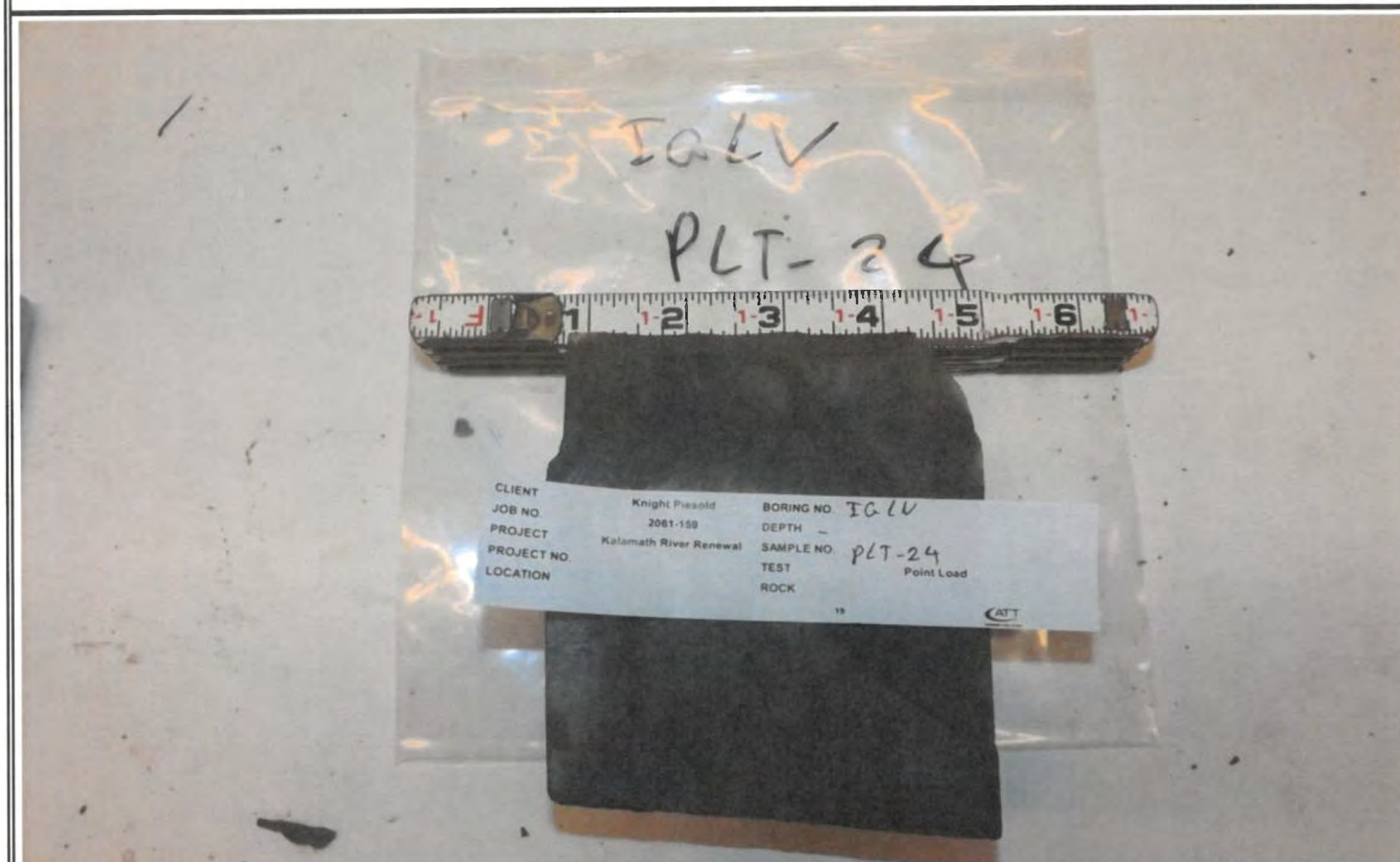
NOTES

File name: 2061159__Image_20_06_21_19_42_22

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-24
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



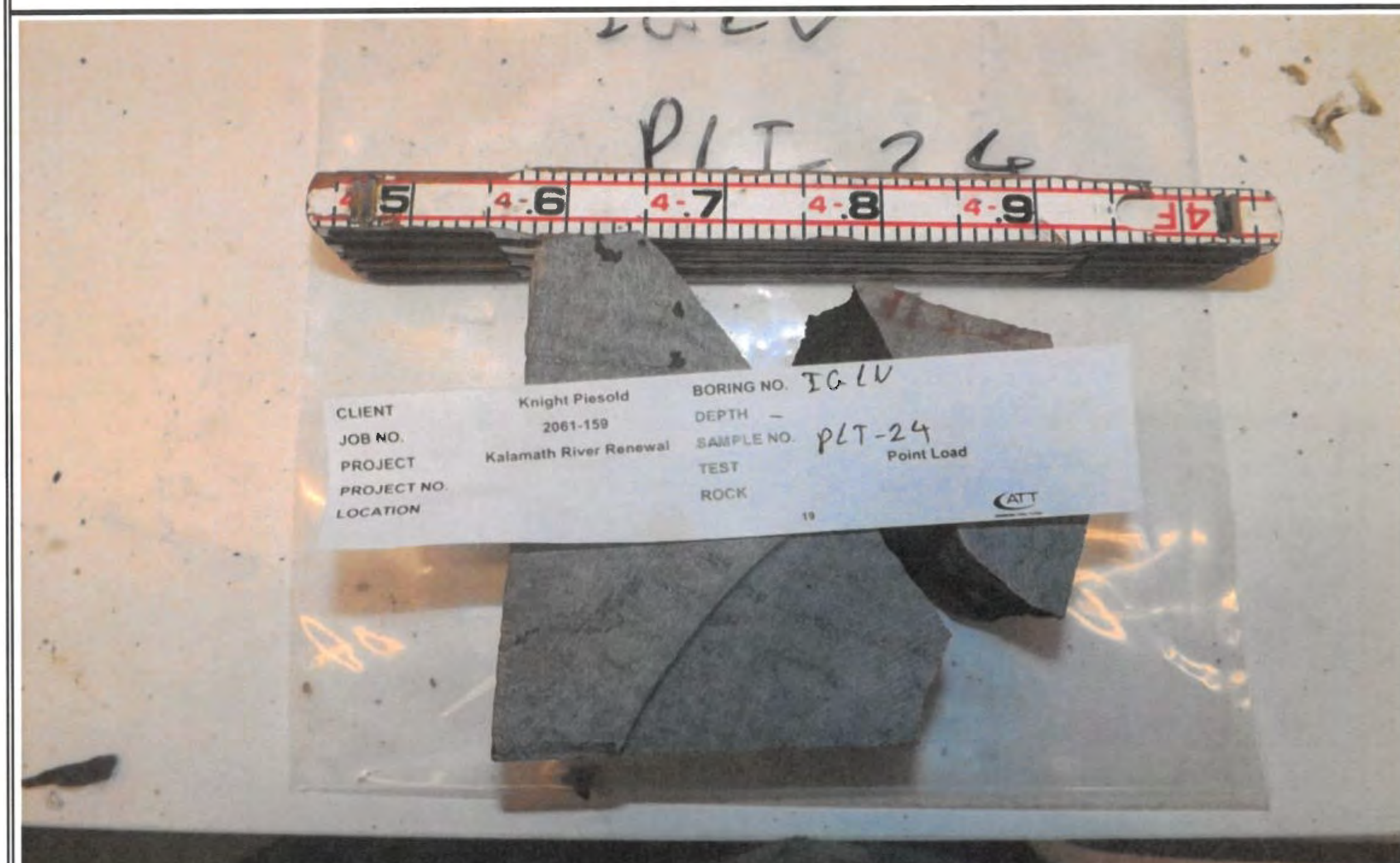
NOTES

File name: 2061159__Image_20_06_21_19_53_23

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-24
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

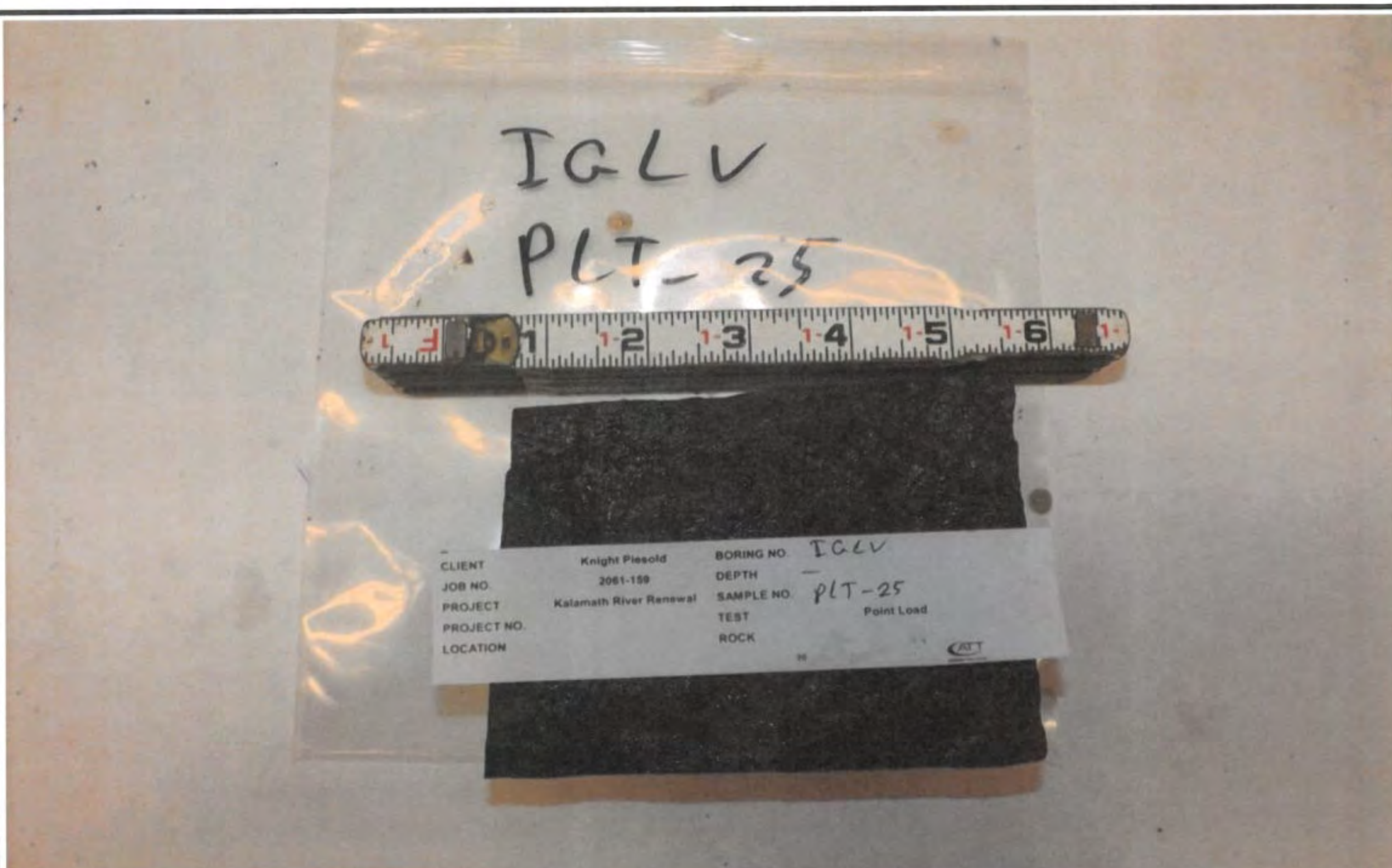
File name: 2061159__Image_20_06_21_19_57_19

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-25
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



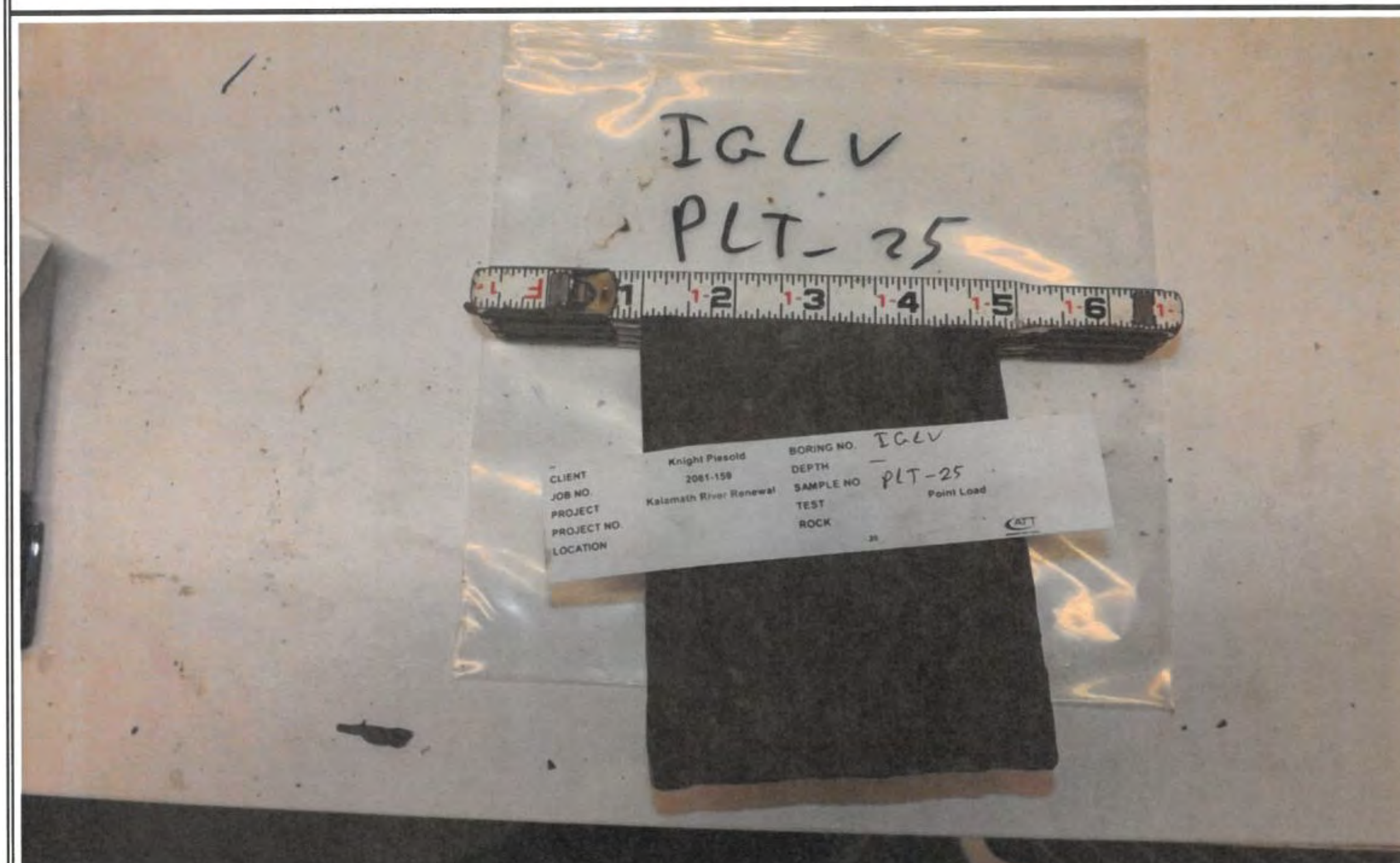
NOTES

File name: 2061159__Image_20_06_21_19_44_39

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-25
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

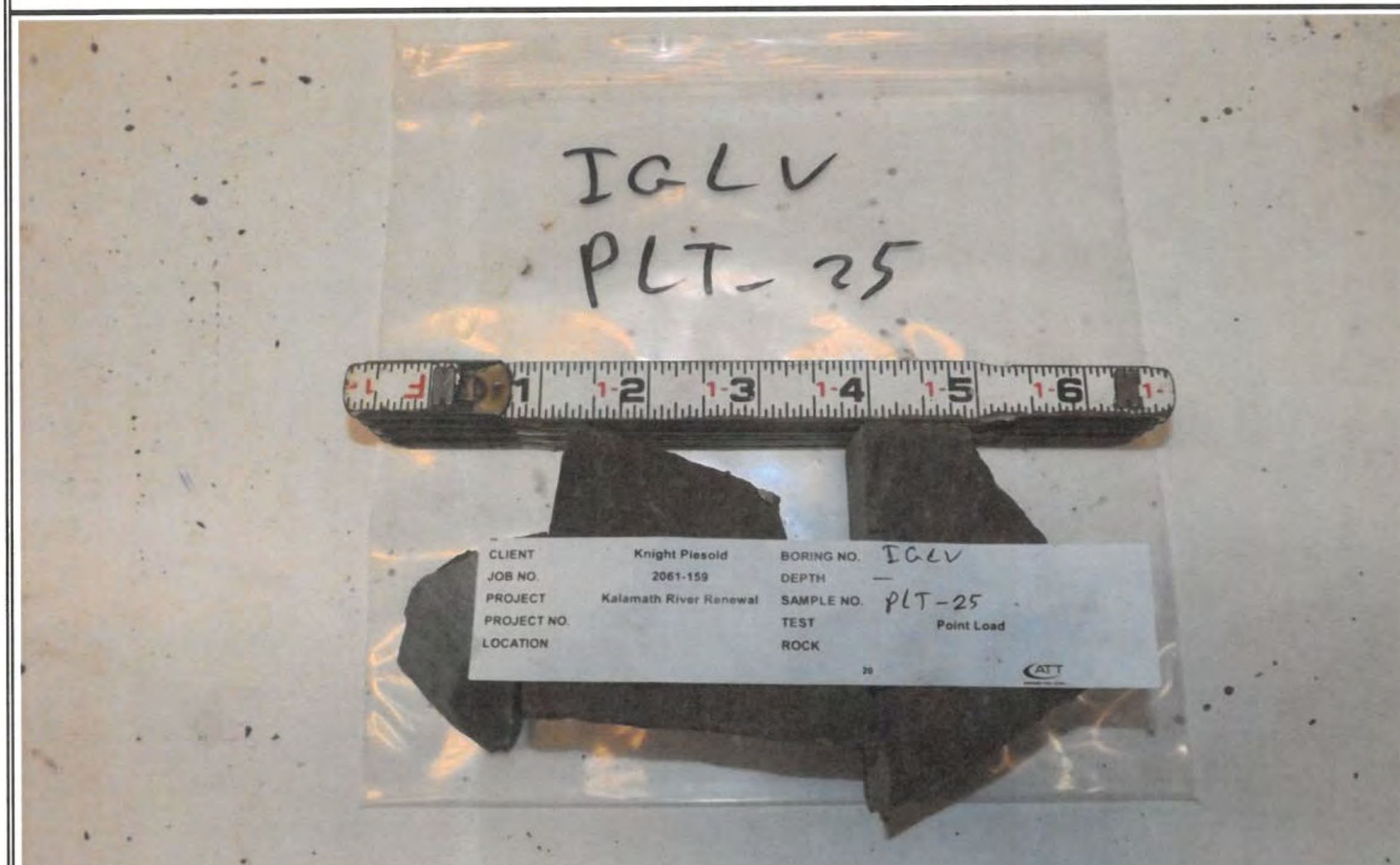
File name: 2061159__Image_20_06_21_19_54_04

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-25
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_21_19_57_49

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-31
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061159__Image_20_06_21_19_47_28

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-31
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

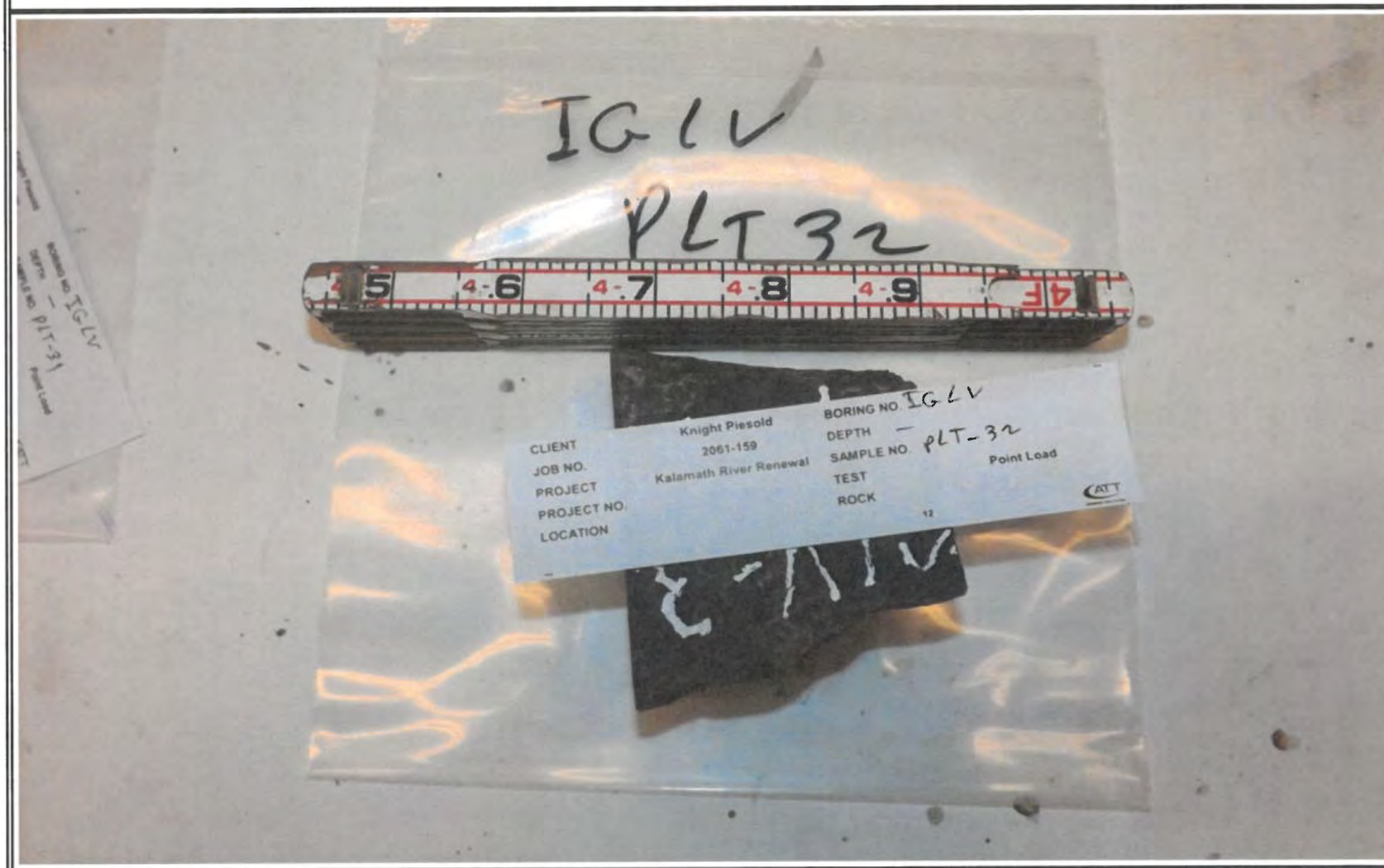
NOTES

File name: 2061159__Image_20_06_21_19_50_25

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-32
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

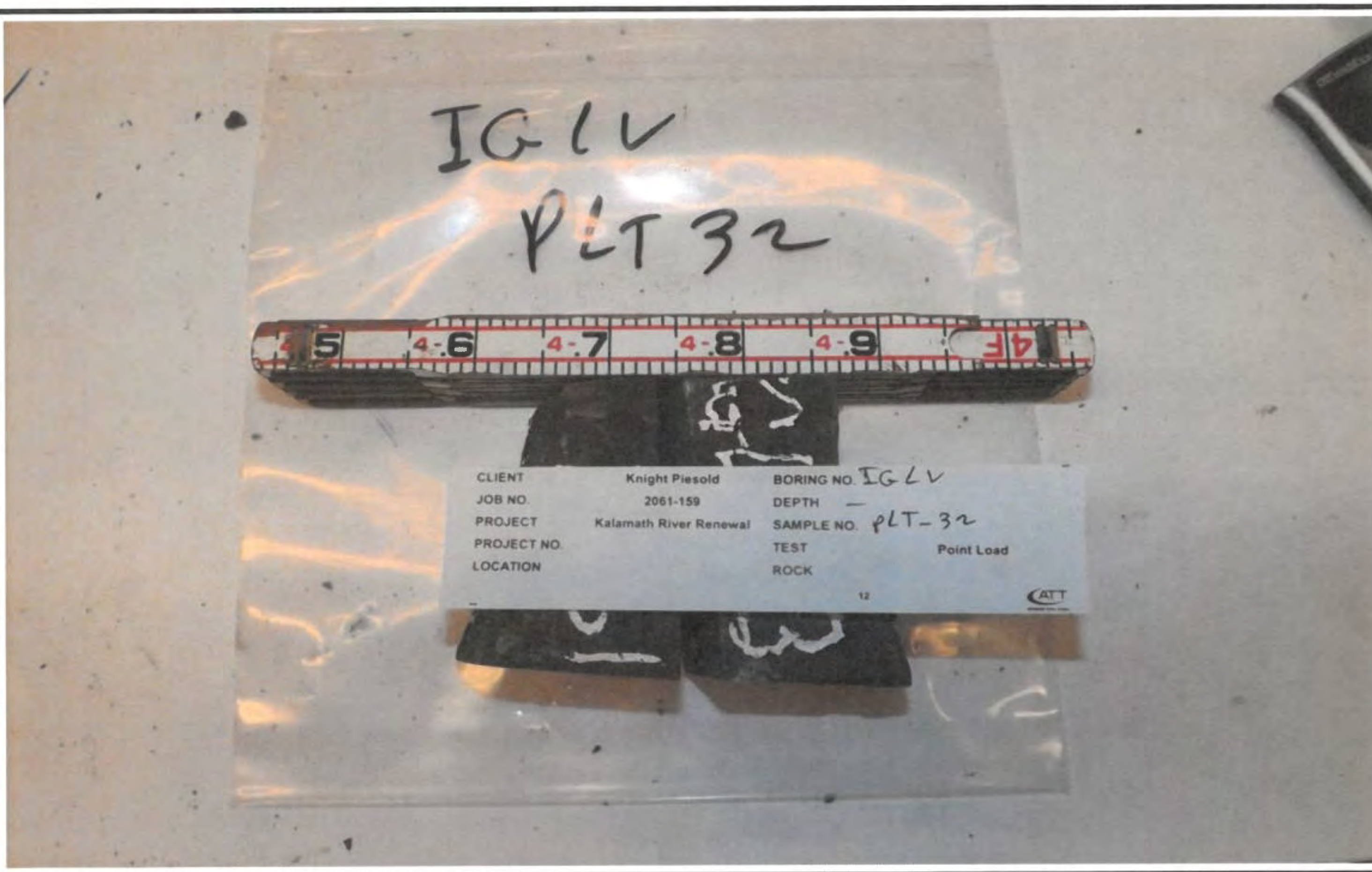
File name: 2061159__Image_20_06_21_19_48_01

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-32
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_21_19_50_59

ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	CRBR	CRBR	CRBR	CRBR
DEPTH				
SAMPLE NO.	PLT-11	PLT-21	PLT-22	PLT-23
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
ROCK TYPE				
Distance Between Platens (in) - D:	1.485	1.065	1.115	1.855
Minimum Specimen Width (in) - W:	3.105	2.340	2.839	2.801
Equivalent Core Diameter (in^2) - De^2:	5.871	3.173	4.030	6.616
Minimum Failure Plane Area (in^2) - A:	4.611	2.492	3.165	5.196
Maximum Load (lbs):	7421	5382	5688	7367
Uncorrected Point Load Strength Index (psi):	1264.0	1696.2	1411.4	1113.6
Size Correction Factor - F:	1.098	0.956	1.009	1.128
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Normal
Failure Mode:	Substance	Combination	Combination	Substance
Corrected Point Load Strength Index (psi):	**1387.9**	**1621.6**	**1423.9**	**1256.0**
Corrected Point Load Strength Index (kPa):	**9569.2**	**11180.4**	**9817.4**	**8660.0**
Approximate Compressive Strength (psi):	**31539**	**37323**	**32523**	**28548**

BORING NO.	CRBR	CRBR	CRBR	CRBR
DEPTH				
SAMPLE NO.	PLT-24	PLT-25	PLT-26	PLT-27
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
DESCRIPTION				
Distance Between Platens (in) - D:	1.800	1.026	1.549	1.620
Minimum Specimen Width (in) - W:	3.050	2.838	2.619	2.588
Equivalent Core Diameter (in^2) - De^2:	6.990	3.707	5.165	5.338
Minimum Failure Plane Area (in^2) - A:	5.490	2.912	4.057	4.193
Maximum Load (lbs):	7553	4175	6769	8415
Uncorrected Point Load Strength Index (psi):	1080.6	1126.2	1310.5	1576.3
Size Correction Factor - F:	1.142	0.990	1.067	1.075
Direction of Load with Respect to Fracture:	Parallel	Parallel	Parallel	Parallel
Failure Mode:	Combination	Combination	Combination	Combination
Corrected Point Load Strength Index (psi):	**1234.0**	**1115.0**	**1398.0**	**1694.1**
Corrected Point Load Strength Index (kPa):	**8508.0**	**7687.9**	**9638.9**	**11680.5**
Approximate Compressive Strength (psi):	**28058**	**25526**	**31793**	**38516**
NOTES				

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Point Load ASTM D5731_6.xlsm		

ADVANCED TERRA TESTING

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	CRBR
DEPTH	
SAMPLE NO.	PLT-28
DATE SAMPLED	
DATE TESTED	06/26/20
TECHNICIAN	HN
ROCK TYPE	
Distance Between Platens (in) - D:	1.799
Minimum Specimen Width (in) - W:	2.552
Equivalent Core Diameter (in²) - De²:	5.846
Minimum Failure Plane Area (in²) - A:	4.591
Maximum Load (lbs):	7142
Uncorrected Point Load Strength Index (psi):	1221.7
Size Correction Factor - F:	1.097
Direction of Load with Respect to Fracture:	Parallel
Failure Mode:	Combination
Corrected Point Load Strength Index (psi):	**1340.1**
Corrected Point Load Strength Index (kPa):	**9239.8**
Approximate Compressive Strength (psi):	**30454**

BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
DESCRIPTION	
Distance Between Platens (in) - D:	
Minimum Specimen Width (in) - W:	
Equivalent Core Diameter (in²) - De²:	
Minimum Failure Plane Area (in²) - A:	
Maximum Load (lbs):	
Uncorrected Point Load Strength Index (psi):	
Size Correction Factor - F:	
Direction of Load with Respect to Fracture:	
Failure Mode:	
Corrected Point Load Strength Index (psi):	
Corrected Point Load Strength Index (kPa):	
Approximate Compressive Strength (psi):	
NOTES	

