

# Removal Preliminary Assessment

## For The

# Big Blue Mill Site

Kernville Ranger District  
Sequoia National Forest



February 10, 2020

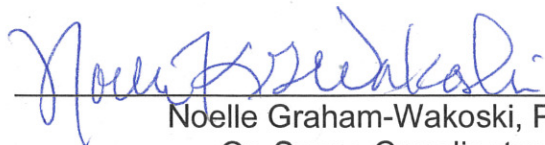
Prepared by:  
Noelle Graham-Wakoski, P.E.  
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Pacific Southwest Region  
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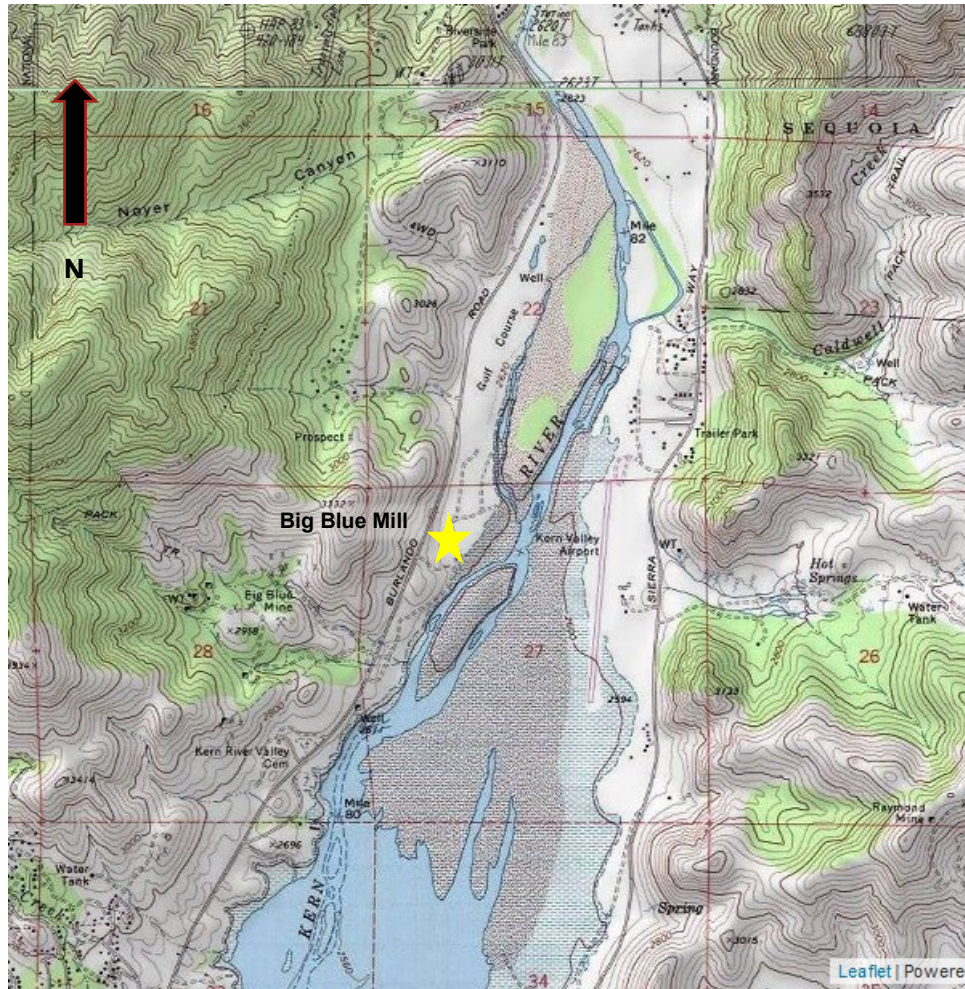


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## 1.0 LOCATION

The Big Blue Mill Site (Site) is a former gold ore processing facility dating back to the 1860s that was associated with the nearby historic Big Blue and Summer group of mines. The Site is located in Section 27, Township 25 South, Range 33 East, Mount Diablo Meridian, on the western bank of the North Fork of the Kern River (River) – a tributary feeding into Lake Isabella within Kern County, California (see Figure 1). The Site is located on both private and national forest system land under the jurisdiction, custody and control of the U.S. Department of Agriculture Forest Service (Forest Service), within the Sequoia National Forest, Kern River Ranger District.



**Figure 1: Location of the Big Blue Mill Site on the western bank of the Kern River above Lake Isabella, Kern County**

The Site is located approximately 2 miles south of Kernville, California and can be accessed by taking California State Highway 178 east from Bakersfield toward Lake Isabella, California. Then turn left and head north on Highway 155 toward Wofford Heights. Continue north on Highway 495 (Burlando Road) toward Kernville for approximately three miles to the Site on the right side, which is approximately 800 feet east of the road toward the Kern River. The preferred access to the Site within Forest Service land is via the abandoned golf course just south of downtown Kernville. This path entails a one-mile travel on single lane track. The north end of the Site is the northern portion of the mill building foundations and the south end of the Site is just beyond the ragged peak along the shoreline of the Kern River.



