Kilarc Diversion Dam Geomorphic Assessment

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DATE: May 20, 2008

This technical memorandum provides an assessment of the sediment stored behind Pacific Gas and Electric Company's (PG&E's) Kilarc Diversion Dam in support of PG&E's planned decommissioning of the Kilarc portion of Kilarc-Cow Creek, FERC Project No. 606. The assessment focuses on the particle size distribution, potential for trace metal accumulations, and potential scour volume of these depositional materials. This memorandum is organized as follows:

- Introduction
- Background
- Methods
- Results
- Recommendations

Introduction

North State Resources, Inc. (NSR) prepared this Technical Memorandum to provide an assessment of depositional materials (sediment) stored in the impoundment created by the Kilarc Diversion Dam. This assessment relies on information and data obtained during field investigations at the impoundment in December 2007 and March 2008, supplemented by the results of laboratory analysis.

The report includes recommendations for decommissioning with respect to sediment release and the excavation and storage of stored sediment. Data collected for this assessment will be used to assist PG&E in determining potential impacts to the environment associated with future sediment management actions.

Background

Under the direction of PG&E, NSR collected bulk samples from the sediments stored behind the Kilarc Diversion Dam. These bulk samples were used to determine the particle size distribution of sediment stored behind the dam. NSR also conducted a screening-level site assessment using the Buchman (1999) criteria for trace metals to determine the presence or absence of mercury (Hg), methylmercury (MeHg), copper (Cu), Silver (Ag), and arsenic (As) within the stored sediment. This screening-level assessment indicated elevated Cu results, and additional laboratory analysis for this metal was conducted. Finally, NSR surveyed the topography of the sediment deposit and the longitudinal profile of the stream channel upstream and downstream of the dam.

Methods

This assessment was prepared by Jim Fitzgerald, Certified Engineering Geologist (#2436), with support from other NSR staff in accordance with standard industry practices for sites of this type and Business and Professions Code section 7800 et seq. (California Geologists and Geophysicists Act). All field work described in the following paragraphs was performed in December 2007 and April 2008.

To characterize the horizontal and vertical distribution of stored sediment, boreholes were located at representative locations across the area of the deposit in a manner that would account for spatial variation in the texture of the substrate. The sampling scheme was designed to determine the heterogeneity of the depositional features associated with the diversion dam. Within the stratified sampling area, the boreholes were located by sedimentary facies (e.g., gravel bar versus thalweg) and bored vertically. The bulk and trace metal sediment samples were taken from boreholes that penetrated gravel with at least some fine sediment less than 2 millimeters (mm) in diameter.

Four bulk sediment samples were collected from alluvial deposits stored behind the Kilarc Diversion Dam. The borehole locations were chosen to best represent the depositional features associated with the stored sediment. The borehole locations were limited by the abundance of boulder size material at the surface and the depth and velocity of Old Cow Creek. Figure 1 illustrates the locations of the boreholes relative to the diversion dam.

The bulk sediment samples were dried and sieved at the Graham Matthews Associates (GMA) sediment laboratory using the sieve mesh sizes listed in Table 1; the particles trapped in the sieves were measured to determine the percentile of particle distribution and weighed to determine the cumulative percent dry weight. Appendix A provides laboratory results received from GMA.

Table 1. Sieve Mesh Size Breaks for Particle Size Analysis

U.S. Standard Sieve Mesh Size (mm)	Wentworth Scale Size Gradation
256	Cobble large
180	
128	Cobble small
90	
64	Cobble–gravel break
45	Gravel very coarse
31.5	
22.4	Gravel coarse
16	
11.2	Gravel medium
8	
5.6	Gravel fine
4	
2.8	
2	Gravel–sand break
0.063	Sand–silt break
Pan	

The sediment dry weight by particle size was also calculated by proportioning the in-place volume of stored sediment using the bulk sample particle size results. Because the boreholes were shallow (i.e., < 2 feet (ft)), this assessment assumes that the averaged particle size results represent the distribution of the entire volume of stored sediment.

Bulk sediment samples K-I, K-II, and K-III were collected from a gravel bar on the upstream northeast side of the diversion dam. Sample K-IV was collected near the thalweg 20 ft upstream of the diversion dam (Figure 1). The depth of the boreholes was limited to about 2 ft due to the large cobble and coarse gravel texture of the stored sediment. Near the dam, the boreholes penetrated the top 10% of the deposit. A high fraction of the substrate is boulder size material (> 300 mm) based on visual observations.

The trace metals assessment analyzed the samples for total solids and the dry weight concentration of Hg, MeHg, Cu, Ag, and As. The samples were field sieved, and sand size material (i.e., < 2mm) was collected in Certified Precleaned plastic jars with Teflon lids and sent to Brooks Rand Laboratory for analysis. The sediment sample volume was between 8 and 12 ounces per sample. Appendix B provides the laboratory results for trace metals received from Brooks Rand Laboratory.

Two of the sediment samples were used to measure Hg, MeHg, Ag, and As; these samples were collected from boreholes K-II and K-III, as shown on Figure 1. Due to the lack of silt/clay present in the borehole samples, the maximum sample particle size had to be increased from < 0.063 mm to < 2 mm to obtain an adequate sample volume.

Four of the sediment samples were used to measure total Cu and leachable Cu; these samples were collected from boreholes K-I, K-II, K-III, and K-IV (Figure 1). These samples were collected as described above for the other trace metals. Like for the other trace metal samples, attempts were made to collect sediment less than 0.063 mm (silt and clay). Only sample K-I had enough silt/clay to collect the minimum sample volume required for trace metal analysis (about 10 grams).

Leachable Cu was analyzed at the Brooks Rand Laboratory using the weak acid leachate test described by Giddings et al. (2001) (Appendix B). This test extracts the Cu that is weakly adsorbed to the sediment surface by running a weak hydrochloric acid over the sample for a fixed amount of time and measuring the resulting dissolved Cu concentration.

Trace metal sediment quality criteria published by the National Oceanic and Atmospheric Administration (NOAA) (Buchman 1999) and the Canadian Council of Ministers of the Environment (2000) and concentrations reported by the U.S. Geological Survey (USGS) (2001) were used as "screening" values since specific sediment quality standards have not been established by the State of California. The NOAA and Canadian criteria were not developed for regulatory purposes; rather, they were established as screening values to be used as part of geochemical investigations to determine the relative importance of the trace metal concentrations and likelihood of adverse biological effects.

The measured concentrations of metals in sediment samples (< 0.063 mm in diameter) taken from behind the Kilarc Diversion Dam were compared to the NOAA and Canadian trace metal sediment screening values and the concentrations reported by USGS (2001). The NOAA publication summarizes existing trace metal data and reports the range of background concentrations, the Threshold Effects Level (TEL), Probable Effects Level (PEC), and Upper Effects Threshold (UET) (Buchman 1999). The Canadian guidelines offer two trace metal risk levels: a lower value called an interim sediment quality guideline (ISQG) and an upper value called the probable effect level (PEL) (Canadian Council of Ministers of the Environment 2000).

The NOAA and Canadian studies indicate that trace element concentrations below the TEL and ISQG are unlikely to be associated with adverse biological effects; conversely, concentrations above the PEC and PEL are likely to be associated with adverse biological effects. Trace element concentrations between the ISQG and PEL fall within the range where effects are possible (Buchman 1999). These trace metal sediment quality guidelines are used in this investigation as screening values that can be used to develop and focus management decisions. The concentration of leachable Cu was used to assess the potential for solid Cu to enter the water column and degrade water quality. According to Giddings et al. (2001), the weak acid leachate test, described above, is intended to provide a more conservative estimate of trace metal availability to compare with water quality objectives.

At Kilarc Diversion Dam, the surface topography of stored sediment was surveyed, and longitudinal channel profiles were surveyed upstream and downstream of the dam. The survey was completed using a Nikon 522 Total Station. A measurement precision of ± 0.01 ft for control points and ± 0.1 ft for foreshots was achieved. The Total Station is accurate to ± 0.01 ft at 500 ft and ± 0.1 ft at 1,000 ft. Known local control points were surveyed to help ensure horizontal and vertical accuracy relative to the established benchmark elevations (located on the dam abutment wall).

A total of 741 ft of water course was surveyed using the Total Station. A total of 487 individual points, each measuring the northing, easting, and elevation of a specific point, were used to measure the topography of stored sediment, the thalweg bed surface, the diversion dam, and downstream right and left bankfull features. The surveyed horizontal position coordinates were translated to latitude and longitude using the Northern American Horizontal Datum 1983 (feet), State Plain, California Zone 1 datum. The surveyed elevations were translated to feet above mean sea level using the National Geodetic Vertical Datum 1929.

At a minimum, survey points were collected when surface topography changed plus or minus 0.5 ft. Three local benchmarks were surveyed to help ensure horizontal and vertical accuracy relative to the established benchmark elevation (BM-1- PG&E Survey Cap, 3840.00 feet above sea level). Two benchmarks are established on each of the diversion dam abutments and a third is established on a large boulder well above flood stage on the right bank near the diversion dam's right abutment. The surface topography was surveyed in enough detail to produce a 1 ft interval contour map (Figure 2).

The longitudinal profile survey extended 270 ft upstream and 471 ft downstream of the diversion dam and measured the stream channel thalweg, slope breaks, and stable control points. The longitudinal profile survey measured elevation points at intervals sufficient to characterize all local changes in bed gradient.

The in-place volume and weight of stored sediment were calculated by subtracting the volume of cut between the Triangular Irregular Network (TIN) surface layer and the projected TIN subsurface layer using spatial data incorporated into a GIS project. The TIN subsurface layer represents the horizontal and vertical scour potential. The actual depth of the stored sediment was only measurable just upstream of the dam and at the scour control point. The horizontal extent and vertical depth of scour were estimated using the longitudinal profile, potential scour grade trend line, upper bank slope, and visual field observations. The subsurface contours were generated using these results and represent the potential topography of the bed and bank of Old Cow Creek if the dam is removed. The accuracy of the TIN layers is limited to a 2-ft contour interval. The accuracy of the surface TIN layer is ± 1 ft and the accuracy of the subsurface TIN layer is ± 2 ft (Figures 2 and 3).

Results and Discussion

Bulk Sample Particle Size

The percentile of particle distribution (d_x) was calculated for each bulk sample (Table 2). Within the sample set, particle size distributions ranged from a minimum d_5 of 0.27 mm (sample K-I) to a maximum d_{90} of 228.7 mm (K-III). The averaged median size (d_{50}) for all bulk samples is 48.1 mm with an average d_5 of 2.3 mm and an average d_{90} of 119.8 mm. In order of increasing d_{50} size, the ranks of the samples are K-I, K-II, K-IID, K-III, and K-IV.

Table 2. Kilarc Diversion Dam Bulk Sediment Sample Particle Size Distribution Percentile Statistics

	Sample ID				
Percentile of Particle Distribution	K-I Gravel Bar Near Bank (mm)	K-II Mid-Gravel Bar (mm)	K-IID Mid-Gravel Bar (Duplicate) (mm)	K-III Mid-Gravel Bar Behind Upstream Side of Dam (mm)	K-IV Thalweg Near Canal Diversion Intake (mm)
D5	0.27	0.56	0.58	1.43	8.42
D16	0.88	4.28	3.66	6.99	24.44
D25	2.13	8.89	10.16	14.62	38.79
D35	4.15	13.29	15.51	25.84	64.76
D50	8.69	20.19	24.36	70.20	117.28
D65	17.99	32.07	37.15	114.93	140.21
D75	28.68	41.30	48.43	193.07	150.58
D84	45.05	52.83	66.71	213.71	160.57
D90	54.85	62.72	85.19	228.68	167.60

For Quality Assurance and Quality Control purposes, samples K-II and K-IID are duplicate samples and have an average size difference of 15.1% in similar statistical divisions. The samples have a 20.7% difference in d_{50} values with a low difference of -14.7% (d_{16}) and a high difference of 35.8% (d_{90}). Each bulk sample was collected from visibly different sedimentary facies starting from the thalweg (K-IV) to the outside of the gravel bar (K-I) immediately upstream and adjacent to the dam (Figure 1). The particle size (from d_5 to d_{65}) for all samples decreased as distance from the thalweg increased. However, D_{75}, D_{84}, and D_{90} are higher in the sample collected from the gravel bar just upstream of the dam (sample K-III) than from the sample collected from thalweg (sample K-IV). Sample K-III has the highest d_{90} (228.7 mm), but visual observations indicate that the largest particles (boulders) are located in the thalweg (sample K-IV) and that these particles were too large to sample. The decrease in particle size from K-III to K-IV may indicate a sampling bias simply because the large boulders in the thalweg were too large to remove or because the large boulders at samples locations K-II, K-III, and K-IV made it difficult to extricate a representative sample. This means that the bulk sample results under-represent the proportion of the stored sediment that is larger than 300 mm in diameter.

The particle size analysis data from the four bulk samples were used to group particles into four size categories: greater than 64 mm (cobble-boulder); 2–64 mm (gravel); 2–0.063 mm (sand); and less than 0.063 mm (silt/clay) (Table 3). Each sample was classified using the Wentworth Scale (Table 1). All of the samples were classified as cobble or gravel. Visual field observations show that there is a fifth particle size class made up of material greater than 300 mm that could not be bulk sampled. This larger size class represents between 40% and 50% of the stored sediment. Therefore, Table 3 under-represents the proportion of material in the boulder size class.

Table 3. Summary of Percent Cobble +, Gravel, Sand, and Silt by Weight for Bulk Samples from Old Cow Creek Near Kilarc Diversion

	Site ID				
Particle Size Category	**K-I Gravel Bar Near Bank (%)**	**K-II Mid-Gravel Bar (%)**	**K-IID Mid-Gravel Bar (duplicate) (%)**	**K-III Mid-Gravel Bar Behind Upstream Side of Dam (%)**	**K-IV Thalweg Canal Diversion Intake (%)**
Boulder-cobble >64mm	5.3	9.3	17.0	52.4	65.3
Gravel 64mm–2mm	70.6	79.2	70.6	41.2	33.9
Sand 2mm–063mm	23.6	11.3	12.2	23.6	23.6
Silt <.063	0.5	0.2	0.2	0.1	0.0
Wentworth Classification	Fine gravel	Medium gravel	Coarse gravel	Gravelly cobble	Gravelly cobble

For all of the bulk samples, about 10% of the dry weight is sediment less than 2 mm. There is very little to no silt/clay size sediment (all samples less than 0.5%) (Table 3). Silt/clay size sediment (< 0.063 mm) constitutes 0.2% of the average dry weight, with a maximum dry weight of 0.5% and a minimum of 0.0% (Table 3). Particles between 0.063 mm and 2 mm (sand) comprise 18.9% of the dry weight of all the combined bulk samples, with a maximum of 23.6% and a minimum of 11.3%. For particle sizes greater than 64 mm (cobble), the average cumulative percent by weight for all bulk samples is 29.9 %, with a

maximum of 65.3% and a minimum of 5.3%. Particles between 2 mm and 64 mm (gravel) have an average dry weight of 59.1%, with a maximum of 79.2% and a minimum of 33.9%.

The particle size data statistics indicate that the proportion of cobble size particles decreases and the proportion of silt size particles increases as the horizontal distance from the thalweg increases. There are no measurable differences in the percentage of sand (11.5%) for samples collected from active gravel bars. The relative amount of cobble size material increased 35% between the mid-channel gravel bar at the upper end of the diversion pool (sample K-II) and the mid-channel gravel bar located directly upstream of the dam (sample K-III) (Figure 1)

Trace Metal Sediment Geochemistry

Two Hg, MeHg, Cu, Ag, and As sediment samples were collected at the Kilarc Diversion Dam from boreholes K-II and K-III taken from the gravel bar (Figure 1). Detectable amounts of Hg, MeHg, Ag, and As were measured (Table 4 and Appendix B).

Table 4. Kilarc Diversion Dam Bulk Sediment Sample Trace Metal Results

Sample ID	% Total Solids	Hg (ng/g)	MeHg (ng/g)	Ag 107 (mg/kg)	As 75 (mg/kg)
K-II	75.3	4.1	0.01	0.2	1.1
K-III	75.5	3.5	0.01	0.2	0.7

Field observations and geochemical data indicate that there is a low potential to release Hg, MeHg, Ag, and As from the depositional material stored behind the Kilarc Diversion Dam (Table 4). Overall, the geochemical data suggest that sediment samples have concentrations of these measured trace metals near background levels and below the published TEL and PEL sediment quality guidelines described above. The concentration of Cu, however, was elevated in both samples.

The concentrations of Hg and MeHg are not elevated in sediments stored behind the Kilarc Diversion Dam and are near background levels according to the NOAA and Canadian sediment quality standards (Table 4) where background = 4–51 mg/kg; TEL = 174 mg/kg; and PEL = 486 mg/kg.

The concentration of Ag is not elevated in sediments stored behind the Kilarc Diversion Dam and is near background levels according to the NOAA and Canadian sediment quality standards where background = <0.5 mg/kg. There is no TEL nor PEL for Ag in freshwater sediments.

The concentration of As is not elevated in sediments stored behind the Kilarc Diversion Dam and is near background levels according to the NOAA and Canadian sediment quality standards where background = 1.1 mg/kg; TEL = 5.9 mg/kg; and PEL = 17 mg/kg.

The trace metal laboratory results suggest that the concentration of Cu adsorbed to sand/silt/clay size material is elevated, and that the concentration of Cu is especially high and soluble (100%) for the silt/clay size fraction stored in mid-channel gravel bars upstream of the diversion dam (Figure 4). For one sample (K-I = 819 mg/kg), the measured concentration of Cu adsorbed to silt/clay for both the total and leachable Cu analyses is significantly elevated relative to the TEL (35.7 mg/kg) and PEL (197 mg/kg) (Figure 4 and Table 5). All of the other samples are above the TEL for total Cu (Figure 5 and Table 5): however, the leachable Cu results suggest that less than 30% of the total Cu is available to the water column.