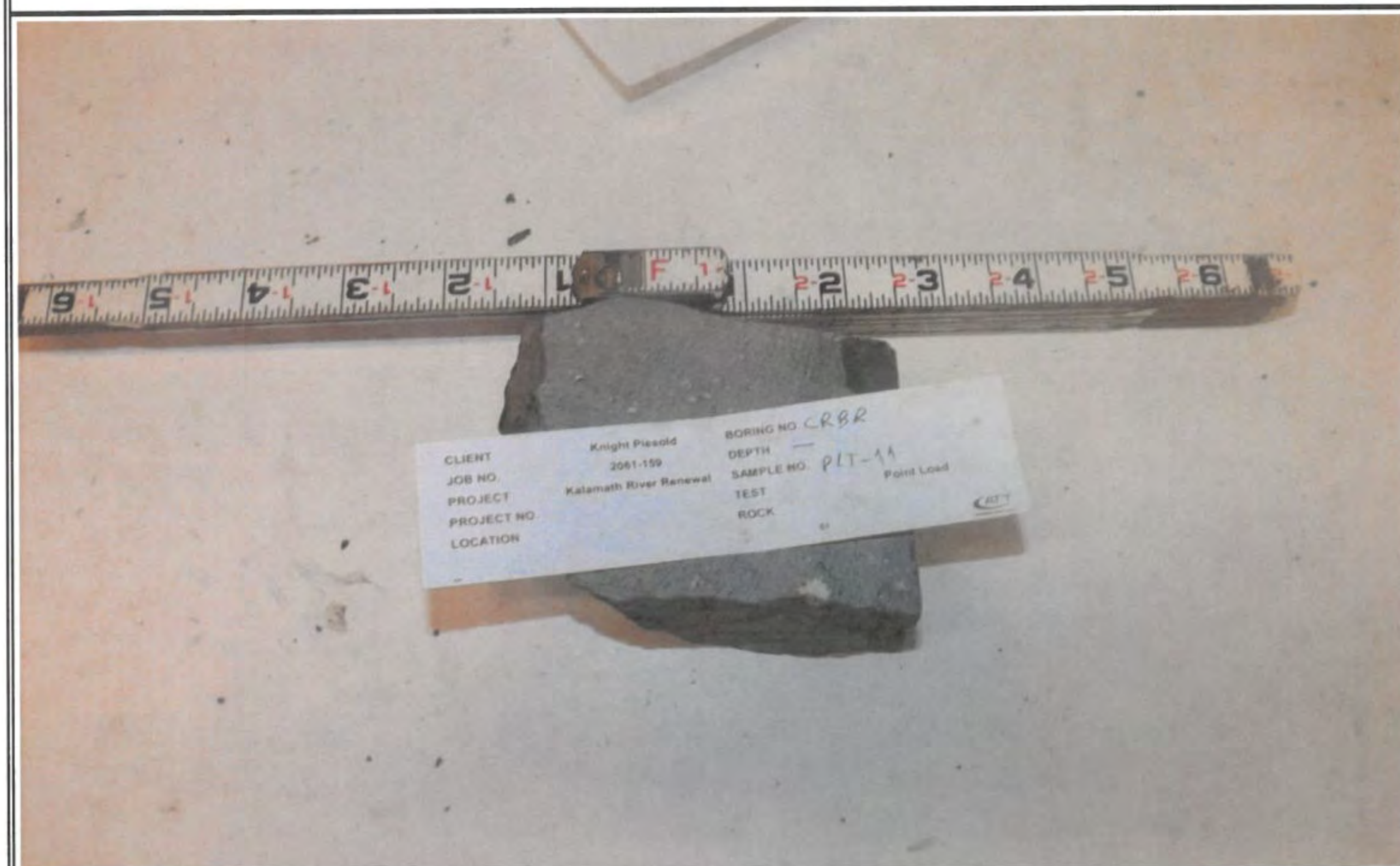
Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	____________	Date:	______________
File name:	2061159__Point Load ASTM D5731_7.xlsm		

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	CRBR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 11
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

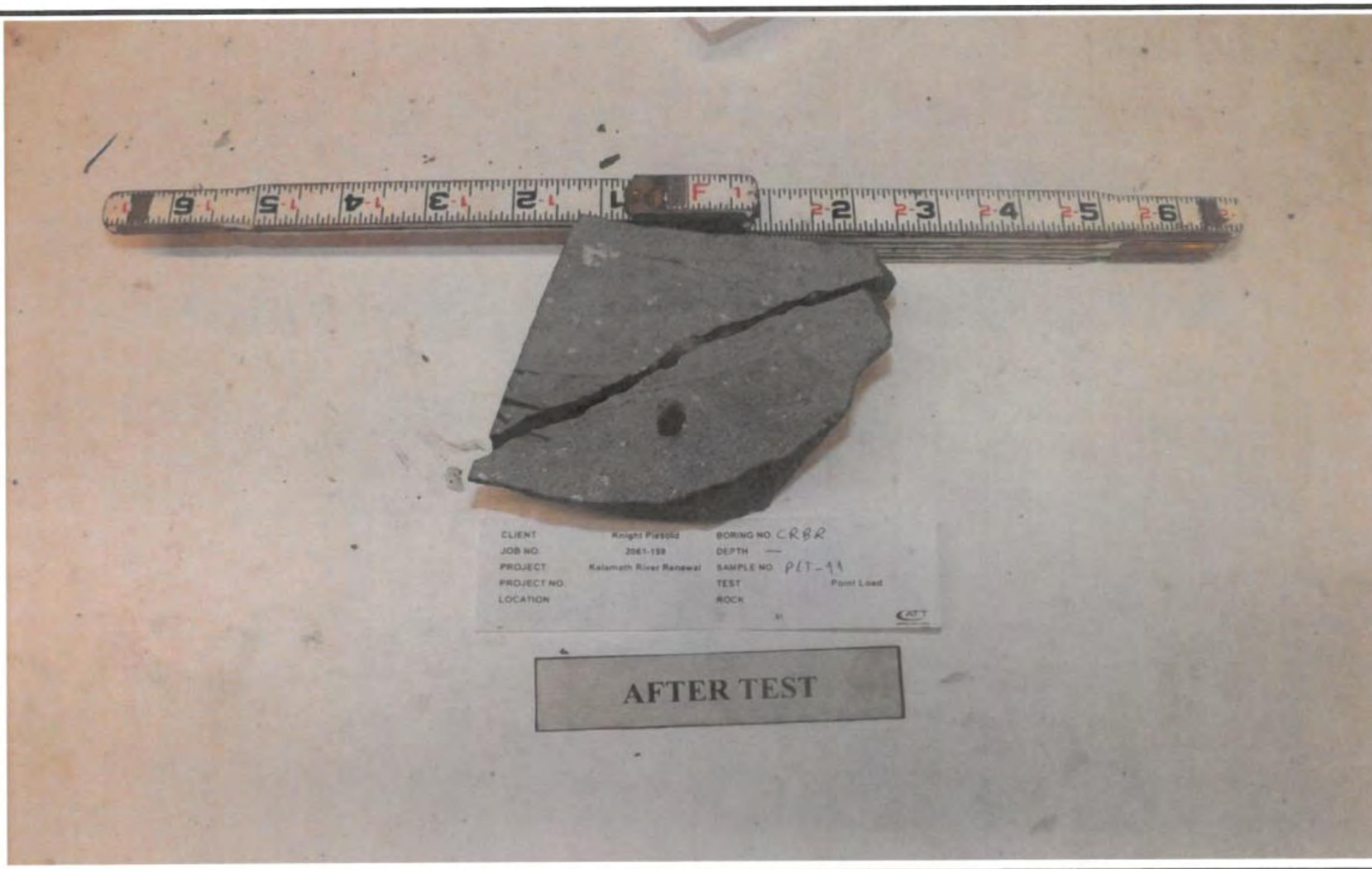
File name: 2061159__Image_20_06_27_16_43_35

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 11
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

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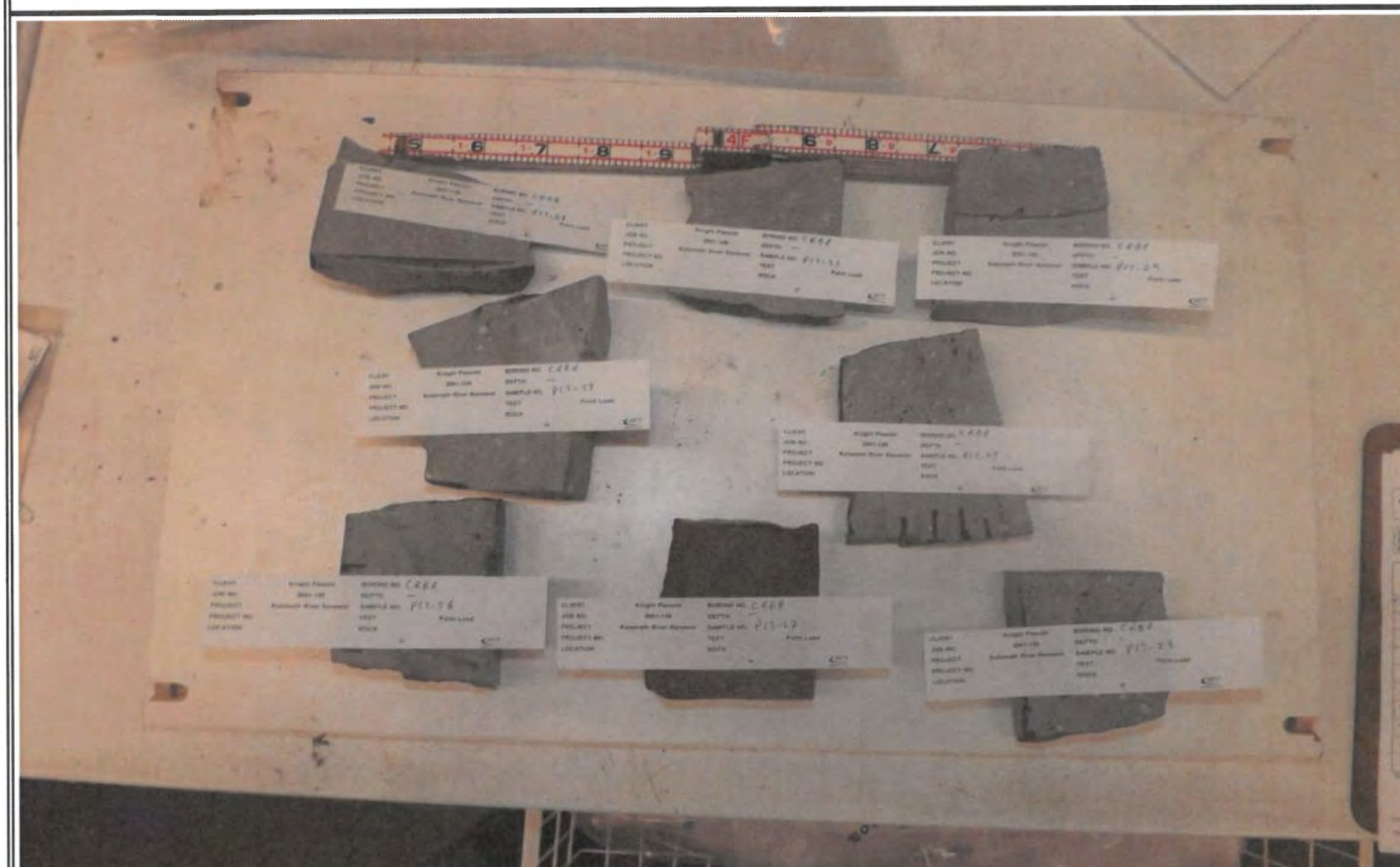
ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	CRBR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22, 23, 24, 25, 26, 27, 28
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

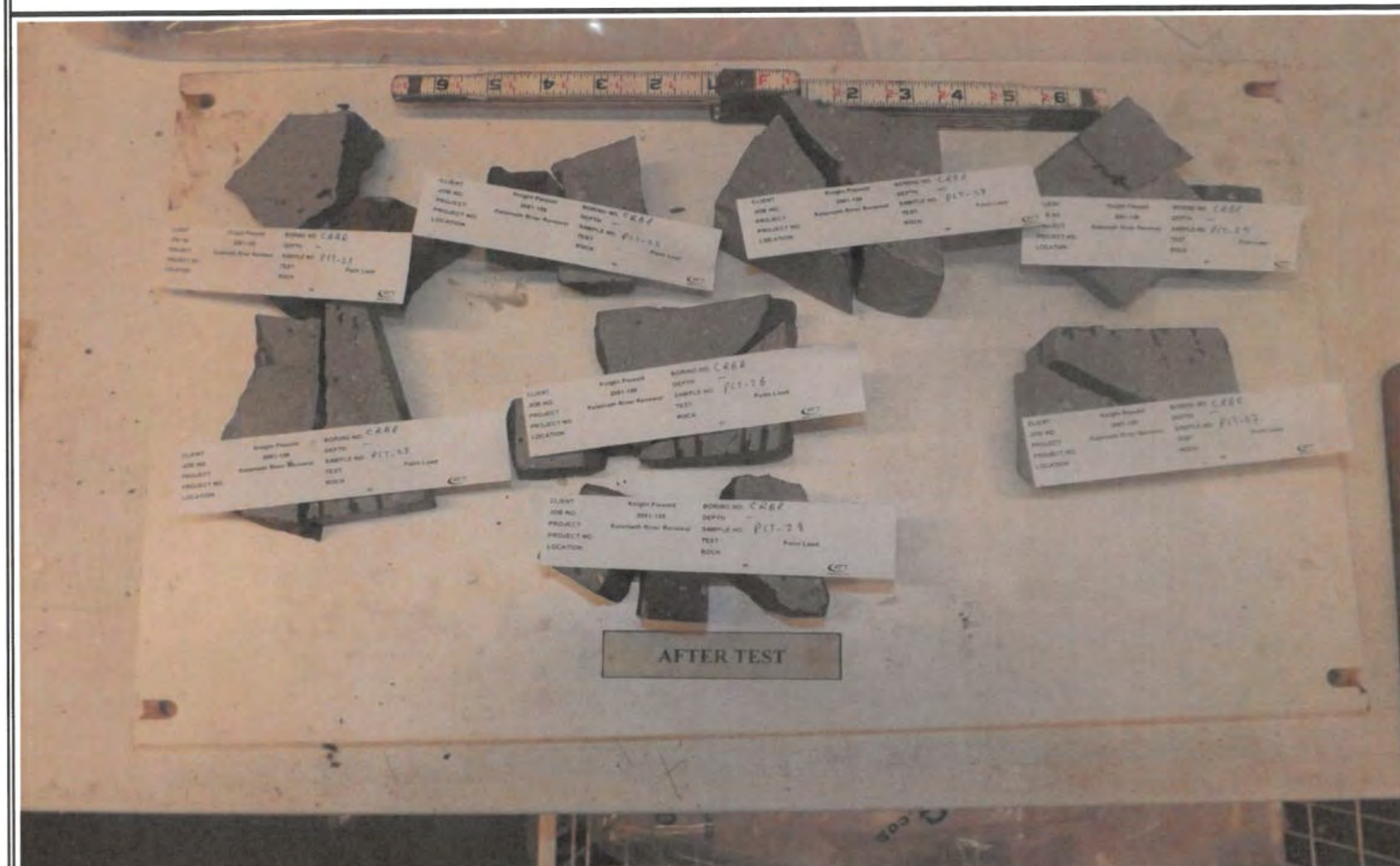
File name: 2061159__Image_20_06_27_16_45_56

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22, 23, 24, 25, 26, 27, 28
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_46_21

ADVANCED TERRA TESTING

PRIVILEGED AND CONFIDENTIAL

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	JCBEP	JCBEP	JCBEP	JCBEP
DEPTH				
SAMPLE NO.	PLT-11	PLT-12	PLT-13	PLT-14
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
ROCK TYPE				
Distance Between Platens (in) - D:	1.950	1.260	1.426	1.919
Minimum Specimen Width (in) - W:	2.683	2.605	2.628	2.568
Equivalent Core Diameter (in²) - De²:	6.661	4.179	4.772	6.275
Minimum Failure Plane Area (in²) - A:	5.232	3.282	3.748	4.928
Maximum Load (lbs):	11126	6821	7431	8073
Uncorrected Point Load Strength Index (psi):	1670.3	1632.1	1557.4	1286.6
Size Correction Factor - F:	1.130	1.017	1.048	1.115
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Normal
Failure Mode:	Combination	Combination	Substance	Substance
Corrected Point Load Strength Index (psi):	**1886.8**	**1660.0**	**1632.1**	**1434.0**
Corrected Point Load Strength Index (kPa):	**13009.0**	**11445.6**	**11252.9**	**9887.1**
Approximate Compressive Strength (psi):	**42887**	**37884**	**37153**	**32587**

BORING NO.	JCBEP	JCBEP	JCBEP	JCBEP
DEPTH				
SAMPLE NO.	PLT-21	PLT-22	PLT-23	PLT-24
DATE SAMPLED				
DATE TESTED	06/26/20	06/26/20	06/26/20	06/26/20
TECHNICIAN	HN	HN	HN	HN
DESCRIPTION				
Distance Between Platens (in) - D:	0.902	0.998	0.916	0.856
Minimum Specimen Width (in) - W:	2.090	2.085	2.635	2.115
Equivalent Core Diameter (in²) - De²:	2.400	2.649	3.073	2.305
Minimum Failure Plane Area (in²) - A:	1.885	2.081	2.414	1.810
Maximum Load (lbs):	4560	4571	4099	2894
Uncorrected Point Load Strength Index (psi):	1899.9	1725.1	1333.7	1255.4
Size Correction Factor - F:	0.898	0.918	0.949	0.890
Direction of Load with Respect to Fracture:	Normal	Normal	Normal	Parallel
Failure Mode:	Combination	Combination	Substance	Fracture
Corrected Point Load Strength Index (psi):	**1705.8**	**1583.7**	**1265.9**	**1116.9**
Corrected Point Load Strength Index (kPa):	**11760.9**	**10919.1**	**8728.0**	**7701.0**
Approximate Compressive Strength (psi):	**39781**	**36743**	**29173**	**26108**
NOTES				

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Point Load ASTM D5731_8.xlsm		

ADVANCED TERRA TESTING

PRIVILEGED AND CONFIDENTIAL

Point Load Strength Index

ASTM D5731 (Block / Irregular Shape)

CLIENT	Knight Piesold	JOB NO.	2061-159
PROJECT	Kalamath River Renewal Project	LOCATION	--
PROJECT NO.	--		

BORING NO.	JCBEP	JCBEP
DEPTH		
SAMPLE NO.	PLT-31	PLT-32
DATE SAMPLED		
DATE TESTED	06/26/20	06/26/20
TECHNICIAN	HN	HN
ROCK TYPE		
Distance Between Platens (in) - D:	0.906	0.901
Minimum Specimen Width (in) - W:	2.090	2.512
Equivalent Core Diameter (in²) - De²:	2.411	2.882
Minimum Failure Plane Area (in²) - A:	1.894	2.263
Maximum Load (lbs):	890	3064
Uncorrected Point Load Strength Index (psi):	369.2	1063.1
Size Correction Factor - F:	0.899	0.936
Direction of Load with Respect to Fracture:	Parallel	Normal
Failure Mode:	Fracture	Combination
Corrected Point Load Strength Index (psi):	**331.8**	**994.6**
Corrected Point Load Strength Index (kPa):	**2287.7**	**6857.4**
Approximate Compressive Strength (psi):	**7736**	**22984**

BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
DESCRIPTION	
Distance Between Platens (in) - D:	
Minimum Specimen Width (in) - W:	
Equivalent Core Diameter (in²) - De²:	
Minimum Failure Plane Area (in²) - A:	
Maximum Load (lbs):	
Uncorrected Point Load Strength Index (psi):	
Size Correction Factor - F:	
Direction of Load with Respect to Fracture:	
Failure Mode:	
Corrected Point Load Strength Index (psi):	
Corrected Point Load Strength Index (kPa):	
Approximate Compressive Strength (psi):	
NOTES	

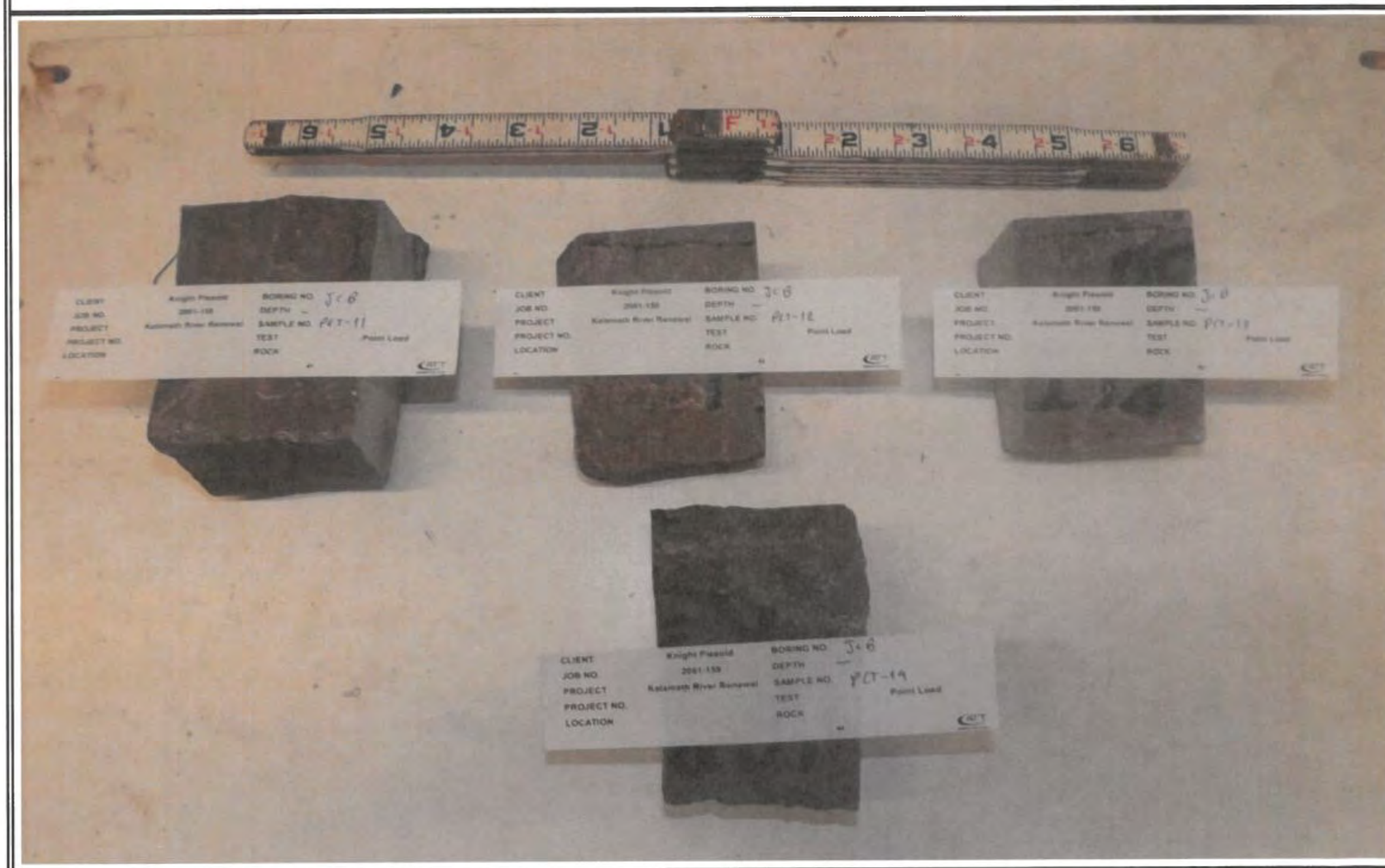
Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Point Load ASTM D5731_9.xlsm		

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

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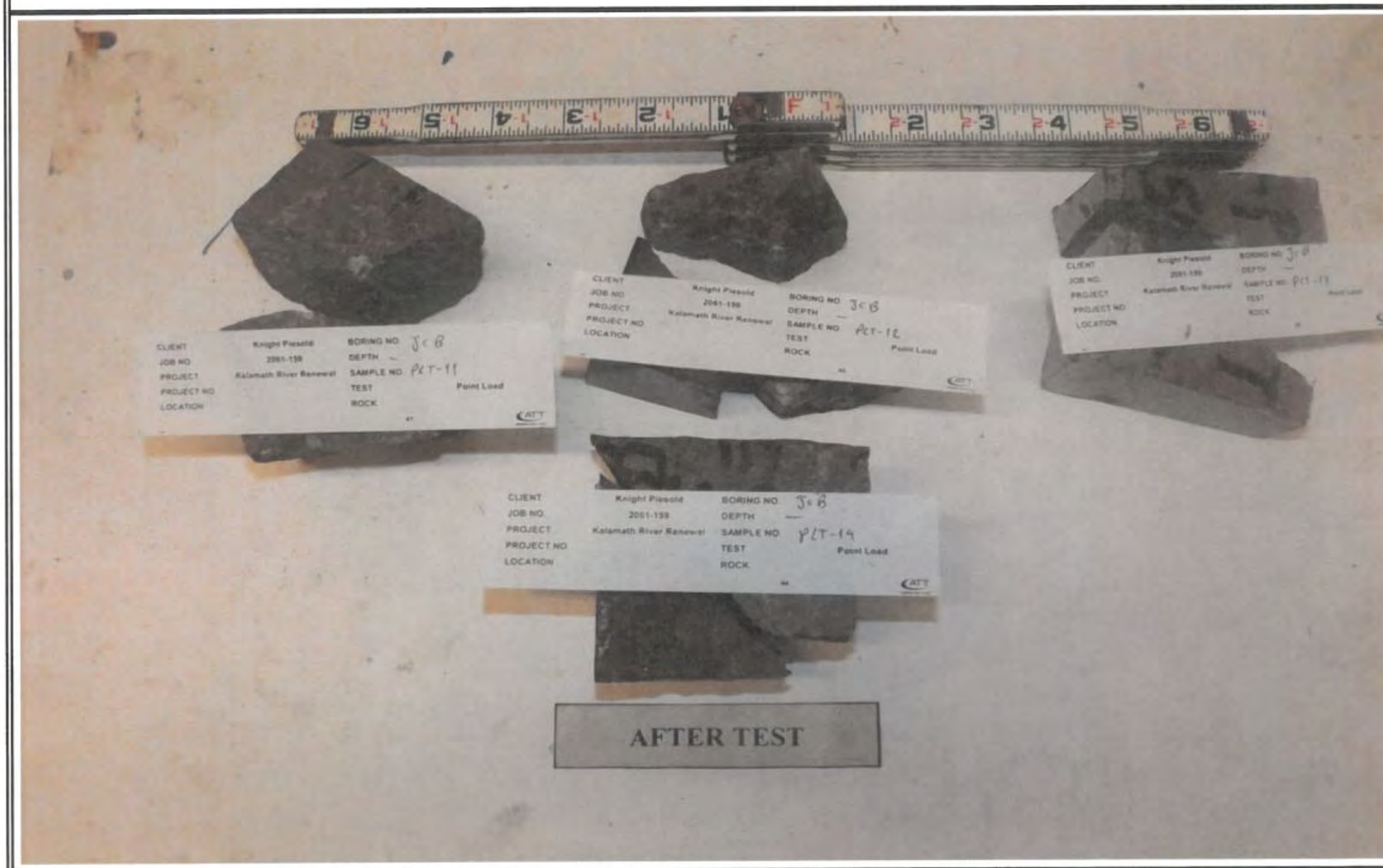
ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-11, 12, 13, 14
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

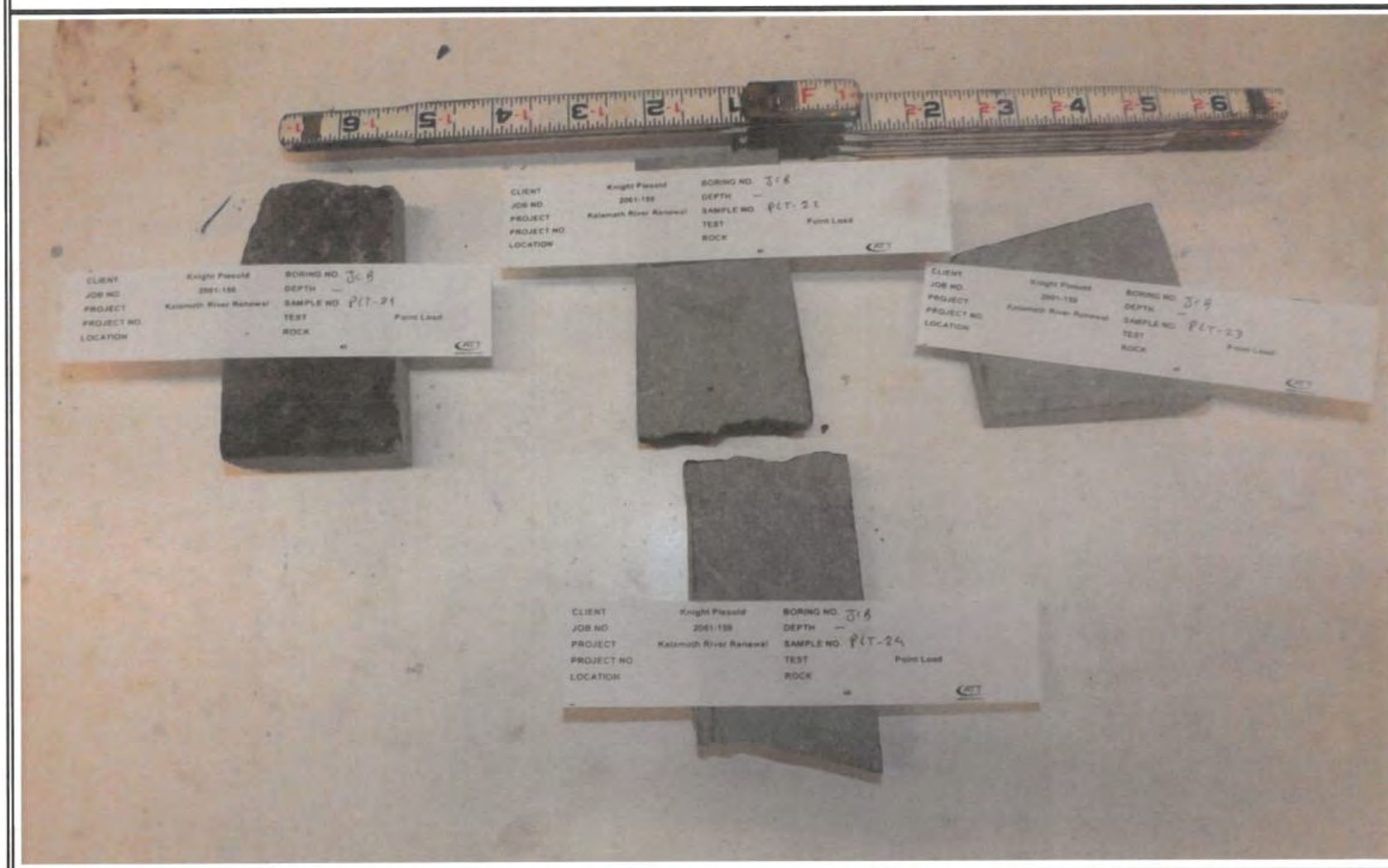
File name: 2061159__Image_20_06_27_16_38_55

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22, 23, 24
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

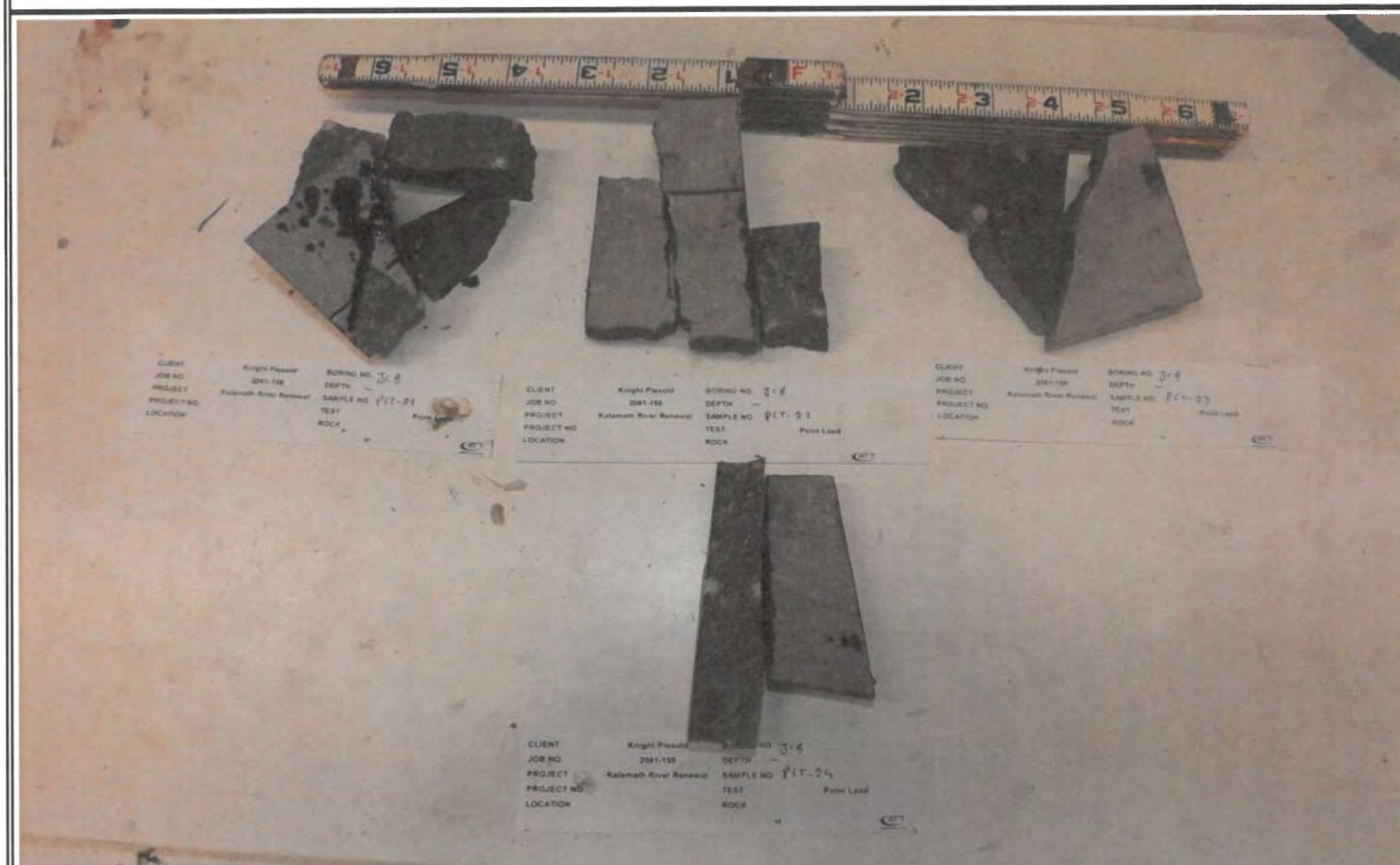
File name: 2061159__Image_20_06_27_16_41_00