## 2.0 BACKGROUND

### 2.1 Site History

The Big Blue Mill Site, also referred to as the "Sumner Mill" in some historic reports, is a former gold ore processing facility dating back to the 1860s that was associated with the nearby historic Big Blue and Sumner group of mines. The Big Blue and Sumner group of mines are located southwest of the Site (see Figure 1) and were part of the historic Cove Mining District on the west side of the Kern River Valley. The September 15, 1896, Thirteenth Report of the State Mineralogist, for the California State Mining Bureau, indicates that there were multiple mining claims associated with mill site, these being the Big Blue, Commonwealth, Content, Nelly Dent, Nelly Dent Extension, Sumner, and Summer 5 Extensions (Beauregard, Bull Run, Frank, Jeff Davis, Lady Bell, and Urbana). According to the January 1940 "Volume 36 California Journal of Mines and Geology", the gold vein mined by these mines was first discovered in 1860.

Historic records from the California State Division of Mines indicate that mineral processing operations were conducted at the site dating back to the 1860s. At least four different mineral processing operations occurred at the Site, including: a 16-stamp mill from approximately 1867 through the mid-1870s, an 80-stamp mill from 1875 through 1883, a 10-stamp mill from approximately 1901 through 1932, and floatation plant and ball mill from 1934 – 1943. Records stated that the 80-stamp mill was the largest of its kind at the time.

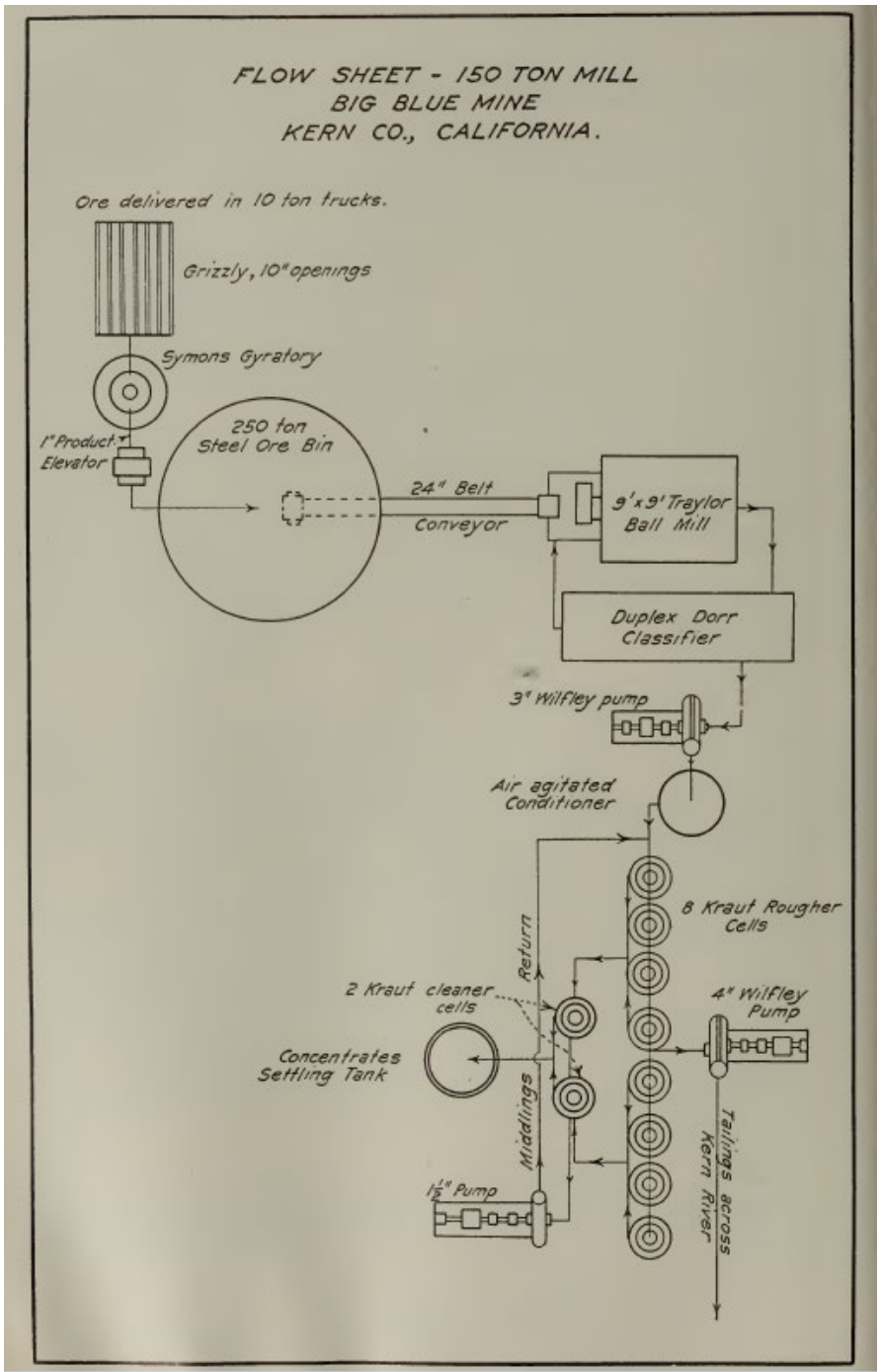
The 1888 "Eighth Annual Report of the State Mineralogist" described the 80-stamp mill as follows: "It is an eighty-stamp mill. Built in 1874 and 1875 and was run by a 56-inch turbine water wheel. The ore from the mine was dumped from five-ton cars into a 60-ton bin, or bunker, whence it fell and went through a 15 by nine jaw-crusher of peculiar lever construction and thence dropped into small cars running on a tramway the whole length of the building. From these cars it was dumped by hand into the separate hoppers of the automatic feeders, one to each battery of five stamps. From the batteries the pulp went to Hendy concentrators, one to each battery. Later on, two of the Hendy concentrators were replaced by four Frue vanners. Below the concentrators and vanners, there are six pans and three large settlers. Tailings were allowed to run into the river. The whole eighty stamps are said to have been run continuously for some two years, after first starting up in the spring of 1875. After that, the mill ran spasmodically, with more or less stamps at a time, up to the date of its final substantial stoppage in November, 1883."