Table 5. Kilarc Diversion Dam Bulk Sediment Sample Total Cu and Leachable Cu Results

ID	% Total Solids	Total Cu (mg/kg dry)	Leachable Cu (mg/kg dry)	% Leachable Cu	TEL	PEL
K-I	6.8	819	1120	100	35.7	197.0
K-II	75.4	58.3	19.1	33	35.7	197.0
K-III	76.1	37.5	7.24	19	35.7	197.0
K-IV	77.2	43.5	8.1	19	35.7	197.0

For sample K-I, the reported leachable Cu is greater than the total Cu concentration. These results are within the margin of error reported by Brooks Rand Laboratory. The lab recognized the anomaly and reports that the results are valid (Appendix B)

Previous water quality monitoring associated with Kilarc-Cow Creek, FERC Project No. 606, measured the pH, total hardness, alkalinity, and total and dissolved Cu concentrations of Old Cow Creek waters upstream and downstream of the diversion dam (PG&E 2008). For two measurements taken in March and October 2003, the measured hardness ranged from 24.5 mg/L to 49.5 mg/L, and the alkalinity ranged from 30 mg/L to 44.8 mg/L, with higher concentrations in October. The pH was measured 12 times between March and October with an average measured value of 8.2, a maximum of 8.3, and a minimum of 7.7. Four water samples were taken in March and October and were analyzed for total and dissolved Cu. The average total Cu was 0.18 µg/L, and the average dissolved Cu was 0.13 µg/L, with the higher concentrations in October. Other water quality monitoring sites on Old Cow Creek and within the Kilarc Forebay show similar results for hardness, alkalinity, pH, and Cu. These water quality monitoring results suggest that the waters of Old Cow Creek are well buffered (alkalinity > 20 mg/L) and basic (pH > 7.0), and that the total and dissolved Cu concentrations are below the Central Valley Regional Water Quality Control Board (CVRWQCB) Basin Plan (2007) water quality objectives (Cu = 2 µg/l).

The available sediment and water quality data indicate that Cu adsorbed to fine sediment (< 2 mm) stored behind the Kilarc Diversion Dam is elevated. The Cu assessment results indicate that total and leachable Cu concentrations are highest in the silt/clay (< 0.063 mm) particle size and are above the PEL (Figure 4 and Table 5). The total and leachable Cu concentrations are elevated in sand (< 2 mm) samples but are below the PEL. The stored sediment particle size results and volume calculations indicate that the silt/clay size fraction is less than 0.5% of the measured dry weight of stored sediments and represents a total of less than 0.5 ton of silt/clay material for all of the sediments stored behind the Kilarc Diversion Dam. The available water quality data indicate that Old Cow Creek waters have a high buffering capacity and a high pH that would inhibit the dissolution of weakly adsorbed Cu on fine sediments. The basic waters with high buffering capacity of Old Cow Creek will inhibit the dissolution of weakly adsorbed Cu. This relationship is confirmed by the total and dissolved Cu concentrations measured in Old Cow Creek waters.

The conclusions of the Cu risk assessment are limited by the low number of sediment samples (i.e., 4) and the depth of the boreholes (about 2 ft) relative to the predicted depth of the stored sediments (6–7 ft) (Figure 6). The conclusion that silt/clay represents a small proportion of the stored sediment is qualified by the fact that the boreholes were limited to a maximum 2-ft sampling depth. This assessment assumes that the vertical particle size distribution is relatively homogeneous and that there are no large lenses of fine material stored behind the diversion dam. The depositional history and age of the stored sediments inferred from this assessment suggest that the presence of more fines at depth is unlikely given the coarse bed material of Old Cow Creek. The relatively small size of the impoundment area associated with the dam limits the opportunity for fine material to settle (fines are readily carried in suspension over the dam) and is unlikely to provide opportunities for well-sorted particle size deposits within the vertical stratigraphy. The steep confined stream channel combined with periodic high flows and high bedload transport capacity suggest that the area behind the diversion dam was filled rapidly after the dam was constructed in the early 1900s and that there is likely a similar mixture of predominantly boulder and coarse gravel, with smaller proportions of sand, and silt/clay.

Topographic Survey

Topography

The topographic features of the stored sediments were mapped using the Total Station. A 1.0-ft contour map and a TIN were created from the topographic survey points. The projected lateral and upstream

extent of scour was used to bound the topographic map shown as Figure 2. The area within the map represents the extent of stored sediments that have deposited due to the backwater influence created by the diversion dam.

Longitudinal Profile

Figure 6 is a longitudinal profile of the existing thalweg surface, the diversion dam, and downstream bankfull features. Both the existing and projected bed profiles were created using data collected during the topographic survey (Figure 7). Bankfull stage survey points were collected using clearly identifiable visual indicators such as high-flow scour, lower bank extent of sand deposits, and trapped large woody debris.

The gradient of the entire thalweg bed surface including the elevation differential of the dam is 6.73%. The gradient of the thalweg bed surface upstream of the diversion dam is 5.85%, and the gradient downstream of the dam is 5.31%. There are only two pools that are more than 3 ft deep; both of these pools are more than 7 ft deep and are scoured into boulder material. One of these pools occurs at the 724-ft mark of the survey (Figure 7), and the other is located adjacent to the downstream side of the diversion dam. In both longitudinal profiles, abrupt changes in bed surface topography are caused by large boulders in the active channel that occupy between 40% and 60% of the channel bed (Figure 7).

The longitudinal profile data were used to estimate the potential upstream extent of scour in the event the diversion dam is removed and to estimate the new channel gradient. If the dam is removed, the gradient of the entire thalweg bed surface is estimated to be 6.4%. The scour control point is a theoretical point where upstream scouring (headcutting) would stop if the diversion dam were removed entirely. At this point, the stream channel substrate is boulder and bedrock material. For this study reach, the scour control point is about 112 ft upstream of the diversion dam at an elevation of 3829.09 ft, as shown on Figures 6 and 7.

Sediment Volume and Weight Calculations

The potential scour volume resulting from stream channel incision after removal of the dam was estimated using the surface and subsurface topography layers (Figure 2 and Figure 3). The total volume that would be scoured and transported downstream depends on subsurface conditions not completely determinable during field investigations. The total measured in-place volume of stored sediment was calculated to be about 580 cubic yards (yd^3), and the weight of gravel was estimated to be about 1,000 tons. The estimate is based on a conversion factor of 1.6 tons/yd^3. The total stored sediment volume was adjusted using a bulking factor of 1.2 where the gravel volume increases 20% once scoured or excavated.

The particle size distribution results for bulk sediment samples were vertically and horizontally averaged to estimate the dry weight of stored sediment by particle size class. The particle size classes summarized in Table 3 were used to estimate the dry weight of stored sediment. Most of the stored sediment is boulder and gravel size material (Table 6). Visual field observations show that about one-forth of the stored sediment is boulder size material that could not be sampled. Large boulders > 4 ft in diameter will likely stay in place and form the post dam lower banks and stream bed; large boulders represent about 40% of the dry weight of stored

Table 6. Stored Sediment Dry Weight by Particle Size Class

Particle Size Class	Dry Weight (tons)	Dry Weight (%)
> 300 mm	401	40
64–300 mm	150	15
2–64 mm	251	25
0.063–2 mm	200	20
< 0.063 mm	0.5	0
Total	1002.5	

sediment. Small to medium boulders will likely be shifted around or transported a short distance downstream.

The bed material transported by Old Cow Creek is large (>300 mm) and highly mobile. Field survey results show that between 40% and 50% of the active stream channel is occupied by boulders. Most of the stored sediment will be transported downstream. Sediment that is available for transport is about 40% boulder, 35% cobble and gravel, and 20% sand.

Bulk sample results suggest that about than 20% of the stored sediment is sand (< 2 mm) and that silt/clay represents < than 0.1% of the total estimated dry weight of the sediment. The lack of silt/clay is confirmed by the fact that the maximum particle size of the trace metal samples had to be increased from < 0.063 mm to < 2 mm to obtain an adequate sample volume. Because the particle size classes are averaged, the bulk sample boreholes did not penetrate the lower portions of the stored sediment, and the boulder portion of the stored sediment was not sampled, these calculations are considered estimates with a margin of error of about 30% or ± 300 tons. The margin of error estimate is approximate and it is high because the boulder portion of the deposit was visually estimated in the field and the bulk sediment samples were biased toward the finer sedimentary deposits. The actual amount of silt/clay is well within this margin of error but is likely to be between 0.5 and 1 ton or < 1 yd^3.

The subsurface streambed shown in Figure 3 is an approximation of the pre-dam bed surface and represents a maximum depth of potential scour and the predicted stable channel elevation following dam removal and scour. It will likely take several years for this form to be reached and transport of the stored sediments from the impoundment area will depend on the frequency and magnitude of flood events. A large flood could scour the entire deposit in one water year. Figure 7 illustrates the surface and subsurface longitudinal profile upstream of the diversion dam. The potential depth of scour ranges from 0.5 ft near the control point (Figure 7) to about 8 ft at the diversion dam.

Stream channel cross-sections were created from the topographic data and show the current bed-surface elevation relative to the potential bed-surface elevation. The locations of the cross-sections are shown on Figure 1. The shape of the subsurface cross-section was estimated using the data described above and was developed to pass the bankfull and floodprone high-flow events.

Cross-section X-1 is located about 18 ft upstream from the diversion dam, at which point the bed is predicted to drop between 6 and 7 ft (Figure 3 and Figure 8). The depth of scour will be limited by the presence of large boulders and bedrock that are visible along the lower right and left banks at this cross-section; however, the entire prism of stored sediment is likely to be transported (or excavated) at this point (Figure 8). Cross-section X-2 is located about 40 ft upstream from the diversion dam, at which point the bed is predicted to drop between 3 and 4 ft (Figure 3 and Figure 9), with a side channel forming along the right lower bank. The presence of large boulders in the center of the channel at this point will likely limit the depth of scour and divert flow to the right. Cross-section X-3 is located about 55 ft upstream from the diversion dam, at which point the bed is predicted to drop between 4 and 5 ft (Figure 3 and Figure 10). This cross-section will be entrenched around the thalweg, and bedrock control at this point will cause the stream gradient to increase (Figure 6).

Conclusions and Recommendations

The following recommendations are intended to assist PG&E in refining the alternatives related to removal of the Kilarc Diversion Dam and the dispensation of sediments stored behind it.

Treatment of Stored Sediment

Using the data, results, and assumptions of this assessment, NSR's conclusion is that it would be acceptable to leave the stored sediments in place and allow the stream to scour, transport, and redistribute

these sediments in response to the restored hydrology of Old Cow Creek. This conclusion is based on the best available information. The percentage of fines < 2 mm is likely less than 20% of the total weight of stored sediment and will represent a portion (200 tons) of the bed material stored and transported by Old Cow Creek. The low proportion of silt/clay in the stored sediments as well as the existing water chemistry of Old Cow Creek suggest that concentrations of total and dissolved Cu are unlikely to exceed CVRWQCB Basin Plan objectives if the dam is removed.

Stream Channel Condition

The results of this assessment of scour potential suggest that the stream reaches upstream and downstream of the diversion dam will not be degraded as a result of dam removal. Once the new dynamic equilibrium of the stream channel is reached, the stability and habitat quality within the affected reach of the Kilarc diversion will change, presumably to a more complex riverine reach. NSR recommends mechanically removing as much of the concrete as possible to allow the passage of large cobble and boulder material.

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U.S. Geological Survey (USGS). 2001. Geochemistry of mercury and other trace elements in fluvial tailings upstream of Daguerre Point Dam, Yuba River, California. Scientific Investigations Report 2004-5165.

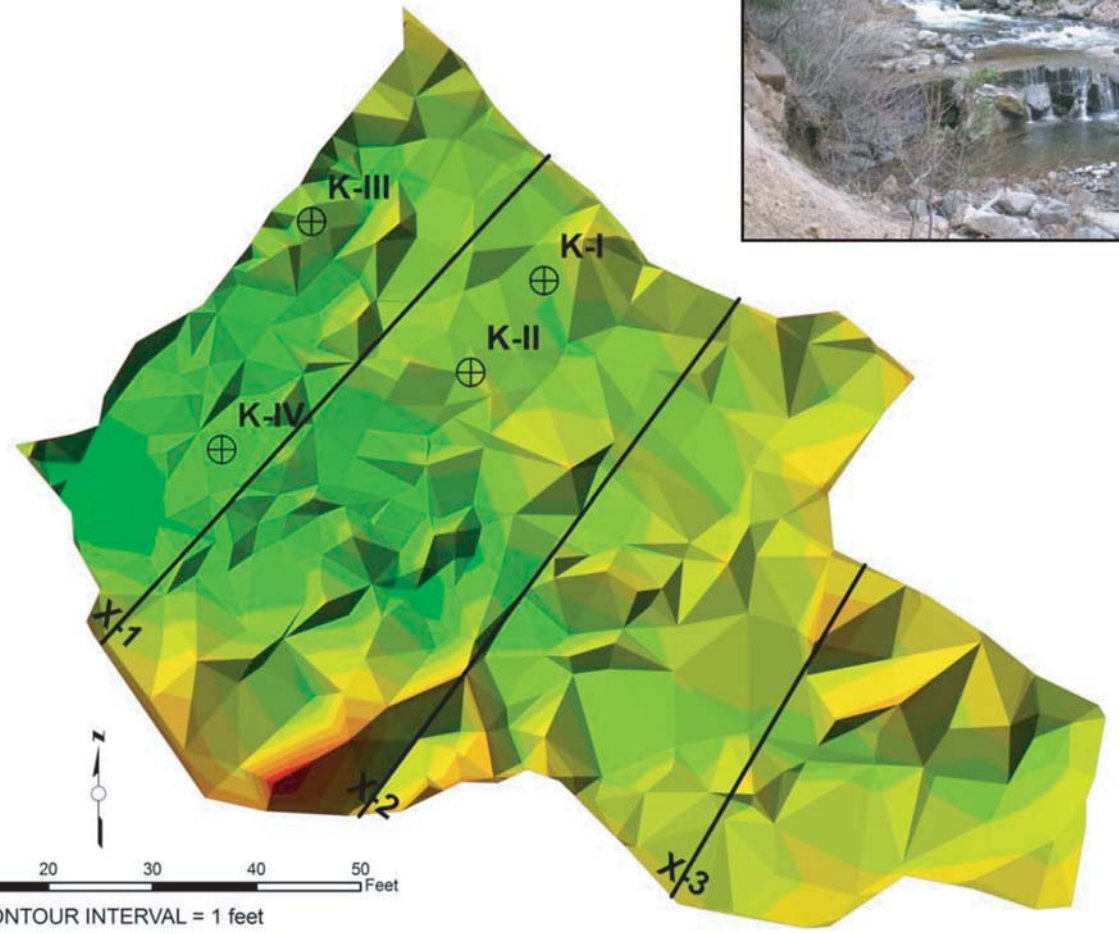

Figure 1
Kilarc Diversion Dam Borehole Location Map and Representative Photo

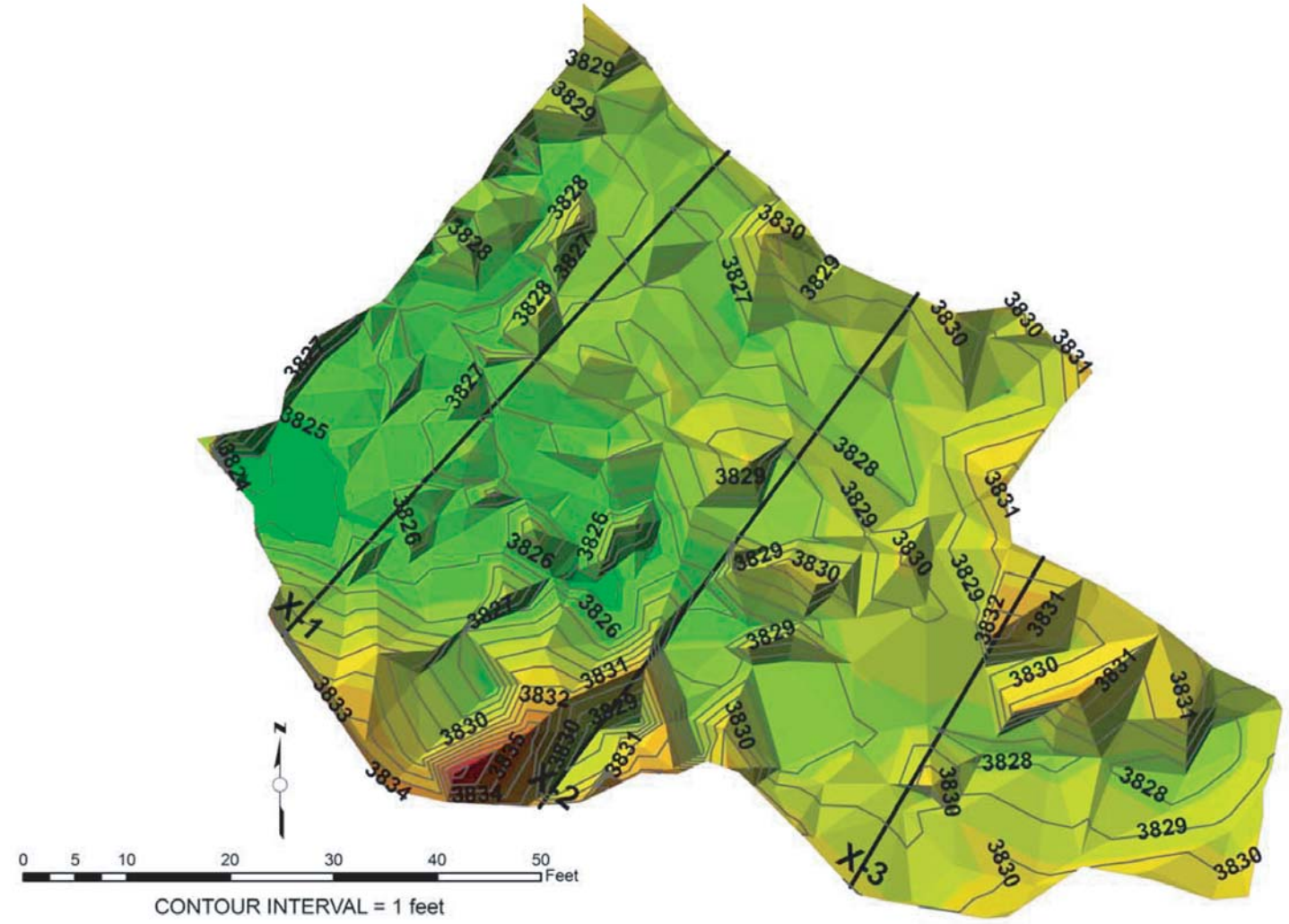

Figure 2
Kilarc Diversion Dam Surface TIN Layer and Contour Map Showing Location of Cross-Sections