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 21, 22, 23, 24
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

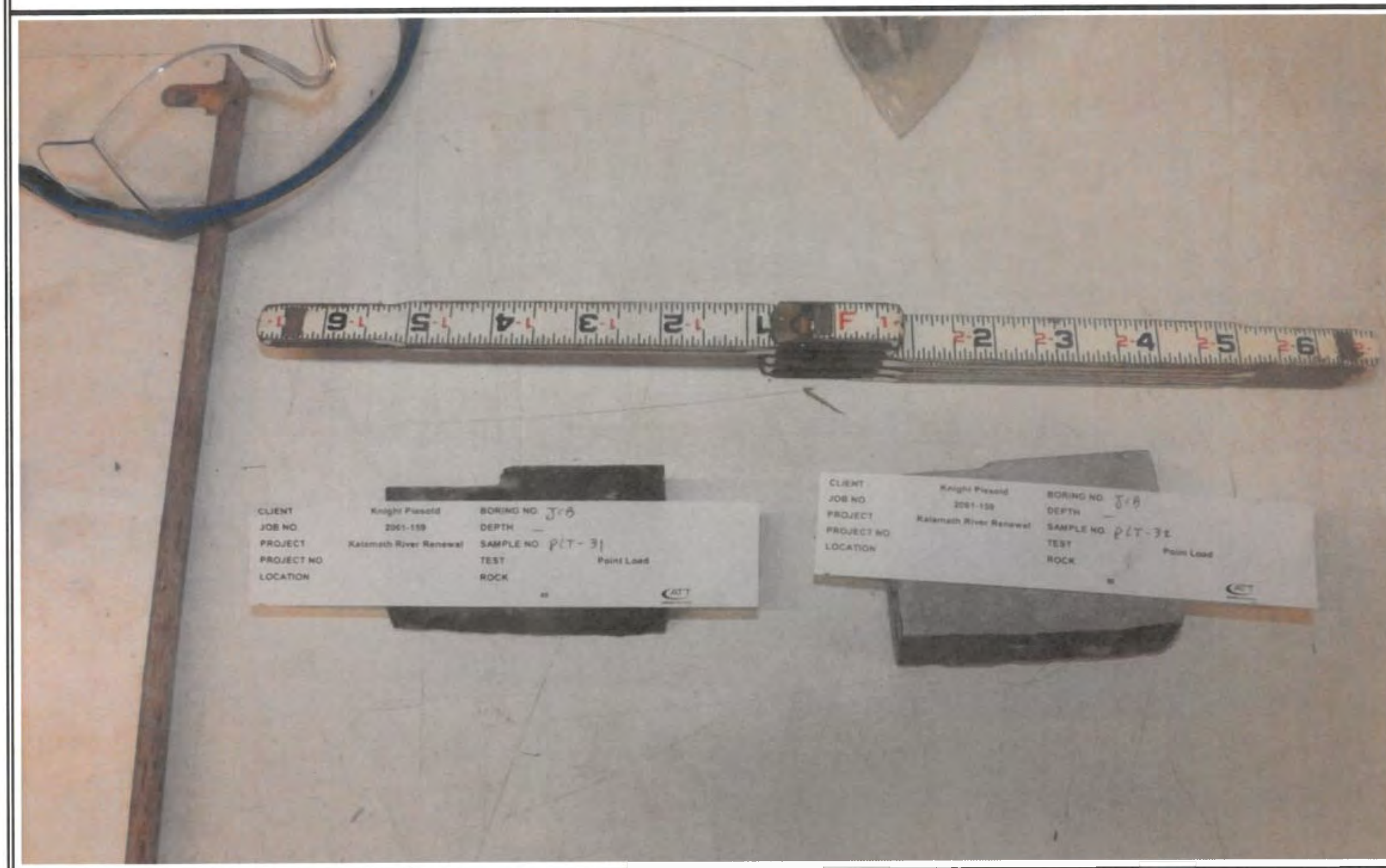
File name: 2061159__Image_20_06_27_16_41_28

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 31, 32
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_42_13

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT- 31, 32
PROJECT NO.	--	TEST TYPE	Point Load
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061159__Image_20_06_27_16_42_33

Knight Piésold CONSULTING

APPENDIX D2

Micro-Deval and Magnesium Sulphate Soundness Results

(Pages D2-1 to D2-73)

ADVANCED TERRA TESTING

Specific Gravity of Rock
ASTM D6473

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	--
PROJECT	--	SAMPLE NO.	--
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	HN/BF		
TECHNICIAN	44029		

Test Data

Sample ID:	A	B	C	D	E
Mass of Saturated Surface Dry Sample (g):	2637.0	2775.1	2506.3	1027.1	3139.3
Mass of Dry Sample (g):	2626.3	2763.5	2461.8	1014.5	3127.8
Apparent Mass of Sample in Water (g):	1638.5	1725.3	1557.5	642.8	1952.3
Specific Gravity Oven Dry Basis:	2.630	2.632	2.595	2.640	2.635
Specific Gravity Saturated Surface Dry Basis:	2.641	2.643	2.642	2.673	2.645
Apparent Specific Gravity:	2.659	2.662	2.722	2.729	2.661
Density (lbs/ft³):	164.1	164.3	161.9	164.7	164.4
Density (kg/m³):	2629	2631	2593	2639	2634
Apparent Density (lbs/ft³):	165.9	166.1	169.9	170.3	166.0
Apparent Density (kg/m³):	2657	2660	2721	2728	2659
Absorption (%)	0.41	0.42	1.81	1.24	0.37
Apparent Specific Gravity at 20°C:	2.657	2.660	2.721	2.728	2.659

Data Summary

Average Specific Gravity Oven Dry Basis:	**2.626**
Average Specific Gravity Saturated Surface Dry Basis:	**2.649**
Average Apparent Specific Gravity:	**2.687**
Average Density (lbs/ft³):	**163.9**
Average Density (kg/m³):	**2625**
Average Apparent Density (lbs/ft³):	**167.6**
Average Apparent Density (kg/m³):	**2685**
Average Absorption (%)	**0.85**
Average Apparent Specific Gravity at 20°C:	**2.685**

NOTES

Data entry by:	BFUTCH	Date:	7/17/2020
Checked by:	HN	Date:	7/20/2020
File name:	2061160__Rock Specific Gravity ASTM D6473_0.xlsm		

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_12_10_59

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_12_11_45

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_12_12_18

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

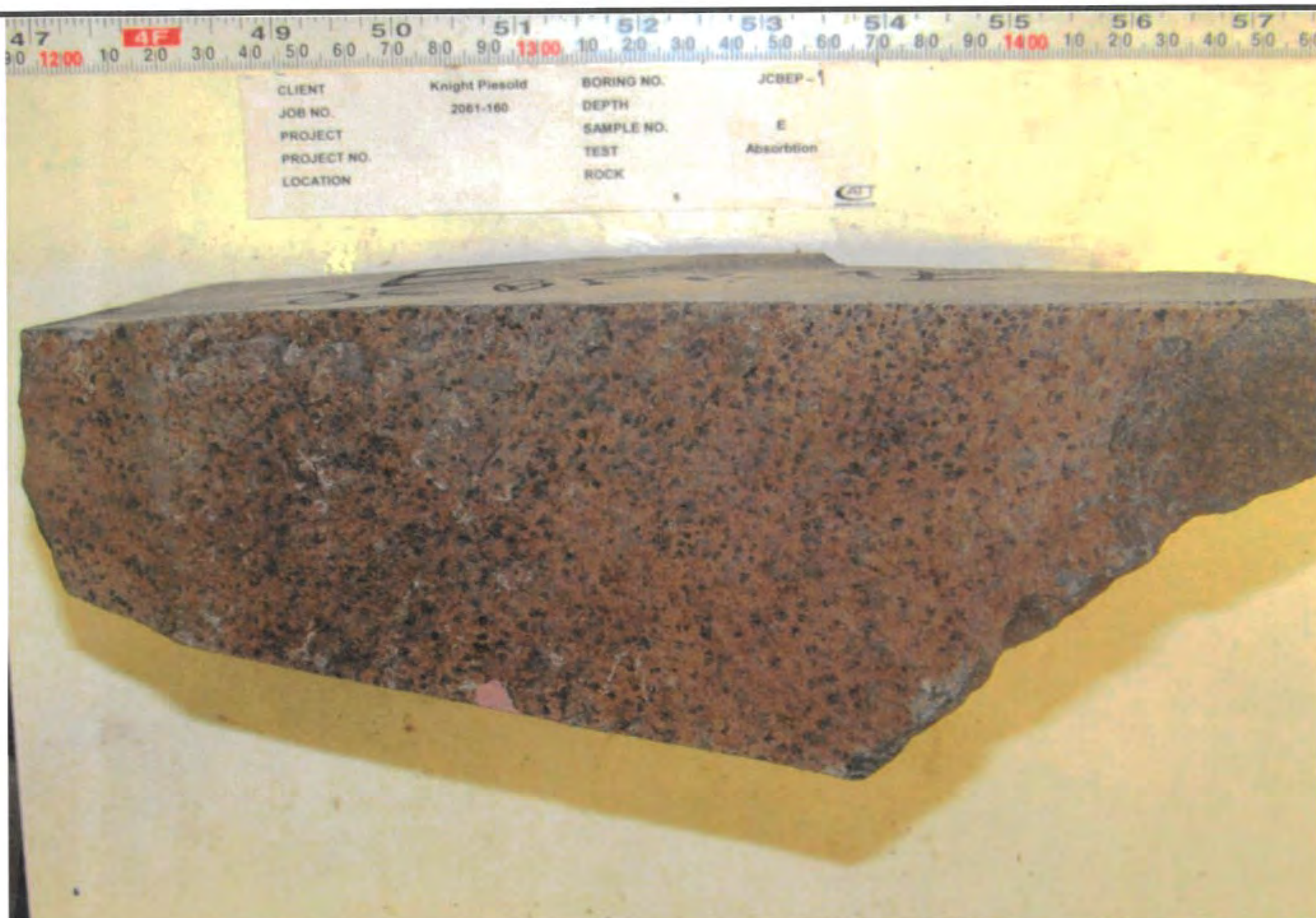
File name: 2061160__Image_20_07_16_12_13_09

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	E
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_16_12_13_48

Image Attachment

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES	

File name: 2061160__Image_20_07_17_13_18_34

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_19_30

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_21_01

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

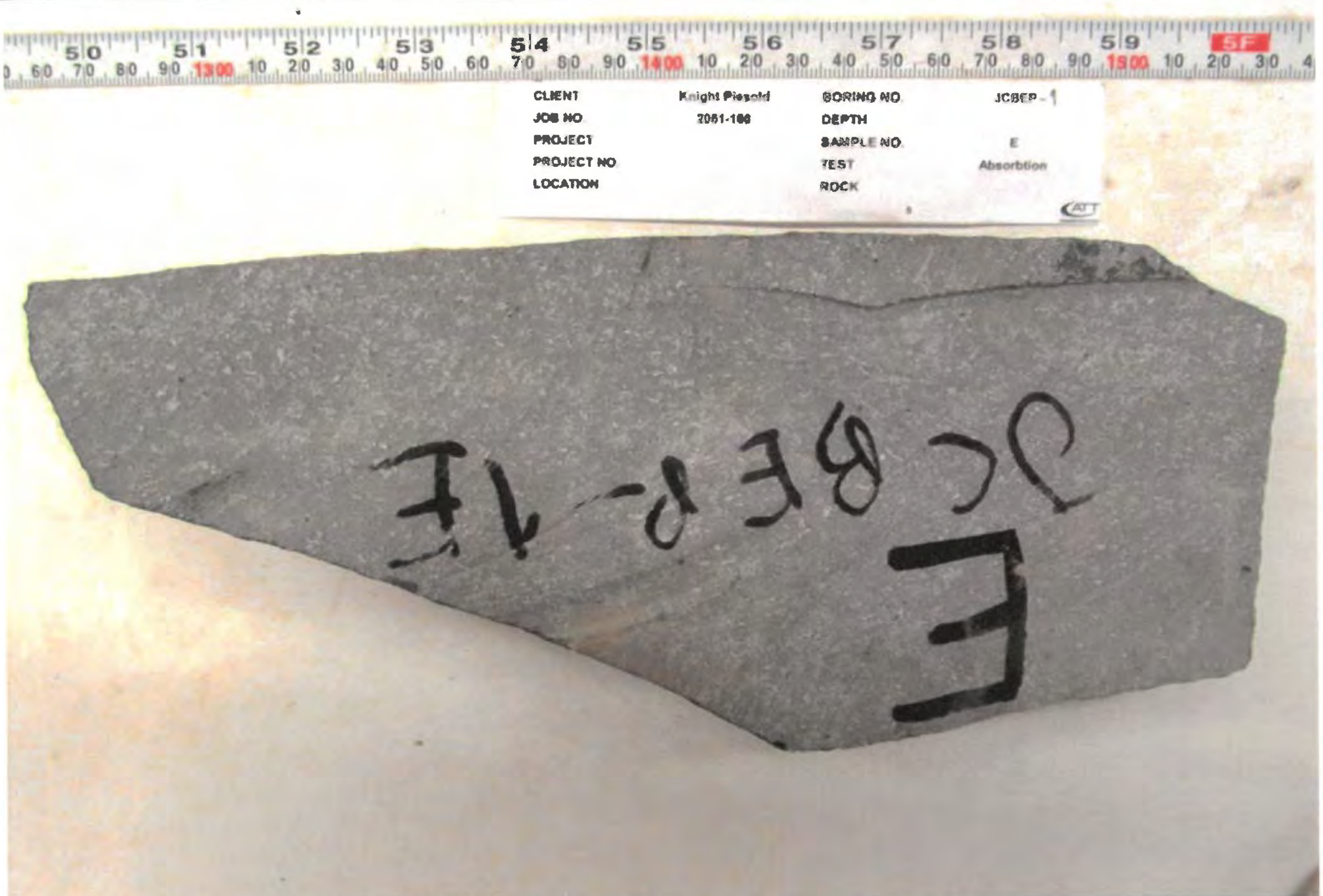
File name: 2061160__Image_20_07_17_13_20_04

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	E
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_17_13_20_39

ADVANCED TERRA TESTING

Specific Gravity of Rock
ASTM D6473

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	--
PROJECT	--	SAMPLE NO.	--
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	HN/BF		
TECHNICIAN	44029		

Test Data

Sample ID:	A	B	C	D	E
Mass of Saturated Surface Dry Sample (g):	3099.5	3598.9	1111.3	3685.4	1249.8
Mass of Dry Sample (g):	3071.5	3562.0	1107.0	3670.0	1241.0
Apparent Mass of Sample in Water (g):	2001.2	2316.7	709.5	2336.1	802.9
Specific Gravity Oven Dry Basis:	2.797	2.778	2.755	2.720	2.777
Specific Gravity Saturated Surface Dry Basis:	2.822	2.807	2.766	2.731	2.797
Apparent Specific Gravity:	2.870	2.860	2.785	2.751	2.833
Density (lbs/ft³):	174.5	173.3	171.9	169.7	173.3
Density (kg/m³):	2795	2777	2754	2719	2776
Apparent Density (lbs/ft³):	179.1	178.5	173.8	171.7	176.8
Apparent Density (kg/m³):	2868	2859	2784	2750	2831
Absorption (%)	0.91	1.04	0.39	0.42	0.71
Apparent Specific Gravity at 20°C:	2.868	2.858	2.783	2.749	2.831

Data Summary

Average Specific Gravity Oven Dry Basis:	**2.765**
Average Specific Gravity Saturated Surface Dry Basis:	**2.785**
Average Apparent Specific Gravity:	**2.820**
Average Density (lbs/ft³):	**172.6**
Average Density (kg/m³):	**2764**
Average Apparent Density (lbs/ft³):	**176.0**
Average Apparent Density (kg/m³):	**2818**
Average Absorption (%)	**0.69**
Average Apparent Specific Gravity at 20°C:	**2.818**

NOTES

Data entry by:	BFUTCH	Date:	7/17/2020
Checked by:	HN	Date:	7/20/2020
File name:	2061160__Rock Specific Gravity ASTM D6473_1.xlsm		

Image Attachment

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_25_15

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_27_14

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_27_49

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_29_00

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_27_34

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_34_10

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_34_48

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_35_14

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	CRBR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	E
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_14_52_57

ADVANCED TERRA TESTING

Specific Gravity of Rock
ASTM D6473

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	--
PROJECT	--	SAMPLE NO.	--
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	HN/BF		
TECHNICIAN	44029		

Test Data

Sample ID:	A	B	C	D	E
Mass of Saturated Surface Dry Sample (g):	3511.0	3708.5	2019.8	2991.0	1766.6
Mass of Dry Sample (g):	3506.2	3681.6	1977.2	2975.8	1755.4
Apparent Mass of Sample in Water (g):	2263.8	2387.7	1273.8	1927.7	1138.8
Specific Gravity Oven Dry Basis:	2.811	2.787	2.650	2.799	2.796
Specific Gravity Saturated Surface Dry Basis:	2.815	2.808	2.708	2.813	2.814
Apparent Specific Gravity:	2.822	2.845	2.811	2.839	2.847
Density (lbs/ft³):	175.4	173.9	165.4	174.6	174.5
Density (kg/m³):	2810	2786	2649	2797	2795
Apparent Density (lbs/ft³):	176.1	177.5	175.4	177.2	177.6
Apparent Density (kg/m³):	2821	2844	2810	2838	2845
Absorption (%)	0.14	0.73	2.15	0.51	0.64
Apparent Specific Gravity at 20°C:	2.820	2.843	2.809	2.837	2.845

Data Summary

Average Specific Gravity Oven Dry Basis:	**2.769**
Average Specific Gravity Saturated Surface Dry Basis:	**2.791**
Average Apparent Specific Gravity:	**2.833**
Average Density (lbs/ft³):	**172.8**
Average Density (kg/m³):	**2767**
Average Apparent Density (lbs/ft³):	**176.8**
Average Apparent Density (kg/m³):	**2831**
Average Absorption (%)	**0.83**
Average Apparent Specific Gravity at 20°C:	**2.831**

NOTES

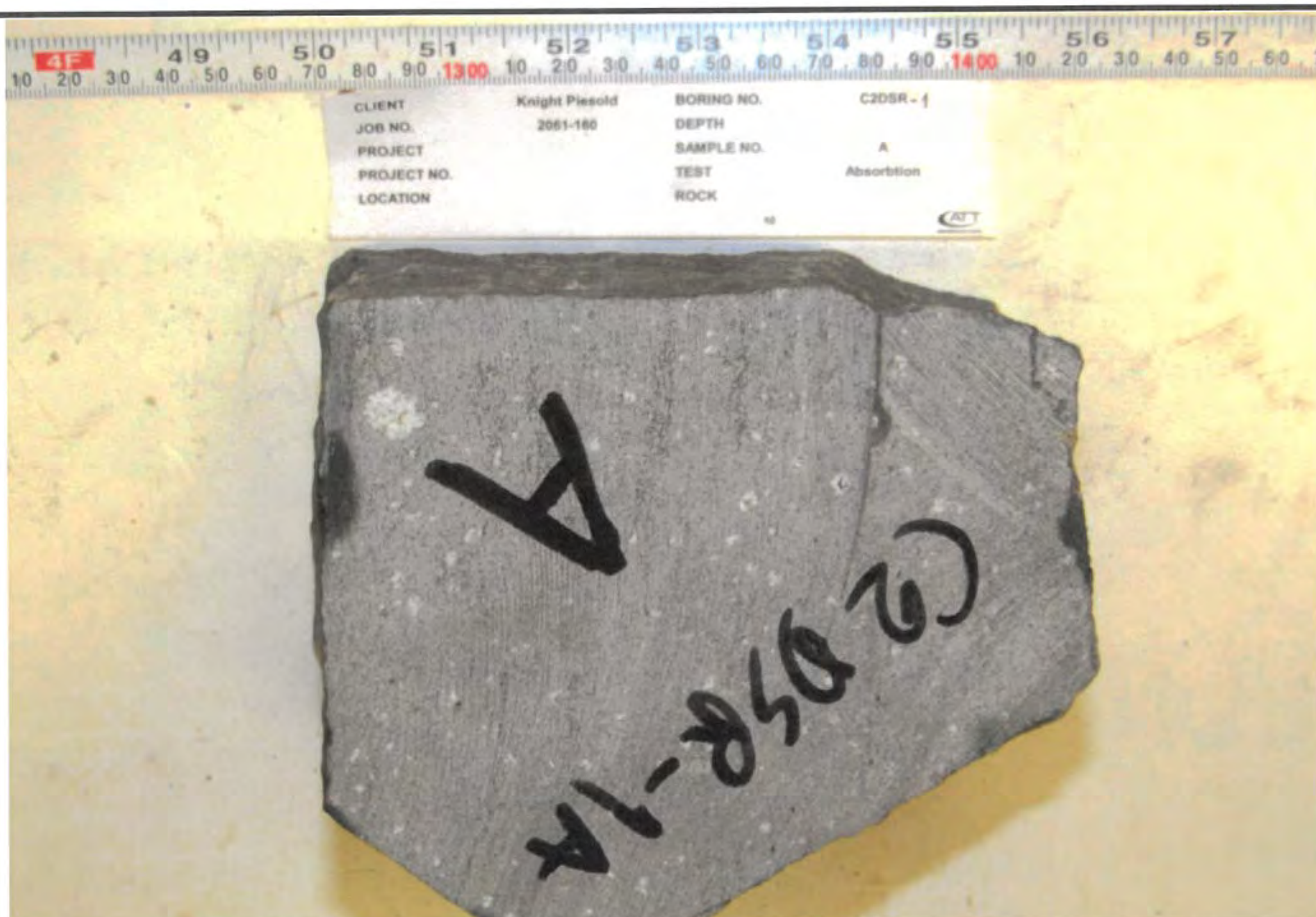
Data entry by:	BFUTCH	Date:	7/17/2020
Checked by:	HN	Date:	7/20/20
File name:	2061160__Rock Specific Gravity ASTM D6473_2.xlsm		

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

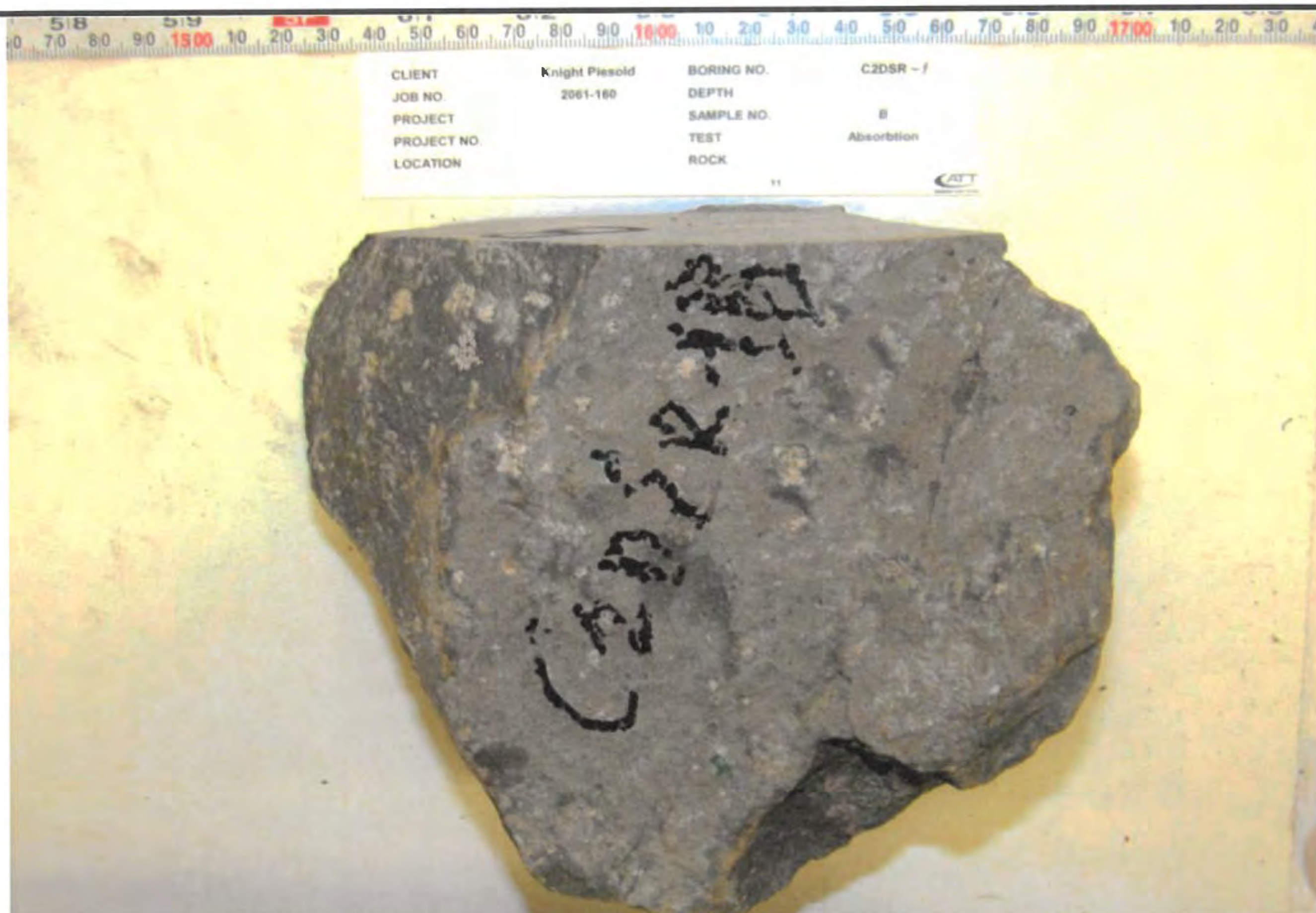
File name: 2061160__Image_20_07_16_12_05_50

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



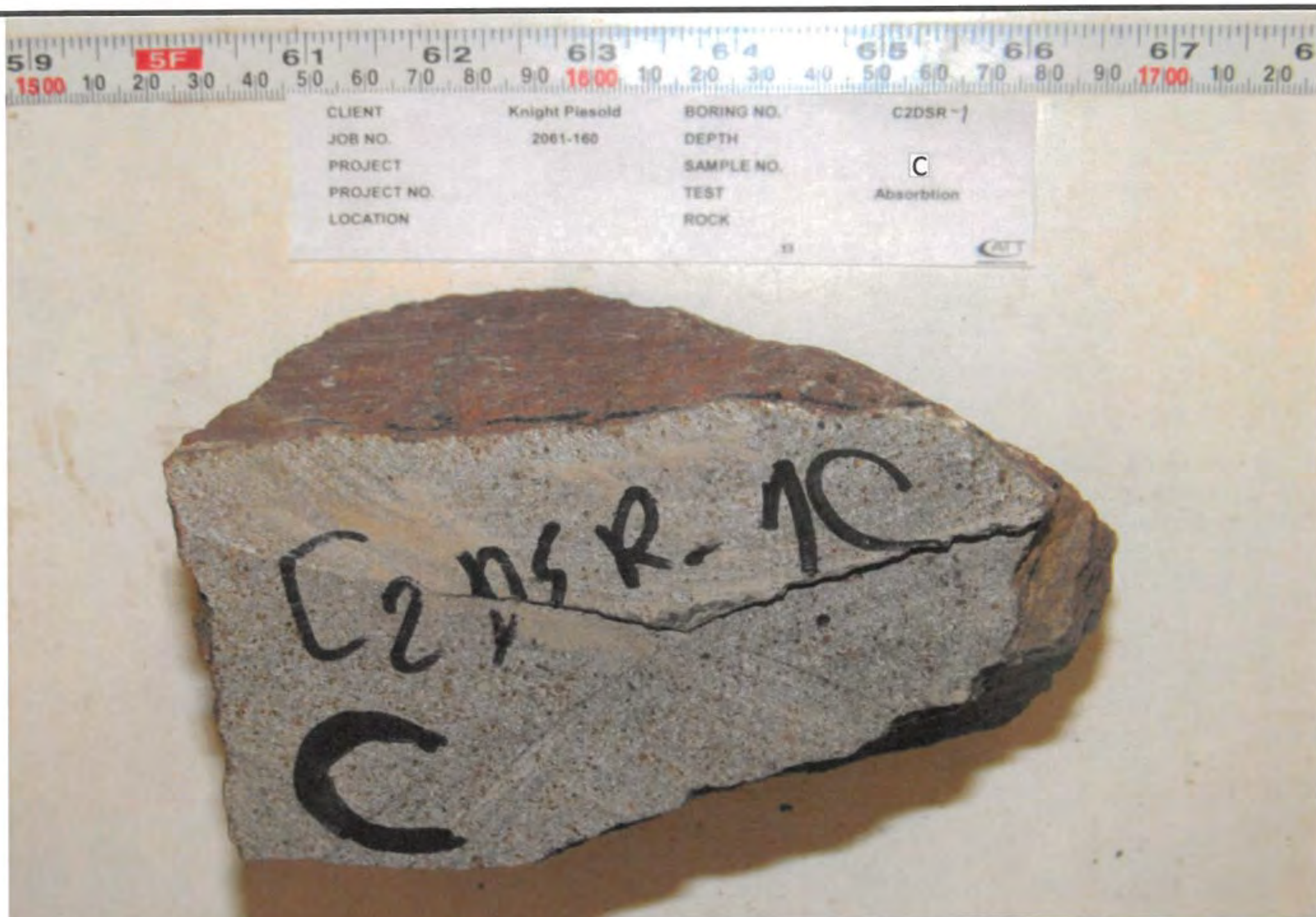
NOTES

File name: 2061160__Image_20_07_16_12_06_19

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_16_12_09_55

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

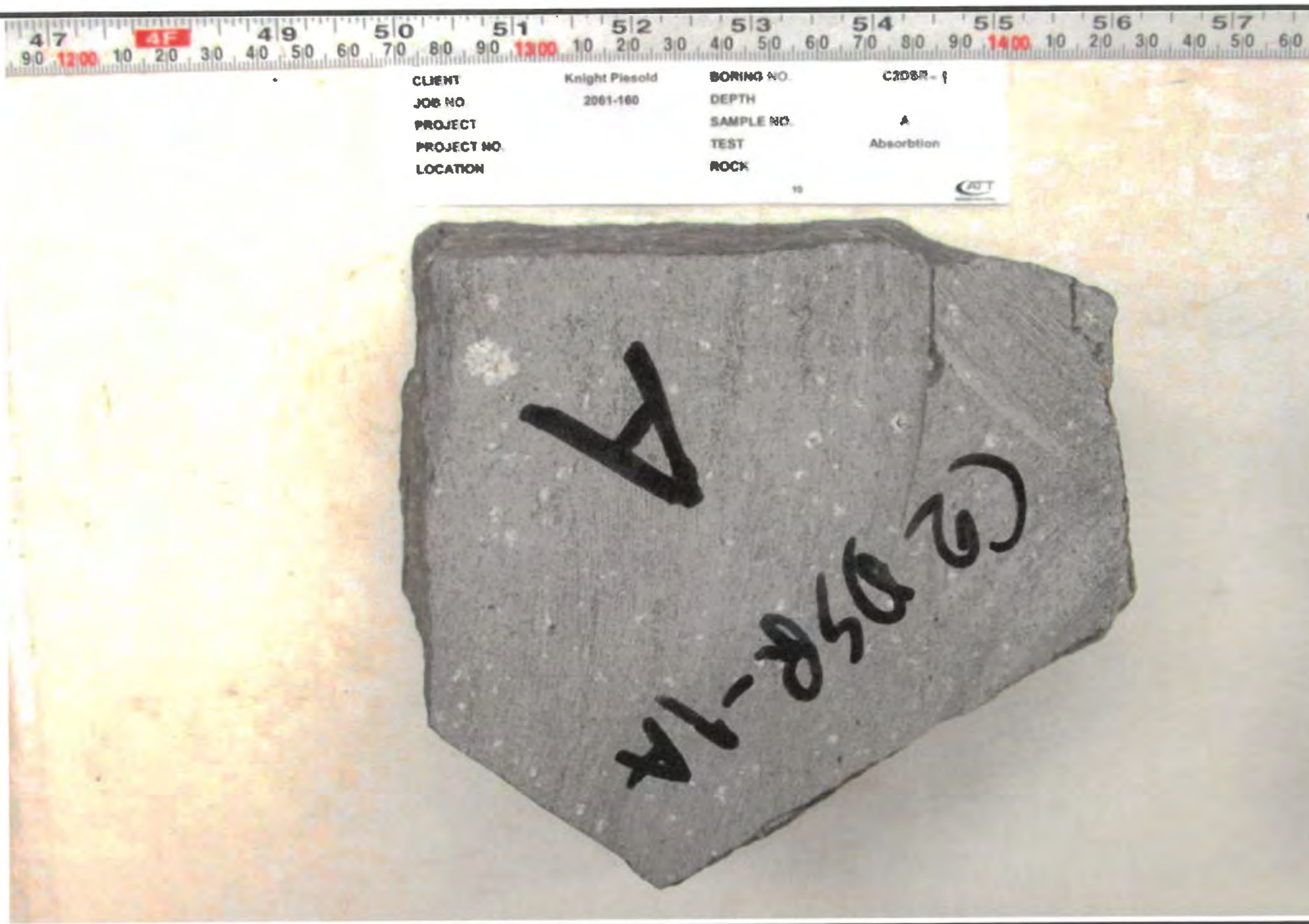
CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_12_08_04