**Figure 2: Big Blue Mill Site on the west bank of the Kern River (date is unknown but thought to be from the 1870s era)**

According to several Annual Reports of the State Mineralogist, up until the 1930s, tailings and other materials from the mill operations were dumped into the Kern River and most washed down stream. In the early 1930s, the flotation plant and ball mill was installed at the site (1934 30th Annual Report of the State Mineralogist) from which point tailings from the processing operations were pumped across the Kern River and deposited into a tailings pond. The 1934 30th Annual Report of the State Mineralogist for the California Division of Mines lists the size of the floatation plant at 150 -ton.

**Figure 3: Flotation Plant Flow Sheet for the Big Blue Mill (source 1934 30th Annual Report of the State Mineralogist)**



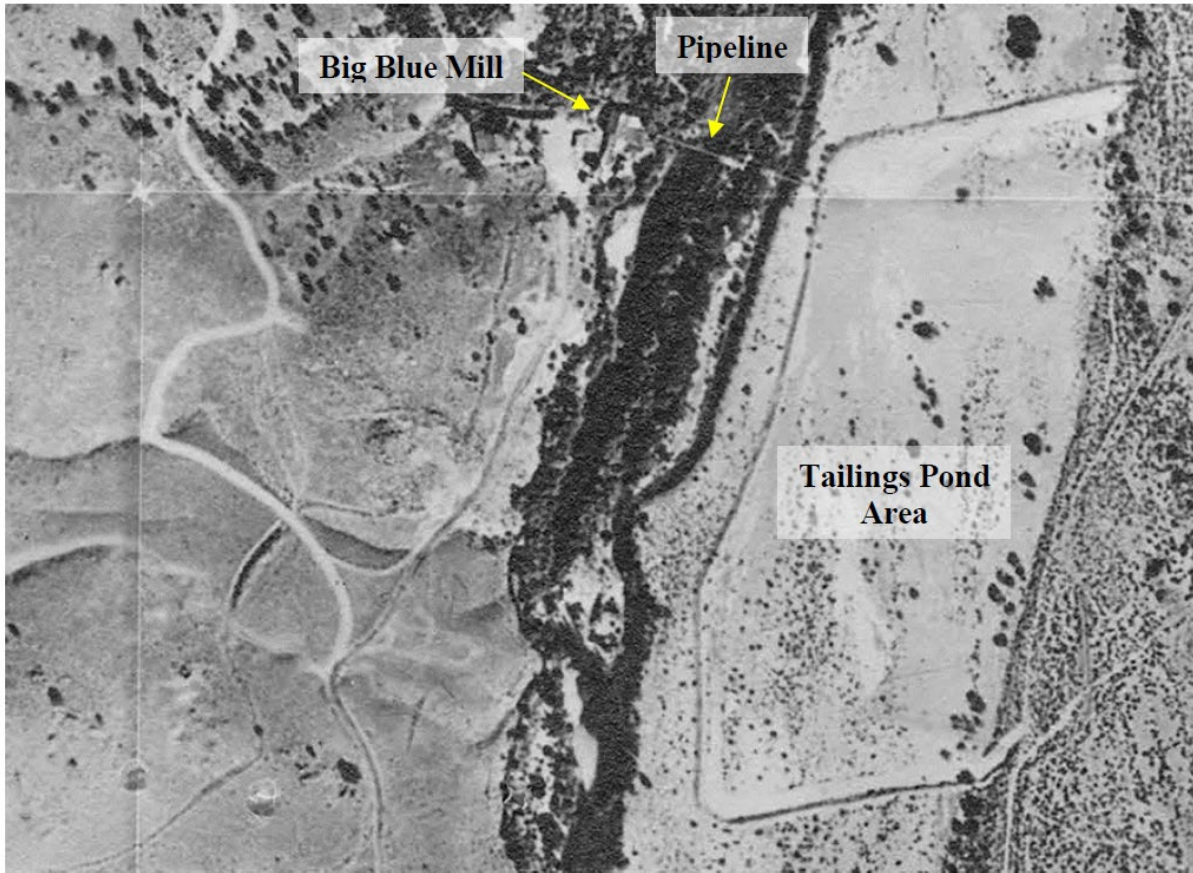


Figure 4: October 20, 1938 Aerial photo showing Big Blue Mill, pipeline, and tailings pond area



Figure 5: Big Blue Mill Circa pre-1940 (source January 1940, Vol 36 California Journal of Mines and Geology)



The Big Blue Mill operated up until 1943 when it was shut down during World War II as a result of Order L 208 of the War Production Board. Order L 208, issued by the War Production Board gave priority to copper mining, which had useful military implications, and labeled gold mines as “nonessential” for purposes of the war effort. As such, Order L-208 prohibited mining of “nonessential” materials. The 1962 report "Mines and Mineral Resources of Kern County, California" by the California Division of Mines and Geology states that Order L208 caused the mine to be shut down permanently.