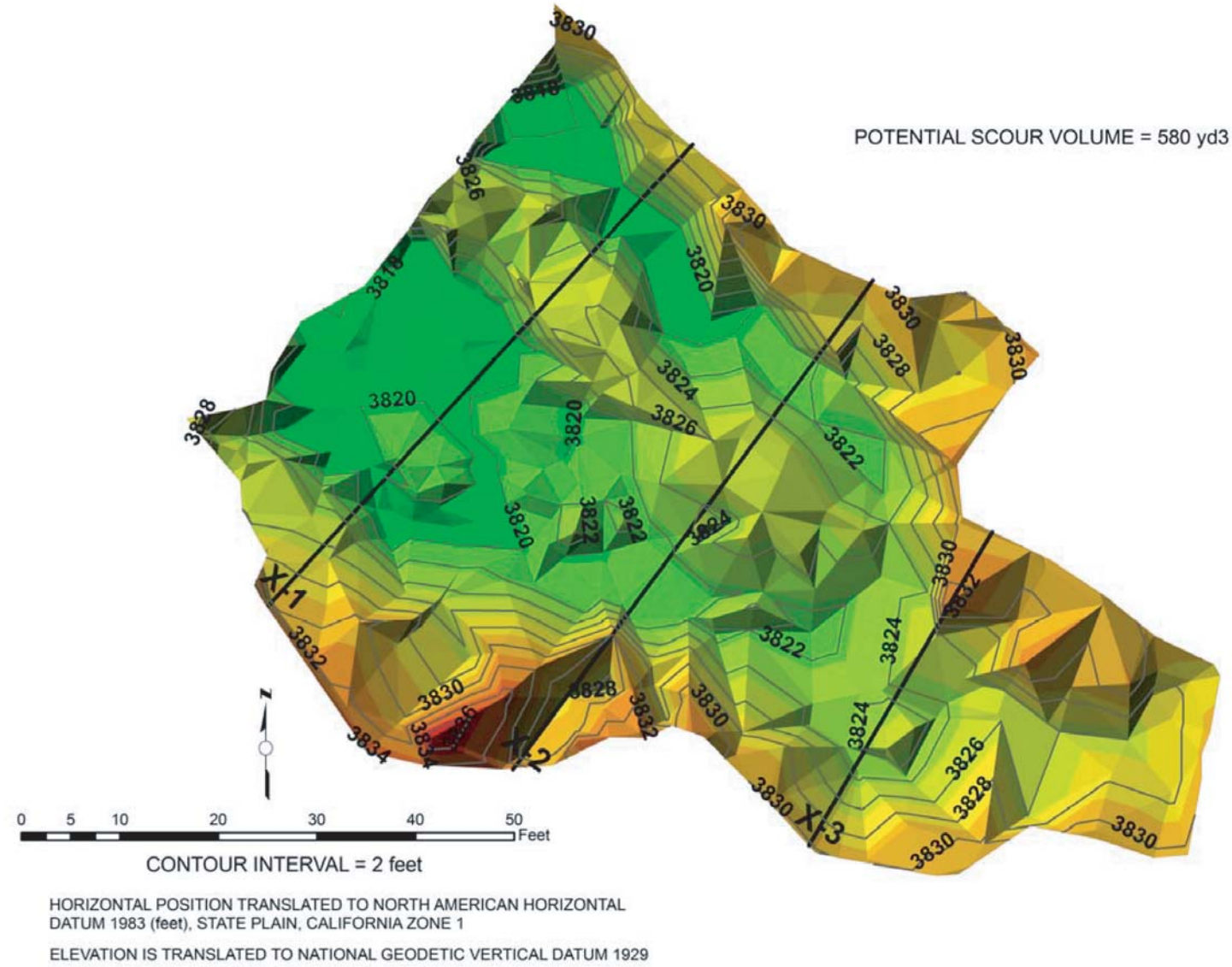

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Figure 3
Kilarc Diversion Dam Subsurface TIN Layer and Contour Map Showing Location of Cross-Sections and Potential Scour Volume Calculation Results

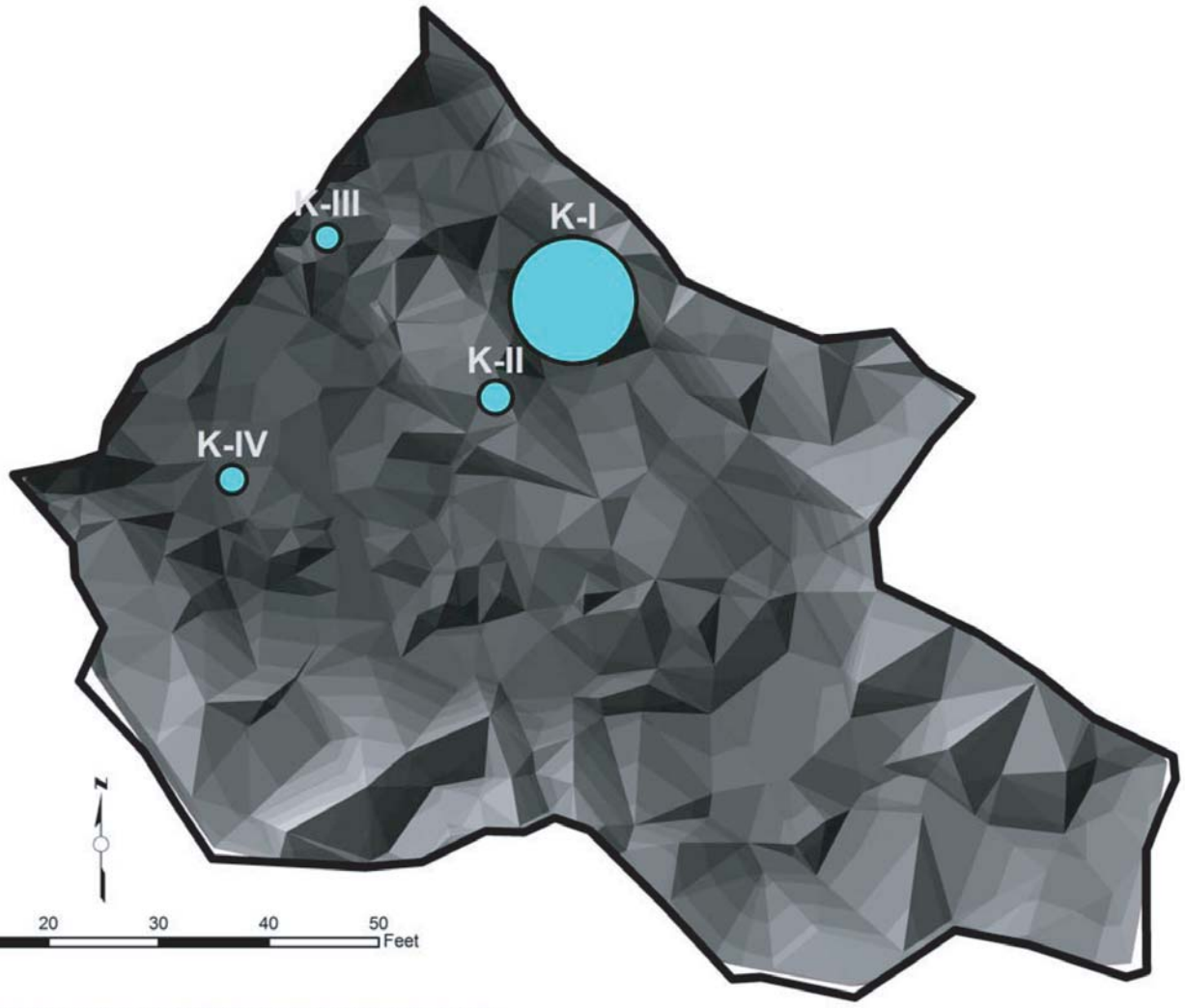

Figure 4
Kilarc Diversion Dam Showing Total Cu Results By Borehole with Subsurface TIN Layer as Background Showing Potential Scour

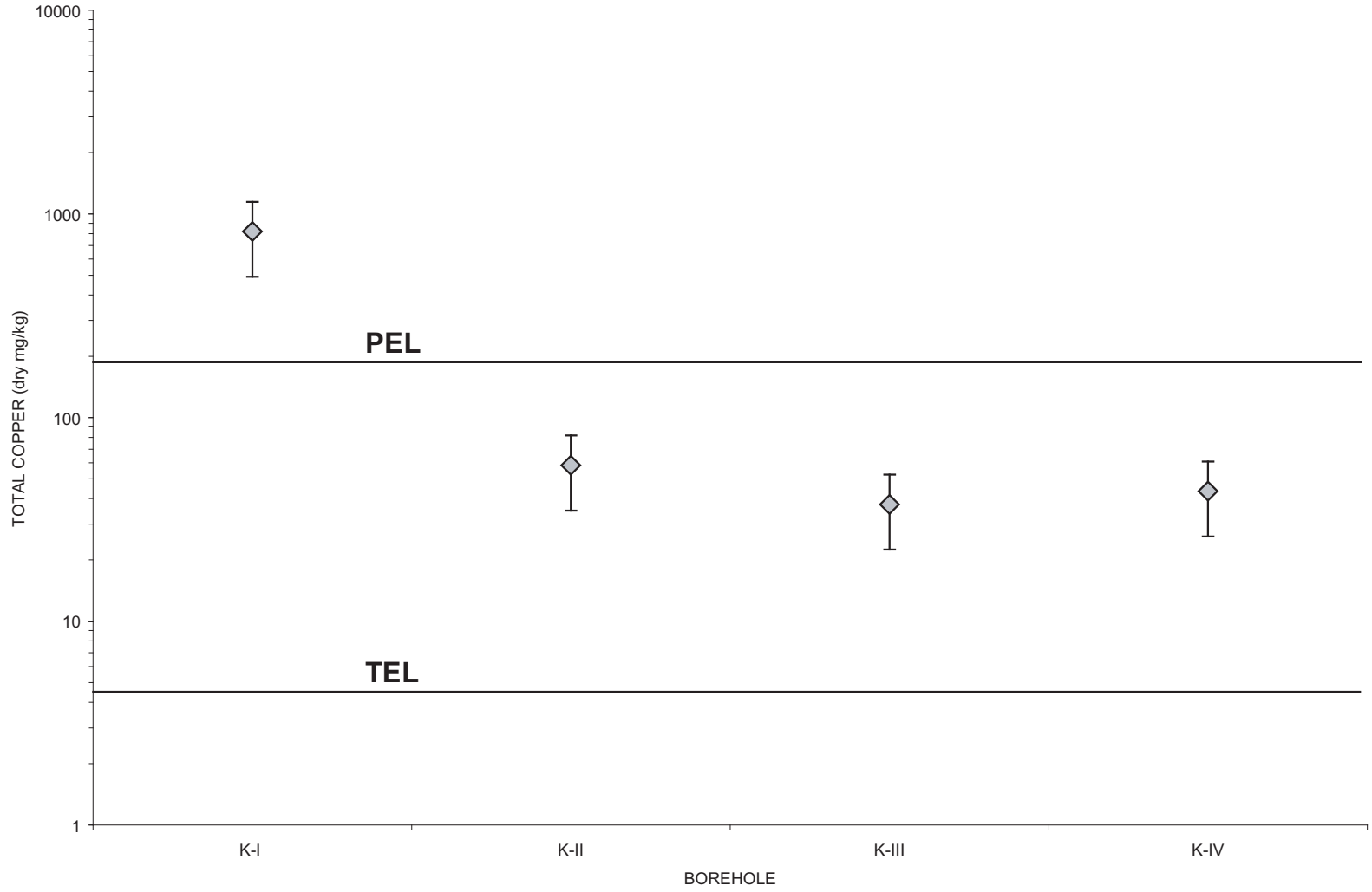

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Figure 5
Kilarc Diversion Dam Total Cu Results By Borehole
Showing 40% Margin of Error, TEL, and PEL Thresholds

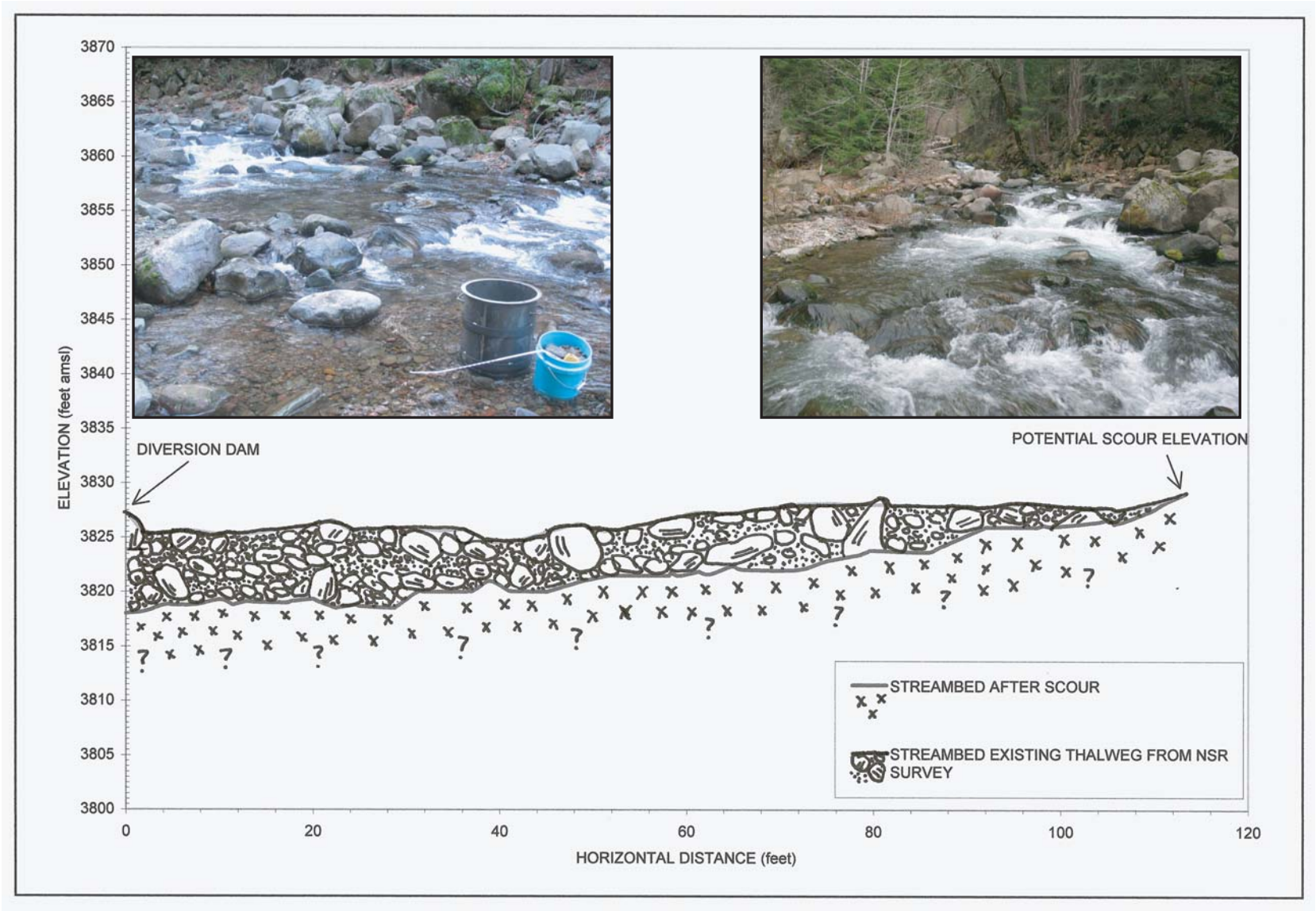

Figure 6
Longitudinal Profile Upstream of the Diversion Dam Showing the Present Thalweg Elevation, Potential Elevation After Scour, Visualization of Substrate at Depth, and Pictures of Surface Substrate Looking Toward the Left Bank (Left Picture) and Upstream (Right Picture)