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

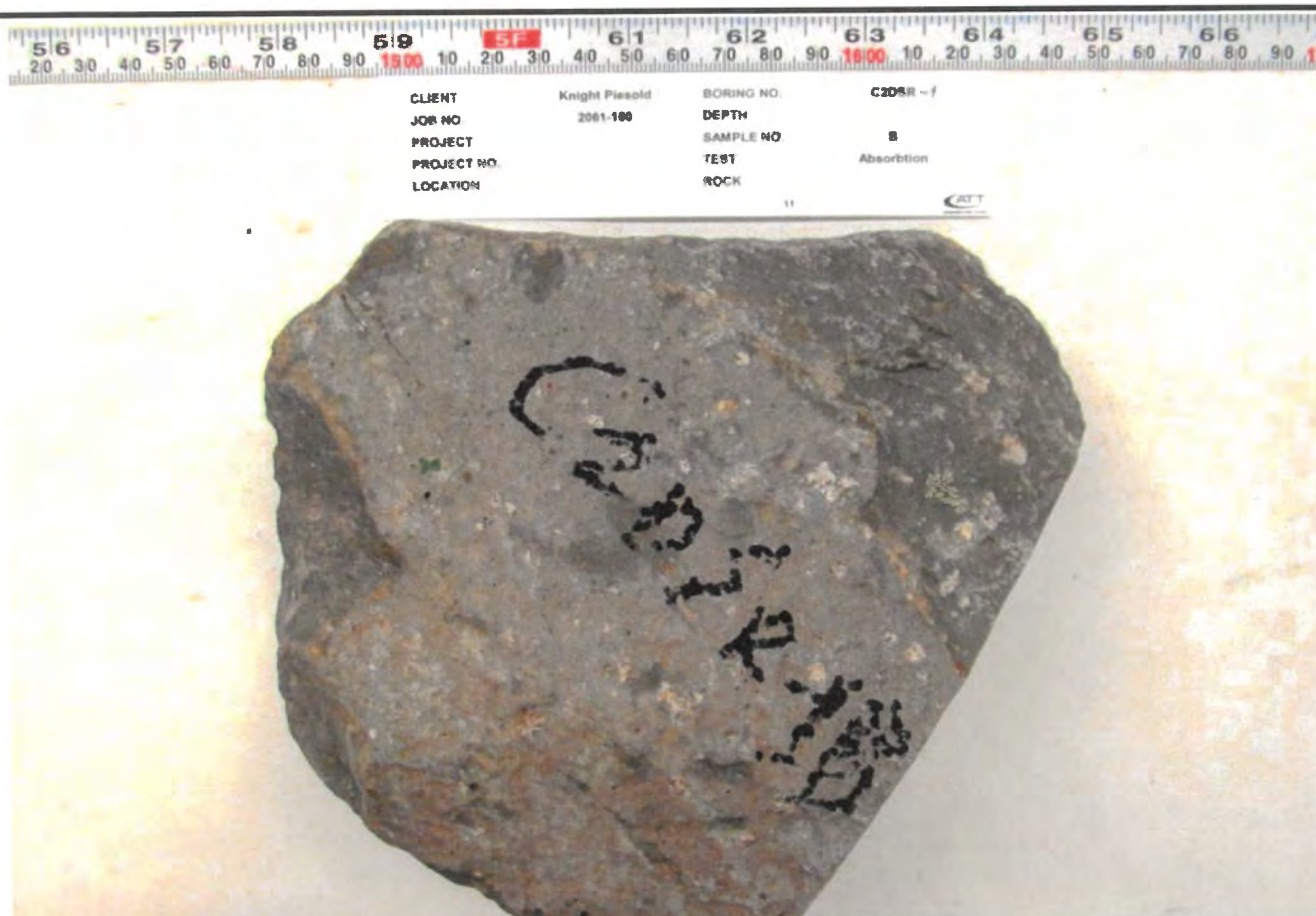
File name: 2061160__Image_20_07_17_13_39_26

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_17_13_39_53

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ATT
ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_40_25

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_41_19

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	E
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_14_54_03

PRIVILEGED AND CONFIDENTIAL

Specific Gravity of Rock
ASTM D6473

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	--
PROJECT	--	SAMPLE NO.	--
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	HN/BF		
TECHNICIAN	44029		

Test Data

Sample ID:	A	B	C	D	E
Mass of Saturated Surface Dry Sample (g):	3324.0	3406.1	2014.0	3773.0	1218.2
Mass of Dry Sample (g):	3300.7	3353.5	1989.4	3746.3	1184.3
Apparent Mass of Sample in Water (g):	2120.6	2153.7	1280.5	2398.9	742.8
Specific Gravity Oven Dry Basis:	2.743	2.678	2.712	2.726	2.491
Specific Gravity Saturated Surface Dry Basis:	2.762	2.720	2.746	2.746	2.562
Apparent Specific Gravity:	2.797	2.795	2.806	2.780	2.682
Density (lbs/ft³):	171.2	167.1	169.2	170.1	155.4
Density (kg/m³):	2741	2676	2711	2725	2490
Apparent Density (lbs/ft³):	174.5	174.4	175.1	173.5	167.4
Apparent Density (kg/m³):	2796	2794	2805	2779	2681
Absorption (%)	0.71	1.57	1.24	0.71	2.86
Apparent Specific Gravity at 20°C:	2.795	2.793	2.804	2.779	2.681

Data Summary

Average Specific Gravity Oven Dry Basis:	**2.670**
Average Specific Gravity Saturated Surface Dry Basis:	**2.707**
Average Apparent Specific Gravity:	**2.772**
Average Density (lbs/ft³):	**166.6**
Average Density (kg/m³):	**2669**
Average Apparent Density (lbs/ft³):	**173.0**
Average Apparent Density (kg/m³):	**2771**
Average Absorption (%)	**1.42**
Average Apparent Specific Gravity at 20°C:	**2.770**

NOTES

Data entry by:	BFUTCH	Date:	7/17/2020
Checked by:	HN	Date:	7/22/20
File name:	2061160__Rock Specific Gravity ASTM D6473_3.xlsm		

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_14_38

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_20_21

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_21_52

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_24_13

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_43_38

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_44_13

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_44_45

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_45_29

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	C2LB-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	E
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_14_54_47

ADVANCED TERRA TESTING

Specific Gravity of Rock
ASTM D6473

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	--
PROJECT	--	SAMPLE NO.	--
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	HN/BF		
TECHNICIAN	44029		

Test Data

Sample ID:	A	B	C	D	E
Mass of Saturated Surface Dry Sample (g):	3594.9	2858.3	3806.4	3258.6	1392.6
Mass of Dry Sample (g):	3586.1	2851.5	3794.8	3252.0	1386.7
Apparent Mass of Sample in Water (g):	2308.5	1832.7	2437.7	2091.6	891.0
Specific Gravity Oven Dry Basis:	2.788	2.780	2.773	2.787	2.765
Specific Gravity Saturated Surface Dry Basis:	2.795	2.787	2.781	2.792	2.776
Apparent Specific Gravity:	2.807	2.799	2.796	2.802	2.797
Density (lbs/ft³):	174.0	173.5	173.0	173.9	172.5
Density (kg/m³):	2786	2779	2771	2785	2763
Apparent Density (lbs/ft³):	175.2	174.7	174.5	174.9	174.6
Apparent Density (kg/m³):	2806	2797	2795	2801	2796
Absorption (%)	0.25	0.24	0.31	0.20	0.43
Apparent Specific Gravity at 20°C:	2.805	2.797	2.794	2.801	2.796

Data Summary

Average Specific Gravity Oven Dry Basis:	**2.778**
Average Specific Gravity Saturated Surface Dry Basis:	**2.786**
Average Apparent Specific Gravity:	**2.800**
Average Density (lbs/ft³):	**173.4**
Average Density (kg/m³):	**2777**
Average Apparent Density (lbs/ft³):	**174.7**
Average Apparent Density (kg/m³):	**2799**
Average Absorption (%)	**0.28**
Average Apparent Specific Gravity at 20°C:	**2.799**

NOTES

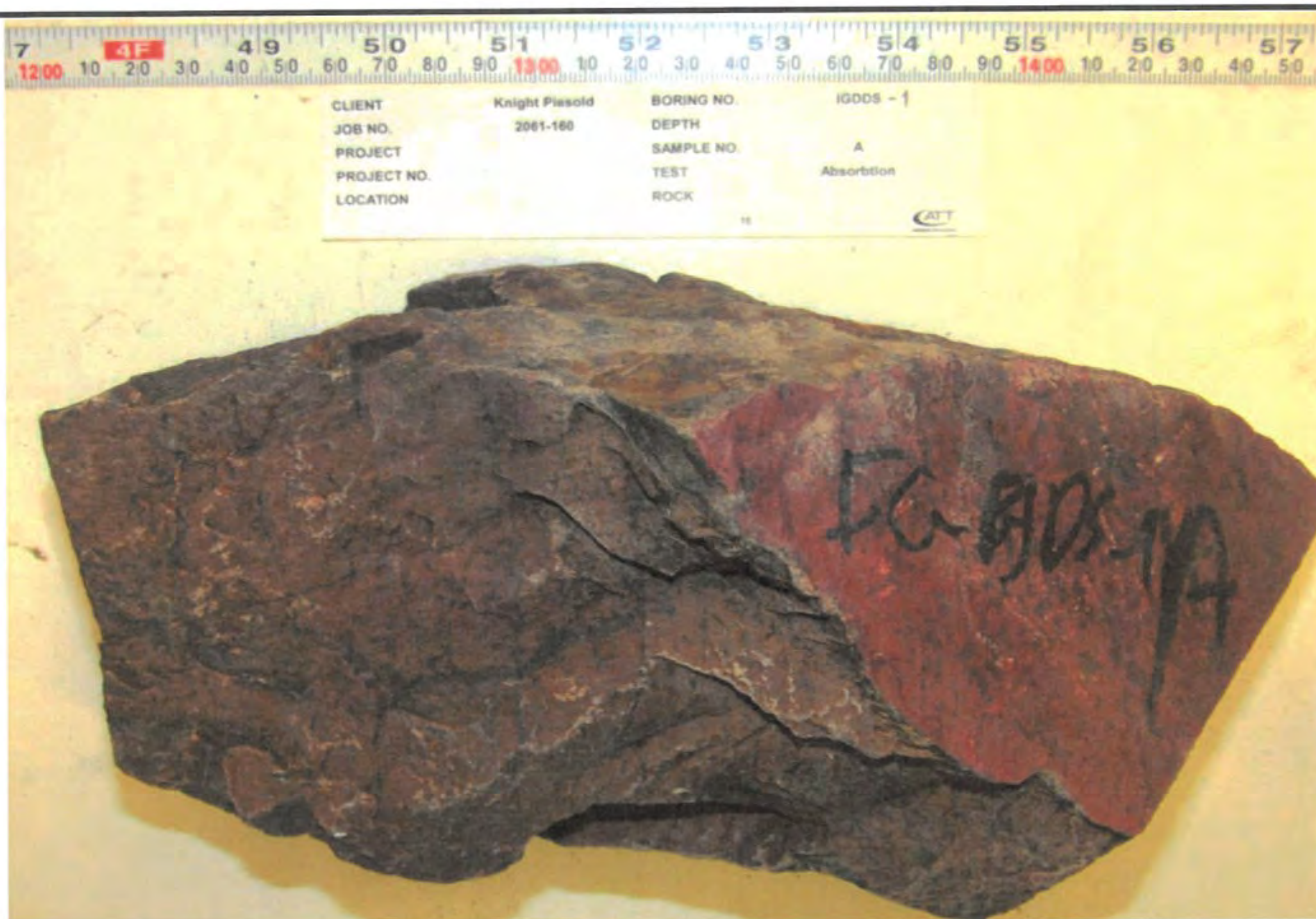
Data entry by:	BFUTCH	Date:	7/17/2020
Checked by:	HN	Date:	7/20/20
File name:	2061160_Rock Specific Gravity ASTM D6473_4.xlsm		

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_16_11_40_29

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_12_02_39

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_12_03_17

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_12_04_26

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

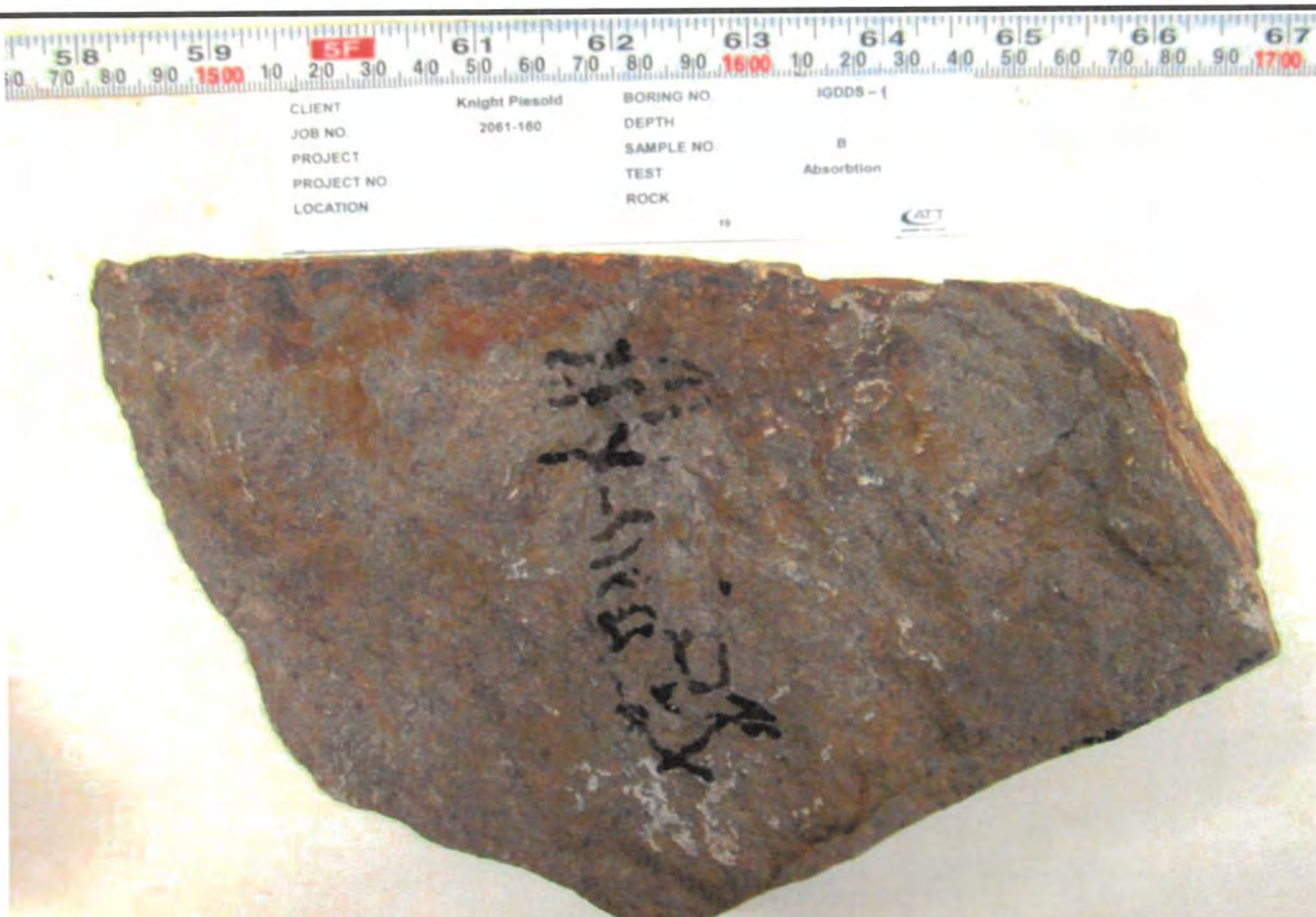
File name: 2061160__Image_20_07_17_13_49_58

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_17_13_50_28

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_50_54

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

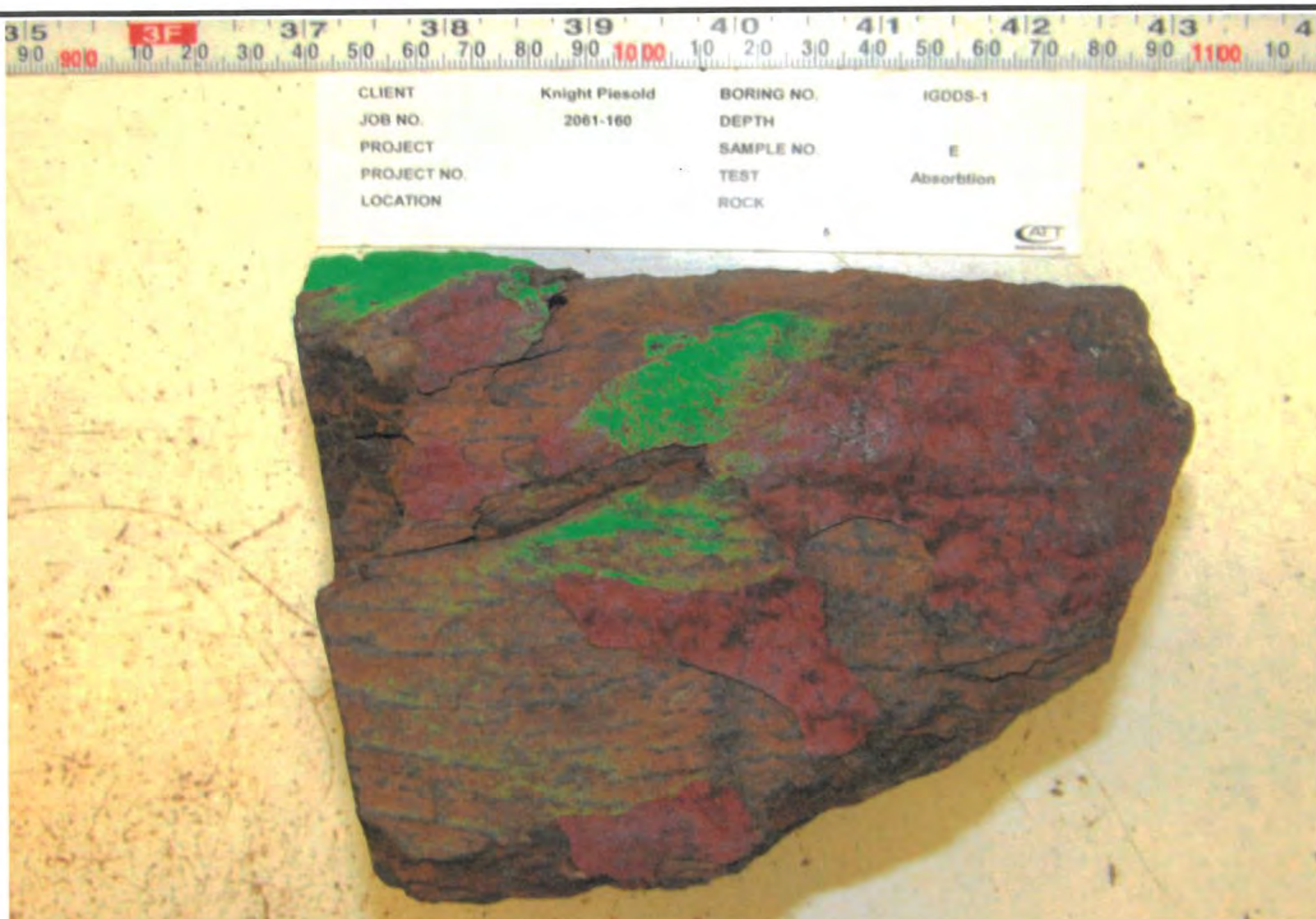
File name: 2061160__Image_20_07_17_13_51_18

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGDDS-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	E
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_17_14_56_45

ADVANCED TERRA TESTING

Specific Gravity of Rock
ASTM D6473

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	--
PROJECT	--	SAMPLE NO.	--
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	HN/BF		
TECHNICIAN	44029		

Test Data

Sample ID:	A	B	C	D	E
Mass of Saturated Surface Dry Sample (g):	3277.9	1973.8	3244.3	1655.5	2361.6
Mass of Dry Sample (g):	3269.4	1961.6	3231.6	1650.6	2323.1
Apparent Mass of Sample in Water (g):	2107.9	1269.1	2075.5	1060.1	1500.6
Specific Gravity Oven Dry Basis:	2.794	2.784	2.765	2.772	2.698
Specific Gravity Saturated Surface Dry Basis:	2.802	2.801	2.776	2.780	2.743
Apparent Specific Gravity:	2.815	2.833	2.795	2.795	2.824
Density (lbs/ft^3):	174.4	173.7	172.5	173.0	168.4
Density (kg/m^3):	2793	2782	2764	2771	2697
Apparent Density (lbs/ft^3):	175.6	176.8	174.4	174.4	176.2
Apparent Density (kg/m^3):	2813	2831	2794	2794	2823
Absorption (%)	0.26	0.62	0.39	0.30	1.66
Apparent Specific Gravity at 20°C:	2.813	2.831	2.793	2.793	2.823

Data Summary

Average Specific Gravity Oven Dry Basis:	**2.763**
Average Specific Gravity Saturated Surface Dry Basis:	**2.780**
Average Apparent Specific Gravity:	**2.812**
Average Density (lbs/ft^3):	**172.4**
Average Density (kg/m^3):	**2761**
Average Apparent Density (lbs/ft^3):	**175.5**
Average Apparent Density (kg/m^3):	**2811**
Average Absorption (%)	**0.65**
Average Apparent Specific Gravity at 20°C:	**2.811**

NOTES

Data entry by:	BFUTCH	Date:	7/17/2020
Checked by:	HN	Date:	7/20/2020
File name:	2061160__Rock Specific Gravity ASTM D6473_5.xlsm		

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

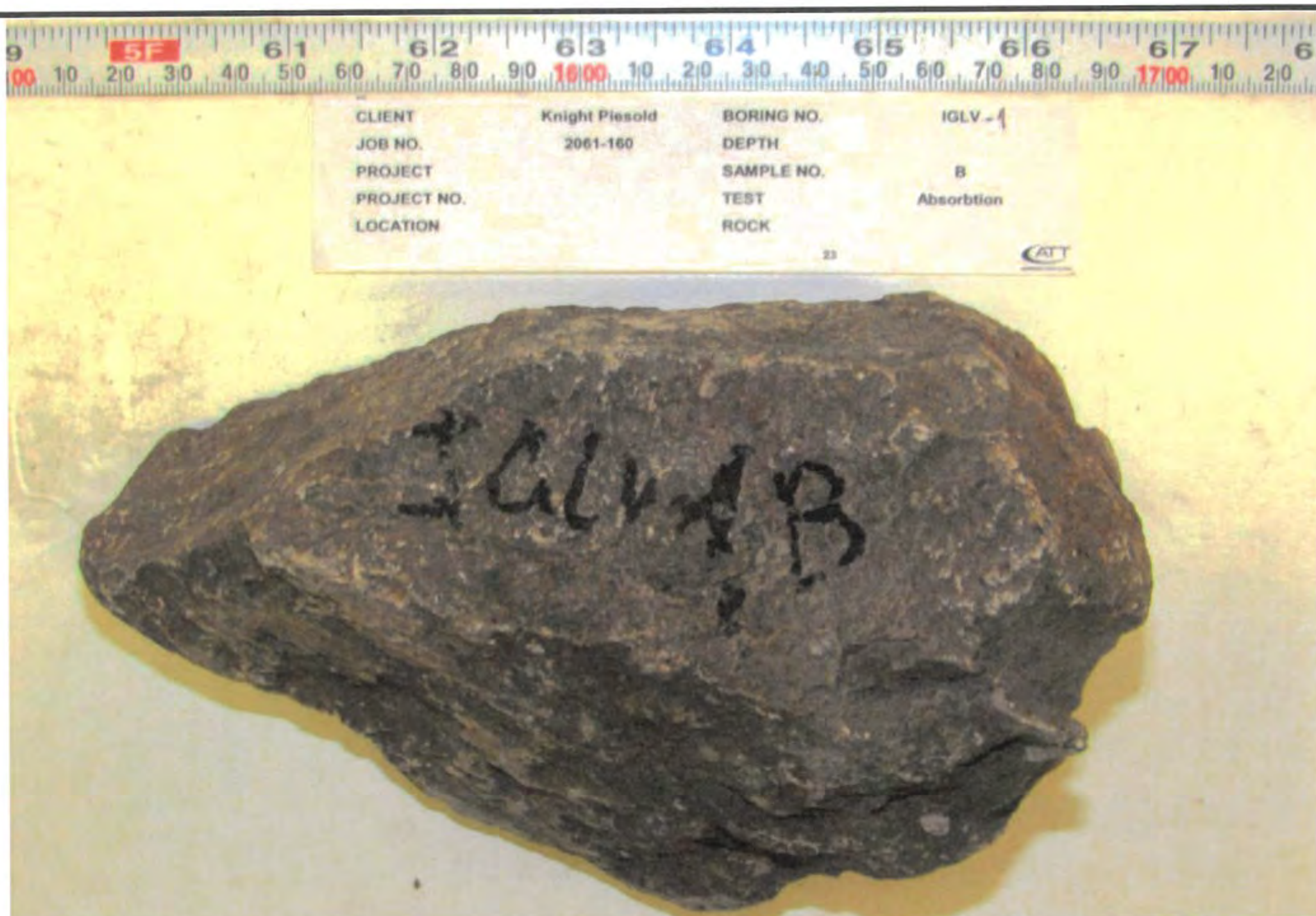
NOTES

File name: 2061160__Image_20_07_16_11_04_09

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061160__Image_20_07_16_11_05_40

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_06_15

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_16_11_07_02

ATT
ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	A
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_53_23

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	B
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_53_46

Image Attachment

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	C
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_54_30

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	D
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_13_55_02

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	IGLV-1
JOB NO.	2061-160	DEPTH	
PROJECT	--	SAMPLE NO.	E
PROJECT NO.	--	TEST TYPE	Absorbtion
LOCATION	--	ROCK TYPE	

NOTES

File name: 2061160__Image_20_07_17_14_57_32

ADVANCED TERRA TESTING

PRIVILEGED AND CONFIDENTIAL

Specific Gravity and Absorption for Erosion Control
ASTM D6473

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	--
PROJECT	Kalamath River Renewal Proje	SAMPLE NO.	PLT-3
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	6/25-27/2020		
TECHNICIAN	HN		

Test Data

Sample ID:	1
Mass of Saturated Surface Dry Sample (g):	780.7
Mass of Dry Sample (g):	774.2
Apparent Mass of Sample in Water (g):	484.2
Absorption (%):	0.84
Bulk Specific Gravity:	2.61
Bulk Density (pcf):	162.9
Bulk Density (kg/m³)	2611

Data Summary

Average Absorption (%):	**0.84**
Average Bulk Spefic Gravity:	**2.61**
Average Bulk Density (pcf):	**162.9**
Average Bulk Density (kg/m³):	**2611**

NOTES

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Absorption ASTM C97_0.xlsm		

ADVANCED TERRA TESTING

Specific Gravity and Absorption for Erosion Control
ASTM D6473

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	CRBR
JOB NO.	2061-159	DEPTH	--
PROJECT	Kalamath River Renewal Proje	SAMPLE NO.	PLT-1
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	6/25-27/2020		
TECHNICIAN	HN		

Test Data

Sample ID:	1
Mass of Saturated Surface Dry Sample (g):	1249.8
Mass of Dry Sample (g):	1241.0
Apparent Mass of Sample in Water (g):	802.9
Absorption (%):	0.71
Bulk Specific Gravity:	2.78
Bulk Density (pcf):	173.3
Bulk Density (kg/m³)	2777

Data Summary

Average Absorption (%):	**0.71**
Average Bulk Spefic Gravity:	**2.78**
Average Bulk Density (pcf):	**173.3**
Average Bulk Density (kg/m³):	**2777**

NOTES

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Absorption ASTM C97_1.xlsm		

Specific Gravity and Absorption for Erosion Control
ASTM D6473

ADVANCED TERRA TESTING

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	--
PROJECT	Kalamath River Renewal Proje	SAMPLE NO.	PLT-2
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	6/25-27/2020		
TECHNICIAN	HN		

Test Data

Sample ID:	1
Mass of Saturated Surface Dry Sample (g):	1766.6
Mass of Dry Sample (g):	1755.4
Apparent Mass of Sample in Water (g):	1138.8
Absorption (%):	0.64
Bulk Specific Gravity:	2.80
Bulk Density (pcf):	174.5
Bulk Density (kg/m³)	2796

Data Summary

Average Absorption (%):	**0.64**
Average Bulk Spefic Gravity:	**2.80**
Average Bulk Density (pcf):	**174.5**
Average Bulk Density (kg/m³):	**2796**

NOTES

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Absorption ASTM C97_2.xlsm		

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ADVANCED TERRA TESTING

Specific Gravity and Absorption for Erosion Control
ASTM D6473

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	--
PROJECT	Kalamath River Renewal Proje	SAMPLE NO.	PLT-1
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	6/25-27/2020		
TECHNICIAN	HN		

Test Data

Sample ID:	1
Mass of Saturated Surface Dry Sample (g):	1218.2
Mass of Dry Sample (g):	1184.3
Apparent Mass of Sample in Water (g):	742.8
Absorption (%):	2.86
Bulk Specific Gravity:	2.49
Bulk Density (pcf):	155.4
Bulk Density (kg/m³)	2491

Data Summary

Average Absorption (%):	**2.86**
Average Bulk Spefic Gravity:	**2.49**
Average Bulk Density (pcf):	**155.4**
Average Bulk Density (kg/m³):	**2491**