## 2.2 Current Land Status

In 1948, US Army Corps of Engineers (USACE) began construction of the Lake Isabella Dam and reservoir project. In 1954, to complete the reservoir project, the USACE acquired all land below elevation 2617 feet. This included Big Blue Mill site which was at a lower elevation than the spillway of Lake Isabella dam. In 1957, the mill was sold at auction, and removed to New Mexico (California Division of Mines and Geology, 1962)

In 1991, in order to ensure ongoing public access to recreational activities along the river, this USACE floodplain land area was exchanged, from the USACE to the USDA Forest Service.

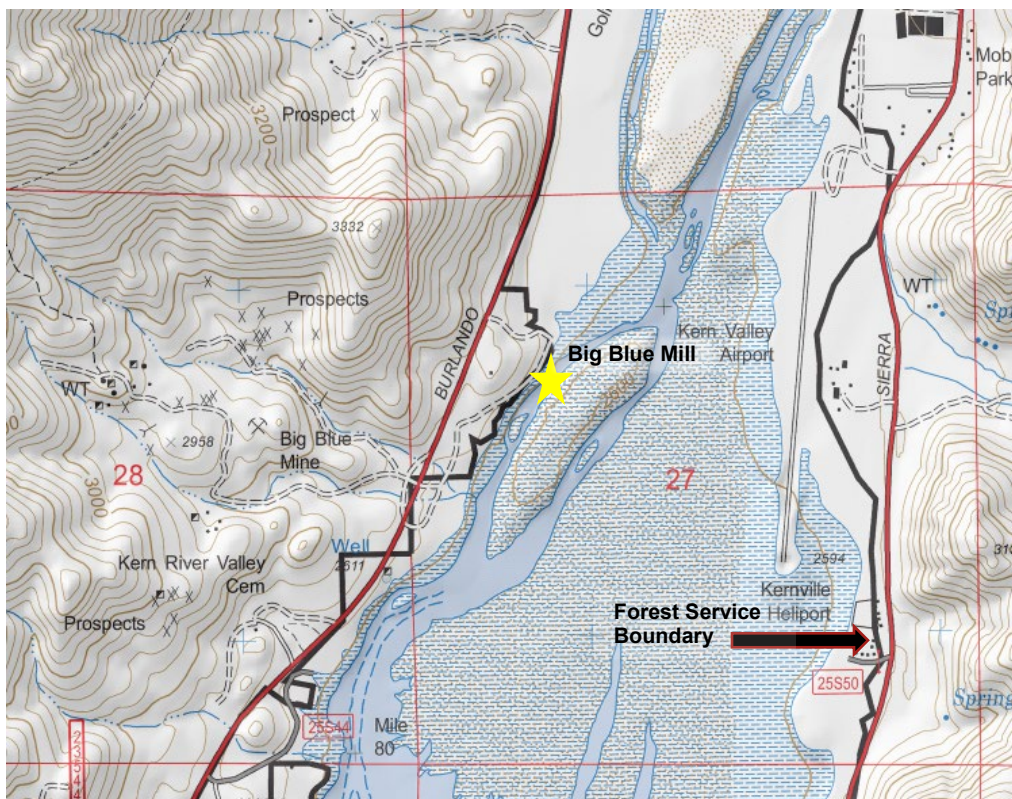


Figure 6: Current Forest Service land boundary

## 2.3 Current Land Use

The site is immediately adjacent to the Kern River which is a popular recreation area for fishing and water sports. The banks of the Kern River are reportedly popular fishing locations and some of the tailing materials encompass a common fishing platform and are bisected by a user created, well developed ‘fishermen’s trail’ leading up from the south. There are also permitted commercial rafting corridors along the Kern River allowing access whereby recreational rafters may readily climb up on the shoreline in this location. There is an occupied single-family private residence within 100 feet of the Site. The home sits immediately adjacent to the posted private property-National Forest land boundary. There are two other parcels with homes at an

approximate distance of 500 feet and 1,000 feet respectively from the Site. It is unknown at this time whether there are children living in these homes. This portion of the River has been determined to be eligible as a Wild & Scenic river byway for permitted, non-permitted and commercial recreational use. The Kern River Valley Chamber of Commerce holds an annual Lake Isabella Fishing Derby for the public every April. This event likely draws huge crowds along the north fork of the Kern River and south/downriver to Lake Isabella.