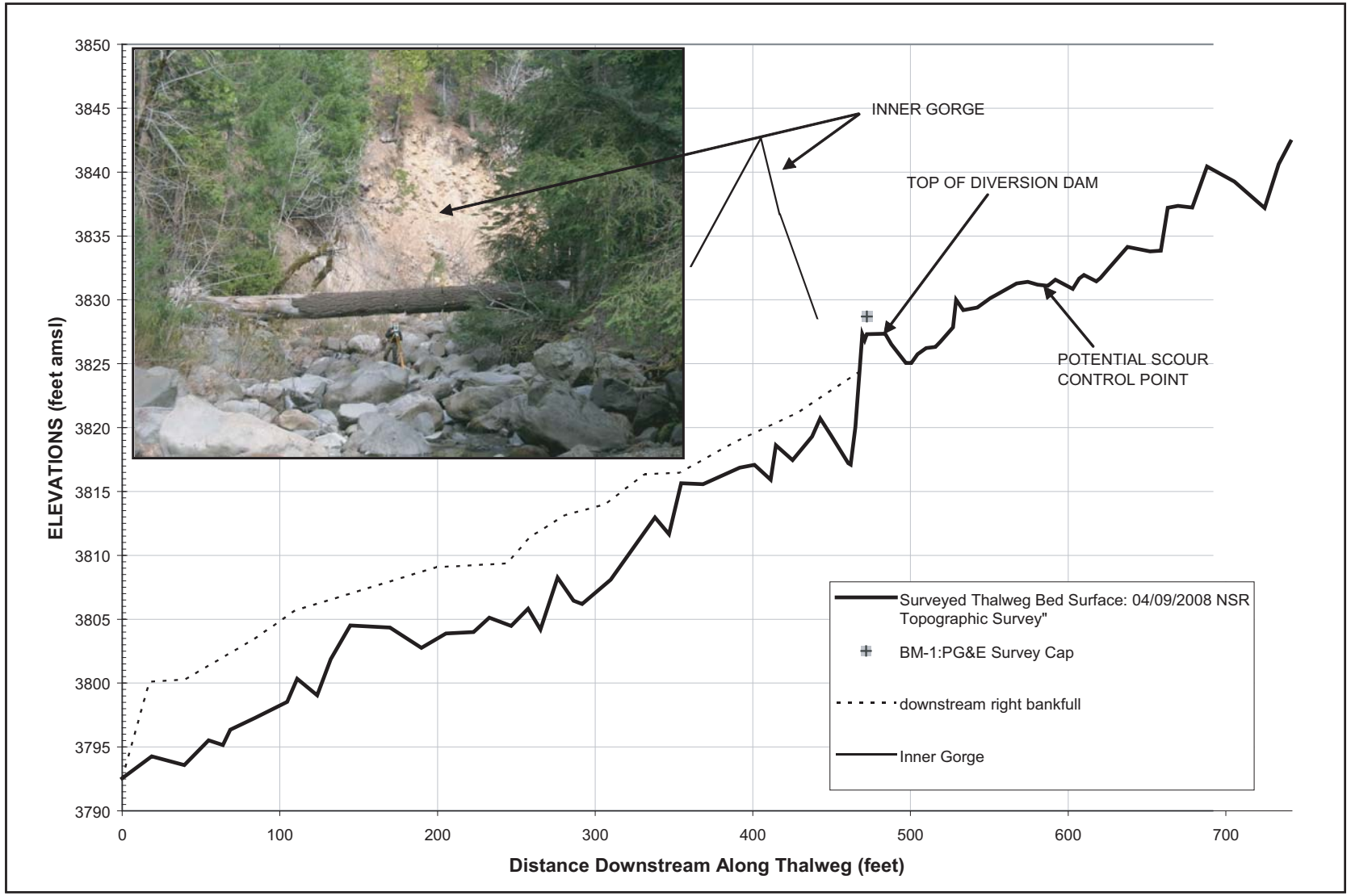

Figure 7
Longitudinal Profile of Old Cow Creek at Kilarc Diversion Dam

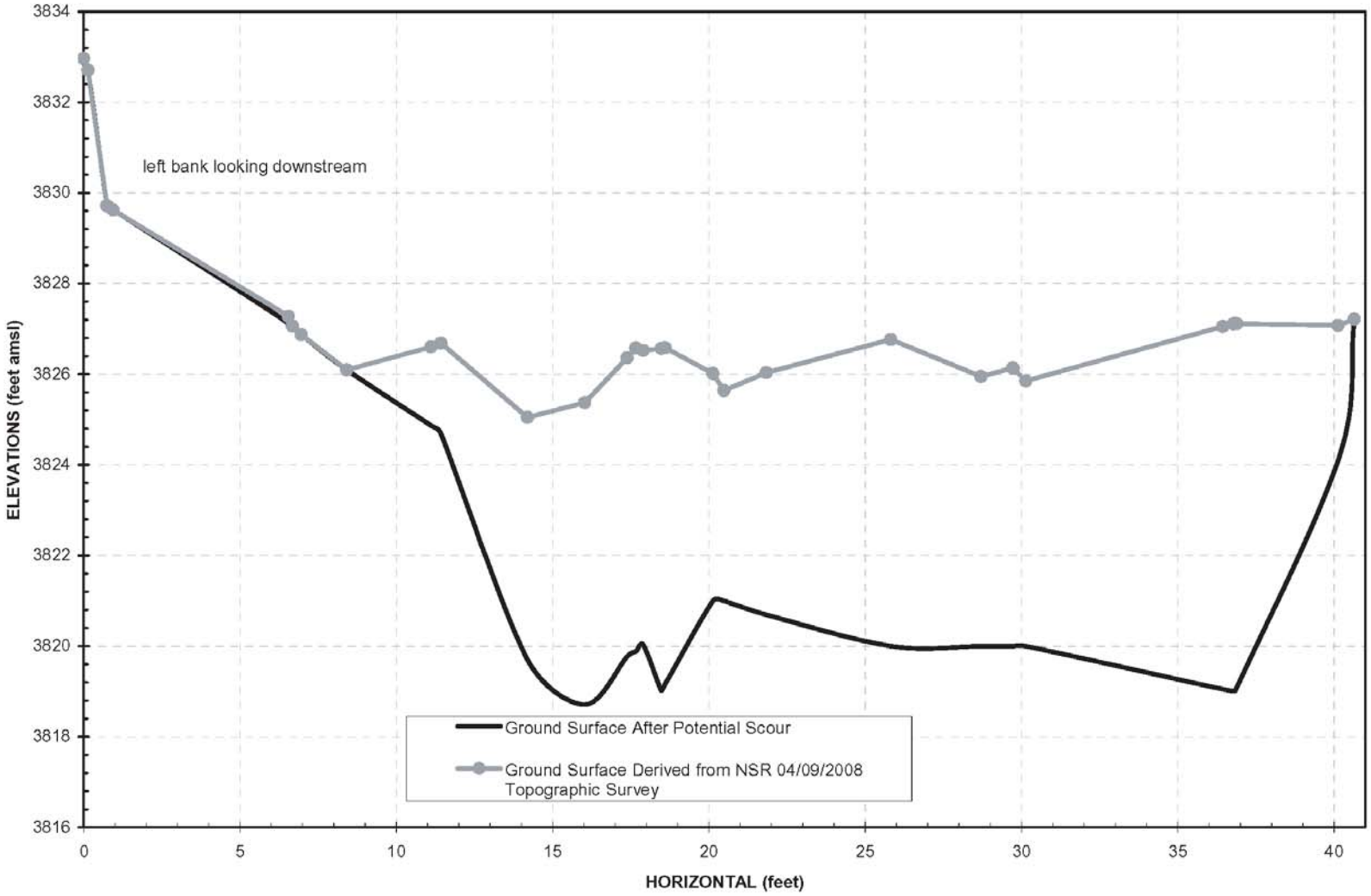

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Figure 8

Stream Channel Cross-Section X-1 Showing the Present Bed Elevation and Potential Elevation After Scour

Gravel bar should form along right bank forming a steep upper bank composed of unconsolidated gravel.

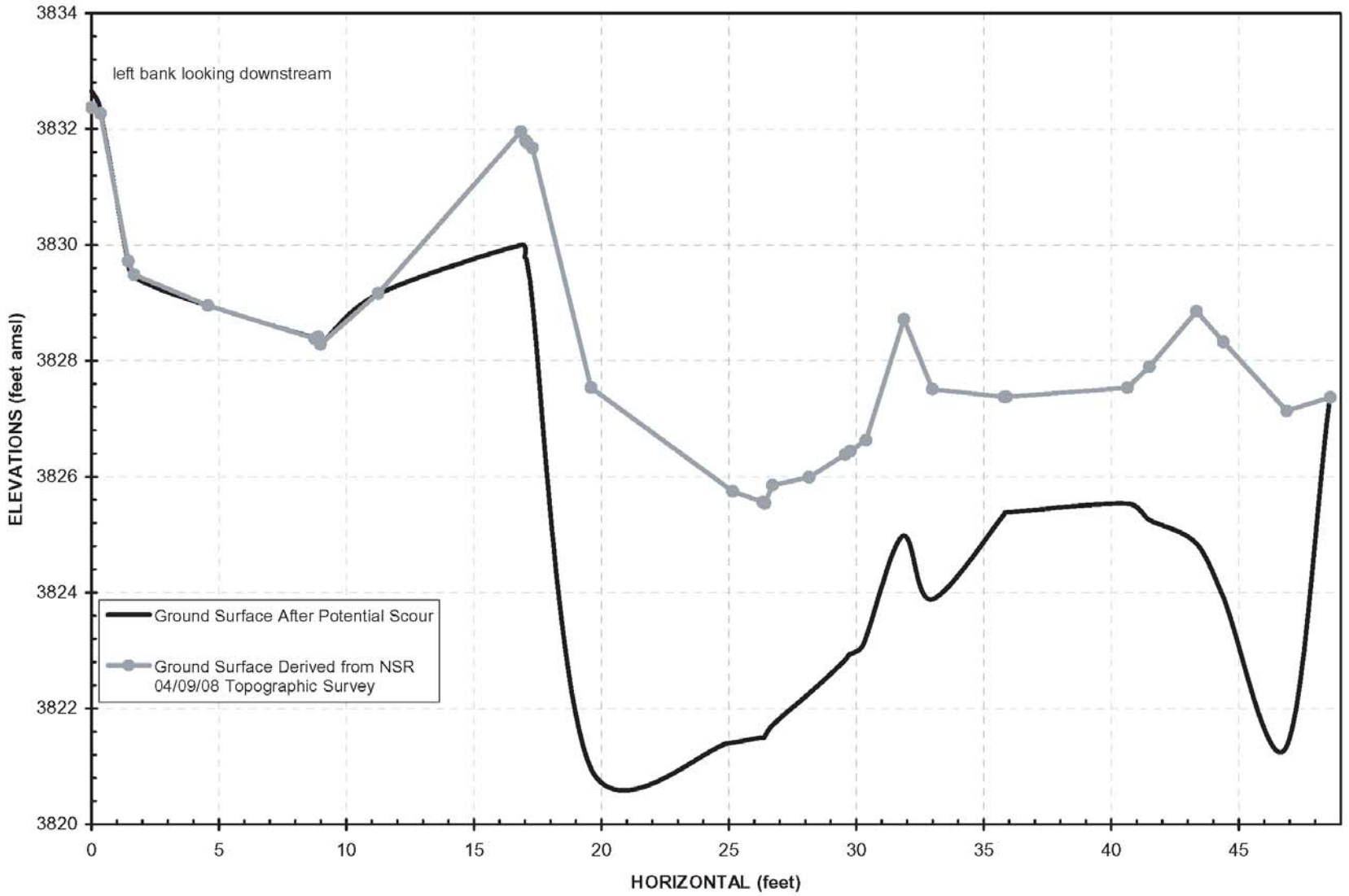

Figure 9
Stream Channel Cross-Section X-2 Showing the Present Bed Elevation and Potential Elevation After Scour
Thalweg is likely to migrate north along exposed bedrock and boulder material that forms the right bank at this cross-section.

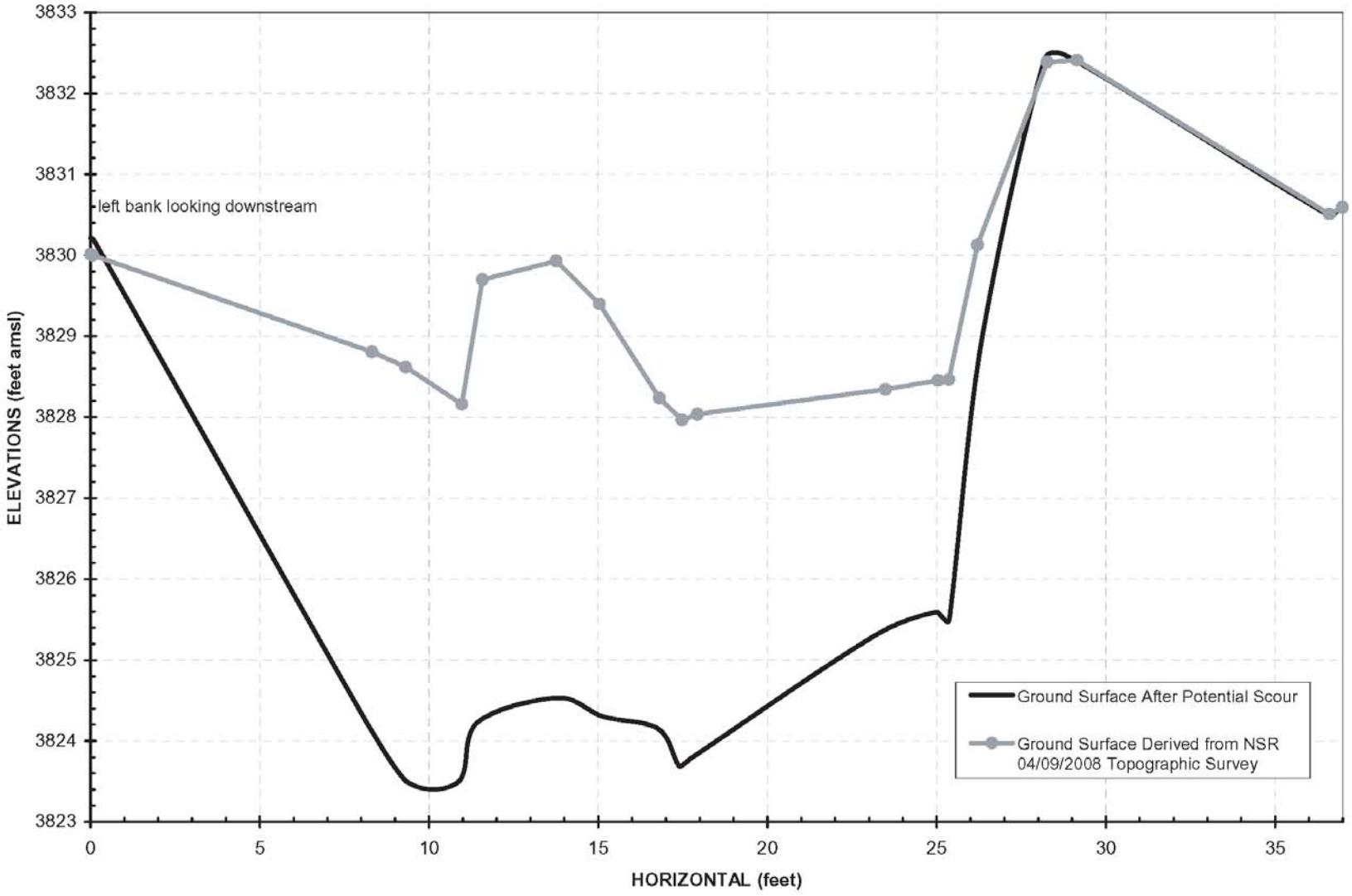

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Figure 10
Stream Channel Cross-Section X-3 Showing the Present Bed Elevation and Potential Elevation After Scour

Attachment A

Graham Matthews and Associates
Kilarc-Cow Bulk Sample Processing
Laboratory Analysis Report

GMA

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BULK SAMPLE: PARTICLE SIZE ANALYSIS

River:	**Kilarc Creek**	**Sample #**	**K-I**
Location:		**Date Collected:**	**12/12/2007**
Crew:		**Method of Collection:**	
Description		**Surface/Sub-surface**	
Sampler		**Bag # of #**	

Date Processed: 2/21/2008

Processed by: DM

UNITS G

---------- WEIGHT ----------

Sieve	Finer than	Final Net		%	Cum%<
256		0.0		**0.0%**	**100.0%**
180	256	0.0		**0.0%**	**100.0%**
128	180	0.0		**0.0%**	**100.0%**
90	128	0.0		**0.0%**	**100.0%**
64	90	1573.0		**5.3%**	**100.0%**
45	64	3190.0		**10.7%**	**94.7%**
31.5	45	1960.0		**6.6%**	**84.0%**
22.4	31.5	2290.0		**7.7%**	**77.4%**
16	22.4	2120.0		**7.1%**	**69.7%**
11.2	16	2180.0		**7.3%**	**62.5%**
8	11.2	2040.0		**6.9%**	**55.2%**
5.6	8	2319.0		**7.8%**	**48.3%**
4	5.6	1833.0		**6.2%**	**40.5%**
2.8	4	1666.3		**5.6%**	**34.3%**
2	2.8	1360.8		**4.6%**	**28.7%**
1	2	2082.9		**7.0%**	**24.1%**
0.85	1	444.4		**1.5%**	**17.1%**
0.5	0.85	1458.1		**4.9%**	**15.6%**
0.25	0.5	1874.6		**6.3%**	**10.7%**
0.125	0.25	916.5		**3.1%**	**4.4%**
0.063	0.125	241.6		**0.8%**	**1.3%**
Pan	0.063	152.7		**0.5%**	**0.5%**
TOTAL:					

SIZE PARAMETERS

D5	**0.3 mm**
D16	**0.9 mm**
D25	**2.1 mm**
D35	**4.1 mm**
D50	**8.7 mm**
D65	**18.0 mm**
D75	**28.7 mm**
D84	**45.1 mm**
D90	**54.8 mm**
dg	**7.0 mm**
FREDLE	**1.9 mm**
T&B STEELHEAD SURVIVAL	**19.6 mm**
T&B CHINOOK SURVIVAL	**15.6 mm**
% LESS THAN 2 mm	**24.1%**
% LESS THAN 0.85 mm	**15.6%**