NOTES

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Absorption ASTM C97_3.xlsm		

ADVANCED TERRA TESTING

Specific Gravity and Absorption for Erosion Control
ASTM D6473

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	--
PROJECT	Kalamath River Renewal Proje	SAMPLE NO.	PLT-2
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	6/25-27/2020		
TECHNICIAN	HN		

Test Data

Sample ID:	1
Mass of Saturated Surface Dry Sample (g):	1392.6
Mass of Dry Sample (g):	1386.7
Apparent Mass of Sample in Water (g):	891.0
Absorption (%):	0.43
Bulk Specific Gravity:	2.76
Bulk Density (pcf):	172.5
Bulk Density (kg/m³)	2765

Data Summary

Average Absorption (%):	**0.43**
Average Bulk Spefic Gravity:	**2.76**
Average Bulk Density (pcf):	**172.5**
Average Bulk Density (kg/m³):	**2765**

NOTES

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Absorption ASTM C97_4.xlsm		

ADVANCED TERRA TESTING

Specific Gravity and Absorption for erosion Control
ASTM D6473

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CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	--
PROJECT	Kalamath River Renewal Proje	SAMPLE NO.	PLT-1
PROJECT NO.	--	DATE SAMPLED	--
LOCATION	--	ROCKTYPE	--
DATE TESTED	6/25-27/2020		
TECHNICIAN	HN		

Test Data

Sample ID:	1
Mass of Saturated Surface Dry Sample (g):	2361.6
Mass of Dry Sample (g):	2323.1
Apparent Mass of Sample in Water (g):	1500.6
Absorption (%):	1.66
Bulk Specific Gravity:	2.70
Bulk Density (pcf):	168.4
Bulk Density (kg/m³)	2698

Data Summary

Average Absorption (%):	**1.66**
Average Bulk Spefic Gravity:	**2.70**
Average Bulk Density (pcf):	**168.4**
Average Bulk Density (kg/m³):	**2698**

NOTES

Data entry by:	BFUTCH	Date:	6/27/2020
Checked by:	HN	Date:	6/29/2020
File name:	2061159__Absorption ASTM C97_5.xlsm		

Image Attachment

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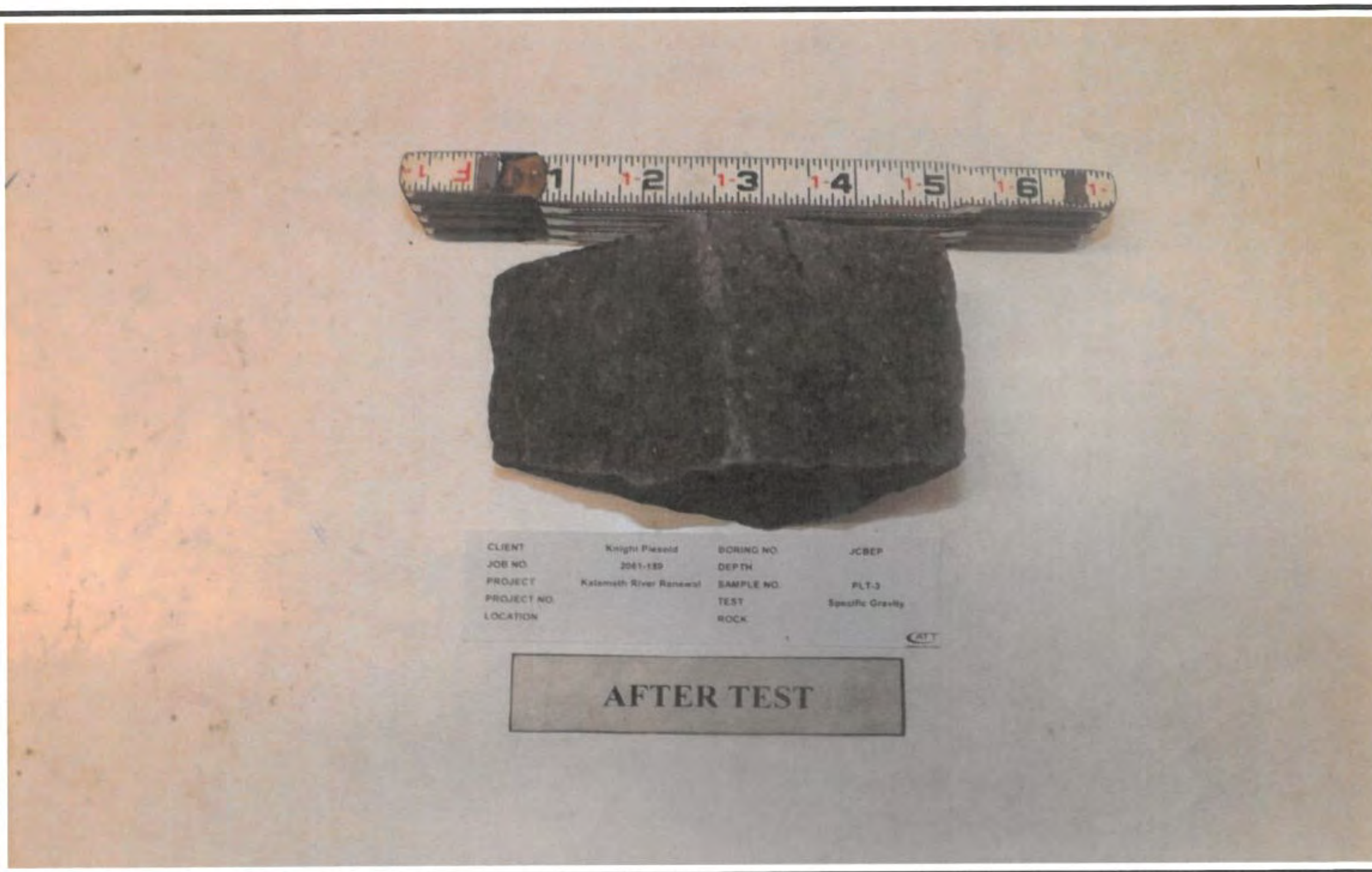
ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	JCBEP
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-3
PROJECT NO.	--	TEST TYPE	Specific Gravity
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_32_43

PRIVILEGED AND CONFIDENTIAL

ADVANCED TERRA TESTING

Image Attachment

CLIENT	Knight Piesold	BORING NO.	CRBR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-1
PROJECT NO.	--	TEST TYPE	Specific Gravity
LOCATION	--	ROCK TYPE	

NOTES

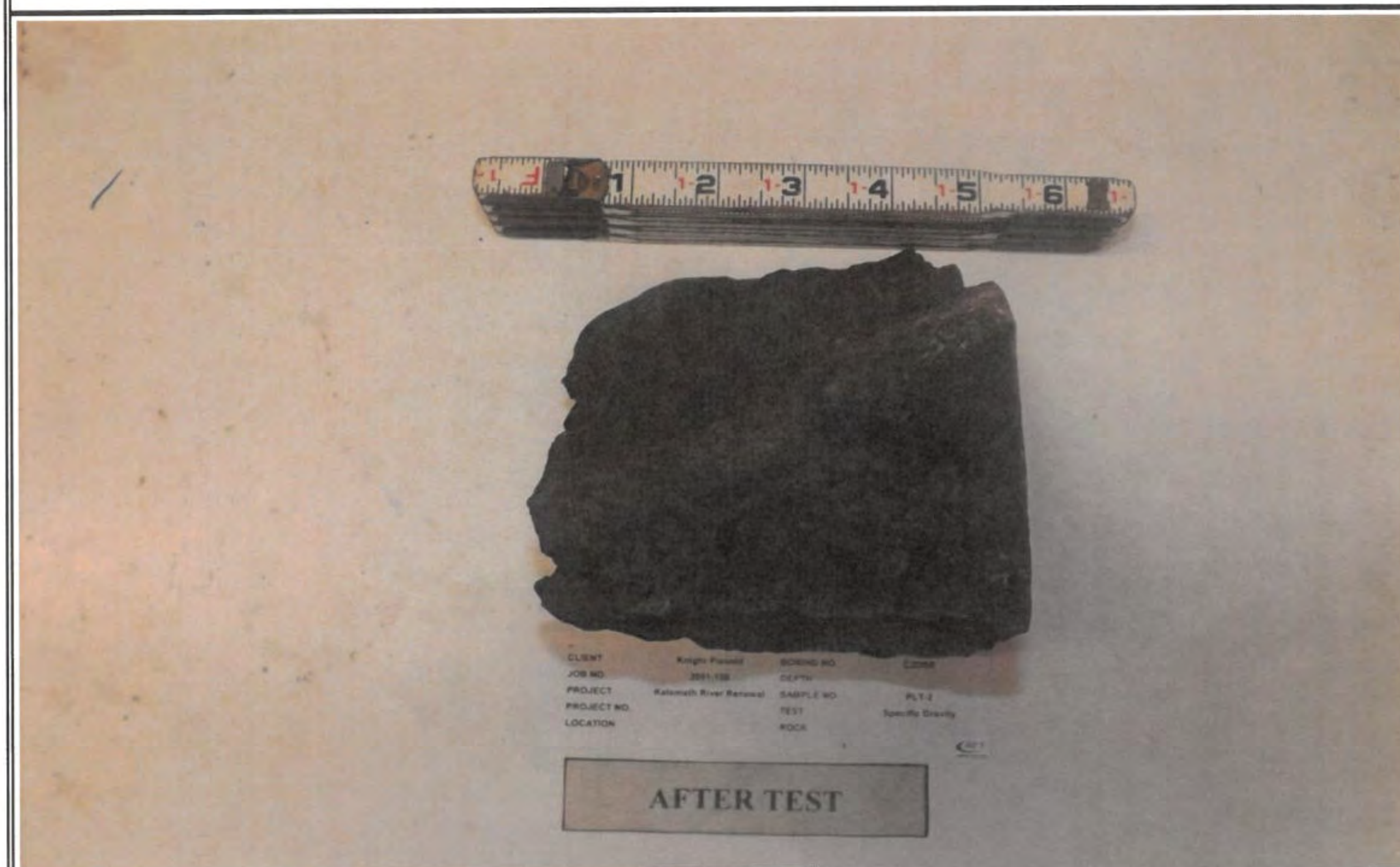
File name: 2061159__Image_20_06_27_16_33_44

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2DSR
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-2
PROJECT NO.	--	TEST TYPE	Specific Gravity
LOCATION	--	ROCK TYPE	



NOTES

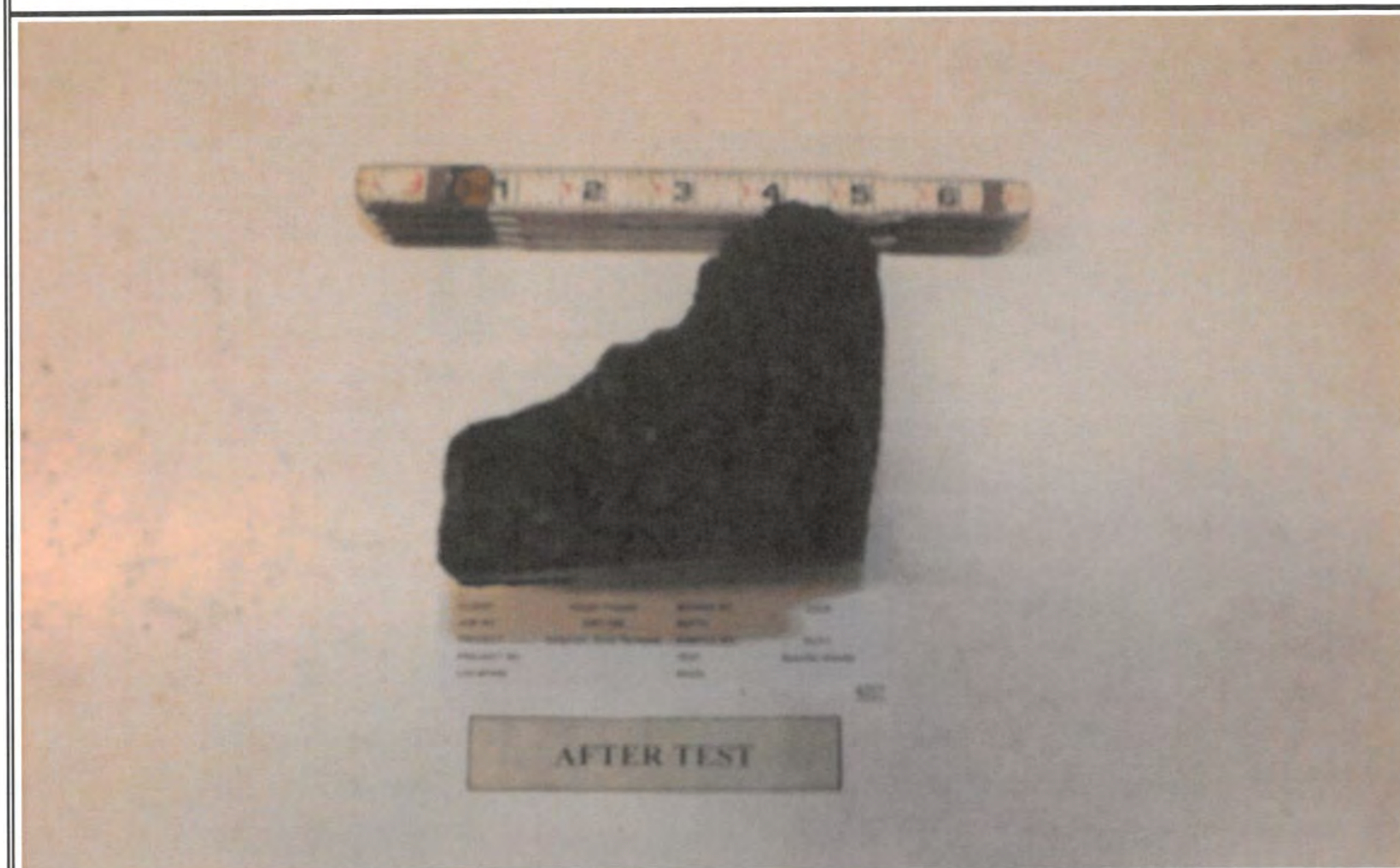
File name: 2061159__Image_20_06_27_16_34_24

PRIVILEGED AND CONFIDENTIAL

Image Attachment

ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	C2LB
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-1
PROJECT NO.	--	TEST TYPE	Specific Gravity
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_35_16

Image Attachment

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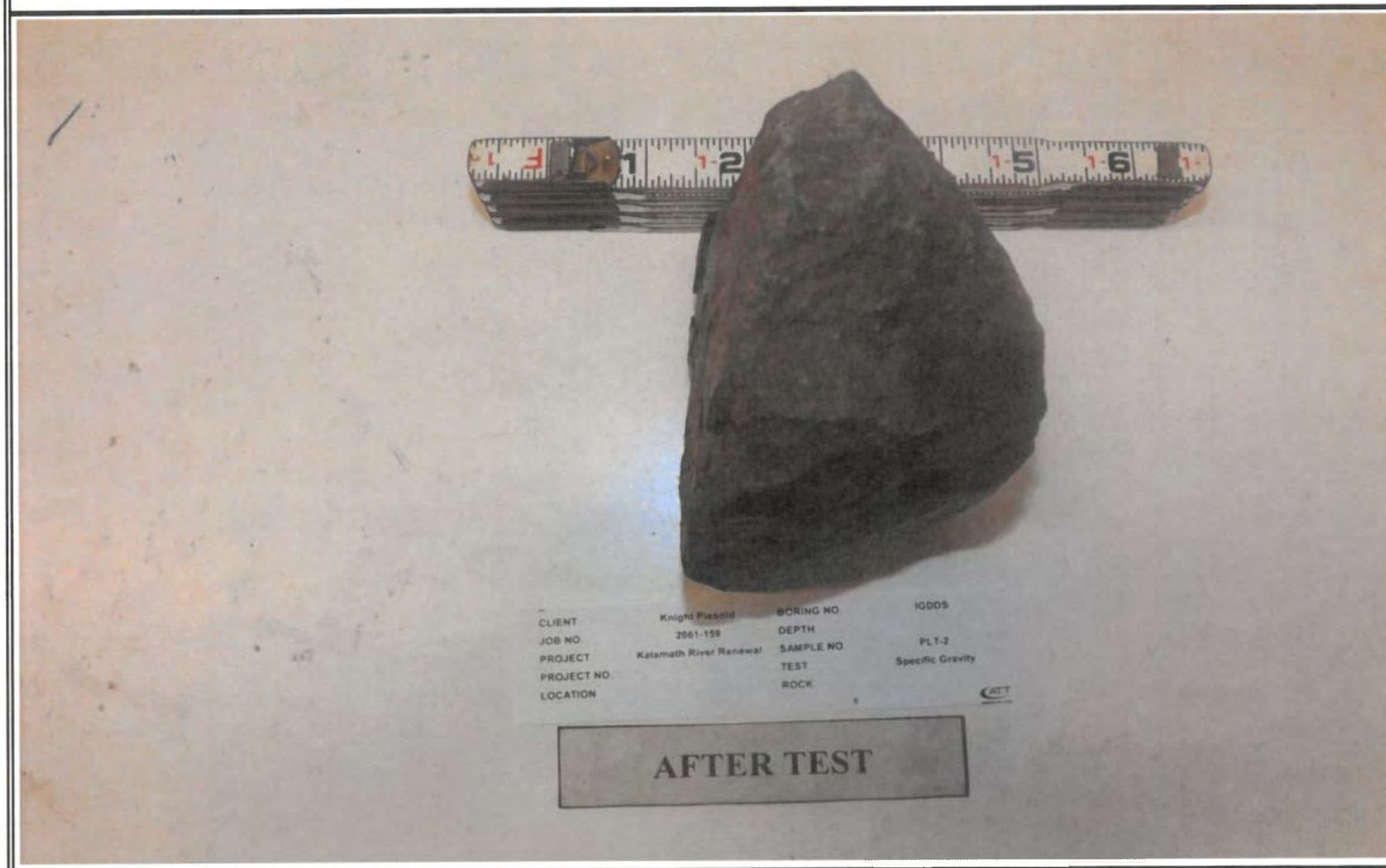
ADVANCED TERRA TESTING

CLIENT	Knight Piesold	BORING NO.	IGDDS
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-2
PROJECT NO.	--	TEST TYPE	Specific Gravity
LOCATION	--	ROCK TYPE	



NOTES

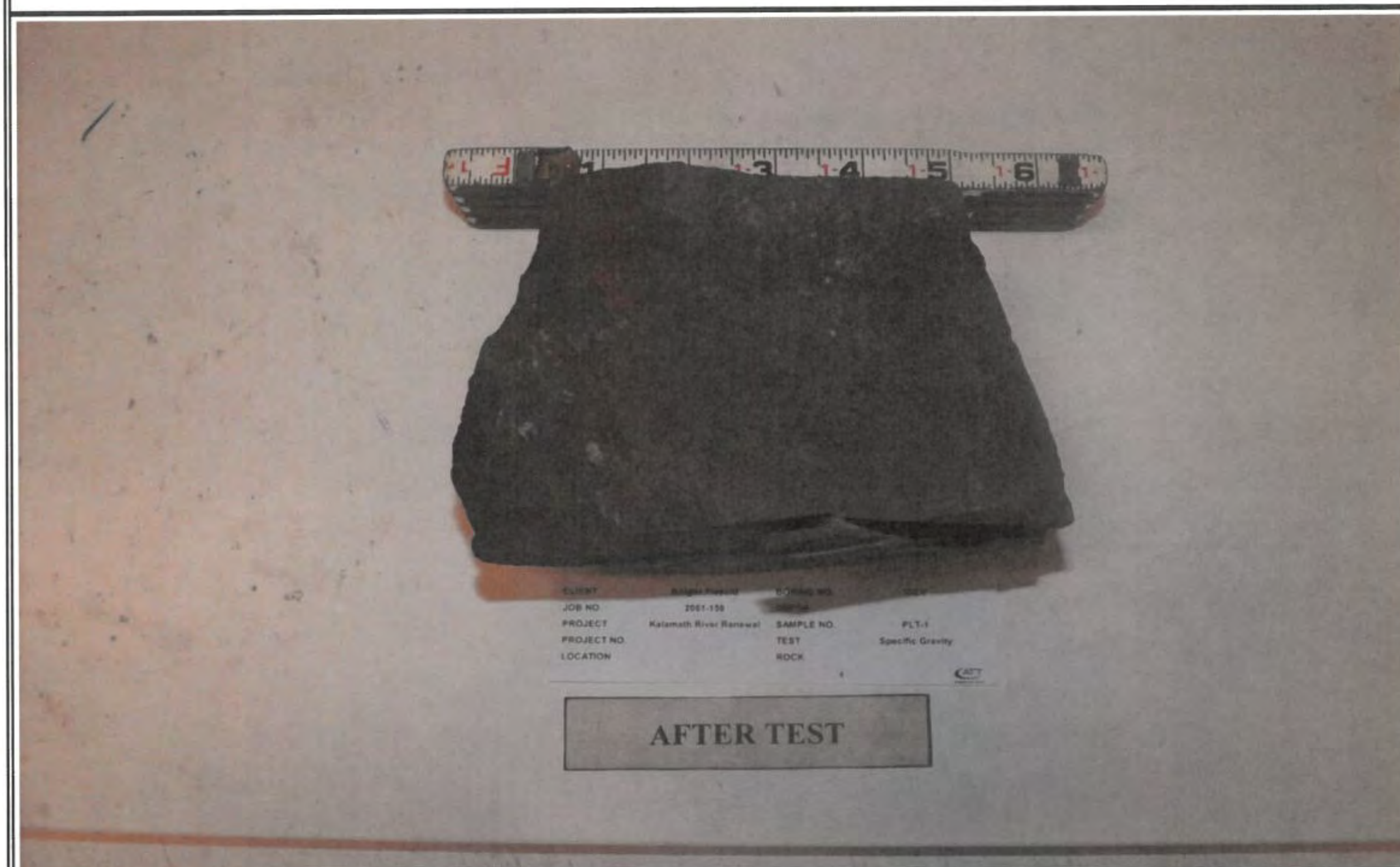
File name: 2061159__Image_20_06_27_16_35_56

ADVANCED TERRA TESTING

Image Attachment

PRIVILEGED AND CONFIDENTIAL

CLIENT	Knight Piesold	BORING NO.	IGLV
JOB NO.	2061-159	DEPTH	
PROJECT	Kalamath River Renewal Project	SAMPLE NO.	PLT-1
PROJECT NO.	--	TEST TYPE	Specific Gravity
LOCATION	--	ROCK TYPE	



NOTES

File name: 2061159__Image_20_06_27_16_36_26

Knight Piésold CONSULTING

APPENDIX D3

Point Load Test Results

(Pages D3-1 to D3-9)

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Office Locations: Denver (HQ), Parker, Colorado Springs, Fort Collins, Glenwood Springs and Summit County, Colorado

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: Knight Piesold/KLAMATH RIVER RENEWAL PROJECT
DATE RECEIVED: 06-01-2020

P.O. #12670

DAM SITE	SAMPLE LOCATION	DATE TESTED	MICRO-DEVAL GRADING A % LOSS	MAGNESIUM SULFATE SOUNDNESS WEIGHTED % LOSS	SOIL OR BEDROCK TYPE
JC BOYLE	DOWNSTREAM OF DAM ID#JCBEP-1	06-02-2020	16.1	2.65	-1 1/2" TO #4 PROCESSED FROM COBBLES
COPCO #1	ACCESS ROAD ID#CRBR-1	06-02-2020	10.6	0.86	-1 1/2" TO #4 PROCESSED FROM COBBLES
COPCO #2	DOWNSTREAM RIGHT BANK ID#C2D5R-1	06-02-2020	31.3	34.3	-1 1/2" TO #4 PROCESSED FROM COBBLES
	DOWNSTREAM LEFT BANK ID#C2LB-1	06-02-2020	12.7	1.02	-1 1/2" TO #4 PROCESSED FROM COBBLES
IRON GATE	DAM DOWNSTREAM FACE ID#1GDDS-1	06-02-2020	8.3	0.15	-1 1/2" TO #4 PROCESSED FROM COBBLES
	LAKEVIEW ROAD ID#IGLV-1	06-02-2020	15.7	3.19	-1 1/2" TO #4 PROCESSED FROM COBBLES

1 OF 1

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TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: Knight Piesold/KLAMATH RIVER RENEWAL PROJECT
DATE RECEIVED: 06-01-2020

DAM SITE	SAMPLE LOCATION	DATE TESTED	MICRO-DEVAL GRADING A % LOSS	MAGNESIUM SULFATE SOUNDNESS WEIGHTED % LOSS	SOIL OR BEDROCK TYPE
COPCO #2	DOWNSTREAM RIGHT BANK ID#C2DSR-1	07-15-2020	55.3	55.68	-1 1/2" TO #4 PROCESSED FROM COBBLES

1 OF 1

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and Environmental Scientists

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TABLE 2
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: J.C. BOYLE - DOWNSTREAM OF DAM - ID#JCBEP-1
DATE RECEIVED: 06-02-2020

MAGNEIUM SULFATE SOUNDESS TEST OF COARSE AGGREGATE

Sieve Size	Grading of Original Sample %	Weight of Fractions Before Test, g.	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
1 1/2" to 3"	18.6	-		
3/4" TO 1 1/2"	54.9	1550.2	2.4	1.32
No. 4 TO 3/4"	17.3	1011.3	7.7	1.33
-No. 4	9.2	-		
Totals	100.0	--	--	2.65

1 OF 1

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TABLE 3
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: COPCO #1 - ACCESS ROAD - ID#CRBR-1
DATE RECEIVED: 06-02-2020

MAGNEIUM SULFATE SOUNDESS TEST OF COARSE AGGREGATE

Sieve Size	Grading of Original Sample %	Weight of Fractions Before Test, g.	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
1 1/2" to 3"	22.0	-		
3/4" TO 1 1/2"	54.4	1567.1	0.22	0.12
No. 4 TO 3/4"	16.6	1009.4	2.20	0.37
-No. 4	7.0	-		
Totals	100.0	--	--	0.86

1 OF 1

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TABLE 4
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: COPCO #2 - DOWNSTREAM RIGHT BANK - ID#C2D5R-1
DATE RECEIVED: 06-02-2020

MAGNEIUM SULFATE SOUNDESS TEST OF COARSE AGGREGATE

Sieve Size	Grading of Original Sample %	Weight of Fractions Before Test, g.	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
1 1/2" to 3"	0	-		
3/4" TO 1 1/2"	49.1	1548.9	43.0	21.11
No. 4 TO 3/4"	27.3	1004.1	48.3	13.19
-No. 4	23.6	-		
Totals	100.0	--	--	**34.3**

1 OF 1

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TABLE 2
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: COPCO #3 - DOWNSTREAM RIGHT BANK - ID#C2DSR-1
DATE RECEIVED: 07-15-2020

MAGNEIUM SULFATE SOUNDESS TEST OF COARSE AGGREGATE

Sieve Size	Grading of Original Sample %	Weight of Fractions Before Test, g.	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
1 1/2" to 3"	0	-		
3/4" TO 1 1/2"	49	1557.4	71.2	34.88
No. 4 TO 3/4"	28	910.3	74.3	20.80
-No. 4	23	-		
Totals	100.0	--	--	55.68

1 OF 1

Kumar & Associates, Inc.
Geotechnical and Materials Engineers
and Environmental Scientists

ACEC MEMBER

PRIVILEGED AND CONFIDENTIAL

2390 South Lipan Street
Denver, CO 80223
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fax: (303) 742-9666
e-mail: kadenver@kumarusa.com
www.kumarusa.com

Office Locations: Denver (HQ), Parker, Colorado Springs, Fort Collins, Glenwood Springs and Summit County, Colorado

TABLE 5
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: COPCO #2 - DOWNSTREAM LEFT BANK - ID#C2LB-1
DATE RECEIVED: 06-02-2020

MAGNEIUM SULFATE SOUNDESS TEST OF COARSE AGGREGATE

Sieve Size	Grading of Original Sample %	Weight of Fractions Before Test, g.	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
1 1/2" to 3"	0	-		
3/4" TO 1 1/2"	47.3	1562.0	0.3	0.14
No. 4 TO 3/4"	44.3	1009.8	1.98	0.88
-No. 4	8.4	-		
Totals	100.0	--	--	1.02

1 OF 1

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TABLE 6
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: IRON GATE – DAM DOWNSTREAM FACE – ID#1GDDS-1
DATE RECEIVED: 06-02-2020

MAGNEIUM SULFATE SOUNDESS TEST OF COARSE AGGREGATE				
Sieve Size	Grading of Original Sample %	Weight of Fractions Before Test, g.	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
1 1/2" to 3"	45.0	–		
3/4" TO 1 1/2"	23.8	1548.1	0.14	0.03
No. 4 TO 3/4"	20.2	1003.8	0.61	0.12
–No. 4	11.0	–		
Totals	100.0	--	--	0.15

1 OF 1

Kumar & Associates, Inc.
Geotechnical and Materials Engineers
and Environmental Scientists

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Office Locations: Denver (HQ), Parker, Colorado Springs, Fort Collins, Glenwood Springs and Summit County, Colorado

TABLE 7
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 20-1-212 (VA-103-00640/01)
PROJECT NAME: IRON GATE - LAKEVIEW ROAD - ID#IGLV-1
DATE RECEIVED: 06-02-2020

MAGNEIUM SULFATE SOUNDESS TEST OF COARSE AGGREGATE

Sieve Size	Grading of Original Sample %	Weight of Fractions Before Test, g.	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
1 1/2" to 3"	0	-		
3/4" TO 1 1/2"	55.1	1553.7	1.9	1.05
No. 4 TO 3/4"	37.6	1012.1	5.7	2.14
-No. 4	7.3	-		
Totals	100.0	--	--	3.19

1 OF 1

Knight Piésold CONSULTING

APPENDIX D4

X-Ray Diffraction Results

(Pages D4-1 to D4-7)

June 17, 2020
Lab no. 220136

Ms. Jane Bruce
Knight Piesold and Co.
5030 Nome Street, Unit A
Denver, Colorado 80239

Dear Ms. Bruce:

Enclosed are the x-ray diffraction (XRD) analytical results for six “VA103-00640/01 Klamath” samples received last week with PO# 12673. This report will be mailed and emailed to you.

The samples were crushed to -1/4" size before analysis. A representative portion of each crushed sample was ground to approximately -400 mesh in a steel swing mill, packed into a well-type plastic holder and then scanned with the diffractometer over the range, 3-61° 2θ using Cu-Kα radiation. The results of the scans are summarized as approximate mineral weight percent concentrations on the enclosed table labeled, “Bulk XRD Results.” Estimates of mineral concentrations were made using our XRF-determined elemental compositions, the relative peak areas on the XRD scans and comparison to XRD data for mineral standards. The detection limit for an average mineral in these samples is ~1-3% and the analytical reproducibility is approximately equal to the square root of the amount. “Unidentified" accounts for that portion of the XRD scan which could not be resolved and a “?” indicates doubt in both mineral identification and amount.

Each sample was subjected to a size separation procedure based on Stokes’ Law to concentrate the clay-size (-2µm) fraction for XRD analysis. A representative portion of each crushed sample was blended with distilled water and 10 ml of 5% Calgon solution to disaggregate the sample without reducing grain size. Each mixture was brought up to volume in a 1000 ml graduated cylinder, allowed to settle for 19.5 hrs and then 20 ml of the material suspended above the 300 ml mark in the cylinder were drawn into a pre-weighed beaker. The material was dried at ~75°C and the weight of the clay-size material determined. The table labeled, “Clay Size Separation Results” lists the weight percent -2µm particles concentrated by this procedure. These figures should not be interpreted as the total weight percent of clay minerals in a sample but as the weight percent of -2µm material concentrated by this procedure.

J. Bruce
Knight Piesold and Co.
Page 2

June 17, 2020
Lab no. 220136

Each remaining suspension was siphoned off for XRD analysis of the clay-size fraction. A portion of each suspension was drawn onto a cellulose acetate filter and then the deposited material was rolled onto a glass disk forming an “oriented mount.” The oriented mounts were scanned over the range, 2-62° 2θ using Cu-Kα radiation, treated with glycol and then re-scanned over the range, 2-22°. The table labeled, “XRD Results for -2µm Fraction” summarizes the results of these scans as approximate mineral weight percent concentrations. Estimates of mineral concentrations were made using the relative peak areas on the XRD scans and comparison to the scan of the bulk samples. Detection limits and reproducibility are similar to those for the bulk sample.