### 3.0 PREVIOUS INVESTIGATIONS

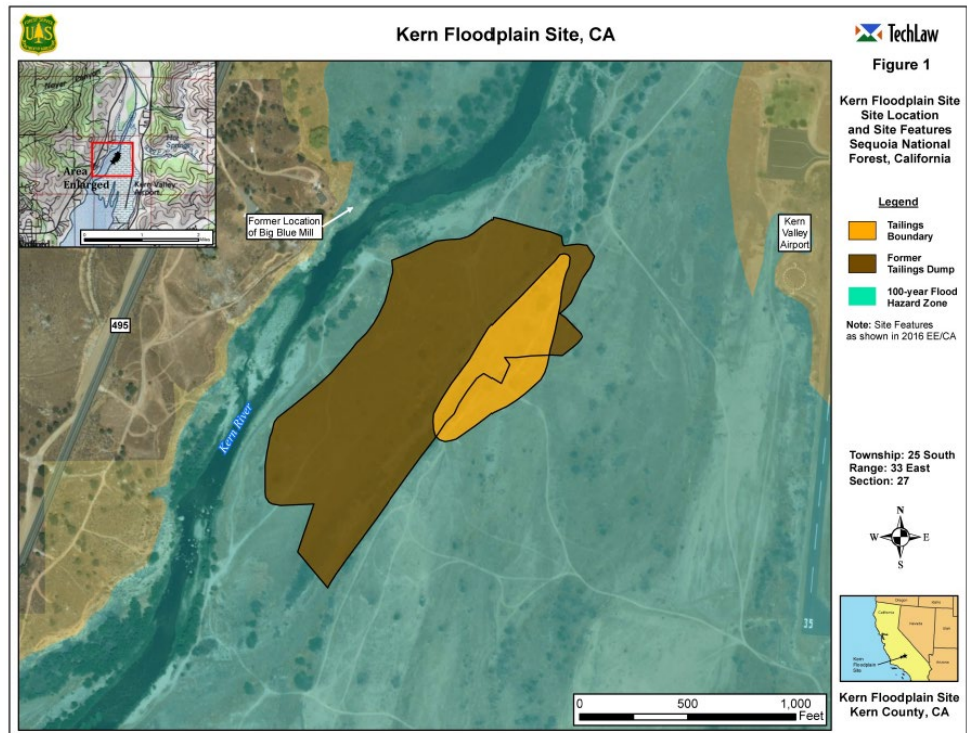
No previous investigations have been performed at the location of the former Big Blue Mill. The Forest Service has conducted several investigations of the former tailings pond area which is located across the Kern River from the former mill site (see Figure 4 above). The former tailings pond area is referred to as the "Kern Floodplain Site". Previous investigations associated with the Kern Floodplain Site include the following:

- February 2011, Investigation Results for Suspected Big Blue Mine Tailings between the Kern Valley Airport Campground and the Kern River by Jerome DeGraff, Forest Service
- January 2013, Kern Floodplain Site Sequoia National Forest, Site Inspection Summary Report, Weston Solutions
- October 2016, Final Engineering Evaluation and Cost Analysis, Kern Floodplain Site, ECM Consultants
- May 2018, Potentially Responsible Party Search Final Report, Kern Floodplain Site, ECM Consultants

### 3.1 Kern Floodplain Site Investigation Summary

The Kern Floodplain Site is the location of the former tailings pond area for the Big Blue Mill. Historic records indicate that tailings from the Big Blue Mill were deposited at the Kern Floodplain Site from approximately 1934 through 1943. The Kern Floodplain site is approximately 4.1 acres in size and is located directly across the Kern River from the Big Blue Mill Site.

**Figure 7: Kern Floodplain Site Tailings Delineation**





Forest Service site investigation efforts at the Kern Floodplain site found elevated levels of arsenic, cadmium and lead present in the mill tailings. With arsenic concentrations peaking at 4,200 mg/kg, lead at 220 mg/kg and cadmium at 4.7 mg/kg.

**Table 9: Summary of Analytical Results by Sample Location**

Sample Location	Sample Depth	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)
Trench 1	0.5	<i>640</i>	<i>1.6</i>	0.12
Trench 1	2	<i>1,500</i>	<i>3.3</i>	0.1
Trench 1	1	<i>2,300</i>	<i>4</i>	0.56
Pothole 11	1	<i>1,300</i>	<i>1.6</i>	<i>46</i>
Trench 2	3	<i>120</i>	<i>3.3</i>	15
Trench 2	4	<i>100</i>	<i>4</i>	3.4
Trench 2	1.5	<i>2,800</i>	<i>2.8</i>	<i>61</i>
Trench 2	8	<i>37</i>	<i>0.29</i>	2.6
Trench 2	8	<i>190</i>	<i>0.072</i>	7.4
Trench 2	4	<i>130</i>	<i>3.3</i>	7.2
Trench 2	0.5	<i>160</i>	<i>0.088</i>	14
Trench 3	3	<i>3,900</i>	<i>0.34</i>	<i>190</i>
Trench 3	3	<i>3,700</i>	<i>0.25</i>	<i>180</i>
Trench 3	4	<i>240</i>	<i>0.94</i>	11
Trench 3	7	<i>190</i>	<i>3.5</i>	6.6
Trench 5	4	<i>130</i>	<i>3.3</i>	3.1
Trench 5	4	<i>120</i>	<i>0.22</i>	3.2
Pothole 15	0.5	<i>4.5</i>	<i>0.11</i>	2.7
Pothole 15	3	<i>4.3</i>	<i>0.091</i>	2.2
Pothole 16	0.8	<i>940</i>	<i>3.6</i>	<i>46</i>
Pothole 16	2	<i>6.6</i>	<i>0.079</i>	2.2
Pothole 18	0.8	<i>14</i>	<i>0.14</i>	3
Pothole 18	2.5	<i>4.4</i>	<i>0.091</i>	2.4
Pothole 20	0.25	<i>17</i>	<i>0.46</i>	5.2
Pothole 20	2.5	<i>3.2</i>	<i>0.063</i>	3.3
Pothole 21	1.5	<i>4,200</i>	<i>4.7</i>	<i>220</i>
Pothole 21	4	<i>62</i>	<i>0.16</i>	4.4
Pothole 22	0.5	<i>15</i>	<i>0.26</i>	4.5
Pothole 22	1.5	<i>5.5</i>	<i>0.17</i>	3.4
Pothole 23	0.6	<i>22</i>	<i>0.82</i>	6.2
Pothole 23	3	<i>6.2</i>	<i>0.16</i>	2
Background	--	5.64	0.15	16.24
TTLIC		500	100	1,000