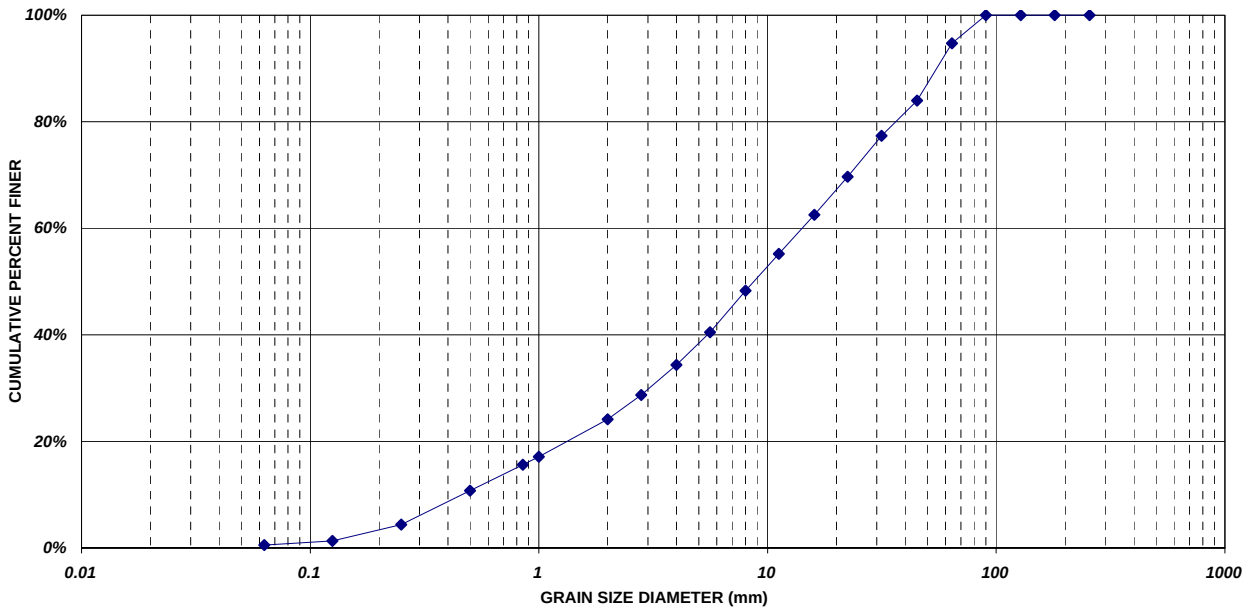
ADDITIONAL NOTES:

Dmax= 94.0 mm

Dmax mass= 355 g

Sample Dry Wt **29723** - Total Processed Wt 29703 = Net Loss: 20.0

% of Sample: 0.07%



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BULK SAMPLE: PARTICLE SIZE ANALYSIS

River:	**Kilarc Creek**	**Sample #**	**K-II**
Location:		**Date Collected:**	**12/12/2007**
Crew:		**Method of Collection:**	
Description		**Surface/Sub-surface**	
Sampler		**Bag # of #**	

Date Processed: 2/22/2008

Processed by: BC

UNITS G

---------- **WEIGHT** ----------

Sieve	Finer than	Final Net		%	Cum%<
256		0.0		**0.0%**	**100.0%**
180	256	0.0		**0.0%**	**100.0%**
128	180	0.0		**0.0%**	**100.0%**
90	128	0.0		**0.0%**	**100.0%**
64	90	2392.5		**9.3%**	**100.0%**
45	64	3171.0		**12.3%**	**90.7%**
31.5	45	3469.5		**13.5%**	**78.4%**
22.4	31.5	2766.5		**10.7%**	**64.9%**
16	22.4	3480.0		**13.5%**	**54.2%**
11.2	16	2800.0		**10.9%**	**40.7%**
8	11.2	1790.0		**7.0%**	**29.8%**
5.6	8	1232.7		**4.8%**	**22.8%**
4	5.6	661.7		**2.6%**	**18.0%**
2.8	4	562.0		**2.2%**	**15.5%**
2	2.8	453.2		**1.8%**	**13.3%**
1	2	953.5		**3.7%**	**11.5%**
0.85	1	219.3		**0.9%**	**7.8%**
0.5	0.85	652.6		**2.5%**	**7.0%**
0.25	0.5	616.3		**2.4%**	**4.4%**
0.125	0.25	204.8		**0.8%**	**2.0%**
0.063	0.125	268.3		**1.0%**	**1.3%**
Pan	0.063	54.4		**0.2%**	**0.2%**
TOTAL:					

SIZE PARAMETERS

D5	**0.6 mm**
D16	**4.3 mm**
D25	**8.9 mm**
D35	**13.3 mm**
D50	**20.2 mm**
D65	**32.1 mm**
D75	**41.3 mm**
D84	**52.8 mm**
D90	**62.7 mm**
dg	**14.8 mm**
FREDLE	**6.9 mm**
T&B STEELHEAD SURVIVAL	**78.3 mm**
T&B CHINOOK SURVIVAL	**89.0 mm**
% LESS THAN 2 mm	**11.5%**
% LESS THAN 0.85 mm	**7.0%**

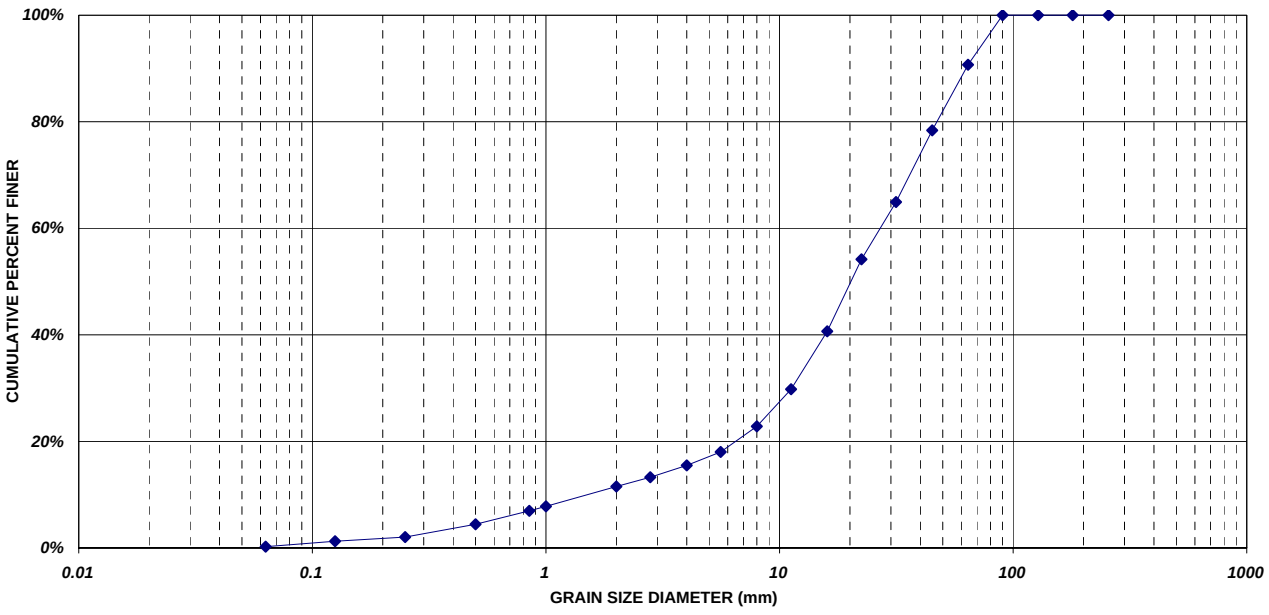
ADDITIONAL NOTES:

Dmax= 85.0 mm

Dmax mass= 1639 g

Sample Dry Wt **25670** - Total Processed Wt 25748 = Net Loss: -78.4

% of Sample: -0.31%



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BULK SAMPLE: PARTICLE SIZE ANALYSIS

River:	**Kilarc Creek**	**Sample #**	**K-IID**
Location:		**Date Collected:**	**12/12/2007**
Crew:		**Method of Collection:**	
Description		**Surface/Sub-surface**	
Sampler		**Bag # of #**	

Date Processed: 2/25/2008

Processed by: BC

UNITS G

---------- WEIGHT ----------

Sieve	Finer than	Final Net		%	Cum%<
256		0.0		**0.0%**	**100.0%**
180	256	0.0		**0.0%**	**100.0%**
128	180	0.0		**0.0%**	**100.0%**
90	128	2028.0		**8.7%**	**100.0%**
64	90	1960.0		**8.4%**	**91.3%**
45	64	2364.5		**10.1%**	**83.0%**
31.5	45	3292.0		**14.0%**	**72.9%**
22.4	31.5	2713.0		**11.6%**	**58.8%**
16	22.4	2686.0		**11.5%**	**47.3%**
11.2	16	2170.0		**9.3%**	**35.8%**
8	11.2	1260.0		**5.4%**	**26.6%**
5.6	8	599.5		**2.6%**	**21.2%**
4	5.6	488.9		**2.1%**	**18.6%**
2.8	4	493.5		**2.1%**	**16.5%**
2	2.8	470.4		**2.0%**	**14.4%**
1	2	977.7		**4.2%**	**12.4%**
0.85	1	244.4		**1.0%**	**8.2%**
0.5	0.85	728.7		**3.1%**	**7.2%**
0.25	0.5	631.8		**2.7%**	**4.1%**
0.125	0.25	212.1		**0.9%**	**1.4%**
0.063	0.125	60.0		**0.3%**	**0.5%**
Pan	0.063	55.3		**0.2%**	**0.2%**
TOTAL:					

SIZE PARAMETERS

D5	**0.6 mm**
D16	**3.7 mm**
D25	**10.2 mm**
D35	**15.5 mm**
D50	**24.4 mm**
D65	**37.2 mm**
D75	**48.4 mm**
D84	**66.7 mm**
D90	**85.2 mm**
dg	**17.3 mm**
FREDLE	**7.9 mm**
T&B STEELHEAD SURVIVAL	**78.7 mm**
T&B CHINOOK SURVIVAL	**91.9 mm**
% LESS THAN 2 mm	**12.4%**
% LESS THAN 0.85 mm	**7.2%**

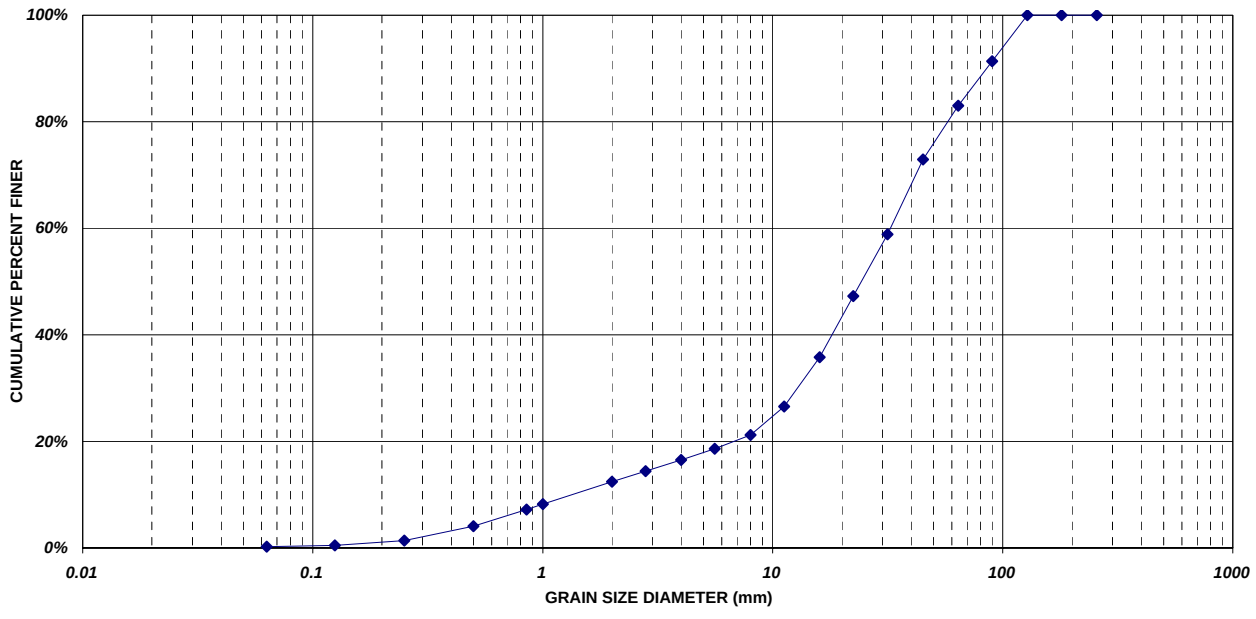
ADDITIONAL NOTES:

Dmax= 115.0 mm

Dmax mass= 2028 g

Sample Dry Wt **23450** - Total Processed Wt 23436 = Net Loss: 14.2

% of Sample: 0.06%



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BULK SAMPLE: PARTICLE SIZE ANALYSIS

River:	**Kilarc Creek**	**Sample #**	**K-III**
Location:		**Date Collected:**	**12/12/2007**
Crew:		**Method of Collection:**	
Description		**Surface/Sub-surface**	
Sampler		**Bag # of #**	

Date Processed: **2/19/2008**

Processed by: **BC**

UNITS **G**

---------- WEIGHT ----------

Sieve	Finer than	Final Net		%	Cum%<
256		0.0		**0.0%**	**100.0%**
180	256	10290.0		**31.2%**	**100.0%**
128	180	0.0		**0.0%**	**68.8%**
90	128	4086.5		**12.4%**	**68.8%**
64	90	2892.5		**8.8%**	**56.4%**
45	64	732.5		**2.2%**	**47.6%**
31.5	45	2094.5		**6.4%**	**45.4%**
22.4	31.5	2226.0		**6.8%**	**39.0%**
16	22.4	1989.5		**6.0%**	**32.3%**
11.2	16	1639.0		**5.0%**	**26.3%**
8	11.2	1407.0		**4.3%**	**21.3%**
5.6	8	894.1		**2.7%**	**17.0%**
4	5.6	982.6		**3.0%**	**14.3%**
2.8	4	938.3		**2.8%**	**11.3%**
2	2.8	681.6		**2.1%**	**8.5%**
1	2	956.0		**2.9%**	**6.4%**
0.85	1	173.5		**0.5%**	**3.5%**
0.5	0.85	455.0		**1.4%**	**3.0%**
0.25	0.5	355.9		**1.1%**	**1.6%**
0.125	0.25	109.8		**0.3%**	**0.5%**
0.063	0.125	33.6		**0.1%**	**0.2%**
Pan	0.063	31.9		**0.1%**	**0.1%**
TOTAL:					

SIZE PARAMETERS

D5	**1.4 mm**
D16	**7.0 mm**
D25	**14.6 mm**
D35	**25.8 mm**
D50	**70.2 mm**
D65	**114.9 mm**
D75	**193.1 mm**
D84	**213.7 mm**
D90	**228.7 mm**
dg	**41.7 mm**
FREDLE	**11.5 mm**
T&B STEELHEAD SURVIVAL	**90.6 mm**
T&B CHINOOK SURVIVAL	**95.2 mm**
% LESS THAN 2 mm	**6.4%**
% LESS THAN 0.85 mm	**3.0%**

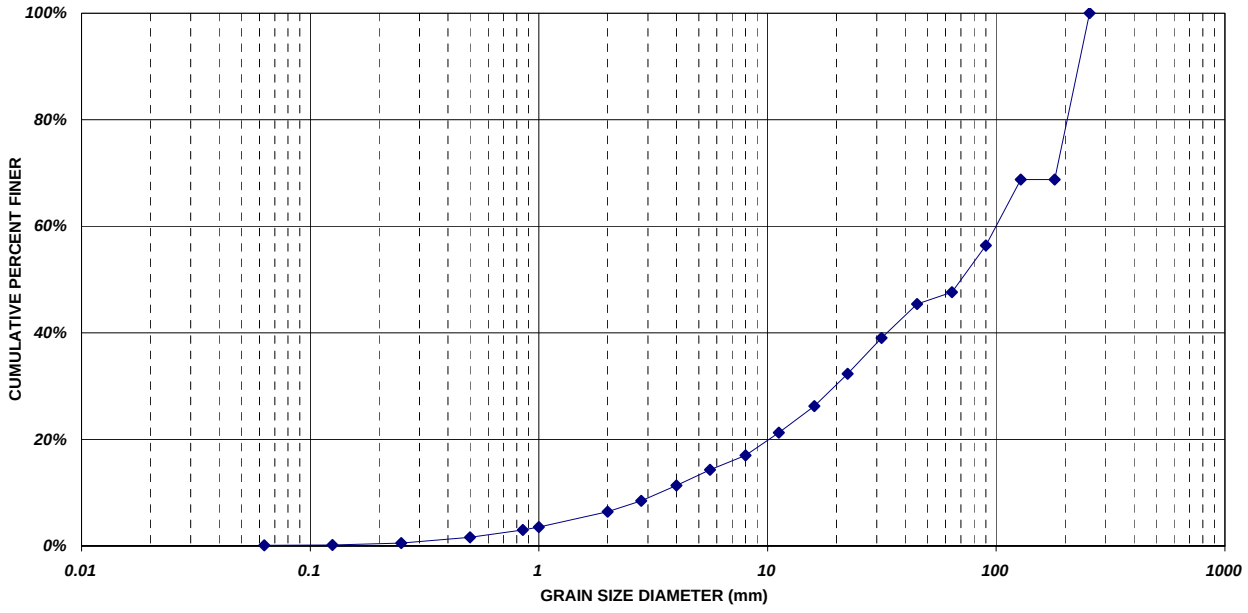
ADDITIONAL NOTES:

Dmax= 210.0 mm

Dmax mass= 10290 g

Sample Dry Wt **32870** - Total Processed Wt 32970 = Net Loss: -99.8

% of Sample: -0.30%



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GRAHAM MATTHEWS & ASSOCIATES

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BULK SAMPLE: PARTICLE SIZE ANALYSIS

River:	**Kilarc Creek**	**Sample #**	**K-IV**
Location:		**Date Collected:**	**12/12/2007**
Crew:		**Method of Collection:**	
Description		**Surface/Sub-surface**	
Sampler		**Bag # of #**	