Thank you for the opportunity to be of service to Knight Piesold.

Sincerely,

Peggy Dalheim
The Mineral Lab, Inc

Knight Piesold and Co. **June 17, 2020**
Bulk XRD Results for "VA103-00640/01 Klamath" Samples (PO# 12673) **Lab no. 220136**
Page 1 of 2

		Approx. Wt %		
Mineral Name	**Chemical Formula**	**JCBEP-1**	**CRBR-1**	**C2DSR-1**
Plagioclase feldspar	$(Na,Ca)Al(Si,Al)_3O_8$	75	63	68
Clinopyroxene	$Ca(Mg,Fe,Al,Ti)(Si,Al)_2O_6$	10	21	17
Olivine	$(Mg,Fe)_2SiO_4$	—	13	8
Quartz	SiO_2	—	—	<5
K-feldspar	$KAlSi_3O_8$	10	—	—
Smectite	$(Ca,Na)_x(Al,Mg,Fe)_4(Si,Al)_8O_{20}(OH,F)_4 \cdot nH_2O$	—	—	—
Apatite	$Ca_5(PO_4,CO_3)_3(OH,F,Cl)$	—	—	<1?
Ilmenite	$FeTiO_3$	—	—	—
Hematite	Fe_2O_3	—	—	—
Magnetite	$(Fe,Mg,Zn,Cu,Ni)(Fe,Al,Cr)_2O_4$	<3?	—	—
"Unidentified"	?	<5	<5	<5

Initial ________

Date _________

Analysis performed by The Mineral Lab, Inc

Knight Piesold and Co. **June 17, 2020**
Bulk XRD Results for “VA103-00640/01 Klamath” Samples (PO# 12673) **Lab no. 220136**
Page 2 of 2

Mineral Name	Chemical Formula	Approx. Wt % C2LB-1	IGDSS-1	IGLV-1
Plagioclase feldspar	$(Na,Ca)Al(Si,Al)_3O_8$	60	58	62
Clinopyroxene	$Ca(Mg,Fe,Al,Ti)(Si,Al)_2O_6$	28	15	15
Olivine	$(Mg,Fe)_2SiO_4$	8	—	—
Quartz	SiO_2	—	5	<5
K-feldspar	$KAlSi_3O_8$	—	8	5
Smectite	$(Ca,Na)_x(Al,Mg,Fe)_4(Si,Al)_8O_{20}(OH,F)_4 \cdot nH_2O$	—	<10	<10
Apatite	$Ca_5(PO_4,CO_3)_3(OH,F,Cl)$	—	—	—
Ilmenite	$FeTiO_3$	<2	—	—
Hematite	Fe_2O_3	—	<3	<3
Magnetite	$(Fe,Mg,Zn,Cu,Ni)(Fe,Al,Cr)_2O_4$	—	<3?	<3?
“Unidentified”	?	<5	<5	<5

Initial ________

Date _________

Analysis performed by The Mineral Lab, Inc

Knight Piesold and Co. **June 15, 2020**

Clay Size Separation Results for "VA103-00640/01 Klamath" Samples (PO# 12673) **Lab no. 220136**

Sample	Weight % -2µm Material Concentrated
JCBEP-1	0.80
CRBR-1	0.03
C2DSR-1	0.18
C2LB-1	0.07
IGDSS-1	0.29
IGLV-1	0.08

Initial _________

Date __________

Analysis performed by The Mineral Lab, Inc

Knight Piesold and Co. | **June 17, 2020**
XRD Results for Clay-Size Fractions of "VA103-00640/01 Klamath" Samples | **Lab no. 220136**
PO# 12673

		Approx. Wt %		
Mineral Name	**Chemical Formula**	**JCBEP-1**	**CRBR-1**	**C2DSR-1**
Plagioclase feldspar	$(Na,Ca)Al(Si,Al)_3O_8$	76	>90	56
Clinopyroxene	$Ca(Mg,Fe,Al,Ti)(Si,Al)_2O_6$	—	<5	—
Quartz	SiO_2	—	—	—
K-feldspar	$KAlSi_3O_8$	—	—	—
Smectite	$(Ca,Na)_x(Al,Mg,Fe)_4(Si,Al)_8O_{20}(OH,F)_4 \cdot nH_2O$	22	—	41
Hematite	Fe_2O_3	—	—	—
"Unidentified"	?	<5	<5	<5

Initial _________

Date __________

Analysis performed by The Mineral Lab, Inc

Knight Piesold and Co. **June 17, 2020**
XRD Results for Clay-Size Fractions of "VA103-00640/01 Klamath" Samples **Lab no. 220136**
PO# 12673

Mineral Name	Chemical Formula	Approx. Wt % C2LB-1	Approx. Wt % IGDSS-1	Approx. Wt % IGLV-1
Plagioclase feldspar	$(Na,Ca)Al(Si,Al)_3O_8$	>90	70	74
Clinopyroxene	$Ca(Mg,Fe,Al,Ti)(Si,Al)_2O_6$	—	<5	<5
Quartz	SiO_2	—	5	<5
K-feldspar	$KAlSi_3O_8$	—	<3	—
Smectite	$(Ca,Na)_x(Al,Mg,Fe)_4(Si,Al)_8O_{20}(OH,F)_4 \cdot nH_2O$	<5	15	17
Hematite	Fe_2O_3	—	<3	—
"Unidentified"	?	<5	<5	<5

Initial _________

Date __________

Analysis performed by The Mineral Lab, Inc

APPENDIX D5

Geochemical Results

(Pages D5-1 to D5-56)

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

June 29, 2020

Report to:
Cynthia Parnow
Knight Piesold and Co.
1999 Broadway, Suite 900
Denver, CO 80202

Bill to:
Cory Vos
Knight Piesold and Co.
#1400-750 West Pender Street
Vancouver, BC Canada V6C 2T8,

cc: Cory Vos

Project ID: 12672
ACZ Project ID: L59593

Cynthia Parnow:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on June 11, 2020. This project has been assigned to ACZ's project number, L59593. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L59593. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after July 29, 2020. If the samples are determined to be hazardous, additional charges apply for disposal (typically $11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.

Max Janicek

Max Janicek has reviewed and approved this report.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Case Narrative

Knight Piesold and Co. June 29, 2020

Project ID: 12672
ACZ Project ID: L59593

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 6 miscellaneous samples from Knight Piesold and Co. on June 11, 2020. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L59593. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both the ACZ invoice and the analytical reports. These samples were analyzed for inorganic, organic parameters. The individual methods are referenced on both the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

The below is from WG499928
Qualifier: N1
Applies to:
L59593-01/TOTAL DISSOLVED SOLIDS
L59593-02/TOTAL DISSOLVED SOLIDS
L59593-03/TOTAL DISSOLVED SOLIDS
L59593-04/TOTAL DISSOLVED SOLIDS
L59593-05/TOTAL DISSOLVED SOLIDS
L59593-06/TOTAL DISSOLVED SOLIDS

On 6/24/20 the time and date was not recorded for coming out of the 180°C oven. It was believed to have been in the 180°c oven for at least one hour and pulled out of the oven when the oven was within range, 178-182°C. The associated quality controls and all associated samples were passing and attained a constant weight.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: JCBEP-1

ACZ Sample ID: ***L59593-01***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, WAD (1312-DI)	SM4500-CN I		-		*				06/23/20 12:15	ttg
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)				*				06/21/20 14:19	ttg
Total Hot Plate Digestion	M3010A ICP-MS								06/18/20 9:10	mfm
Total Hot Plate Digestion	M3010A ICP								06/23/20 11:49	kja

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1	0.58			mg/L	0.05	0.3	06/24/20 8:48	jlw
Antimony (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0004	0.002	06/22/20 15:38	bsu
Arsenic (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0002	0.001	06/22/20 15:38	bsu
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	06/24/20 8:48	jlw
Beryllium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00008	0.0003	06/22/20 15:38	bsu
Cadmium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00005	0.0003	06/22/20 15:38	bsu
Calcium (1312)	M6010D ICP	1	2.8		*	mg/L	0.1	0.5	06/24/20 8:48	jlw
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 8:48	jlw
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 8:48	jlw
Iron (1312)	M6010D ICP	1	0.25		*	mg/L	0.06	0.2	06/24/20 8:48	jlw
Lead (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:38	bsu
Magnesium (1312)	M6010D ICP	1	1.5		*	mg/L	0.2	1	06/24/20 8:48	jlw
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 8:48	jlw
Mercury (1312)	M7470A CVAA	1		U	*	mg/L	0.0002	0.001	06/18/20 17:12	slm
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	06/24/20 8:48	jlw
Potassium (1312)	M6010D ICP	1	0.8	B	*	mg/L	0.2	1	06/24/20 8:48	jlw
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	06/22/20 15:38	bsu
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	06/24/20 8:48	jlw
Sodium (1312)	M6010D ICP	1	2.0		*	mg/L	0.2	1	06/24/20 8:48	jlw
Thallium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:38	bsu
Zinc (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.05	06/24/20 8:48	jlw

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: JCBEP-1

ACZ Sample ID: ***L59593-01***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4			U		t CaCO3/Kt	0.31	3.1	06/29/20 0:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		17.0			t CaCO3/Kt	1	5	06/29/20 0:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		17.0			t CaCO3/Kt			06/29/20 0:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	1.7		*	%	0.1	0.5	06/16/20 12:46	qcm
pH, (1312)	M9045D/M9040C									
pH		1	9.3			units	0.1	0.1	06/17/20 0:00	llr
Temperature		1	21.9			C	0.1	0.1	06/17/20 0:00	llr
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Organic Residual		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Pyritic Sulfide		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Sulfate		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Total		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	06/17/20 0:00	llr

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				06/12/20 16:45	jms
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				06/15/20 15:15	qcm
Synthetic Precip. Leaching Procedure	M1312								06/16/20 14:27	llr
Synthetic Precip. Leaching Procedure	M1312, DI Water		7.97						06/17/20 10:38	qcm

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: JCBEP-1

ACZ Sample ID: ***L59593-01***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	11.4	B	*	mg/L	2	20	06/18/20 0:00	jck
Carbonate as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Total Alkalinity		1	11.8	B	*	mg/L	2	20	06/18/20 0:00	jck
Chloride (1312 DI)	SM4500Cl-E	1		U	*	mg/L	0.5	2	06/18/20 11:24	ttg
Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	06/23/20 17:17	ttg
Fluoride (1312 DI)	SM4500F-C	1	0.2	B	*	mg/L	0.1	0.4	06/23/20 11:44	eep
Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	1	0.09	B	*	mg/L	0.02	0.1	06/17/20 22:45	pjb
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	06/19/20 11:35	mss2
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	1	0.09		*	mg/L	0.01	0.05	06/24/20 11:29	rbt
Residue, Filterable (TDS) @180C (1312)	SM2540C	1	30	B	*	mg/L	20	40	06/23/20 10:58	eep
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	06/24/20 9:49	mlh

Arizona license number: AZ0102

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: CRBR-1

ACZ Sample ID: ***L59593-02***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, WAD (1312-DI)	SM4500-CN I		-		*				06/23/20 12:45	ttg
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)				*				06/21/20 14:52	ttg
Total Hot Plate Digestion	M3010A ICP-MS								06/18/20 9:10	mfm
Total Hot Plate Digestion	M3010A ICP								06/23/20 12:23	kja

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1	1.48			mg/L	0.05	0.3	06/24/20 8:52	jlw
Antimony (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0004	0.002	06/22/20 15:43	bsu
Arsenic (1312)	M6020B ICP-MS	1	0.0006	B	*	mg/L	0.0002	0.001	06/22/20 15:43	bsu
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	06/24/20 8:52	jlw
Beryllium (1312)	M6020B ICP-MS	1	0.00009	B	*	mg/L	0.00008	0.0003	06/22/20 15:43	bsu
Cadmium (1312)	M6020B ICP-MS	1	0.00007	B	*	mg/L	0.00005	0.0003	06/22/20 15:43	bsu
Calcium (1312)	M6010D ICP	1	2.4		*	mg/L	0.1	0.5	06/24/20 8:52	jlw
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 8:52	jlw
Copper (1312)	M6010D ICP	1	0.02	B	*	mg/L	0.01	0.05	06/24/20 8:52	jlw
Iron (1312)	M6010D ICP	1	0.28		*	mg/L	0.06	0.2	06/24/20 8:52	jlw
Lead (1312)	M6020B ICP-MS	1	0.0004	B	*	mg/L	0.0001	0.0005	06/22/20 15:43	bsu
Magnesium (1312)	M6010D ICP	1	0.6	B	*	mg/L	0.2	1	06/24/20 8:52	jlw
Manganese (1312)	M6010D ICP	1	0.02	B	*	mg/L	0.01	0.05	06/24/20 8:52	jlw
Mercury (1312)	M7470A CVAA	1		U	*	mg/L	0.0002	0.001	06/18/20 17:13	slm
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	06/24/20 8:52	jlw
Potassium (1312)	M6010D ICP	1	0.7	B	*	mg/L	0.2	1	06/24/20 8:52	jlw
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	06/22/20 15:43	bsu
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	06/24/20 8:52	jlw
Sodium (1312)	M6010D ICP	1	1.9		*	mg/L	0.2	1	06/24/20 8:52	jlw
Thallium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:43	bsu
Zinc (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.05	06/24/20 8:52	jlw

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Inorganic Analytical Results

Knight Piesold and Co.

Project ID: 12672

Sample ID: CRBR-1

ACZ Sample ID: ***L59593-02***

Date Sampled: *06/11/20 00:00*

Date Received: *06/11/20*

Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.31	B		t CaCO3/Kt	0.31	3.1	06/29/20 0:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		22.0			t CaCO3/Kt	1	5	06/29/20 0:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		21.7			t CaCO3/Kt			06/29/20 0:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	2.2		*	%	0.1	0.5	06/16/20 12:57	qcm
pH, (1312)	M9045D/M9040C									
pH		1	9.1			units	0.1	0.1	06/17/20 0:00	llr
Temperature		1	21.7			C	0.1	0.1	06/17/20 0:00	llr
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Organic Residual		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Pyritic Sulfide		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Sulfate		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Total		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Total Sulfur minus Sulfate		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				06/12/20 16:57	jms
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				06/15/20 15:24	qcm
Synthetic Precip. Leaching Procedure	M1312								06/16/20 17:47	llr
Synthetic Precip. Leaching Procedure	M1312, DI Water		8.01						06/17/20 11:06	qcm

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: CRBR-1

ACZ Sample ID: ***L59593-02***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	6.1	B	*	mg/L	2	20	06/18/20 0:00	jck
Carbonate as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Total Alkalinity		1	6.1	B	*	mg/L	2	20	06/18/20 0:00	jck
Chloride (1312 DI)	SM4500Cl-E	1		U	*	mg/L	0.5	2	06/18/20 11:24	ttg
Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	06/23/20 17:19	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	06/23/20 11:55	eep
Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	1		U	*	mg/L	0.02	0.1	06/17/20 22:47	pjb
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	06/19/20 11:38	mss2
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	1	0.19		*	mg/L	0.01	0.05	06/24/20 11:31	rbt
Residue, Filterable (TDS) @180C (1312)	SM2540C	1	28	B	*	mg/L	20	40	06/23/20 11:03	eep
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	06/24/20 10:21	mlh

Arizona license number: AZ0102

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: C2DSR-1

ACZ Sample ID: ***L59593-03***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, WAD (1312-DI)	SM4500-CN I		-		*				06/23/20 13:00	ttg
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)				*				06/21/20 15:09	ttg
Total Hot Plate Digestion	M3010A ICP-MS								06/18/20 9:10	mfm
Total Hot Plate Digestion	M3010A ICP								06/23/20 13:32	kja

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1	0.61			mg/L	0.05	0.3	06/24/20 9:00	jlw
Antimony (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0004	0.002	06/22/20 15:47	bsu
Arsenic (1312)	M6020B ICP-MS	1	0.0017		*	mg/L	0.0002	0.001	06/22/20 15:47	bsu
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	06/24/20 9:00	jlw
Beryllium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00008	0.0003	06/22/20 15:47	bsu
Cadmium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00005	0.0003	06/22/20 15:47	bsu
Calcium (1312)	M6010D ICP	1	6.2		*	mg/L	0.1	0.5	06/24/20 9:00	jlw
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:00	jlw
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:00	jlw
Iron (1312)	M6010D ICP	1	0.34		*	mg/L	0.06	0.2	06/24/20 9:00	jlw
Lead (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:47	bsu
Magnesium (1312)	M6010D ICP	1	1.0		*	mg/L	0.2	1	06/24/20 9:00	jlw
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:00	jlw
Mercury (1312)	M7470A CVAA	1		U	*	mg/L	0.0002	0.001	06/18/20 17:15	slm
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	06/24/20 9:00	jlw
Potassium (1312)	M6010D ICP	1	0.7	B	*	mg/L	0.2	1	06/24/20 9:00	jlw
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	06/22/20 15:47	bsu
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	06/24/20 9:00	jlw
Sodium (1312)	M6010D ICP	1	1.5		*	mg/L	0.2	1	06/24/20 9:00	jlw
Thallium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:47	bsu
Zinc (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.05	06/24/20 9:00	jlw

** Please refer to Qualifier Reports for details.*

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: C2DSR-1

ACZ Sample ID: ***L59593-03***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.31	B		t CaCO3/Kt	0.31	3.1	06/29/20 0:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		40.0			t CaCO3/Kt	1	5	06/29/20 0:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		39.7			t CaCO3/Kt			06/29/20 0:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	4.0		*	%	0.1	0.5	06/16/20 13:00	qcm
pH, (1312)	M9045D/M9040C									
pH		1	9.5			units	0.1	0.1	06/17/20 0:00	llr
Temperature		1	21.9			C	0.1	0.1	06/17/20 0:00	llr
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Organic Residual		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Pyritic Sulfide		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Total		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	06/17/20 0:00	llr

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				06/12/20 17:10	jms
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				06/15/20 15:33	qcm
Synthetic Precip. Leaching Procedure	M1312								06/16/20 20:01	llr
Synthetic Precip. Leaching Procedure	M1312, DI Water		8.89		*				06/17/20 11:20	qcm

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: C2DSR-1

ACZ Sample ID: ***L59593-03***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	17.2	B	*	mg/L	2	20	06/18/20 0:00	jck
Carbonate as CaCO3		1	4.3	B	*	mg/L	2	20	06/18/20 0:00	jck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Total Alkalinity		1	21.5		*	mg/L	2	20	06/18/20 0:00	jck
Chloride (1312 DI)	SM4500Cl-E	1		U	*	mg/L	0.5	2	06/18/20 11:24	ttg
Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	06/23/20 17:20	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	06/23/20 11:58	eep
Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	1	0.05	B	*	mg/L	0.02	0.1	06/17/20 22:50	pjb
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	06/19/20 11:41	mss2
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.01	0.05	06/24/20 11:33	rbt
Residue, Filterable (TDS) @180C (1312)	SM2540C	1	36	B	*	mg/L	20	40	06/23/20 11:06	eep
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	06/24/20 10:38	mlh

Arizona license number: AZ0102

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: C2LB-1

ACZ Sample ID: ***L59593-04***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, WAD (1312-DI)	SM4500-CN I		-		*				06/23/20 13:30	ttg
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)				*				06/21/20 15:25	ttg
Total Hot Plate Digestion	M3010A ICP								06/23/20 14:07	kja
Total Hot Plate Digestion	M3010A ICP-MS								06/18/20 9:10	mfm

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1	1.43			mg/L	0.05	0.3	06/24/20 9:04	jlw
Antimony (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0004	0.002	06/22/20 15:49	bsu
Arsenic (1312)	M6020B ICP-MS	1	0.0004	B	*	mg/L	0.0002	0.001	06/22/20 15:49	bsu
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	06/24/20 9:04	jlw
Beryllium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00008	0.0003	06/22/20 15:49	bsu
Cadmium (1312)	M6020B ICP-MS	1	0.00005	B	*	mg/L	0.00005	0.0003	06/22/20 15:49	bsu
Calcium (1312)	M6010D ICP	1	1.6		*	mg/L	0.1	0.5	06/24/20 9:04	jlw
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:04	jlw
Copper (1312)	M6010D ICP	1	0.01	B	*	mg/L	0.01	0.05	06/24/20 9:04	jlw
Iron (1312)	M6010D ICP	1	0.32		*	mg/L	0.06	0.2	06/24/20 9:04	jlw
Lead (1312)	M6020B ICP-MS	1	0.0002	B	*	mg/L	0.0001	0.0005	06/22/20 15:49	bsu
Magnesium (1312)	M6010D ICP	1	0.4	B	*	mg/L	0.2	1	06/24/20 9:04	jlw
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:04	jlw
Mercury (1312)	M7470A CVAA	1		U	*	mg/L	0.0002	0.001	06/18/20 17:16	slm
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	06/24/20 9:04	jlw
Potassium (1312)	M6010D ICP	1	1.4		*	mg/L	0.2	1	06/24/20 9:04	jlw
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	06/22/20 15:49	bsu
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	06/24/20 9:04	jlw
Sodium (1312)	M6010D ICP	1	1.2		*	mg/L	0.2	1	06/24/20 9:04	jlw
Thallium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:49	bsu
Zinc (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.05	06/24/20 9:04	jlw

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: C2LB-1

ACZ Sample ID: ***L59593-04***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.31	B		t CaCO3/Kt	0.31	3.1	06/29/20 0:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		23.0			t CaCO3/Kt	1	5	06/29/20 0:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		22.7			t CaCO3/Kt			06/29/20 0:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	2.3		*	%	0.1	0.5	06/16/20 13:04	qcm
pH, (1312)	M9045D/M9040C									
pH		1	9.3			units	0.1	0.1	06/17/20 0:00	llr
Temperature		1	21.8			C	0.1	0.1	06/17/20 0:00	llr
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Organic Residual		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Pyritic Sulfide		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Total		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	06/17/20 0:00	llr

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				06/12/20 17:22	jms
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				06/15/20 15:42	qcm
Synthetic Precip. Leaching Procedure	M1312								06/16/20 21:07	llr
Synthetic Precip. Leaching Procedure	M1312, DI Water		8.68						06/17/20 11:33	qcm

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: C2LB-1

ACZ Sample ID: ***L59593-04***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	8.0	B	*	mg/L	2	20	06/18/20 0:00	jck
Carbonate as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Total Alkalinity		1	8.7	B	*	mg/L	2	20	06/18/20 0:00	jck
Chloride (1312 DI)	SM4500Cl-E	1		U	*	mg/L	0.5	2	06/18/20 11:24	ttg
Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	06/23/20 17:22	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	06/23/20 12:03	eep
Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	1	0.03	B	*	mg/L	0.02	0.1	06/17/20 22:51	pjb
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	06/19/20 11:43	mss2
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	1	0.23		*	mg/L	0.01	0.05	06/24/20 11:34	rbt
Residue, Filterable (TDS) @180C (1312)	SM2540C	1	30	B	*	mg/L	20	40	06/23/20 11:09	eep
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	06/24/20 10:54	mlh

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: IGDSS-1

ACZ Sample ID: ***L59593-05***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, WAD (1312-DI)	SM4500-CN I		-		*				06/23/20 13:45	ttg
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)				*				06/21/20 15:58	ttg
Total Hot Plate Digestion	M3010A ICP-MS								06/18/20 9:10	mfm
Total Hot Plate Digestion	M3010A ICP								06/23/20 14:41	kja

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1	0.90			mg/L	0.05	0.3	06/24/20 9:08	jlw
Antimony (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0004	0.002	06/22/20 15:56	bsu
Arsenic (1312)	M6020B ICP-MS	1	0.0008	B	*	mg/L	0.0002	0.001	06/22/20 15:56	bsu
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	06/24/20 9:08	jlw
Beryllium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00008	0.0003	06/22/20 15:56	bsu
Cadmium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00005	0.0003	06/22/20 15:56	bsu
Calcium (1312)	M6010D ICP	1	1.8		*	mg/L	0.1	0.5	06/24/20 9:08	jlw
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:08	jlw
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:08	jlw
Iron (1312)	M6010D ICP	1	0.32		*	mg/L	0.06	0.2	06/24/20 9:08	jlw
Lead (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:56	bsu
Magnesium (1312)	M6010D ICP	1	0.5	B	*	mg/L	0.2	1	06/24/20 9:08	jlw
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:08	jlw
Mercury (1312)	M7470A CVAA	1		U	*	mg/L	0.0002	0.001	06/18/20 17:17	slm
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	06/24/20 9:08	jlw
Potassium (1312)	M6010D ICP	1	0.4	B	*	mg/L	0.2	1	06/24/20 9:08	jlw
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	06/22/20 15:56	bsu
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	06/24/20 9:08	jlw
Sodium (1312)	M6010D ICP	1	2.2		*	mg/L	0.2	1	06/24/20 9:08	jlw
Thallium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:56	bsu
Zinc (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.05	06/24/20 9:08	jlw

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: IGDSS-1

ACZ Sample ID: ***L59593-05***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		0.63	B		t CaCO3/Kt	0.31	3.1	06/29/20 0:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		18.0			t CaCO3/Kt	1	5	06/29/20 0:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		17.4			t CaCO3/Kt			06/29/20 0:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	1.8		*	%	0.1	0.5	06/16/20 13:07	qcm
pH, (1312)	M9045D/M9040C									
pH		1	9.4			units	0.1	0.1	06/17/20 0:00	llr
Temperature		1	21.7			C	0.1	0.1	06/17/20 0:00	llr
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Organic Residual		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Pyritic Sulfide		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Sulfate		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Total		1	0.02	B	*	%	0.01	0.1	06/17/20 0:00	llr
Total Sulfur minus Sulfate		1	0.01	B	*	%	0.01	0.1	06/17/20 0:00	llr

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				06/12/20 17:35	jms
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				06/15/20 15:51	qcm
Synthetic Precip. Leaching Procedure	M1312								06/16/20 22:14	llr
Synthetic Precip. Leaching Procedure	M1312, DI Water		8.71						06/17/20 11:47	qcm

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: IGDSS-1

ACZ Sample ID: ***L59593-05***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	8.9	B	*	mg/L	2	20	06/18/20 0:00	jck
Carbonate as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Total Alkalinity		1	10.2	B	*	mg/L	2	20	06/18/20 0:00	jck
Chloride (1312 DI)	SM4500Cl-E	1		U	*	mg/L	0.5	2	06/18/20 11:24	ttg
Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	06/23/20 17:22	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	06/23/20 12:06	eep
Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	1		U	*	mg/L	0.02	0.1	06/17/20 22:52	pjb
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	06/19/20 11:44	mss2
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.01	0.05	06/24/20 11:36	rbt
Residue, Filterable (TDS) @180C (1312)	SM2540C	1	28	B	*	mg/L	20	40	06/23/20 11:12	eep
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	06/24/20 11:10	mlh

Arizona license number: AZ0102

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: IGLV-1

ACZ Sample ID: ***L59593-06***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, WAD (1312-DI)	SM4500-CN I		-		*				06/23/20 14:00	ttg
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)				*				06/21/20 16:15	ttg
Total Hot Plate Digestion	M3010A ICP-MS								06/18/20 9:10	mfm
Total Hot Plate Digestion	M3010A ICP								06/23/20 15:16	kja

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1	0.89			mg/L	0.05	0.3	06/24/20 9:16	jlw
Antimony (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0004	0.002	06/22/20 15:58	bsu
Arsenic (1312)	M6020B ICP-MS	1	0.0003	B	*	mg/L	0.0002	0.001	06/22/20 15:58	bsu
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	06/24/20 9:16	jlw
Beryllium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00008	0.0003	06/22/20 15:58	bsu
Cadmium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.00005	0.0003	06/22/20 15:58	bsu
Calcium (1312)	M6010D ICP	1	1.6		*	mg/L	0.1	0.5	06/24/20 9:16	jlw
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:16	jlw
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:16	jlw
Iron (1312)	M6010D ICP	1	0.29		*	mg/L	0.06	0.2	06/24/20 9:16	jlw
Lead (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:58	bsu
Magnesium (1312)	M6010D ICP	1	0.3	B	*	mg/L	0.2	1	06/24/20 9:16	jlw
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	06/24/20 9:16	jlw
Mercury (1312)	M7470A CVAA	1		U	*	mg/L	0.0002	0.001	06/18/20 17:18	slm
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	06/24/20 9:16	jlw
Potassium (1312)	M6010D ICP	1		U	*	mg/L	0.2	1	06/24/20 9:16	jlw
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	06/22/20 15:58	bsu
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	06/24/20 9:16	jlw
Sodium (1312)	M6010D ICP	1	1.8		*	mg/L	0.2	1	06/24/20 9:16	jlw
Thallium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	06/22/20 15:58	bsu
Zinc (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.05	06/24/20 9:16	jlw

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: IGLV-1

ACZ Sample ID: ***L59593-06***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4			U		t CaCO3/Kt	0.31	3.1	06/29/20 0:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		17.0			t CaCO3/Kt	1	5	06/29/20 0:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		17.0			t CaCO3/Kt			06/29/20 0:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	1.7		*	%	0.1	0.5	06/16/20 13:11	qcm
pH, (1312)	M9045D/M9040C									
pH		1	9.4			units	0.1	0.1	06/17/20 0:00	llr
Temperature		1	21.8			C	0.1	0.1	06/17/20 0:00	llr
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Organic Residual		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Pyritic Sulfide		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Sulfate		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Sulfur Total		1		U	*	%	0.01	0.1	06/17/20 0:00	llr
Total Sulfur minus Sulfate		1		U	*	%	0.01	0.1	06/17/20 0:00	llr

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972				*				06/12/20 17:47	jms
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3				*				06/15/20 16:00	qcm
Synthetic Precip. Leaching Procedure	M1312								06/16/20 23:21	llr
Synthetic Precip. Leaching Procedure	M1312, DI Water		8.57						06/17/20 12:01	qcm

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Inorganic Analytical Results

Knight Piesold and Co.
Project ID: 12672
Sample ID: IGLV-1

ACZ Sample ID: ***L59593-06***
Date Sampled: *06/11/20 00:00*
Date Received: *06/11/20*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	24.1		*	mg/L	2	20	06/18/20 0:00	jck
Carbonate as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	06/18/20 0:00	jck
Total Alkalinity		1	24.4		*	mg/L	2	20	06/18/20 0:00	jck
Chloride (1312 DI)	SM4500Cl-E	1		U	*	mg/L	0.5	2	06/18/20 11:24	ttg
Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	06/23/20 17:25	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	06/23/20 12:09	eep
Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	1		U	*	mg/L	0.02	0.1	06/17/20 22:53	pjb
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	06/19/20 11:46	mss2
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.01	0.05	06/24/20 11:39	rbt
Residue, Filterable (TDS) @180C (1312)	SM2540C	1	26	B	*	mg/L	20	40	06/23/20 11:15	eep
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	06/24/20 11:27	mlh

Arizona license number: AZ0102

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Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

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Inorganic QC Summary

Knight Piesold and Co. ACZ Project ID: ***L59593***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499681													
WG499681PBW	PBW	06/18/20 15:11				3.1	mg/L		-20	20			
WG499681LCSW1	LCSW	06/18/20 15:24	WC200615-3	820.0001		841	mg/L	103	90	110			
WG499375PBS	PBS	06/18/20 15:33				U	mg/L		-20	20			
L59593-01DUP	DUP	06/18/20 15:53			11.8	14.5	mg/L				21	20	RA
WG499681LCSW2	LCSW	06/18/20 16:54	WC200615-3	820.0001		846	mg/L	103	90	110			

Aluminum (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.965	mg/L	98	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.15	0.15			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.15	0.15			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	1.0012		.951	mg/L	95	80	120			
L59593-02DUP	DUP	06/24/20 8:56			1.48	1.493	mg/L				1	20	
L59593-06MS	MS	06/24/20 9:27	II200526-3	1.0012	.89	1.855	mg/L	96	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	1.0012	.89	1.829	mg/L	94	75	125	1	20	