*Notes:*

*Italicized text denotes concentration exceeds site-specific background.*

**Bold text denotes concentration exceeds the Total Threshold Limit Concentration (TTLIC).**

**Figure 8: Summary of arsenic, lead and cadmium levels present in tailings at the Kern Floodplain Site (source October 2016 Final Engineering Evaluation and Cost Analysis Report, Kern Floodplain Site)**

#### 4.0 BIG BLUE MILL SITE INVESTIGATION

On October 17, 2019, an initial site visit was made to the former Big Blue Mill Site to assess whether there was a tailings deposit near the former mill site. The site was chosen because of its historical connection to the tailing materials discovered in 2011 in the floodplain on the east side of the Kern River. Initial screening with a field X Ray Fluorescence (XRF) revealed elevated arsenic and lead levels in deposits along the bank. Arsenic levels ranged from 95

milligrams per kilogram (mg/kg) to 97,592 mg/kg and lead levels ranged from 35 mg/kg to 7,539 mg/kg. Based on these initial results a follow-up assessment was planned to further assess site contamination and potential risks.

The follow-up site assessment was conducted on January 14, 2020 by Forest Service On-Scene Coordinators (OSCs), Rick Weaver and Noelle Graham-Wakoski using two separate field XRF field instruments to better delineate the full range of contaminants at the Site.

During the October 2019 visit, the Big Blue Mill site was accessed by foot from the abandoned golf course on National Forest land north of the private property from Burlando Road. For the January site visit, Forest Service employees were accompanied by a Law Enforcement officer, who had previously contacted the occupant of the northern parcel residence. Permission was granted to the Forest Service to park vehicles along the private driveway and to walk down toward the former mill site from above.

#### 4.1 Current Site Conditions

The only physical evidence remaining at the site of the former mill structures are concrete foundations and dilapidated retaining walls. The area is strewn with driftwood and other river debris and indicates that the site has been subject to periodic flooding.



**Figure 9: Concrete foundations that once supported structures and processing equipment at the Big Blue Mill. Photo taken from across the Kern River shows the proximity of nearby residences to the foundations that once supported site structures and processing equipment.**



The mill foundation and tailings materials are located within 100 feet of the northern parcel single-story residence that was constructed up to the public/private property boundary in the early 2000s (Figures 9 and 10). Given the large footprint of the former Mill structures, there is the potential that the home foundation is immediately adjacent, if not on top of the footprint of the former mill structures. Two other residential dwellings are located within 500 and 1,000 feet of the site. Trash and other evidence of human visitation to the Site is present throughout the area.



**Figure 10: Approximate location of the former mill relative to nearby residences and the Kern Floodplain Site**

Fishing is very popular along the Kern River from the shoreline. A well-used 'Fishermen's Trail' exists through the Site and a fishing platform was observed on the heavy metal impacted tailing materials at the shoreline. The west bank of the Kern River near the former site is heavily eroded although pockets of tailing deposits remain. The east side of the river is lined with cottonwoods, locust and willow trees. Along the shoreline there is clear evidence of tailings depicted by very fine brown materials, rust colored formations, white powdery and chunked deposits, likely to be mineral processing wastes from the former mill operations. (Figures 11, 12).





**Figure 11: Rust colored tailings and mineral processing deposits along the Kern riverbank below the former mill.**



**Figure 12: Deposits of very fine white powdery material along the riverbank (left) and brown silty materials below the former mill foundation (right) where elevated arsenic, lead and mercury were found.**



**Figure 13: Fishing platform on river bank comprised of mill tailing deposits below the former mill site.**



## 4.2 Site Sampling

Field screening was conducted using a Thermo Scientific Niton Model XL3t-600 and an Olympus Delta Model DS-4000 handheld X-Ray Fluorescence analyzer. XRF sampling was performed by Forest Service OSCs along the areas with visible evidence of tailings along the streambank and near foundation of the former mill. A total of 31 locations throughout the former mill site were sampled, including one (1) up gradient location for site background (Figure 14).



**Figure 14: January 14, 2020, XRF (sample Locations 429-445 taken by the Thermo Scientific Niton Model XL3t-600 and sample numbers 3-22 by the Olympus Delta XRF Model DS-4000).**

Prior to conducting sampling, both XRFs were field calibrated in accordance with manufacturer specifications and checked to ensure they were set to the same analysis mode. XRF readings were taken using a 60 second acquisition time period. Materials in several locations were also analyzed by both instruments in order to assess the variability between the two XRF devices.

Nine (9) soil samples were taken around the site in locations with the highest XRF reading for laboratory confirmation sampling. Samples were drawn using a steel hand shovel and placed into new sample bags and immediately labelled with a sharpie pen with the corresponding XRF instrument auto numbered identifier shot on that sample bag. Full sample description labels were created with sampler name, sample date, sample identifier, and project information following the field visit. Samples were sent to Babcock Laboratories in Riverside, California - a California and National ELAP accredited laboratory for analysis.

## 4.3 Site Sampling Results

XRF values obtained during this assessment indicate that contamination is present at the Site as a result of historic mineral processing activities. XRF results are provided below in Table 1. Initial screening results point to arsenic, lead, mercury and zinc initial constituents of concern.