Date Processed: 2/22/2008

Processed by: BC

UNITS G

---------- **WEIGHT** ----------

Sieve	Finer than	Final Net		%	Cum%<
256		0.0		**0.0%**	**100.0%**
180	256	0.0		**0.0%**	**100.0%**
128	180	12700.0		**47.8%**	**100.0%**
90	128	2391.0		**9.0%**	**52.2%**
64	90	2270.0		**8.5%**	**43.2%**
45	64	1715.0		**6.5%**	**34.7%**
31.5	45	1985.0		**7.5%**	**28.3%**
22.4	31.5	1684.0		**6.3%**	**20.8%**
16	22.4	1185.5		**4.5%**	**14.5%**
11.2	16	862.5		**3.2%**	**10.0%**
8	11.2	548.0		**2.1%**	**6.8%**
5.6	8	368.4		**1.4%**	**4.7%**
4	5.6	315.8		**1.2%**	**3.3%**
2.8	4	216.6		**0.8%**	**2.1%**
2	2.8	124.7		**0.5%**	**1.3%**
1	2	129.6		**0.5%**	**0.8%**
0.85	1	17.0		**0.1%**	**0.3%**
0.5	0.85	35.6		**0.1%**	**0.3%**
0.25	0.5	20.2		**0.1%**	**0.1%**
0.125	0.25	6.5		**0.0%**	**0.1%**
0.063	0.125	5.3		**0.0%**	**0.0%**
Pan	0.063	7.3		**0.0%**	**0.0%**
TOTAL:					

SIZE PARAMETERS

D5	**8.4 mm**
D16	**24.4 mm**
D25	**38.8 mm**
D35	**64.8 mm**
D50	**117.3 mm**
D65	**140.2 mm**
D75	**150.6 mm**
D84	**160.6 mm**
D90	**167.6 mm**
dg	**70.8 mm**
FREDLE	**36.0 mm**
T&B STEELHEAD SURVIVAL	**94.7 mm**
T&B CHINOOK SURVIVAL	**94.2 mm**
% LESS THAN 2 mm	**0.8%**
% LESS THAN 0.85 mm	**0.3%**

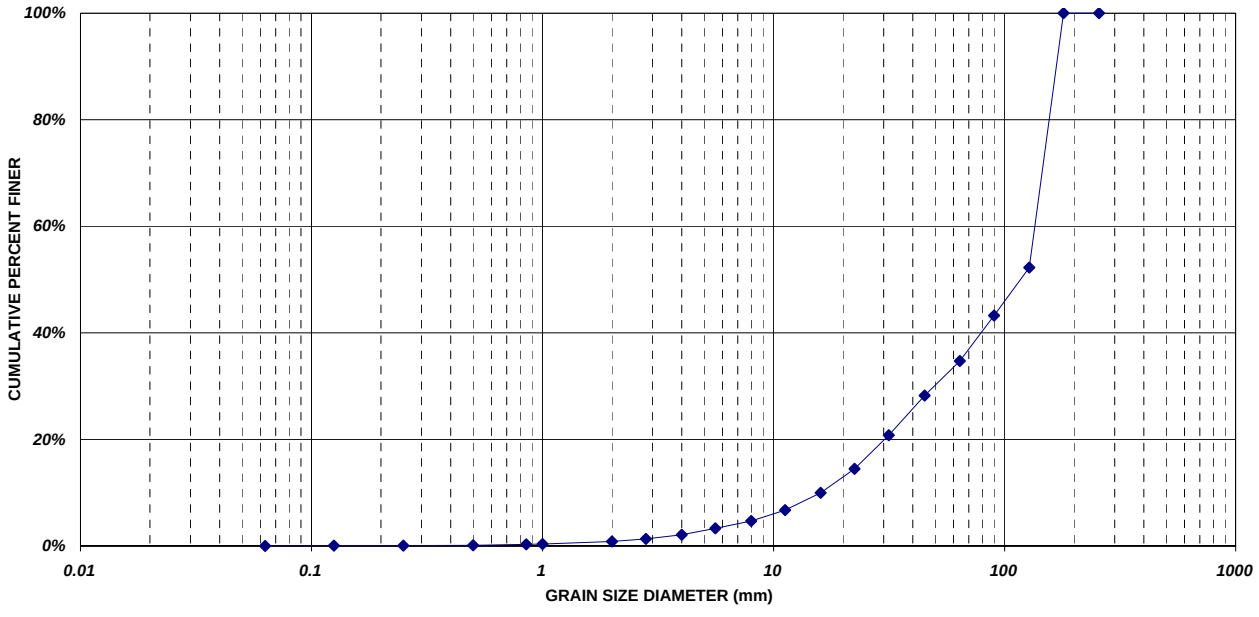
ADDITIONAL NOTES:

Dmax= 160.0 mm

Dmax mass= 5820 g

Sample Dry Wt 26560 - Total Processed Wt 26588 = Net Loss: -28.0

% of Sample: -0.11%



Attachment B

Brooks Rand Labs
Trace Metals Analysis Report

BROOKS RAND LABS

MEANINGFUL METALS DATA

March 11, 2008

North State Resources
Attn: Jim Fitzgerald
305 Chestnut St
Mount Shasta CA 96067
fitzgerald@nsrnet.com

RE: BRL Project Reference: NSR-MS0801 BRL Project ID: 0806042
Client Project Reference: P26601

Mr. Fitzgerald,

This is a report regarding the analysis of nineteen sediment samples received by Brooks Rand Labs (BRL) on February 7, 2008. The requested analyses were mercury (Hg), monomethyl mercury (MMHg), arsenic (As), copper (Cu), and silver (Ag). The analyses for several samples and analytes were cancelled as requested by the client. The samples were received, prepared, analyzed, and stored according to BRL standard operating procedures (SOP) and EPA methodology.

The results were blank-corrected as described in the calculations section of the relevant BRL SOP(s) and may have been evaluated using reporting limits that have been adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific method detection limits (MDL), method reporting limits (MRL), and other details.

According to BRL SOP BR0011 for MMHg, samples should be analyzed within 48 hours after preparation. Due to an instrument malfunction at the time of analysis the samples in sequence 0800156 (B080204) were not properly processed. Since the ethylating reagent was already present in the samples, the system was re-started and the samples were analyzed upon return on Monday morning. Based on good recoveries produced by the continuing calibration verification standards (CCV) indicating the system was in control, and two matrix spike/matrix spike duplicate (MS/MSD) sets that met the acceptance criterion, the results have been reported unqualified. Additionally, the results from this sequence match the results from a previous analysis in a different sequence that demonstrated a calibration discrepancy.

An additional blank spike (BS2) was prepared for analysis in sequence 0800161 (B080209). The result for this blank spike did not match the spiking information suggesting that a blank spike from a different batch was actually analyzed. When the alternate spiking information was entered, the blank spike calculated a recovery with the control limits. All certified reference

materials (CRM), MS/MSD sets, and BS1 met their respective criteria and the BS2 has not been reported.

The results less than or equal to the MDL have been qualified "U" for non-detect and have been reported at the MDL. The results above the MDL and less than or equal to the MRL have been qualified "B" and should be considered estimates. All other criteria were met and no additional qualification of the data was required.

BRL, a NELAC accredited laboratory (FL LAB ID E87982), certifies that the reported results meet all NELAC requirements. Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Amanda Fawley
Project Manager
amanda@brooksrand.com

Amy Durdle
Project Manager
amy@brooksrand.com

BROOKS RAND LABS
MEANINGFUL METALS DATA

Organization: North State Resources
Contact: Jim Fitzgerald

BRL Project ID: 0806042
BRL Project Reference: NSR-MS0801
BRL Project Manager: Amanda Fawley
Report Date: March 11, 2008

ANALYTICAL REPORT FOR SAMPLES

Sample ID	BRL ID	Date Sampled	Date Received	Matrix
K-IIb	0806042-01	12/12/07	02/07/08	Soil/Sediment
K-IIIb	0806042-02	12/12/07	02/07/08	Soil/Sediment
K-IIbM	0806042-04	12/12/07	02/07/08	Soil/Sediment
K-IIIbM	0806042-05	12/12/07	02/07/08	Soil/Sediment
C-III	0806042-07	12/13/07	02/07/08	Soil/Sediment
C-IIIDM	0806042-08	12/13/07	02/07/08	Soil/Sediment
C-I	0806042-10	12/13/07	02/07/08	Soil/Sediment
C-IM	0806042-11	12/13/07	02/07/08	Soil/Sediment
C-III	0806042-14	12/13/07	02/07/08	Soil/Sediment
C-IIIM	0806042-15	12/13/07	02/07/08	Soil/Sediment

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BATCH SUMMARY FOR SAMPLES

Batch	Parameter	Prep Date	Analyzed Date	Sequence
B080190	%TS by EPA Method 160.3	02/14/2008	02/15/2008	N/A
B080201	Hg by EPA Method 1631, Appendix	02/20/2008	02/21/2008	0800142
B080202	%TS by EPA Method 160.3	02/20/2008	02/22/2008	N/A
B080204	MMHg by EPA Method 1630 mod.	02/21/2008	02/25/2008	0800156
B080209	As 75 by EPA Method 1638 mod.	02/19/2008	02/27/2008	0800161
B080289	Ag 107 by EPA Method 1638 mod.	02/29/2008	03/02/2008	0800174
B080289	Cu 63 by EPA Method 1638 mod.	02/29/2008	03/02/2008	0800174

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SAMPLE RESULTS

Total Mercury and Mercury Speciation by CVAFS

Analyte	Method	Total or Dissolved	Result	Qualifier	MDL	MRL	Units	Batch	Sequence
K-IIb 0806042-01 Soil/Sediment									
Hg	EPA Method 1631, Appendix		4.13		0.07	0.24	ng/g dry	B080201	0800142
K-IIIb 0806042-02 Soil/Sediment									
Hg	EPA Method 1631, Appendix		3.52		0.08	0.26	ng/g dry	B080201	0800142
K-IIbM 0806042-04 Soil/Sediment									
MMHg	EPA Method 1630 mod.		0.011	U	0.011	0.035	ng/g dry	B080204	0800156
K-IIIbM 0806042-05 Soil/Sediment									
MMHg	EPA Method 1630 mod.		0.011	U	0.011	0.034	ng/g dry	B080204	0800156
C-III 0806042-07 Soil/Sediment									
Hg	EPA Method 1631, Appendix		7.14		0.07	0.22	ng/g dry	B080201	0800142
C-IIIDM 0806042-08 Soil/Sediment									
MMHg	EPA Method 1630 mod.		0.012	B	0.010	0.031	ng/g dry	B080204	0800156
C-I 0806042-10 Soil/Sediment									
Hg	EPA Method 1631, Appendix		8.92		0.07	0.23	ng/g dry	B080201	0800142
C-IM 0806042-11 Soil/Sediment									
MMHg	EPA Method 1630 mod.		0.032		0.009	0.030	ng/g dry	B080204	0800156
C-III 0806042-14 Soil/Sediment									
Hg	EPA Method 1631, Appendix		6.33		0.07	0.24	ng/g dry	B080201	0800142

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SAMPLE RESULTS

Total Mercury and Mercury Speciation by CVAFS

Analyte	Method	Total or Dissolved	Result	Qualifier	MDL	MRL	Units	Batch	Sequence
C-IIIM	**0806042-15**	**Soil/Sediment**							
MMHg	EPA Method 1630 mod.		0.011	B	0.011	0.034	ng/g dry	B080204	0800156

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SAMPLE RESULTS

Trace Metals by ICP-MS

Analyte	Method	Total or Dissolved	Result	Qualifier	MDL	MRL	Units	Batch	Sequence
K-IIb 0806042-01 Soil/Sediment									
Ag 107	EPA Method 1638 mod.		0.15		0.04	0.12	mg/kg dry	B080289	0800174
As 75	EPA Method 1638 mod.		1.1	B	0.5	1.4	mg/kg dry	B080209	0800161
Cu 63	EPA Method 1638 mod.		51.2		0.21	1.23	mg/kg dry	B080289	0800174
K-IIIb 0806042-02 Soil/Sediment									
Ag 107	EPA Method 1638 mod.		0.19		0.04	0.13	mg/kg dry	B080289	0800174
As 75	EPA Method 1638 mod.		0.7	B	0.5	1.4	mg/kg dry	B080209	0800161
Cu 63	EPA Method 1638 mod.		34.2		0.22	1.27	mg/kg dry	B080289	0800174
C-III 0806042-07 Soil/Sediment									
Ag 107	EPA Method 1638 mod.		0.11	B	0.04	0.12	mg/kg dry	B080289	0800174
As 75	EPA Method 1638 mod.		2.4		0.4	1.3	mg/kg dry	B080209	0800161
Cu 63	EPA Method 1638 mod.		30.0		0.20	1.20	mg/kg dry	B080289	0800174
C-I 0806042-10 Soil/Sediment									
Ag 107	EPA Method 1638 mod.		0.12		0.03	0.11	mg/kg dry	B080289	0800174
As 75	EPA Method 1638 mod.		1.6		0.4	1.3	mg/kg dry	B080209	0800161
Cu 63	EPA Method 1638 mod.		27.0		0.19	1.12	mg/kg dry	B080289	0800174
C-III 0806042-14 Soil/Sediment									
Ag 107	EPA Method 1638 mod.		0.09	B	0.04	0.12	mg/kg dry	B080289	0800174
As 75	EPA Method 1638 mod.		2.5		0.4	1.3	mg/kg dry	B080209	0800161
Cu 63	EPA Method 1638 mod.		25.6		0.20	1.19	mg/kg dry	B080289	0800174

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SAMPLE RESULTS

Physical Properties

Analyte	Method	Total or Dissolved	Result	Qualifier	MDL	MRL	Units	Batch	Sequence
K-IIb 0806042-01 Soil/Sediment									
%TS	EPA Method 160.3		75.30		0.10	0.32	%	B080202	N/A
K-IIIb 0806042-02 Soil/Sediment									
%TS	EPA Method 160.3		75.54		0.10	0.32	%	B080202	N/A
K-IIbM 0806042-04 Soil/Sediment									
%TS	EPA Method 160.3		76.11		0.05	0.16	%	B080190	N/A
K-IIIbM 0806042-05 Soil/Sediment									
%TS	EPA Method 160.3		78.63		0.05	0.16	%	B080190	N/A
C-III 0806042-07 Soil/Sediment									
%TS	EPA Method 160.3		81.65		0.10	0.32	%	B080202	N/A
C-IIIDM 0806042-08 Soil/Sediment									
%TS	EPA Method 160.3		83.03		0.05	0.16	%	B080190	N/A
C-I 0806042-10 Soil/Sediment									
%TS	EPA Method 160.3		87.12		0.10	0.32	%	B080202	N/A
C-IM 0806042-11 Soil/Sediment									
%TS	EPA Method 160.3		86.43		0.05	0.16	%	B080190	N/A
C-III 0806042-14 Soil/Sediment									
%TS	EPA Method 160.3		83.36		0.10	0.32	%	B080202	N/A

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SAMPLE RESULTS

Physical Properties

Analyte	Method	Total or Dissolved	Result	Qualifier	MDL	MRL	Units	Batch	Sequence
C-IIIM 0806042-15 Soil/Sediment									
%TS	EPA Method 160.3		80.74		0.05	0.16	%	B080190	N/A

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QUALITY ASSURANCE SUMMARY

Accuracy and Precision

Batch	Method	SOP	Matrix

B080190 **EPA Method 160.3** **BR-1501** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Duplicate (0806042-04)			B080190-DUP1					
%TS	76.10	%	76.11				0.01	15

B080201 **EPA Method 1631, Appendix** **BR-0002** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Laboratory Fortified Blank(0803063)			B080201-BS1					
Hg	0.09	ng/g dry		0.1000	90	70-130		
Duplicate (0806039-06)			B080201-DUP1					
Hg	71.84	ng/g dry	67.20				7	30
Matrix Spike (0806039-06)			B080201-MS1					
Hg	424.7	ng/g dry	67.20	337.7	106	70-130		
Matrix Spike Duplicate (0806039-06)			B080201-MSD1					
Hg	415.4	ng/g dry	67.20	343.3	101	70-130	2	30
Certified Reference Material (0720023, MESS-3)			B080201-SRM1					
Hg	93.63	ng/g dry		91.00	103	0-200		

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QUALITY ASSURANCE SUMMARY

Accuracy and Precision

Batch	Method	SOP	Matrix

B080202 **EPA Method 160.3** **BR-1501** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Duplicate (0806042-01)			B080202-DUP1					
%TS	75.46	%	75.30				0.2	15

B080204 **EPA Method 1630 mod.** **BR-0011** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Laboratory Fortified Blank(0805077)			B080204-BS1					
MMHg	0.021	ng/g dry		0.02500	84	65-135		
Duplicate (0806042-05)			B080204-DUP1					
MMHg	0.011U	ng/g dry	0.011 U					35
Matrix Spike (0806042-05)			B080204-MS1					
MMHg	0.107	ng/g dry	0.011 U	0.1010	106	65-135		
Matrix Spike Duplicate (0806042-05)			B080204-MSD1					
MMHg	0.103	ng/g dry	0.011 U	0.1000	103	65-135	4	35
Certified Reference Material (0720007, CC-580)			B080204-SRM1					
MMHg	62.03	ng/g dry		75.00	83	65-135		

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QUALITY ASSURANCE SUMMARY

Accuracy and Precision

Batch	Method	SOP	Matrix

B080204 **EPA Method 1630 mod.** **BR-0011** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Certified Reference Material (0720007, CC-580)			B080204-SRM2					
MMHg	65.51	ng/g dry		75.00	87	65-135		

B080209 **EPA Method 1638 mod.** **BR-0067** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Laboratory Fortified Blank(0808067)			B080209-BS1					
As 75	1.8	mg/kg dry		2.000	90	75-125		
Duplicate (0806042-01)			B080209-DUP1					
As 75	0.7	mg/kg dry	1.1				44	30
Matrix Spike (0806042-01)			B080209-MS1					
As 75	83.0	mg/kg dry	1.1	98.90	83	70-130		
Cu 63	130.3	mg/kg dry	39.50	98.92	92	70-130		
Matrix Spike Duplicate (0806042-01)			B080209-MSD1					
As 75	88.7	mg/kg dry	1.1	96.90	90	70-130	7	30
Certified Reference Material (0751120, NIST 2709)			B080209-SRM1					
As 75	16.6	mg/kg dry		17.70	94	0-200		