Antimony (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499860													
WG499860ICV	ICV	06/22/20 14:58	MS200511-3	.02004		.01976	mg/L	99	90	110			
WG499860ICB	ICB	06/22/20 15:00				U	mg/L		-0.0012	0.0012			
WG499376PBS	PBS	06/22/20 15:34				U	mg/L		-0.0012	0.0012			
WG499376LFB2	LFB	06/22/20 15:36	MS200421-3	.01		.01066	mg/L	107	80	120			
L59593-01MS	MS	06/22/20 15:40	MS200421-3	.01	U	.01052	mg/L	105	75	125			
L59593-01MSD	MSD	06/22/20 15:42	MS200421-3	.01	U	.01057	mg/L	106	75	125	0	20	
L59593-02DUP	DUP	06/22/20 15:45			U	U	mg/L				0	20	RA

Arsenic (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499860													
WG499860ICV	ICV	06/22/20 14:58	MS200511-3	.05		.05067	mg/L	101	90	110			
WG499860ICB	ICB	06/22/20 15:00				U	mg/L		-0.0006	0.0006			
WG499376PBS	PBS	06/22/20 15:34				U	mg/L		-0.0006	0.0006			
WG499376LFB2	LFB	06/22/20 15:36	MS200421-3	.05005		.04992	mg/L	100	80	120			
L59593-01MS	MS	06/22/20 15:40	MS200421-3	.05005	U	.05055	mg/L	101	75	125			
L59593-01MSD	MSD	06/22/20 15:42	MS200421-3	.05005	U	.04996	mg/L	100	75	125	1	20	
L59593-02DUP	DUP	06/22/20 15:45			.0006	.00046	mg/L				26	20	RA

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Inorganic QC Summary

Knight Piesold and Co. ACZ Project ID: ***L59593***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Barium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.951	mg/L	98	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.021	0.021			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.021	0.021			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	.5005		.4705	mg/L	94	80	120			
L59593-02DUP	DUP	06/24/20 8:56			U	U	mg/L				0	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	.5005	U	.4748	mg/L	95	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	.5005	U	.4688	mg/L	94	75	125	1	20	

Beryllium (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499860													
WG499860ICV	ICV	06/22/20 14:58	MS200511-3	.05		.049887	mg/L	100	90	110			
WG499860ICB	ICB	06/22/20 15:00				.000093	mg/L		-0.00024	0.00024			
WG499376PBS	PBS	06/22/20 15:34				U	mg/L		-0.00024	0.00024			
WG499376LFB2	LFB	06/22/20 15:36	MS200421-3	.05005		.050996	mg/L	102	80	120			
L59593-01MS	MS	06/22/20 15:40	MS200421-3	.05005	U	.050992	mg/L	102	75	125			
L59593-01MSD	MSD	06/22/20 15:42	MS200421-3	.05005	U	.05118	mg/L	102	75	125	0	20	
L59593-02DUP	DUP	06/22/20 15:45			.00009	U	mg/L				200	20	RA

Cadmium (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499860													
WG499860ICV	ICV	06/22/20 14:58	MS200511-3	.05		.050715	mg/L	101	90	110			
WG499860ICB	ICB	06/22/20 15:00				U	mg/L		-0.00015	0.00015			
WG499376PBS	PBS	06/22/20 15:34				U	mg/L		-0.00015	0.00015			
WG499376LFB2	LFB	06/22/20 15:36	MS200421-3	.05005		.048705	mg/L	97	80	120			
L59593-01MS	MS	06/22/20 15:40	MS200421-3	.05005	U	.04854	mg/L	97	75	125			
L59593-01MSD	MSD	06/22/20 15:42	MS200421-3	.05005	U	.048833	mg/L	98	75	125	1	20	
L59593-02DUP	DUP	06/22/20 15:45			.00007	.00007	mg/L				0	20	RA

Calcium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	100		98.26	mg/L	98	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.3	0.3			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.3	0.3			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	67.99353		66.25	mg/L	97	80	120			
L59593-02DUP	DUP	06/24/20 8:56			2.4	2.3	mg/L				4	20	
L59593-06MS	MS	06/24/20 9:27	II200526-3	67.99353	1.6	69.31	mg/L	100	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	67.99353	1.6	68.06	mg/L	98	75	125	2	20	

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Inorganic QC Summary

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ACZ Project ID: ***L59593***

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Chloride (1312 DI) SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499621													
WG499621ICB	ICB	06/18/20 9:27				U	mg/L		-1.5	1.5			
WG499621ICV	ICV	06/18/20 9:27	WI200506-2	55.055		54.59	mg/L	99	90	110			
WG499621LFB	LFB	06/18/20 11:24	WI200327-3	30.03		30.93	mg/L	103	90	110			
WG499375PBS	PBS	06/18/20 11:24				U	mg/L		-1.5	1.5			
L59593-01DUP	DUP	06/18/20 11:24			U	U	mg/L				0	20	RA
L59593-04AS	AS	06/18/20 11:24	WI200327-3	30.03	U	31.75	mg/L	106	90	110			

Chromium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.951	mg/L	98	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.03	0.03			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.03	0.03			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	.501		.491	mg/L	98	80	120			
L59593-02DUP	DUP	06/24/20 8:56			U	U	mg/L				0	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	.501	U	.489	mg/L	98	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	.501	U	.486	mg/L	97	75	125	1	20	

Copper (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.931	mg/L	97	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.03	0.03			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.03	0.03			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	.501		.491	mg/L	98	80	120			
L59593-02DUP	DUP	06/24/20 8:56			.02	.02	mg/L				0	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	.501	U	.503	mg/L	100	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	.501	U	.495	mg/L	99	75	125	2	20	

Cyanide, WAD (1312-DI) SM4500-CN I,E-Colorimetric w/ distillation

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499983													
WG499983ICV	ICV	06/23/20 15:28	WI200622-7	.3003		.2769	mg/L	92	90	110			
WG499983ICB	ICB	06/23/20 15:29				U	mg/L		-0.003	0.003			
WG499998													
WG499918PBS	PBS	06/23/20 17:15				U	mg/L		-0.003	0.003			
WG499918LFB	LFB	06/23/20 17:16	WI200622-6	.2002		.1809	mg/L	90	90	110			
WG499375PBS	PBS	06/23/20 17:16				U	mg/L		-0.003	0.003			
L59593-01DUP	DUP	06/23/20 17:18			U	U	mg/L				0	20	RA
L59593-03MS	MS	06/23/20 17:21	WI200622-6	.2002	U	.1667	mg/L	83	90	110			M2

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Fluoride (1312 DI) SM4500F-C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499921													
WG499921ICB	ICB	06/23/20 11:30				U	mg/L		-0.3	0.3			
WG499921LFB	LFB	06/23/20 11:37	WC200511-1	5		5.21	mg/L	104	90	110			
WG499375PBS	PBS	06/23/20 11:41				U	mg/L		-0.3	0.3			
L59593-01AS	AS	06/23/20 11:48	WC200511-1	5	.2	5.23	mg/L	101	90	110			
L59593-01DUP	DUP	06/23/20 11:51			.2	.15	mg/L				29	20	RA

Iron (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.887	mg/L	94	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.18	0.18			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.18	0.18			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	1.0018		.971	mg/L	97	80	120			
L59593-02DUP	DUP	06/24/20 8:56			.28	.27	mg/L				4	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	1.0018	.29	1.254	mg/L	96	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	1.0018	.29	1.245	mg/L	95	75	125	1	20	

Lead (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499860													
WG499860ICV	ICV	06/22/20 14:58	MS200511-3	.05		.05142	mg/L	103	90	110			
WG499860ICB	ICB	06/22/20 15:00				U	mg/L		-0.0003	0.0003			
WG499376PBS	PBS	06/22/20 15:34				U	mg/L		-0.0003	0.0003			
WG499376LFB2	LFB	06/22/20 15:36	MS200421-3	.05005		.04944	mg/L	99	80	120			
L59593-01MS	MS	06/22/20 15:40	MS200421-3	.05005	U	.0491	mg/L	98	75	125			
L59593-01MSD	MSD	06/22/20 15:42	MS200421-3	.05005	U	.04985	mg/L	100	75	125	2	20	
L59593-02DUP	DUP	06/22/20 15:45			.0004	U	mg/L				200	20	RA

Magnesium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	100		96.88	mg/L	97	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.6	0.6			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.6	0.6			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	49.99828		47.13	mg/L	94	80	120			
L59593-02DUP	DUP	06/24/20 8:56			.6	.61	mg/L				2	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	49.99828	.3	48.33	mg/L	96	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	49.99828	.3	47.55	mg/L	95	75	125	2	20	

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Inorganic QC Summary

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Manganese (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.906	mg/L	95	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.03	0.03			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.03	0.03			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	.5015		.482	mg/L	96	80	120			
L59593-02DUP	DUP	06/24/20 8:56			.02	.012	mg/L				50	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	.5015	U	.487	mg/L	97	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	.5015	U	.48	mg/L	96	75	125	1	20	

Mercury (1312) M7470A CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499515													
WG499515ICV	ICV	06/18/20 14:24	HG200526-2	.004995		.00493	mg/L	99	95	105			
WG499515ICB	ICB	06/18/20 14:25				U	mg/L		-0.0002	0.0002			
WG499629													
WG499376PBS	PBS	06/18/20 17:10				U	mg/L		-0.0006	0.0006			
WG499376LFB1	LFB	06/18/20 17:11	HG200608-4	.002002		.00202	mg/L	101	85	115			
L59593-02DUP	DUP	06/18/20 17:14			U	U	mg/L				0	20	RA
L59593-06MS	MS	06/18/20 17:21	HG200608-4	.002002	U	.00189	mg/L	94	85	115			
L59593-06MSD	MSD	06/18/20 17:22	HG200608-4	.002002	U	.00189	mg/L	94	85	115	0	20	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499366													
WG499366PBS	PBS	06/16/20 12:39				U	%		-0.2	0.2			
WG499366LCSS	LCSS	06/16/20 12:42	PCN59681	4.96		5	%	101	80	120			
L59593-01MS	MS	06/16/20 12:49	SI190303-1	1	1.7	2.48	%	78	70	130			
L59593-01DUP	DUP	06/16/20 12:53			1.7	1.65	%				3	20	

Nickel (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.971	mg/L	99	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.024	0.024			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.024	0.024			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	.501		.4943	mg/L	99	80	120			
L59593-02DUP	DUP	06/24/20 8:56			U	U	mg/L				0	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	.501	U	.4986	mg/L	100	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	.501	U	.5006	mg/L	100	75	125	0	20	

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Inorganic QC Summary

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Nitrate/Nitrite as N (1312-DI) M353.2 - Automated Cadmium Reduction

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499568													
WG499568ICV	ICV	06/17/20 21:47	WI200514-1	2.416		2.492	mg/L	103	90	110			
WG499568ICB	ICB	06/17/20 21:48				U	mg/L		-0.02	0.02			
WG499570													
WG499570LFB	LFB	06/17/20 22:42	WI200331-15	2		2.065	mg/L	103	90	110			
WG499375PBS	PBS	06/17/20 22:43				U	mg/L		-0.02	0.02			
L59593-01DUP	DUP	06/17/20 22:46			.09	.106	mg/L				16	20	RA
L59593-02AS	AS	06/17/20 22:48	WI200331-15	2	U	2.094	mg/L	105	90	110			

Nitrogen, ammonia (1312-DI) M350.1 Auto Salicylate w/gas diffusion

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499722													
WG499722ICV	ICV	06/19/20 10:00	WI200327-4	12.012		11.675	mg/L	97	90	110			
WG499722ICB	ICB	06/19/20 10:02				U	mg/L		-0.05	0.05			
WG499763													
WG499763LFB	LFB	06/19/20 11:32	WI191111-3	10		9.304	mg/L	93	90	110			
WG499375PBS	PBS	06/19/20 11:34				U	mg/L		-0.05	0.05			
L59593-01DUP	DUP	06/19/20 11:37			U	U	mg/L				0	20	RA
L59593-02AS	AS	06/19/20 11:40	WI191111-3	10	U	9.697	mg/L	97	90	110			

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499870													
WG499870ICV	ICV	06/17/20 9:46	PCN59583	4.01		4	units	100	3.9	4.1			
L59593-02DUP	DUP	06/17/20 10:34			9.1	9.2	units				1	20	

Phosphorus, Total (1312-DI) M365.1 - Auto Ascorbic Acid (digest)

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499950													
WG499950ICV1	ICV	06/24/20 11:22	WI200608-9	.65228		.669	mg/L	103	90	110			
WG499950ICB1	ICB	06/24/20 11:25				U	mg/L		-0.01	0.01			
WG499805PBS	PBS	06/24/20 11:26				U	mg/L		-0.01	0.01			
WG499805LFB	LFB	06/24/20 11:27	WI200619-2	.5		.487	mg/L	97	90	110			
WG499375PBS	PBS	06/24/20 11:28				U	mg/L		-0.01	0.01			
L59593-01DUP	DUP	06/24/20 11:30			.09	.159	mg/L				55	20	RA
L59593-04MS	MS	06/24/20 11:35	WI200619-2	.5	.23	.729	mg/L	100	90	110			

Potassium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	20		19.57	mg/L	98	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.6	0.6			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.6	0.6			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	99.96426		93.33	mg/L	93	80	120			
L59593-02DUP	DUP	06/24/20 8:56			.7	.59	mg/L				17	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	99.96426	U	93.3	mg/L	93	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	99.96426	U	91.75	mg/L	92	75	125	2	20	

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Residue, Filterable (TDS) @180C (1312) SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499928													
WG499928PBW	PBW	06/23/20 10:50				U	mg/L		-20	20			
WG499928LCSW	LCSW	06/23/20 10:52	PCN61085	1000		984	mg/L	98	80	120			
WG499375PBS	PBS	06/23/20 10:55				U	mg/L		-40	40			
L59593-01DUP	DUP	06/23/20 11:01			30	34	mg/L				13	10	RA

Selenium (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499860													
WG499860ICV	ICV	06/22/20 14:58	MS200511-3	.05		.05163	mg/L	103	90	110			
WG499860ICB	ICB	06/22/20 15:00				U	mg/L		-0.0003	0.0003			
WG499376PBS	PBS	06/22/20 15:34				U	mg/L		-0.0003	0.0003			
WG499376LFB2	LFB	06/22/20 15:36	MS200421-3	.05		.04814	mg/L	96	80	120			
L59593-01MS	MS	06/22/20 15:40	MS200421-3	.05	U	.04879	mg/L	98	75	125			
L59593-01MSD	MSD	06/22/20 15:42	MS200421-3	.05	U	.04879	mg/L	98	75	125	0	20	
L59593-02DUP	DUP	06/22/20 15:45			U	U	mg/L				0	20	RA

Silver (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	1		.991	mg/L	99	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.03	0.03			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.03	0.03			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	.5		.464	mg/L	93	80	120			
L59593-02DUP	DUP	06/24/20 8:56			U	U	mg/L				0	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	.5	U	.478	mg/L	96	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	.5	U	.469	mg/L	94	75	125	2	20	

Sodium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	100		98.73	mg/L	99	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.6	0.6			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.6	0.6			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	100.0086		95.32	mg/L	95	80	120			
L59593-02DUP	DUP	06/24/20 8:56			1.9	1.55	mg/L				20	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	100.0086	1.8	98.65	mg/L	97	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	100.0086	1.8	97.22	mg/L	95	75	125	1	20	

Sulfate (1312 DI) SM4500 SO4-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500032													
WG500032PBW	PBW	06/24/20 9:00				U	mg/L		-60	60			
WG500032LCSW	LCSW	06/24/20 9:16	WC200605-2	100		96	mg/L	96	80	120			
WG499375PBS	PBS	06/24/20 9:32				U	mg/L		-60	60			
L59593-01DUP	DUP	06/24/20 10:05			U	U	mg/L				0	20	RA

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Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499362													
L59593-01DUP	DUP	06/17/20 14:55			U	U	%				0	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499362													
L59593-01DUP	DUP	06/17/20 14:55			U	.01	%				200	20	RA

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499362													
WG499362PBS	PBS	06/17/20 14:42				U	%		-0.03	0.03			
L59593-01DUP	DUP	06/17/20 14:55			U	U	%				0	20	RA

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499362													
WG499362PBS	PBS	06/17/20 13:17				U	%		-0.03	0.03			
WG499362LCSS	LCSS	06/17/20 13:21	PCN60873	4.01		3.77	%	94	80	120			
L59593-01MS	MS	06/17/20 13:27	PCN60251	1.32	U	1.25	%	95	80	120			
L59593-01DUP	DUP	06/17/20 13:30			U	U	%				0	20	RA

Thallium (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499860													
WG499860ICV	ICV	06/22/20 14:58	MS200511-3	.05		.05406	mg/L	108	90	110			
WG499860ICB	ICB	06/22/20 15:00				U	mg/L		-0.0003	0.0003			
WG499376PBS	PBS	06/22/20 15:34				U	mg/L		-0.0003	0.0003			
WG499376LFB2	LFB	06/22/20 15:36	MS200421-3	.0501		.05089	mg/L	102	80	120			
L59593-01MS	MS	06/22/20 15:40	MS200421-3	.0501	U	.05064	mg/L	101	75	125			
L59593-01MSD	MSD	06/22/20 15:42	MS200421-3	.0501	U	.05144	mg/L	103	75	125	2	20	
L59593-02DUP	DUP	06/22/20 15:45			U	U	mg/L				0	20	RA

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG499362													
WG499362PBS	PBS	06/17/20 14:42				U	%		-0.03	0.03			
L59593-01DUP	DUP	06/17/20 14:55			U	.01	%				200	20	RA

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Zinc (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG500011													
WG500011ICV	ICV	06/24/20 8:13	II200616-2	2		1.956	mg/L	98	90	110			
WG500011ICB	ICB	06/24/20 8:16				U	mg/L		-0.06	0.06			
WG499376PBS	PBS	06/24/20 8:41				U	mg/L		-0.06	0.06			
WG499376LFB1	LFB	06/24/20 8:44	II200526-3	.50075		.503	mg/L	100	80	120			
L59593-02DUP	DUP	06/24/20 8:56			U	U	mg/L				0	20	RA
L59593-06MS	MS	06/24/20 9:27	II200526-3	.50075	U	.505	mg/L	101	75	125			
L59593-06MSD	MSD	06/24/20 9:31	II200526-3	.50075	U	.499	mg/L	100	75	125	1	20	

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59593-01	WG499860	Antimony (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Beryllium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499860	Cadmium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Calcium (1312)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG499681	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499621	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499998	Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499921	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG500011	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Lead (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Magnesium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499629	Mercury (1312)	M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499570	Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	Q6	Sample was received above recommended temperature.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499763	Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499950	Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499928	Residue, Filterable (TDS) @180C (1312)	SM2540C	N1	See Case Narrative.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG499860	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500032	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Thallium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59593-02	WG499860	Antimony (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Beryllium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499860	Cadmium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Calcium (1312)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG499681	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499621	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499998	Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499921	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG500011	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Lead (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Magnesium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499629	Mercury (1312)	M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499570	Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	Q6	Sample was received above recommended temperature.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499763	Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499950	Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499928	Residue, Filterable (TDS) @180C (1312)	SM2540C	N1	See Case Narrative.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG499860	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500032	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Thallium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59593-03	WG499860	Antimony (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Beryllium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499860	Cadmium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Calcium (1312)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG499681	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499621	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499998	Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499921	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG500011	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Lead (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Magnesium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499629	Mercury (1312)	M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499570	Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	Q6	Sample was received above recommended temperature.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499763	Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499950	Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499928	Residue, Filterable (TDS) @180C (1312)	SM2540C	N1	See Case Narrative.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG499860	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500032	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Thallium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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					sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59593-04	WG499860	Antimony (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Beryllium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499860	Cadmium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Calcium (1312)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG499681	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499621	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499998	Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499921	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG500011	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Lead (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Magnesium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499629	Mercury (1312)	M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499570	Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No

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					hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	Q6	Sample was received above recommended temperature.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499763	Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499950	Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499928	Residue, Filterable (TDS) @180C (1312)	SM2540C	N1	See Case Narrative.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG499860	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500032	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Thallium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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					sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59593-05	WG499860	Antimony (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Beryllium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499860	Cadmium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Calcium (1312)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG499681	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499621	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499998	Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499921	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG500011	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Lead (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Magnesium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499629	Mercury (1312)	M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499570	Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	Q6	Sample was received above recommended temperature.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499763	Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499950	Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499928	Residue, Filterable (TDS) @180C (1312)	SM2540C	N1	See Case Narrative.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG499860	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500032	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Thallium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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Inorganic Extended Qualifier Report

Knight Piesold and Co.

ACZ Project ID: ***L59593***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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Inorganic Extended Qualifier Report

Knight Piesold and Co.

ACZ Project ID: ***L59593***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59593-06	WG499860	Antimony (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Beryllium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499860	Cadmium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Calcium (1312)	M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG499681	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG499621	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499998	Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499921	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG500011	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Lead (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Magnesium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499629	Mercury (1312)	M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499570	Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No

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Inorganic Extended Qualifier Report

Knight Piesold and Co.

ACZ Project ID: ***L59593***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M353.2 - Automated Cadmium Reduction	Q6	Sample was received above recommended temperature.
			M353.2 - Automated Cadmium Reduction	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499763	Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499950	Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499928	Residue, Filterable (TDS) @180C (1312)	SM2540C	N1	See Case Narrative.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			SM2540C	Z3	Sample volume yielded a residue less than 2.5 mg
	WG499860	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG500032	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sulfur Total	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499860	Thallium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499681	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG499362	Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG500011	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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Certification Qualifiers

Knight Piesold and Co. ACZ Project ID: ***L59593***

Metals Analysis

The following parameters are not offered for certification or are not covered by AZ certificate #AZ0102.	
Selenium (1312)	M6020B ICP-MS

Soil Analysis

The following parameters are not offered for certification or are not covered by AZ certificate #AZ0102.	
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.	
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD

Wet Chemistry

The following parameters are not offered for certification or are not covered by AZ certificate #AZ0102.	
Cyanide, WAD (1312-DI)	SM4500-CN I,E-Colorimetric w/ distillation
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)
The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.	
Bicarbonate as CaCO3	SM2320B - Titration
Carbonate as CaCO3	SM2320B - Titration
Chloride (1312 DI)	SM4500Cl-E
Fluoride (1312 DI)	SM4500F-C
Hydroxide as CaCO3	SM2320B - Titration
Nitrate/Nitrite as N (1312-DI)	M353.2 - Automated Cadmium Reduction
Nitrogen, ammonia (1312-DI)	M350.1 Auto Salicylate w/gas diffusion
Phosphorus, Total (1312-DI)	M365.1 - Auto Ascorbic Acid (digest)
Residue, Filterable (TDS) @180C (1312)	SM2540C
Sulfate (1312 DI)	SM4500 SO4-D
Total Alkalinity	SM2320B - Titration

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Sample Receipt

Knight Piesold and Co.
12672

ACZ Project ID: L59593
Date Received: 06/11/2020 10:01
Received By:
Date Printed: 6/12/2020

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?		X	
There was no Date/Time on the COC or sample containers. There was no relinquished by Date/Time so the received Date/Time was used to log the samples in.			
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

The Relinquished By field on the COC was not completed. The project manager is contacting the client.

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
NA33015	19.1	<=6.0	15	N/A

Was ice present in the shipment container(s)?

No - Wet or gel ice was not present in the shipment container(s).

ACZ Laboratories, Inc.
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Sample Receipt

Knight Piesold and Co.
12672

ACZ Project ID:	L59593
Date Received:	06/11/2020 10:01
Received By:	
Date Printed:	6/12/2020

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L59593 CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Cynthia Parnow	Address: 1999 Broadway Suite 900
Company: Knight Piésold and Company	Denver, CO 80202
E-mail: cparnow@knightpiesold.com	Telephone: 303-629-8788

Copy of Report to:

Name: Cory Vos	E-mail: cvos@knightpiesold.com
Company: Knight Piésold and Company	Telephone: 1-604-685-0543

Invoice to:

Name: Cory Vos	Address: Suite 1400 - 750 West Pender Street
Company: same as above	Vancouver, B.C Canada, V6C 2T8
E-mail:	Telephone: 1-604-685-0543

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☐ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☐

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: ______ **Sampler's Site Information** State______ Zip code______ Time Zone______

***Sampler's Signature:** ______ *I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION — ANALYSES REQUESTED *(attach list or use quote number)*

Quote #: ABA 1312

PO#: 12672

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	ABA	SPLP						
JCBEP-1		O	1	☒	☒	☐	☐	☐	☐	☐	☐
CRBR-1		O	1	☒	☒	☐	☐	☐	☐	☐	☐
C2DSR-1		O	1	☒	☒	☐	☐	☐	☐	☐	☐
C2LB-1		O	1	☒	☒	☐	☐	☐	☐	☐	☐
IGDSS-1		O	1	☒	☒	☐	☐	☐	☐	☐	☐
IGLV-1		O	1	☒	☒	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐
				☐	☐	☐	☐	☐	☐	☐	☐

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

matrix: CRUSHED ROCK

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
		[signature]	6/11/20 1050

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L59593 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Cynthia Parnow
Knight Piesold and Co.
1999 Broadway, Suite 900
Denver, CO 80202

Page 1 of 3
3/9/2020

Quote Number: ABA-1312

Matrix: Soil   Modified ABA and SPLP West of Mississippi Extraction on 1 soil sample

Parameter	Method	Detection Limit	Cost/Sample
Diskette/QC Summary			
Quality Control Summary			$0.00
Inorganic Prep			
Total Hot Plate Digestion	M3010A ICP		$0.00
Login Review			
Labor Charges for Sample Prep			$28.00
Metals Analysis			
Arsenic (1312)	M6010D ICP	0.04 mg/L	$10.25
Barium (1312)	M6010D ICP	0.007 mg/L	$10.25
Cadmium (1312)	M6010D ICP	0.008 mg/L	$10.25
Chromium (1312)	M6010D ICP	0.01 mg/L	$10.25
Lead (1312)	M6010D ICP	0.03 mg/L	$10.25
Mercury (1312)	M7470A CVAA	0.0002 mg/L	$26.75
Selenium (1312)	M6010D ICP	0.05 mg/L	$10.25
Silver (1312)	M6010D ICP	0.01 mg/L	$10.25
Misc.			
Electronic Data Deliverable			$0.00
Sample Preparation			
Air Dry at 34 Degrees C	USDA No. 1, 1972		$8.25
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3		$18.50
Synthetic Precip. Leaching Procedure	M1312		$77.25
Soil Analysis			
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	Calculation	$0.00
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	Calculation	$0.00
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	Calculation	$0.00
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.1 %	$16.50
Sulfur Forms	M600/2-78-054 3.2.4-MOD	0.01 %	$76.25

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Cynthia Parnow
Knight Piesold and Co.
1999 Broadway, Suite 900
Denver, CO 80202

3/9/2020

Cost/Sample: **$323.25**

This quote is based on a Standard Turn Around Time of approximately 21 days for soil and solid matrices (15 business days). TAT may vary with seasonal heavy workload. Please contact your PM if rush TAT is required. Rush TAT needs to be pre-approved prior to sample shipment to assure that due dates can be met. Pricing includes standard reporting formats and standard ACZ EDDs. All projects received are subject to a $125.00 Minimum Charge. Please note that method detection limits are estimates and may be elevated depending on sample matrix that require dilution. Pricing includes coolers, soil jars or bags, labels, COCs and ice-packs (if needed for your analysis), shipped to your site or office via UPS ground. Return shipping is the responsibility of the client. Please allow ample time for your bottles to arrive. Please note that soil preparation charges may change based on the condition and volume of sample(s) upon receipt. Wet samples may increase the TAT if air-drying is needed required. ACZ assigns a Project Manager to all of our clients. Your Project Manager is Max Janicek. Max will serve as your main point of contact for all bottle orders, report statuses, questions on your data and changes to your account, and can be reached at maxj@acz.com or 970-879-6590 ext 128.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Cynthia Parnow
Knight Piesold and Co.
1999 Broadway, Suite 900
Denver, CO 80202

3/9/2020

Quote Number: ABA-1312

CONTRACT DETAILS
Pricing includes coolers, bottles pre-preserved as needed, labels, COCs and ice-packs shipped to your site or office via UPS ground. Return shipping is the responsibility of the client. Please allow three to five days for delivery when ordering containers. ACZ must be notified prior to receiving samples of all special requests such as electronic data deliverables or special reporting requirements. The client will be charged for special sample containers or express shipping and additional charges may apply for non-standard requests.

This quotation is valid for six months from the bid date unless specified otherwise in the bid. All bids must be signed and returned to ACZ before the project(s) is received. The authorized signature represents acceptance of the pricing as well as the general terms and conditions of ACZ Laboratories, Inc. which may be downloaded from our web site at http://www.acz.com/wp-content/uploads/2015/10/ACZ_Terms_Conditions.pdf. Please note that MDL's in this quote may possibly increase due to sample matrix or samples with high TDS.

All orders that require shipping of coolers are subject to a minimum charge of $200.00. Local orders without shipping are subject to a minimum charge of $125.00. Samples may incur a $11.00/sample disposal fee for any samples deemed to be hazardous.

ACZ Representative (Authorized signature and date) ______________________

Client Representative (Authorized signature and date) ______________________

KNIGHT PIESOLD AND CO.
1999 BROADWAY SUITE ~~600~~ 900
DENVER, COLORADO 80202-5706
(303) 629-8788
FAX (303) 629-8789

PURCHASE ORDER

PRIVILEGED AND CONFIDENTIAL

12672

Show this Purchase Order Number on all correspondence, invoices, shipping papers and packages.

TO ACZ Labs

DATE 6-9-20

SHIP TO
Knight Piesold
1999 Broadway Suite 900
Denver Co 80202

PROJECT #	TASK	QTY	DESCRIPTION	BILLABLE Y/N	UNIT PRICE	TOTAL
VA103-00640/01 Klamath		6	modifies ABA	yes		
		6	SPLP	yes		

The parties hereby incorporate the requirements of 41 C.F.R. § 60-1.4(a) and 29 C.F.R. § 471, Appendix A to Subpart A, if applicable. This contractor and subcontractor shall abide by the requirements of 41 CFR 60-300.5(a) and 41 CFR 60-741.5(a), if applicable. These regulations prohibit discrimination against qualified protected veterans and qualified individuals with disabilities, and require affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans and qualified individuals with disabilities.

EMP. #	EMPLOYEE SIGNATURE	EMP. #	PRINCIPAL SIGNATURE
	X		X

EMP. #	P.M. / DEPT. MANAGERS SIGNATURE	OTHER
894	X	☐ CHECK WITH PM FOR PAYMENT

EQUAL OPPORTUNITY EMPLOYER

1. Please send ____________ copies of your invoice.
2. Order is to be entered in accordance with prices, delivery and specifications shown above.
3. Notify us immediately if you are unable to ship as specified.