Levels of arsenic, lead, mercury, and zinc (CERCLA hazardous substances) greatly exceed site background levels, as shown in Table 2 below and indicates that a release of hazardous substances to the environment has occurred as a result of historic mineral processing operations.

**Table 2: Summary of XRF Arsenic, Lead, Mercury, and Zinc Concentrations Compared to Site Background Levels**

	<b>Arsenic (mg/kg)</b>	<b>Lead (mg/kg)</b>	<b>Mercury (mg/kg)</b>	<b>Zinc (mg/kg)</b>
<b>XRF Detection Range</b>	ND - 239,639	ND - 12,513	ND - 3,896	ND - 1,047
<b>Site Background (sample 22)</b>	15	21	8	42
<b>Site Background Exceedance</b>	0x - 15,975.9x	0x - 595.9x	0x - 487x	0x - 24.9x

To assess field instrument consistency, soil sample 8 was analyzed by both XRF devices. The readings of the two machines are compared below in Table 3.

**Table 3: Field XRF Consistency Samples**

<b>XRF Device</b>	<b>Arsenic mg/kg</b>	<b>Lead mg/kg</b>	<b>Mercury mg/kg</b>	<b>Zinc mg/kg</b>
Olympus Delta Model DS-4000	152,928	2,733	3,016	593
Thermo Scientific Niton Model XL3t-600	143,314	3,356	1,183	311
<b>Relative percent difference</b>	6.5	20.5	174.6	62.4

The variation between the two separate XRF instruments range from 6.5 percent for arsenic to 174.6 percent for mercury and 62.4 for zinc. While the variance results seems to vary greatly between the two instruments, both results confirm the trend of elevated metals. The low relative percent difference for arsenic between the two instruments demonstrates a higher confidence of an elevated concentrations detected at the Site.

Laboratory results for the ten (10) samples sent off for laboratory analysis are provided in Appendix A. It is believed that the sample preparation method utilized by the laboratory did not provide for a full extraction of the metals from the samples. Resulting in lower reporting and not providing a correct correlation with the XRF data. The laboratory results, summarized in Table 3, do confirm that arsenic, lead and mercury are present in concentrations significantly above background levels and that a release of hazardous substances has occurred as a result of historic mineral processing operations.

**Table 3: Summary of Laboratory Arsenic, Lead, Mercury, and Zinc Concentrations Compared to Site Background Levels**

	<b>Arsenic (mg/kg)</b>	<b>Lead (mg/kg)</b>	<b>Mercury (mg/kg)</b>	<b>Zinc (mg/kg)</b>
<b>Laboratory Analytical Results</b>	400 - 60,000	50 - 8,300	5 - 1,500	25 - 180
<b>Site Background (sample 22)</b>	15	21	8	42
<b>Site Background Exceedance</b>	26.7x - 4,000x	2.4x - 395.2x	0.6x - 187.5x	0.6x - 4.3x

#### 4.4 Human Health Risk Screening Assessment

Exposure pathways of concern for the Big Blue Mill Site are through inhalation, dermal exposure and ingestion by site visitors. Contamination is present within 100 feet from an occupied residence on private land and within 500 feet and 1,000 feet of two other residences on separate private parcels. Mill waste and tailings are present in powdery surface deposits and soils and there is a high likelihood of transferring contamination to clothing, equipment and vehicles that would result in contaminated material being transported and deposited at off-site locations such as residences and offices. Fishing is very popular along the Kern River from the shoreline. A well-used 'Fishermen's Trail' exists through the Site and a fishing platform was observed on the heavy metal impacted tailing materials at the shoreline (Figure 13). The close proximity of occupied residences to the site and the high recreational usage of the area increase the likelihood of exposure of children to contaminants. Children are considered a sensitive group upon which exposures to heavy metals could interfere with neurological development.

Arsenic, lead, and mercury concentrations at the Site greatly exceed established human health risk screening levels (SLs). Screening levels are concentrations of chemicals in soil intended to be protective of human health and/or the environment under a defined exposure setting (Cox, 2017 Update). They represent heavy metal concentrations thresholds at which people, under varying exposure levels, will not experience adverse health effects during their lifetimes.

The most widely used human health screening values are the Regional Screening Level (RSLs) developed by the US EPA for residential and industrial populations (<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>). EPA RSLs are based on a residential exposure frequency of 350 days/year for 26 years and the industrial RSLs assume worker exposure frequency of 225 days/year for 25 years. These residential and industrial exposure frequencies are very conservative for many abandoned mine land (AML) sites. Recreational visitors are the most common group of human receptors to AML sites. This is a broad category that can cover a range of possible recreational activities, including camping, hiking, hunting, biking, ATV riding, horseback riding, etc.

To address recreational visitation at AML sites, the Bureau of Land Management (BLM) developed recreational exposure SLs for metals found in soils at AML sites. BLM's recreational SLs take into account the reduced exposures associated with most recreational activities and are based on a recreational exposure frequency of 14 days/year for 26 years (Cox, September 2017 update).

Although highly conservative for most AML sites, EPA's RSLs provide a useful benchmark in gaining an initial understanding of the magnitude of potential risk and at sites where off-site residents live in immediate proximity of the contamination. In the case of the Big Blue Mill site, residential property is immediately adjacent to the former mill site and an occupied residential home is located within 100 feet of identified site contamination. Two other occupied residences are located within 500 and 1,000 feet of site contamination (see Figures 9, 10 and 14). Given the close proximity of occupied residences to the site, the use of EPA residential RSLs is warranted in assessing potential site risks.