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QUALITY ASSURANCE SUMMARY

Accuracy and Precision

Batch	Method	SOP	Matrix

B080209 **EPA Method 1638 mod.** **BR-0067** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Certified Reference Material (0517001, NIST 2710)			B080209-SRM2					
As 75	550.0	mg/kg dry		626.0	88	75-125		
Certified Reference Material (0750097, MESS 3)			B080209-SRM3					
As 75	18.2	mg/kg dry		21.20	86	75-125		

B080289 **EPA Method 1638 mod.** **BR-0067** **Soil/Sediment**

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Laboratory Fortified Blank(0809108)			B080289-BS2					
Ag 107	0.43	mg/kg dry		0.5000	86	75-125		
Duplicate (0806042-01)			B080289-DUP1					
Ag 107	0.16	mg/kg dry	0.15				6	30
Cu 63	57.28	mg/kg dry	51.20				11	30
Matrix Spike (0806042-01)			B080289-MS1					
Ag 107	24.85	mg/kg dry	0.15	25.89	95	70-130		
Cu 63	108.1	mg/kg dry	51.20	64.72	88	70-130		

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QUALITY ASSURANCE SUMMARY

Accuracy and Precision

Batch	Method	SOP	Matrix
B080289	EPA Method 1638 mod.	BR-0067	Soil/Sediment

Analyte	Result	Units	Sample Value	Spike Value	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Matrix Spike Duplicate (0806042-01)				B080289-MSD1				
Ag 107	24.48	mg/kg dry	0.15	24.28	100	70-130	2	30
Cu 63	109.7	mg/kg dry	51.20	60.70	96	70-130	1	30
NIST 2709				B080289-SRM1				
Ag 107	0.38	mg/kg dry		0.4100	93	75-125		
Cu 63	35.35	mg/kg dry		34.60	102	75-125		
PACS-2				B080289-SRM2				
Ag 107	1.12	mg/kg dry		1.220	92	75-125		
Cu 63	306.4	mg/kg dry		310.0	99	75-125		

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QUALITY ASSURANCE SUMMARY

Method Blanks/Detection Limits

Batch #	Method #	SOP #	Matrix
B080190	EPA Method 160.3	BR-1501	Soil/Sediment

Analyte	Result	Units	Average	Standard Deviation	Average Limits	StDev Limits	MDL	MRL
							%	
Method Blanks								
%TS								
B080190-BLK1	0.00	%						
B080190-BLK2	0.00	%						
Method Blank Summary					0.10	0.03	0.05	0.16

Batch #	Method #	SOP #	Matrix
B080201	EPA Method 1631, Appendix	BR-0002	Soil/Sediment

Analyte	Result	Units	Average	Standard Deviation	Average Limits	StDev Limits	MDL	MRL
							ng/g	
Method Blanks								
Hg								
B080201-BLK1	0.04	ng/g						
B080201-BLK2	0.07	ng/g						
B080201-BLK3	0.06	ng/g						
B080201-BLK4	0.04	ng/g						
Method Blank Summary			0.05	0.02	0.06	0.02	0.03	0.10

Batch #	Method #	SOP #	Matrix
B080202	EPA Method 160.3	BR-1501	Soil/Sediment

Analyte	Result	Units	Average	Standard Deviation	Average Limits	StDev Limits	MDL	MRL
							%	

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QUALITY ASSURANCE SUMMARY

Method Blanks/Detection Limits

Batch #	Method #	SOP #	Matrix
B080202	EPA Method 160.3	BR-1501	Soil/Sediment

Analyte	Result	Units	Average	Standard Deviation	Average Limits	StDev Limits	MDL	MRL
							%	
Method Blanks								
%TS								
B080202-BLK1	-0.06	%						
B080202-BLK2	-0.03	%						
Method Blank Summary					0.20	0.07	0.10	0.32

Batch #	Method #	SOP #	Matrix
B080204	EPA Method 1630 mod.	BR-0011	Soil/Sediment

Analyte	Result	Units	Average	Standard Deviation	Average Limits	StDev Limits	MDL	MRL
							ng/g	
Method Blanks								
MMHg								
B080204-BLK1	0.005	ng/g						
B080204-BLK2	0.006	ng/g						
B080204-BLK3	0.003	ng/g						
B080204-BLK4	0.003	ng/g						
Method Blank Summary			0.004	0.002	0.016	0.005	0.008	0.025

Batch #	Method #	SOP #	Matrix
B080289	EPA Method 1638 mod.	BR-0067	Soil/Sediment

Analyte	Result	Units	Average	Standard Deviation	Average Limits	StDev Limits	MDL	MRL
							mg/kg dry	

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Amy Durdle For Amanda Fawley
Project Manager

3958 6th Avenue NW Seattle WA 98107 · P(206) 632-6206 · F(206) 632-6017 · brl@brooksrand.com · www.brooksrand.com

BROOKS RAND LABS
MEANINGFUL METALS DATA

Organization: North State Resources
Contact: Jim Fitzgerald

BRL Project ID: 0806042
BRL Project Reference: NSR-MS0801
BRL Project Manager: Amanda Fawley
Report Date: March 11, 2008

QUALITY ASSURANCE SUMMARY

Method Blanks/Detection Limits

Batch #	Method #	SOP #	Matrix
B080289	EPA Method 1638 mod.	BR-0067	Soil/Sediment

Analyte	Result	Units	Average	Standard Deviation	Average Limits	StDev Limits	MDL mg/kg dry	MRL mg/kg dry
Method Blanks								
Ag 107								
B080289-BLK1	-0.00100	mg/kg dry						
B080289-BLK2	-0.00500	mg/kg dry						
B080289-BLK3	0.03	mg/kg dry						
Method Blank Summary			0.01	0.02	0.10	0.03	0.03	0.10
Cu 63								
B080289-BLK1	-0.13	mg/kg dry						
B080289-BLK2	-0.12	mg/kg dry						
B080289-BLK3	-0.13	mg/kg dry						
Method Blank Summary			-0.13	0.01	1.00	0.17	0.17	1.00

Amy Durdle

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MEANINGFUL METALS DATA

Phone: 206-632-6206
Fax: 206-632-6017
Email: brl@brooksrand.com

WORK ORDER
0806042

Customer:	North State Resources	**Due Date:**	03/06/08
Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07
QA Level:	Standard	**Sample Custodian:**	Jason Barrett
EDD:	None	**BRL Project Manager:**	Amanda Fawley
Turn-around time:	20	**Courier:**	FedEx

Shipping Container #1

Custody Seals: Present

Airbill #: 944224315019
Shipping Container: Default Cooler
Shipping Container Temp.: 3.0 °C
Shipping Container Coolant: Ice

Work order notes:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-01	K-IIb	12/12/07 10:50	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-01A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-02	K-IIIb	12/12/07 11:15	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-02A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

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WORK ORDER
0806042

Customer:	North State Resources	**Due Date:**	03/06/08
Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-03	K-IID	12/12/07 12:00	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-03A	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-04	K-IIbM	12/12/07 10:50	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-04A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-05	K-IIIbM	12/12/07 11:15	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-05A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-06	K-IIDM	12/12/07 12:00	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-06A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

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WORK ORDER
0806042

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Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-07	C-III	12/13/07 10:40	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-07A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

0806042-08	C-IIIDM	12/13/07 10:40	Soil/Sediment

	Container	Size	Preservation	pH		
0806042-08A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

0806042-09	FB-1	12/13/07	Soil/Sediment

	Container	Size	Preservation	pH		
0806042-09A	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Mo
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ba
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Be
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cd
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Co
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Zn
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ni
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Pb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Sb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Se
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Tl
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	V
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cr

Comments: FB: Do not spike

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0806042

Customer:	North State Resources	**Due Date:**	03/06/08
Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-10	C-I	12/13/07 10:00	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-10A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-11	C-IM	12/13/07 10:00	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-11A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

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Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-12	C-II	12/13/07 10:20	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-12A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ba
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Be
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cd
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Co
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Zn
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Mo
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ni
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Pb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Sb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Se
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Tl
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	V
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cr

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-13	C-IIM	12/13/07 10:20	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-13A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

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Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-14	C-III	12/13/07 10:35	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-14A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

0806042-15	C-IIIM	12/13/07 10:35	Soil/Sediment

	Container	Size	Preservation	pH		
0806042-15A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

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Customer:	North State Resources	**Due Date:**	03/06/08
Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-16	C-IV	12/13/07 10:50	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-16A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ba
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Be
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cd
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Co
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Zn
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Mo
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ni
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Pb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Sb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Se
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Tl
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	V
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cr

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-17	C-IVM	12/13/07 10:50	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-17A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments:

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Customer:	North State Resources	**Due Date:**	03/06/08
Contact:	Jim Fitzgerald	**Receipt date:**	02/07/08 08:45
Project ID:	NSR-MS0801	**Log-in date:**	02/08/08 15:07

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-18	C-V	12/13/07 11:10	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-18A	Jar HDPE	8oz	None		**Method:** EPA Method 1631, Appendix	Hg
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ag
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	As
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ba
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Be
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cd
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Co
	Jar HDPE	8oz	None		**Method:** EPA Method 160.3	%TS
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Zn
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Mo
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Ni
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Pb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Sb
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Se
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Tl
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	V
	Jar HDPE	8oz	None		**Method:** EPA Method 1638 mod.	Cr

Comments:

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0806042-19	C-VM	12/13/07 11:10	Soil/Sediment	

	Container	Size	Preservation	pH		
0806042-19A	Jar Glass	8oz	None		**Method:** EPA Method 1630 mod.	MMHg
	Jar Glass	8oz	None		**Method:** EPA Method 160.3	%TS

Comments: Sample decanted

D Hawley - updated
Sample Custodian

2-12-08
Date

D Hawley
Reviewed By

2-12-08
Date

0806042

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
Yellow: CUSTOMER COPY

Client: Entrix via NSR	COC receipt confirmation? (Y) N)	Ship to: **Brooks Rand LLC**
Contact: Jim Fitzgerald	If yes, by Fax / Email (circle one)	3958 6th Avenue NW
Address: 305 Chestnut St. Mt. Shasta, CA 96067	Fax #:	Seattle, WA 98107
	Email: fitzgerald@nsrnet.com	Phone: 206-632-6206
	Sampler's name: Jim Fitzgerald	Fax: 206-632-6017
Phone #: (530) 227-8963	Client project ID: PZ6601	Email: samples@brooksrand.com
PO #: Z6601	BRL project ID: ENY002	www.brooksrand.com

	Sample ID	Collection: Date	Collection: Time	Misc: Sampler (initials)	Misc: Matrix type	Misc: # of containers	Misc: Sample field filtered (Y/N)	Field Preservation: Unpreserved / ice only	Field Preservation: HCl/HNO_3/BrCl (circle one)	Field Preservation: Other (specify)	Analyses required: Total Hg, EPA 1631	Methyl Hg, EPA 1630	Metals ICP-MS (specify)	As / Se species (specify)	% Solids	Filtration	Other (specify) CAM 17	Other (specify)	Other (specify)	Comments
1	K-I	12/12/07	1035	JF	S	1	N	X												JF
2	K-V	12/12/07	1050	JF	S	1	N	X												JF
3	K-IIb	12/12/07	1050	JF	S	1	N	X									X			
4	K-IV	12/12/07	1115	JF	S	1	N	X												JF
5	K-IIIb	12/12/07	1115	JF	S	1	N	X									X			
6	K-IX	12/12/07	1135	JF	S	1	N	X												JF
7	K-IIb	12/12/07	1200	JF	S	1	N	X									X			
8																				
9																				
10																				

Relinquished by: Jim Fitzgerald	Date: 2/6/08	Time: 1100	Received by:
Relinquished by:	Date:	Time:	Received at BRL by:
Shipping carrier: Fed Ex	# of coolers: 1		BRL Tracking #:

Date:	Time:	
Date: 2/9/08	Time: 845	

0806042

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
Yellow: CUSTOMER COPY

Client: Entrix via NSR	COC receipt confirmation? (Y) / N)	Ship to: **Brooks Rand LLC**
Contact: Jim Fitzgerald	If yes, by Fax / Email (circle one)	3958 6th Avenue NW
Address: 305 Chestnut St. Mt. Shasta, CA 96067	Fax #:	Seattle, WA 98107
	Email: Sitzgerald@snsnet.com	Phone: 206-632-6206
	Sampler's name: Jim Fitzgerald	Fax: 206-632-6017
Phone #: (530) 227-8963	Client project ID: P26601	Email: samples@brooksrand.com
PO #: 26601	BRL project ID: ENX002	www.brooksrand.com

	Sample ID	Collection: Date	Collection: Time	Misc: Sampler (initials)	Misc: Matrix type	Misc: # of containers	Misc: Sample field filtered (Y/N)	Field Preservation: Unpreserved / ice only	Field Preservation: HCl/HNO_3/BrCl (circle one)	Field Preservation: Other (specify)	Analyses required: Total Hg, EPA 1631	Analyses required: Methyl Hg, EPA 1630	Analyses required: Metals ICP-MS (specify)	Analyses required: As / Se species (specify)	Analyses required: % Solids	Analyses required: Filtration	Analyses required: Other (specify) CAM 17	Analyses required: Other (specify)	Analyses required: Other (specify)	Comments
1	VR-IDM	12/12/07	1055	JF	S	1	N	X				X								Sample Split in 2008 JF
2	K-IIDM	12/12/07	1050	JF	S	1	N	X				X								Sample Split in 2008 JF
3	K-IIbM	12/12/07	1050	JF	S	1	N	X				X								
4	K-IIIM	12/12/07	1115	JF	S	1	N	X				X								JF
5	K-IIIbM	12/12/07	1115	JF	S	1	N	X				X								
6	K-IVDM	12/12/07	1135	JF	S	1	N	X				X								JF
7	K-IIDM	12/12/07	1200	JF	S	1	N	X				X								
8	C-III	12/13/07	1040	JF	S	1	N	X				~~X~~ JF					X			
9	C-IIIDM	12/13/07	1040	JF	S	1	N	X				X								
10	FB-1	12/13/07	1130	JF	W	1	N	X									X			

Relinquished by: Jim Fitzgerald	Date: 2/6/08	Time: 1100	Received by:
Relinquished by:	Date:	Time:	Received at BRL by: Date: 2/9/08 Time: 845
Shipping carrier: Fed Ex	# of coolers: 1		BRL Tracking #:

0806042

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Contact: Jim Fitzgerald	If yes, by Fax / Email (circle one)	3958 6th Avenue NW
Address: 305 Chestnut St. Mt. Shasta, CA 96067	Fax #:	Seattle, WA 98107
	Email: fitzgerald@nsrnet.com	Phone: 206-632-6206
	Sampler's name: Jim Fitzgerald	Fax: 206-632-6017
Phone #: (530) 227-8963	Client project ID: PZ66001	Email:samples@brooksrand.com
PO #: Z66001	BRL project ID: ENX 002	www.brooksrand.com

	Sample ID	Collection: Date	Collection: Time	Misc: Sampler (initials)	Misc: Matrix type	Misc: # of containers	Misc: Sample field filtered (Y/N)	Field Preservation: Unpreserved / ice only	Field Preservation: HCl/HNO_3/BrCl (circle one)	Field Preservation: Other (specify)	Analyses required: Total Hg, EPA 1631	Analyses required: Methyl Hg, EPA 1630	Analyses required: Metals ICP-MS (specify)	Analyses required: As / Se species (specify)	Analyses required: % Solids	Analyses required: Filtration	Analyses required: Other (specify) CAM 17	Analyses required: Other (specify)	Analyses required: Other (specify)	Comments
1	C-I	12/13/07	1000	JF	S	1	N	X									X			
2	C-I M	12/13/07	1000	JF	S	1	N	X				X								
3	C-II	12/13/07	1020	JF	S	1	N	X									X			
4	C-II M	12/13/07	1020	JF	S	1	N	X				X								
5	C-III	12/13/07	1035	JF	S	1	N	X									X			
6	C-III M	12/13/07	1035	JF	S	1	N	X				X								
7	C-IV	12/13/07	1050	JF	S	1	N	X									X			
8	C-IV M	12/13/07	1050	JF	S	1	N	X				X								
9	C-V	12/13/07	1110	JF	S	1	N	X									X			
10	C-V M	12/13/07	1110	JF	S	1	N	X				X								

Relinquished by: Jim Fitzgerald	Date: 12/16/08	Time: 1100	Received by:
Relinquished by:	Date:	Time:	Received at BRL by: Date: 2/9/08 Time: 845
Shipping carrier: Fed Ex	# of coolers: 1		BRL Tracking #:

BROOKS RAND LABS

MEANINGFUL METALS DATA

April 22, 2008

North State Resources
Attn: Jim Fitzgerald
305 Chestnut St
Mount Shasta CA 96067
fitzgerald@nsrnet.com

RE: BRL Project Reference: NSR-MS0802 BRL Work Order: 0813013

Mr. Fitzgerald,

This is a report regarding the analysis of five sediment samples for total and leachable copper (Cu). The samples were received, prepared, analyzed, and stored according to BRL standard operating procedures (SOP) and EPA methodology.

The results were blank-corrected as described in the calculations section of the relevant BRL SOP(s) and may have been evaluated using reporting limits that have been adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific method detection limits (MDL), method reporting limits (MRL), and other details.

The internal standard germanium (Ge) in sequence 0800309 showed a trend of lower recoveries throughout the analysis; however, all QC samples corrected using the internal standard were within the control limits. On this basis, no qualification of the data was required.

Sample *K-I* yielded a leachable Cu result greater than the result from the total fraction; however, a comparison of the results produced a relative percent difference (RPD) within the method criterion for duplicate precision. Therefore, the results were considered statistically equivalent.