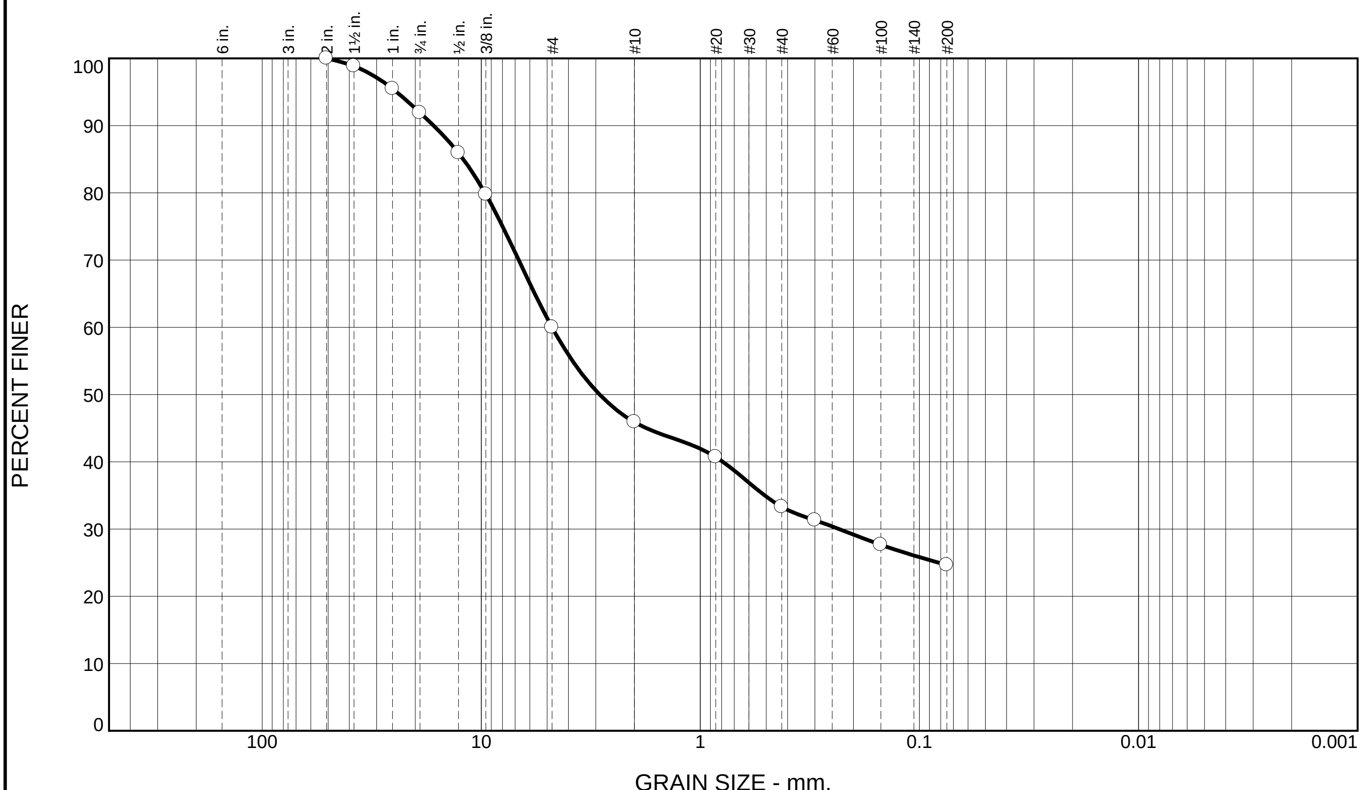
Knight Piésold CONSULTING

APPENDIX E

Granular Fill Particle Size Analysis and Atterberg Limit Laboratory Results

(Pages E-1 to E-8)

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.1	31.9	14.1	12.6	8.6	24.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	98.8		
1	95.5		
0.75	91.9		
0.5	85.9		
0.375	79.8		
#4	60.0		
#10	45.9		
#20	40.7		
#40	33.3		
#50	31.3		
#100	27.7		
#200	24.7		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 25 LL= 59 PI= 34

Coefficients

D_{90}= 16.5058 D_{85}= 12.0815 D_{60}= 4.7536
D_{50}= 2.8811 D_{30}= 0.2328 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-2-7(2)

Remarks

Collected sample along toe of slope.

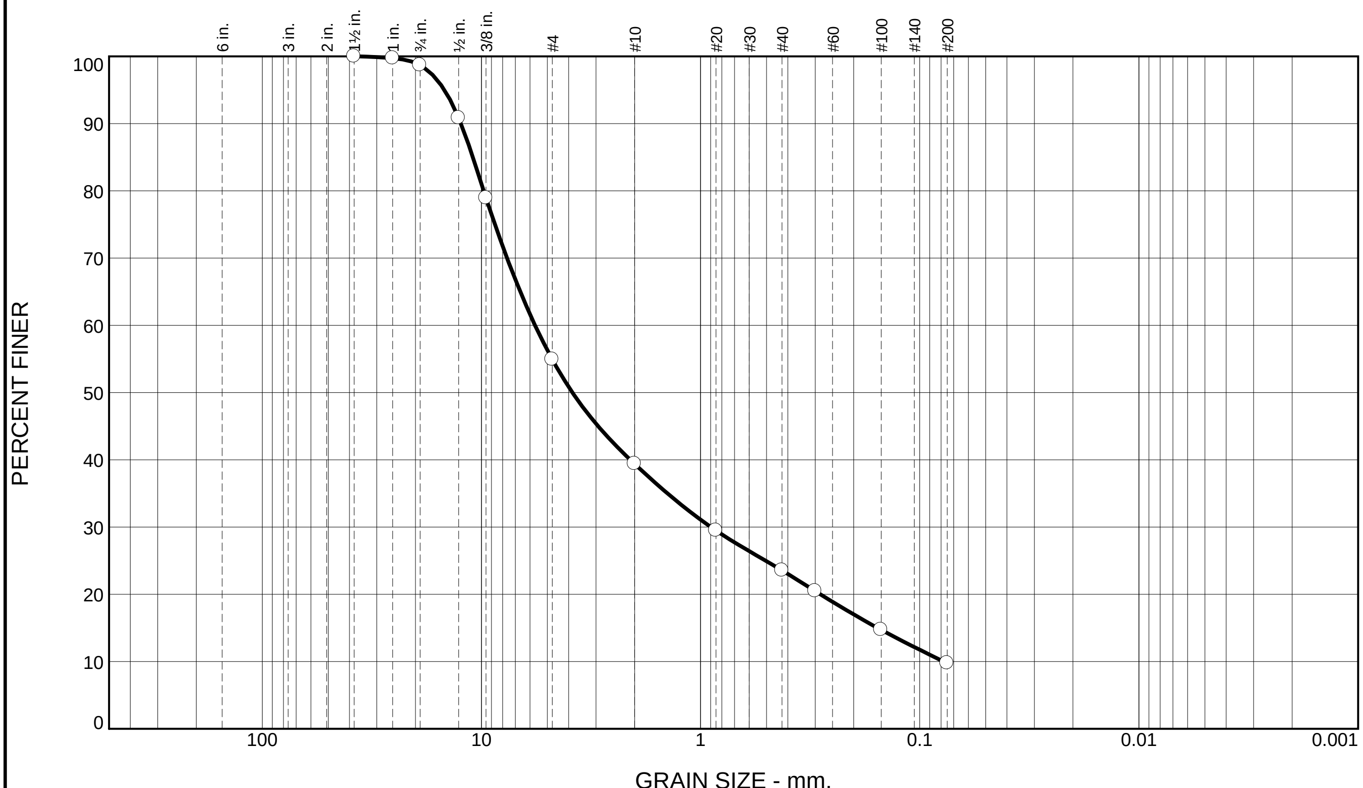
Location: Iron Gate - Worker's Accomodation Area
Sample Number: IGWA-GF1 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** IGWA-GF1

Tested By: bh **Checked By:** spb

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.3	43.8	15.5	15.9	13.8	9.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	99.7		
0.75	98.7		
0.5	90.8		
0.375	78.9		
#4	54.9		
#10	39.4		
#20	29.5		
#40	23.5		
#50	20.5		
#100	14.7		
#200	9.7		

* (no specification provided)

Soil Description

well-graded sand with silt and gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 12.4046 D_{85}= 10.9464 D_{60}= 5.6925
D_{50}= 3.8426 D_{30}= 0.8975 D_{15}= 0.1557
D_{10}= 0.0778 C_u= 73.16 C_c= 1.82

Classification

USCS= SW-SM AASHTO= A-1-a

Remarks

Road wearing course sample.

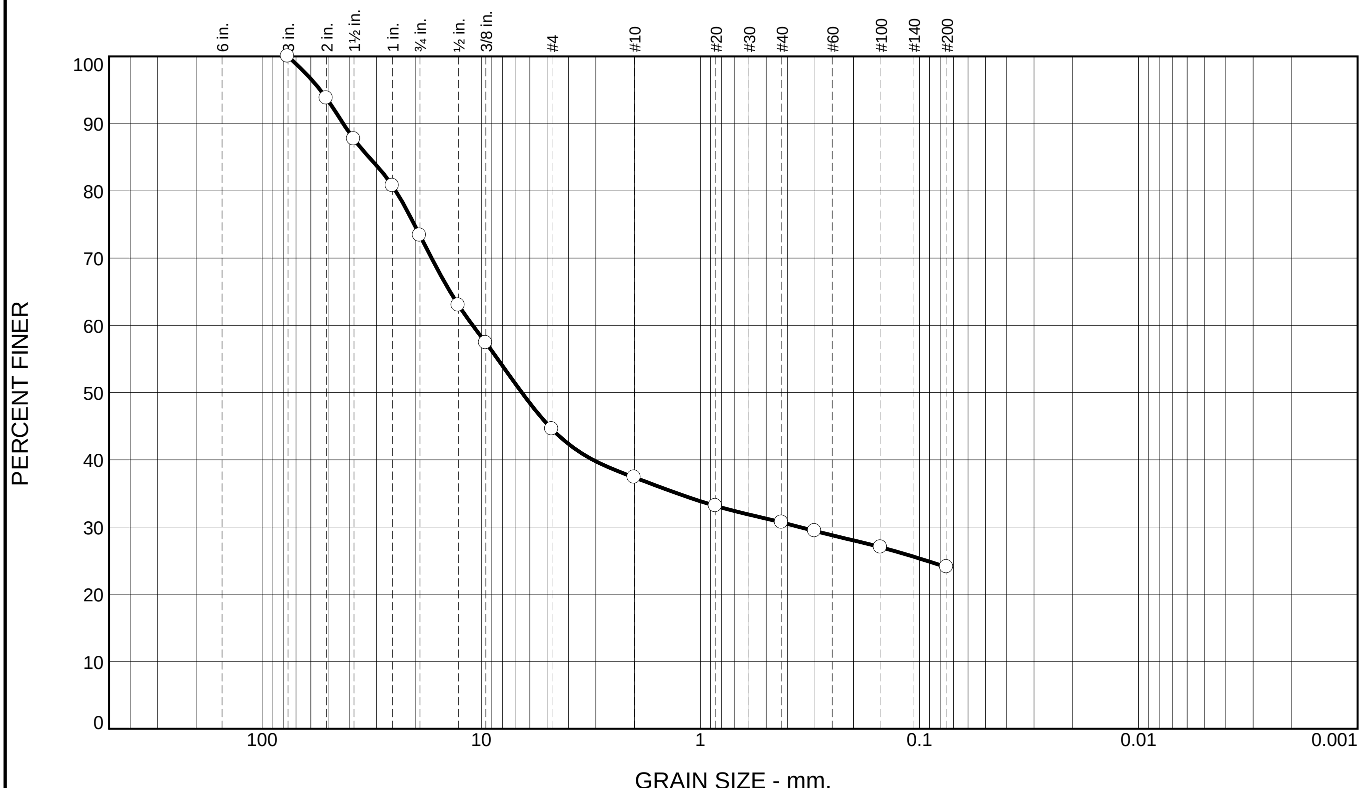
Location: Iron Gate - Lakeview Road
Sample Number: LV-GF1 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** LV-GF1

Tested By: bh **Checked By:** spb

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.6	28.9	7.1	6.7	6.7	24.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	93.8		
1.5	87.7		
1	80.7		
0.75	73.4		
0.5	63.0		
0.375	57.4		
#4	44.5		
#10	37.4		
#20	33.1		
#40	30.7		
#50	29.4		
#100	27.0		
#200	24.0		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= 30 LL= 34 PI= 4

Coefficients

D_{90}= 42.6385 D_{85}= 32.5200 D_{60}= 10.9473
D_{50}= 6.5278 D_{30}= 0.3530 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-1-b

Remarks

Surficial grab sample obtained on slope.

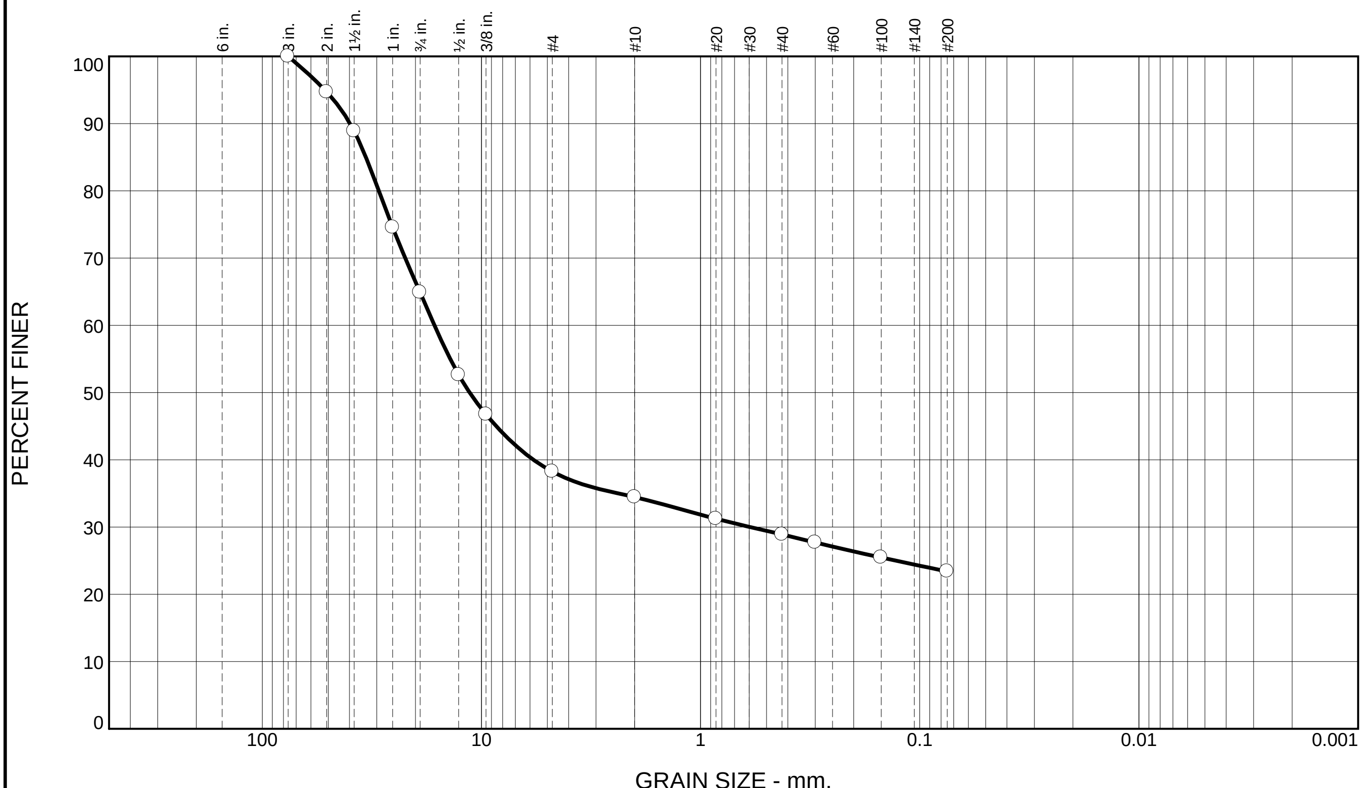
Location: Copco 1 - Village
Sample Number: C1V-1 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** C1V-1

Tested By: bh **Checked By:** spb

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	35.1	26.7	3.7	5.6	5.5	23.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	94.7		
1.5	88.9		
1	74.6		
0.75	64.9		
0.5	52.6		
0.375	46.7		
#4	38.2		
#10	34.5		
#20	31.2		
#40	28.9		
#50	27.7		
#100	25.5		
#200	23.4		

* (no specification provided)

Soil Description

clayey gravel

Atterberg Limits

PL= 21 LL= 52 PI= 31

Coefficients

D_{90}= 39.7455 D_{85}= 33.6697 D_{60}= 16.3758
D_{50}= 11.3239 D_{30}= 0.5938 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-2-7(2)

Remarks

Existing native stockpile on west side of slope.

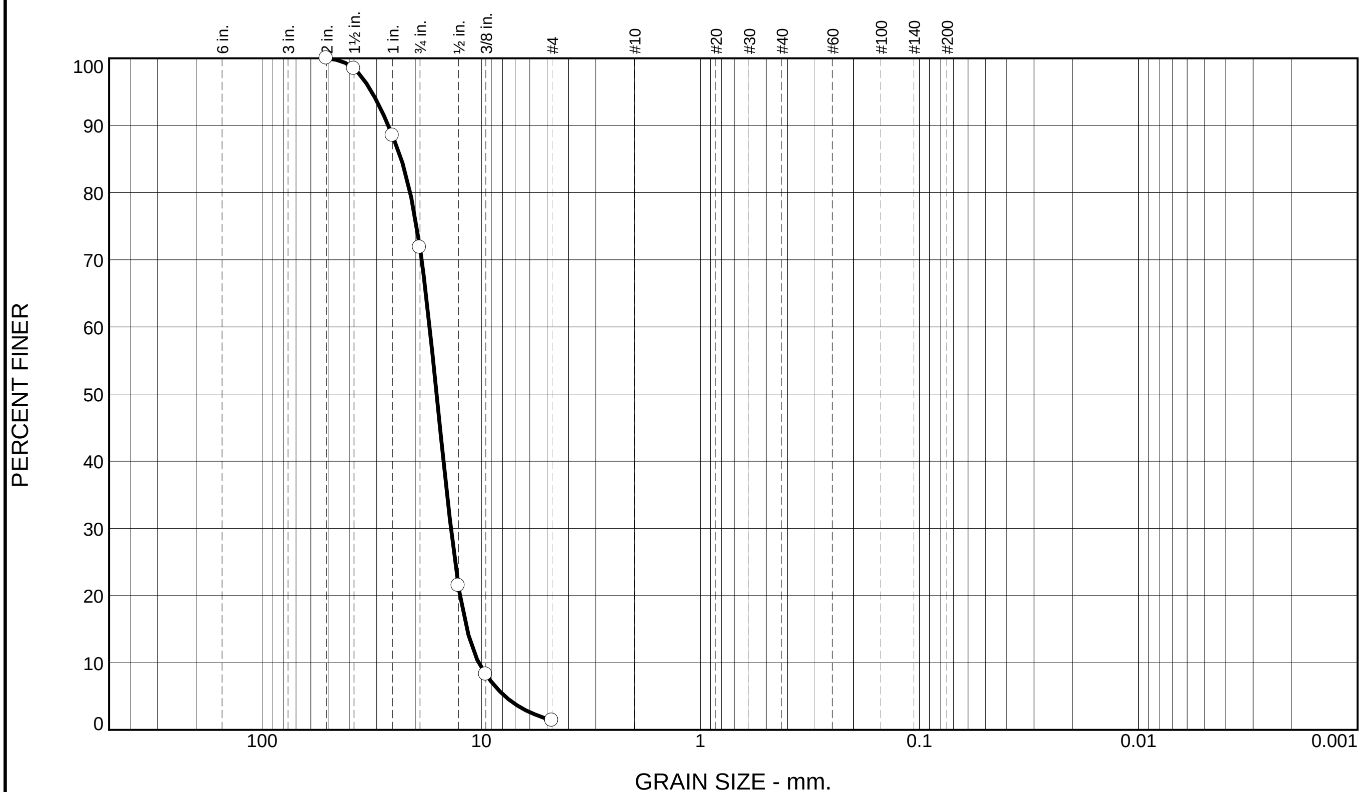
Location: Copco 2 - Wood-stave Penstock
Sample Number: C2WP-1 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** C2WP-1

Tested By: bh **Checked By:** spb

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	28.2	70.4				1.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	98.5		
1	88.5		
0.75	71.8		
0.5	21.5		
0.375	8.2		
#4	1.4		

* (no specification provided)

Soil Description

poorly graded gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 26.5753 D_{85}= 23.1885 D_{60}= 17.2102
D_{50}= 15.9826 D_{30}= 13.7570 D_{15}= 11.6275
D_{10}= 10.2765 C_u= 1.67 C_c= 1.07

Classification

USCS= AASHTO=

Remarks

Granular Fill grab sample obtained from center of slope.

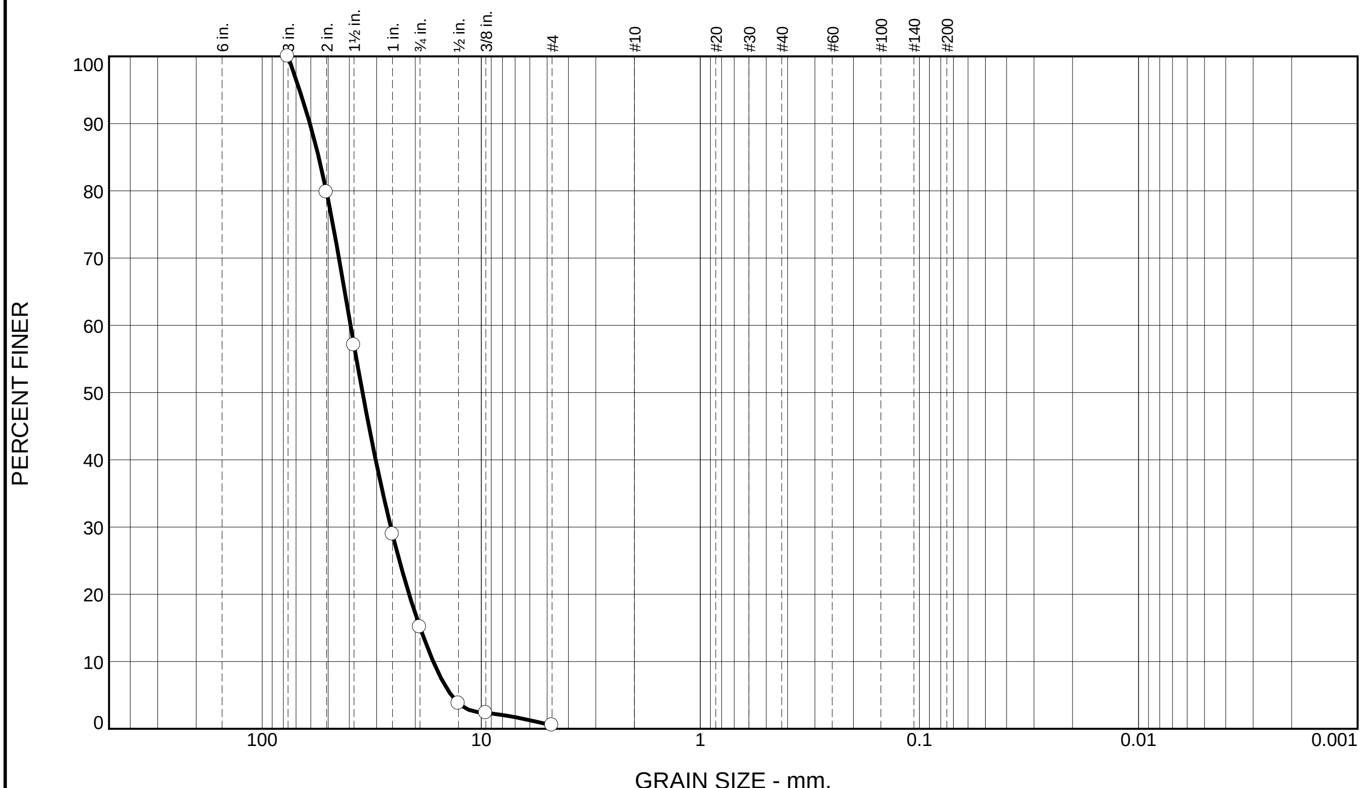
Location: Copco 2 - Wood-stave Penstock
Sample Number: C2WP-2 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** C2WP-2

Tested By: bh **Checked By:** spb

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	84.9	14.6				0.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	79.8		
1.5	57.1		
1	28.9		
0.75	15.1		
0.5	3.8		
0.375	2.4		
#4	0.5		

* (no specification provided)

Soil Description

poorly graded GRAVEL

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 60.5507 D_{85}= 55.1559 D_{60}= 39.4960
D_{50}= 34.8205 D_{30}= 25.8787 D_{15}= 18.9919
D_{10}= 16.5629 C_u= 2.38 C_c= 1.02

Classification

USCS= AASHTO=

Remarks

Granular Fill grab sample obtained on right side of slope.

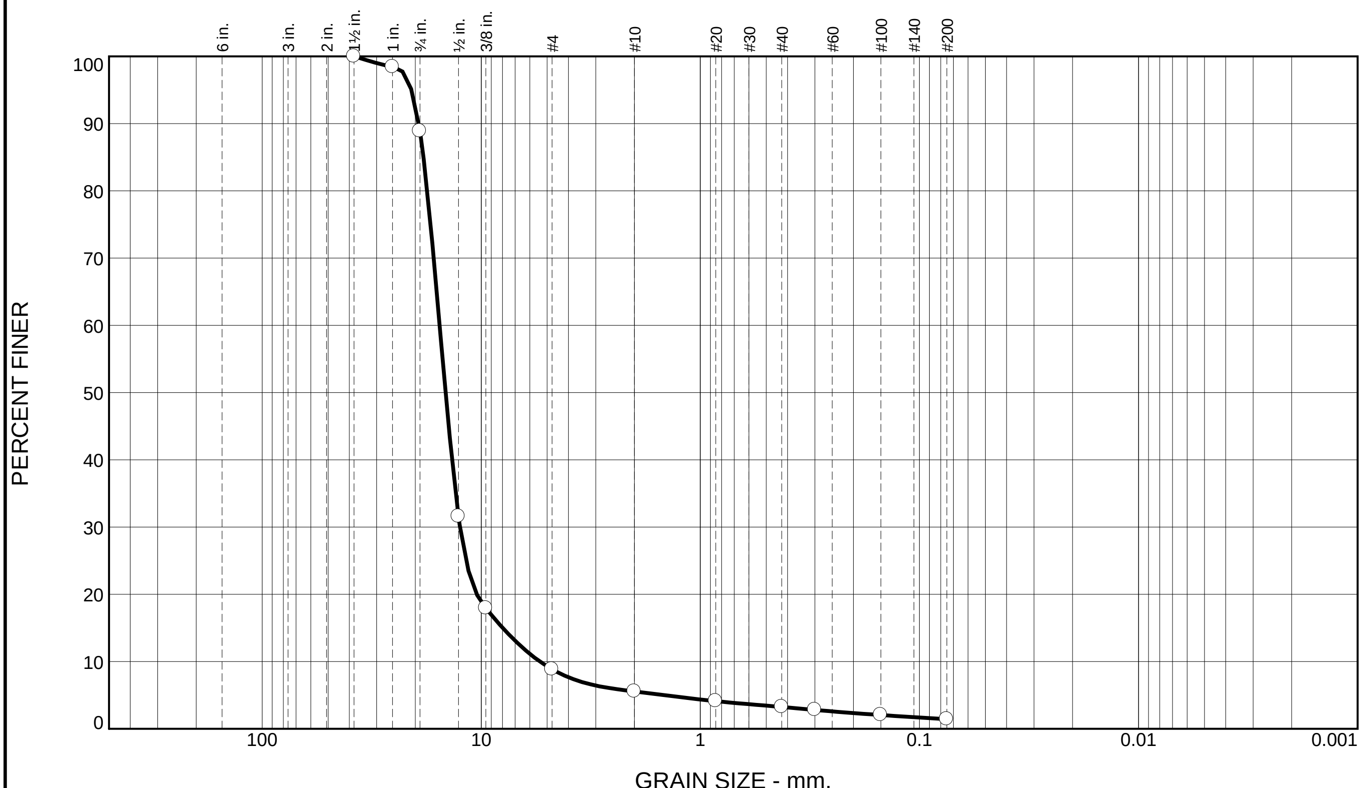
Location: Copco 2 - Wood-stave Penstock
Sample Number: C2WP-3 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** C2WP-3

Tested By: bh **Checked By:** spb

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.1	80.0	3.3	2.4	1.8	1.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	98.4		
0.75	88.9		
0.5	31.6		
0.375	17.9		
#4	8.9		
#10	5.6		
#20	4.1		
#40	3.2		
#50	2.8		
#100	2.0		
#200	1.4		

* (no specification provided)

Soil Description

poorly graded gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 19.2828 D_{85}= 18.3594 D_{60}= 15.4807
D_{50}= 14.5465 D_{30}= 12.5001 D_{15}= 7.9801
D_{10}= 5.3938 C_u= 2.87 C_c= 1.87

Classification

USCS= GP AASHTO= A-1-a

Remarks

Granular Fill grab sample obtained within existing road wearing course.

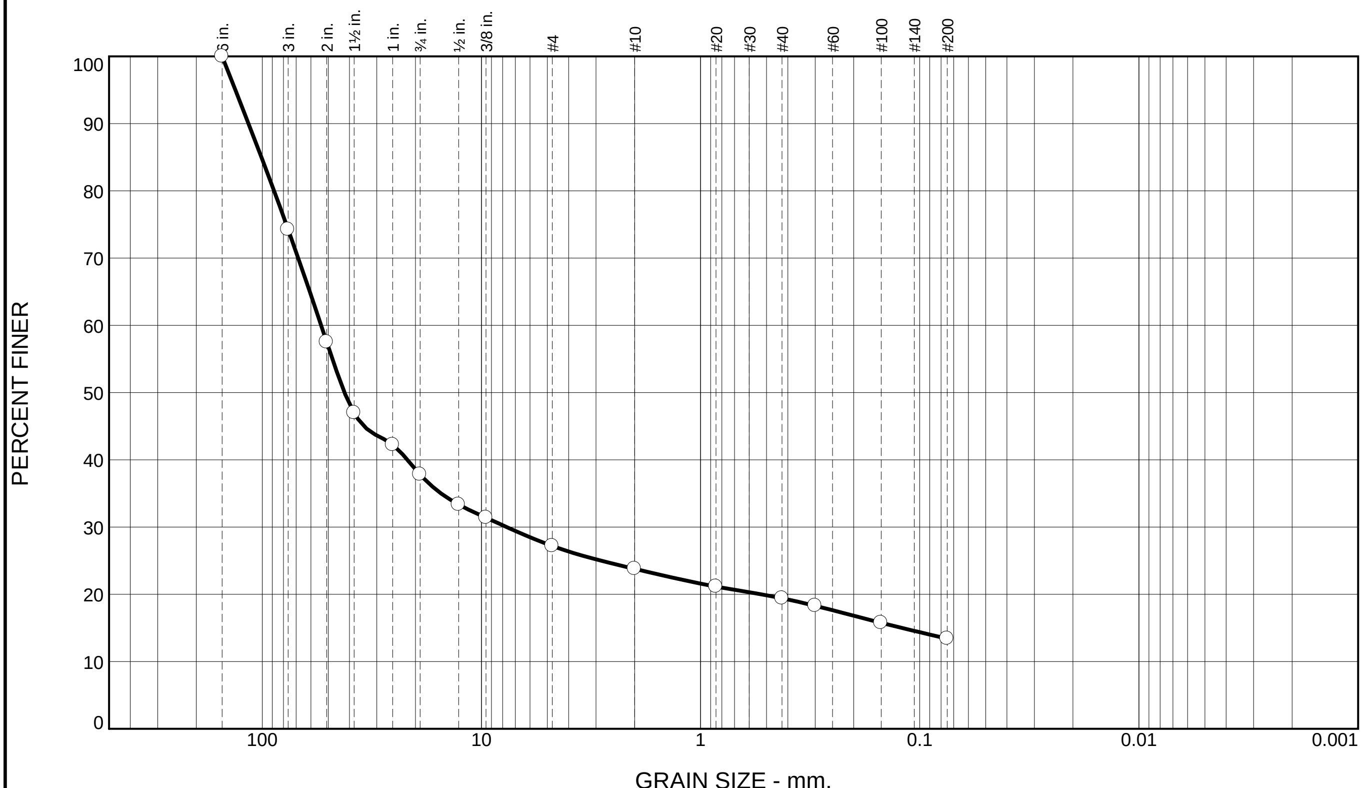
Location: JC Boyle - Powerhouse Area
Sample Number: JCBP-GF1 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** JCBP-GF1

Tested By: bh **Checked By:** spb

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
25.8	36.4	10.6	3.4	4.4	6.0	13.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
6	100.0		
3	74.2		
2	57.5		
1.5	47.0		
1	42.2		
0.75	37.8		
0.5	33.3		
0.375	31.4		
#4	27.2		
#10	23.8		
#20	21.1		
#40	19.4		
#50	18.3		
#100	15.8		
#200	13.4		

* (no specification provided)

Soil Description

clayey gravel with sand, some cobbles

Atterberg Limits

PL= 20 LL= 33 PI= 13

Coefficients

D_{90}= 115.5458 D_{85}= 100.8857 D_{60}= 53.8792
D_{50}= 42.1124 D_{30}= 7.6707 D_{15}= 0.1207
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

Granular Fill grab sample north of access road on west side of pipes.

Location: JC Boyle - Powerhouse Area
Sample Number: JCBP-GF2 **Depth:** Surf. **Date:** 5/20/20

Knight Piésold CONSULTING

Client: Kiewit Infrastructure West Co.
Project: Klamath River Renewal Project
Project No: VA103-00640.01 **Sample** JCBP-GF2

Tested By: bh **Checked By:** spb