BRL, a NELAC accredited laboratory (FL LAB ID E87982), certifies that the reported results meet all NELAC requirements. Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Amanda Fawley
Project Manager
amanda@brooksrand.com

Bryan Setzer
Project Coordinator
bryan@brooksrand.com

BROOKS RAND LABS
MEANINGFUL METALS DATA

Organization: North State Resources
Contact: Jim Fitzgerald
Report Date: April 22, 2008

BRL Work Order: 0813013
BRL Project Reference: NSR-MS0802
BRL Project Manager: Amanda Fawley

ANALYTICAL REPORT FOR SAMPLES

Sample ID	BRL ID	Sampled	Received	Matrix
K-IIb	0813013-01	12/12/07	03/25/08	Soil/Sediment
K-IIIb	0813013-02	12/12/07	03/25/08	Soil/Sediment
C-I	0813013-03	12/13/07	03/25/08	Soil/Sediment
K-I	0813013-04	12/12/07	03/25/08	Soil/Sediment
K-IV	0813013-05	12/12/07	03/25/08	Soil/Sediment

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MEANINGFUL METALS DATA

0813013

BATCH SUMMARY FOR SAMPLES

Analyte/Method	Prepared	Analyzed	Batch	Sequence
Cu 65 by EPA Method 1638 mod.	04/17/2008	04/19/2008	B080533	0800309
Cu 65 by EPA Method 1638 mod. leachable	04/17/2008	04/19/2008	B080534	0800309
%TS by EPA Method 160.3	04/17/2008	04/18/2008	B080535	N/A

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MEANINGFUL METALS DATA

0813013

SAMPLE RESULTS

Method	Analyte	Total or Dissolved	Result	Qualifier	MDL	MRL	Units	Batch	Sequence
0813013-01 Soil/Sediment K-IIb									
EPA Method 1638 mod. leachable	Cu 65		19.1		0.22	0.65	mg/kg dry	B080534	0800309
EPA Method 1638 mod.	Cu 65		58.3		0.23	1.33	mg/kg dry	B080533	0800309
0813013-02 Soil/Sediment K-IIIb									
EPA Method 1638 mod. leachable	Cu 65		7.24		0.21	0.63	mg/kg dry	B080534	0800309
EPA Method 1638 mod.	Cu 65		37.5		0.22	1.28	mg/kg dry	B080533	0800309
0813013-03 Soil/Sediment C-I									
EPA Method 1638 mod. leachable	Cu 65		6.11		0.19	0.56	mg/kg dry	B080534	0800309
EPA Method 1638 mod.	Cu 65		29.0		0.18	1.09	mg/kg dry	B080533	0800309
0813013-04 Soil/Sediment K-I									
EPA Method 1638 mod. leachable	Cu 65		1120		2.21	6.50	mg/kg dry	B080534	0800309
EPA Method 1638 mod.	Cu 65		819		2.23	13.1	mg/kg dry	B080533	0800309
0813013-05 Soil/Sediment K-IV									
EPA Method 1638 mod. leachable	Cu 65		8.10		0.21	0.63	mg/kg dry	B080534	0800309
EPA Method 1638 mod.	Cu 65		43.5		0.22	1.28	mg/kg dry	B080533	0800309

BROOKS RAND LABS

MEANINGFUL METALS DATA

0813013

SAMPLE RESULTS

	Method	Analyte	Total or Dissolved	Result	Qualifier	MDL	MRL	Units	Batch	Sequence
0813013-01	**Soil/Sediment K-IIb**									
	EPA Method 160.3	%TS		75.41		0.10	0.33	%	B080535	N/A
0813013-02	**Soil/Sediment K-IIIb**									
	EPA Method 160.3	%TS		76.07		0.10	0.33	%	B080535	N/A
0813013-03	**Soil/Sediment C-I**									
	EPA Method 160.3	%TS		89.23		0.10	0.33	%	B080535	N/A
0813013-04	**Soil/Sediment K-I**									
	EPA Method 160.3	%TS		6.78		0.10	0.33	%	B080535	N/A
0813013-05	**Soil/Sediment K-IV**									
	EPA Method 160.3	%TS		77.22		0.10	0.33	%	B080535	N/A

BROOKS RAND LABS
MEANINGFUL METALS DATA

0813013

QUALITY ASSURANCE SUMMARY

Accuracy and Precision

Batch: B080533 **Method: EPA Method 1638 mod.** **SOP: BR-0067** **Matrix: Soil/Sediment**

Analyte	Sample Value	Spike Value	Result	Units	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Laboratory Fortified Blank(0816093)			B080533-BS2					
Cu 65		25.00	28.76	mg/kg dry	115	75-125		
Duplicate (0813013-01)			B080533-DUP1					
Cu 65	58.30		51.38	mg/kg dry			13	30
Matrix Spike (0813013-01)			B080533-MS1					
Cu 65	58.30	31.76	91.75	mg/kg dry	105	70-130		
Matrix Spike Duplicate (0813013-01)			B080533-MSD1					
Cu 65	58.30	32.83	90.16	mg/kg dry	97	70-130	2	30
NIST 2709			B080533-SRM1					
Cu 65		34.60	37.43	mg/kg dry	108	75-125		
NIST 2710			B080533-SRM2					
Cu 65		2950	3151	mg/kg dry	107	75-125		

Batch: B080534 **Method: EPA Method 1638 mod. leachable** **Matrix: Soil/Sediment**

Analyte	Sample Value	Spike Value	Result	Units	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Laboratory Fortified Blank(0816093)			B080534-BS9					
Cu 65		1.000	1.21	mg/kg dry	121	75-125		

BROOKS RAND LABS

MEANINGFUL METALS DATA

0813013

QUALITY ASSURANCE SUMMARY

Accuracy and Precision

Batch: B080534 **Method: EPA Method 1638 mod. leachable** **Matrix: Soil/Sediment**

Analyte	Sample Value	Spike Value	Result	Units	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Laboratory Fortified Blank(0816093)			B080534-BSA					
Cu 65		1.000	1.16	mg/kg dry	116	75-125		
Laboratory Fortified Blank(0816093)			B080534-BSB					
Cu 65		1.000	1.12	mg/kg dry	112	75-125		
Laboratory Fortified Blank(0816093)			B080534-BSC					
Cu 65		1.000	1.20	mg/kg dry	120	75-125		
Duplicate (0813013-01)			B080534-DUP1					
Cu 65	19.10		18.70	mg/kg dry			2	30
Matrix Spike (0813013-01)			B080534-MS3					
Cu 65	19.10	12.71	31.74	mg/kg dry	99	70-130		

Batch: B080535 **Method: EPA Method 160.3** **SOP: BR-1501** **Matrix: Soil/Sediment**

Analyte	Sample Value	Spike Value	Result	Units	% Recovery	% Recovery Limits	Duplicate RPD	RPD Limits
Duplicate (0813013-01)			B080535-DUP1					
%TS	75.41		74.77	%			0.8	15

BROOKS RAND LABS
MEANINGFUL METALS DATA

0813013

QUALITY ASSURANCE SUMMARY

Method Blanks/Detection Limits

Batch: B080533 **Method: EPA Method 1638 mod.** **SOP: BR-0067** **Matrix: Soil/Sediment**

Analyte	Result	Units
Cu 65		
B080533-BLK1	-0.17	mg/kg dry
B080533-BLK2	-0.18	mg/kg dry
B080533-BLK3	-0.17	mg/kg dry
B080533-BLK4	-0.14	mg/kg dry

	Average	Average Limits	Standard Deviation	StDev Limits	MDL	MRL
Method Blank Summary	-0.17	1.00	0.02	0.17	0.17	1.00

Batch: B080534 **Method: EPA Method 1638 mod. leachable** **Matrix: Soil/Sediment**

Analyte	Result	Units
Cu 65		
B080534-BLK1	-0.01	mg/kg dry
B080534-BLK2	-0.02	mg/kg dry
B080534-BLK3	-0.02	mg/kg dry
B080534-BLK4	-0.02	mg/kg dry

	Average	Average Limits	Standard Deviation	StDev Limits	MDL	MRL
Method Blank Summary	-0.02	0.50	0.01	0.17	0.17	0.50

BROOKS RAND LABS
MEANINGFUL METALS DATA

0813013

QUALITY ASSURANCE SUMMARY

Method Blanks/Detection Limits

Batch: B080535 **Method: EPA Method 160.3** **SOP: BR-1501** **Matrix: Soil/Sediment**

Analyte	Result	Units
%TS		
B080535-BLK1	0.02	%
B080535-BLK2	0.00	%

	Average	Average Limits	Standard Deviation	StDev Limits	MDL	MRL
Method Blank Summary		0.20		0.07	0.10	0.33

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BROOKS RAND LABS
MEANINGFUL METALS DATA

Phone: 206-632-6206
Fax: 206-632-6017
Email: brl@brooksrand.com

WORK ORDER
0813013

Customer: North State Resources
Contact: Jim Fitzgerald
Project ID: NSR-MS0802

Due Date: 04/22/08
Receipt Date: 03/25/08 13:51
Log-in Date: 03/25/08 13:51

QA Level: Standard
EDD: None

Sample Custodian: Amanda Fawley
BRL Project Manager: Amanda Fawley

TAT: 20

Courier: FedEx

Shipping Container #1

Airbill: 944224315019
Shipping Container: Default Cooler
Shipping Container Temp: Ambient
Shipping Container Coolant: Ice

Custody Seals: Present

Work order notes:
Copy/Relog from 0806042.

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0813013-01	K-IIb	12/12/07 10:50	Soil/Sediment	

	Container	Size	Preservation	pH		
0813013-01A	Jar HDPE				**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE				**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE				**Method:** EPA Method 160.3	%TS

0813013-02	K-IIIb	12/12/07 11:15	Soil/Sediment

	Container	Size	Preservation	pH		
0813013-02A	Jar HDPE				**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE				**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE				**Method:** EPA Method 160.3	%TS

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Seattle WA 98107
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MEANINGFUL METALS DATA

Phone: 206-632-6206
Fax: 206-632-6017
Email: brl@brooksrand.com

WORK ORDER
0813013

Customer: North State Resources
Contact: Jim Fitzgerald
Project ID: NSR-MS0802

Due Date: 04/22/08
Receipt Date: 03/25/08 13:51
Log-in Date: 03/25/08 13:51

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0813013-03	C-I	12/13/07 10:00	Soil/Sediment	

	Container	Size	Preservation	pH		
0813013-03A	Jar HDPE				**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE				**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE				**Method:** EPA Method 160.3	%TS

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0813013-04	K-I	12/12/07 10:35	Soil/Sediment	

	Container	Size	Preservation	pH		
0813013-04A	Jar HDPE	8 oz			**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8 oz			**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8 oz			**Method:** EPA Method 160.3	%TS

BRL Sample ID	Client ID / Site ID	Collection Date/Time	Matrix	Analyte
0813013-05	K-IV	12/12/07 11:35	Soil/Sediment	

	Container	Size	Preservation	pH		
0813013-05A	Jar HDPE	8 oz			**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8 oz			**Method:** EPA Method 1638 mod.	Cu
	Jar HDPE	8 oz			**Method:** EPA Method 160.3	%TS

Sample Custodian

Reviewed By

3/28/08
Date

3/28/08
Date

0806042

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
Yellow: CUSTOMER COPY

Client: Entrix via NSR	COC receipt confirmation? (Y) N)	Ship to: **Brooks Rand LLC**
Contact: Jim Fitzgerald	If yes, by Fax / Email (circle one)	3958 6th Avenue NW
Address: 305 Chestnut St. Mt. Shasta, CA 96067	Fax #:	Seattle, WA 98107
	Email: fitzgerld@nsrnet.com	Phone: 206-632-6206
	Sampler's name: Jim Fitzgerald	Fax: 206-632-6017
Phone #: (530) 227-8963	Client project ID: PZ6601	Email: samples@brooksrand.com
PO #: Z6601	BRL project ID: ENY002	www.brooksrand.com

	Sample ID	Collection: Date	Collection: Time	Misc: Sampler (initials)	Misc: Matrix type	Misc: # of containers	Misc: Sample field filtered (Y/N)	Field Preservation: Unpreserved / ice only	Field Preservation: HCl/HNO_3/BrCl (circle one)	Field Preservation: Other (specify)	Analyses required: Total Hg, EPA 1631	Analyses required: Methyl Hg, EPA 1630	Analyses required: Metals ICP-MS (specify)	Analyses required: As / Se species (specify)	Analyses required: % Solids	Analyses required: Filtration	Analyses required: Other (specify) CAM 17	Analyses required: Other (specify)	Analyses required: Other (specify)	Comments
1	K-I	12/12/07	1035	JF	S	1	N	X									X			JF
2	K-II	12/12/07	1050	JF	S	1	N	X									X			JF
3	K-IIb	12/12/07	1050	JF	S	1	N	X									X			
4	K-IV	12/12/07	1115	JF	S	1	N	X									X			JF
5	K-IIIb	12/12/07	1115	JF	S	1	N	X									X			
6	K-III	12/12/07	1135	JF	S	1	N	X									X			JF
7	K-ID	12/12/07	1200	JF	S	1	N	X									X			
8																				
9																				
10																				

Relinquished by: Jim Fitzgerald	Date: 2/6/08	Time: 1100	Received by:
Relinquished by:	Date:	Time:	Received at BRL by:
Shipping carrier: Fed Ex	# of coolers: 1		BRL Tracking #:

Date:	Time:	
Date: 2/9/08	Time: 845	

0806042

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
Yellow: CUSTOMER COPY

Client: Entrix via NSR	COC receipt confirmation? (Y / N)	Ship to: **Brooks Rand LLC**
Contact: Jim Fitzgerald	If yes, by Fax / Email (circle one)	3958 6th Avenue NW
Address: 305 Chestnut St. Mt. Shasta, CA 96067	Fax #:	Seattle, WA 98107
	Email: Sitzgerald@nsrnet.com	Phone: 206-632-6206
	Sampler's name: Jim Fitzgerald	Fax: 206-632-6017
Phone #: (530) 227-8963	Client project ID: P26601	Email: samples@brooksrand.com
PO #: 26601	BRL project ID: ENX002	www.brooksrand.com

	Sample ID	Collection: Date	Collection: Time	Misc: Sampler (initials)	Misc: Matrix type	Misc: # of containers	Misc: Sample field filtered (Y/N)	Field Preservation: Unpreserved / ice only	Field Preservation: HCl/HNO_3/BrCl (circle one)	Field Preservation: Other (specify)	Analyses required: Total Hg, EPA 1631	Analyses required: Methyl Hg, EPA 1630	Analyses required: Metals ICP-MS (specify)	Analyses required: As / Se species (specify)	Analyses required: % Solids	Analyses required: Filtration	Analyses required: Other (specify) CAM17	Analyses required: Other (specify)	Analyses required: Other (specify)	Comments
1	K-I M	12/12/07	1055	JF	S	1	N	X				X								Sample Split in 2008 JF
2	K-II M	12/12/07	1050	JF	S	1	N	X				X								Sample Split in 2008 JF
3	K-II bM	12/12/07	1050	JF	S	1	N	X				X								
4	K-III M	12/12/07	1113	JF	S	1	N	X				X								JF
5	K-III bM	12/12/07	1115	JF	S	1	N	X				X								
6	K-IV M	12/12/07	1135	JF	S	1	N	X				X								JF
7	K-II DM	12/12/07	1200	JF	S	1	N	X				X								
8	C-III	12/13/07	1040	JF	S	1	N	X				X JF					X			
9	C-III DM	12/13/07	1040	JF	S	1	N	X				X								
10	FB-1	12/13/07	1130	JF	W	1	N	X									X			

Relinquished by: Jim Fitzgerald	Date: 2/6/08	Time: 1100	Received by:
Relinquished by:	Date:	Time:	Received at BRL by: Date: 2/7/08 Time: 845
Shipping carrier: Fed Ex	# of coolers: 1		BRL Tracking #:

08060042

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
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Client: Entrix via NSR	COC receipt confirmation? (Y) N)	Ship to: **Brooks Rand LLC**
Contact: Jim Fitzgerald	If yes, by Fax / Email (circle one)	3958 6th Avenue NW
Address: 305 Chestnut St. Mt. Shasta, CA 96067	Fax #:	Seattle, WA 98107
	Email: fitzgerald@nsrnet.com	Phone: 206-632-6206
	Sampler's name: Jim Fitzgerald	Fax: 206-632-6017
Phone #: (530) 227-8963	Client project ID: PZ6601 J	Email:samples@brooksrand.com
PO #: Z6601	BRL project ID: ENX 002	www.brooksrand.com

	Sample ID	Collection		Miscellaneous				Field Preservation			Analyses required									Comments
		Date	Time	Sampler (initials)	Matrix type	# of containers	Sample field filtered (Y/N)	Unpreserved / ice only	HCl/HNO_3/BrCl (circle one)	Other (specify)	Total Hg, EPA 1631	Methyl Hg, EPA 1630	Metals ICP-MS (specify)	As / Se species (specify)	% Solids	Filtration	Other (specify) CAM 17	Other (specify)	Other (specify)	
1	C-I	12/13/07	1000	JF	S	1	N	X									X			
2	C-I M	12/13/07	1000	JF	S	1	N	X				X								
3	C-II	12/13/07	1020	JF	S	1	N	X									X			
4	C-II M	12/13/07	1020	JF	S	1	N	X				X								
5	C-III	12/13/07	1035	JF	S	1	N	X									X			
6	C-III M	12/13/07	1035	JF	S	1	N	X				X								
7	C-IV	12/13/07	1050	JF	S	1	N	X									X			
8	C-IV M	12/13/07	1050	JF	S	1	N	X				X								
9	C-V	12/13/07	1110	JF	S	1	N	X									X			
10	C-V M	12/13/07	1110	JF	S	1	N	X				X								

Relinquished by: Jim Fitzgerald	Date: 12/16/08	Time: 1100	Received by:
Relinquished by:	Date:	Time:	Received at BRL by:
Shipping carrier: Fed Ex	# of coolers: 1		BRL Tracking #:

Received by:	Date:	Time:
Received at BRL by:	Date: 12/9/08	Time: 845
BRL Tracking #:		