A summary of arsenic, lead, and mercury concentrations compared to EPA residential RSLs and BLM recreational SLs is provided in Table 4 below and a comparison to the laboratory results is provided in Table 5.

**Table 4: Summary of XRF Arsenic, Lead, and Mercury Concentrations Compared To Human Health Screening Levels**

	<b>Arsenic (mg/kg)</b>	<b>Lead (mg/kg)</b>	<b>Mercury (mg/kg)</b>
<b>XRF Concentration Range</b>	ND - 239,639	ND -12,513	ND - 3,896
<b>EPA Residential RSL<sup>1</sup></b>	0.68 <sup>2</sup>	400	11
<b>EPA Residential RSL Exceedance</b>	0x - 352,410.3x	0x - 31.3x	0x - 354.2x
<b>BLM Recreation SL<sup>3</sup></b>	30.6	800	271
<b>BLM Recreation SL Exceedance</b>	0x - 7,831.3x	0x - 15.6x	0x - 14.4x

<sup>1</sup> (<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>)

<sup>2</sup> Arsenic detected in background sample at 15 mg/kg.

<sup>3</sup> September 2017 Update, BLM Technical Memorandum: Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites

**Table 5: Summary of Laboratory Arsenic, Lead, and Mercury Concentrations Compared To Human Health Screening Levels**

	<b>Arsenic (mg/kg)</b>	<b>Lead (mg/kg)</b>	<b>Mercury (mg/kg)</b>
<b>Laboratory Concentration Range</b>	400 - 60,000	50 - 8,300	5 - 1,500
<b>EPA Residential RSL<sup>1</sup></b>	0.68	400	11
<b>EPA Residential RSL Exceedance</b>	588.2x - 88,235.3x	0.1x - 20.8x	0.5x - 136.4x
<b>BLM Recreation SL<sup>2</sup></b>	30.6	800	271
<b>BLM Recreation SL Exceedance</b>	13.1x - 1,960.8x	0.06x - 10.4x	0.0x - 5.5x

<sup>1</sup> (<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>)

<sup>2</sup> September 2017 Update, BLM Technical Memorandum: Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites

Arsenic, lead, and mercury concentrations greatly exceed residential and recreational exposure screening levels. Exceedances of the SLs can be interpreted as follows in order to provide a means for assessing the hazard posed by the presence of heavy metals:

- Less than the criteria: low risk
- 1-10 times the criteria: moderate risk
- 10-100 times the criteria: high risk
- >100 times the criteria: extremely high risk

The range of detected arsenic concentrations indicate the Site poses a potential extremely high risk for arsenic under recreational and residential exposure scenarios. XRF screening found arsenic concentrations in surface materials ranging from 133 to 239,639 mg/kg. Greatly exceeding residential and recreational exposure SLs (Table 4). Laboratory results, provided in Table 5, confirm that arsenic concentrations exceed EPA residential RSLs and BLM recreational SLs and that the Site poses potential extremely high risk for arsenic under recreational and residential exposure scenarios. The exposure routes of concern for arsenic would primarily be through the inhalation, ingestion, and dermal pathways.

XRF lead concentrations ranged from 83 to 12,513 mg/kg, indicating the Site poses a potential high risk for lead under recreational and residential exposure scenarios. Laboratory results, provided in Table 5, confirm that lead concentrations exceed EPA residential RSLs and BLM recreational SLs and that the Site poses a potential exposure high risk to recreational and



residential visitors for lead. The exposure routes of concern for lead would primarily be through the ingestion and inhalation pathways.

XRF mercury concentrations ranged from 26 to 3,896 mg/kg, indicating the Site poses a potential extremely high risk for mercury under the residential exposure scenarios and a high exposure risk under the recreational exposure scenario. Laboratory results, provided in Table 5 confirm that lead concentrations exceed EPA residential RSLs and BLM recreational SLs and that the Site poses a potential extremely high risk for mercury under the residential exposure scenarios and a moderate exposure risk under the recreational exposure scenario. The exposure routes of concern for mercury would be the inhalation, ingestion, and dermal pathways.

#### 4.5 Ecological Risk Screening Assessment

To assess potential risks to wildlife posed by contamination present at the site, XRF and laboratory data was compared to EPA Ecological Soil Screening Levels (Eco-SSLs). Eco-SSLs are concentrations of contaminants in soil that are protective of ecological receptors that commonly come into contact with soil or ingest biota that live in or on soil. Although Eco-SSLs were developed specifically to be used during Step 2 of the Superfund ecological risk assessment process (Screening-Level Exposure Estimate and Risk Calculation), they can be used during the site screening process to screen soil contaminants in order to determine if additional ecological site studies are warranted.

Tables 6 and 7 below list the primary constituents of concern from the site XRF and laboratory data which exceed EPA Eco-SSLs.

**Table 6: Summary of XRF Concentrations for Constituents Exceeding Ecological Screening Levels**

	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
<b>XRF Concentration Range</b>	ND - 1,136	133 - 239,639	ND - 937	ND - 334	8 - 289	ND - 78	83 -12,513	ND - 477	ND - 295	51 - 1,047
<b>Plant ECO-SSL<sup>1</sup></b>	NA <sup>2</sup>	18	NA <sup>2</sup>	32	NA <sup>2</sup>	70	120	0.52 <sup>3</sup>	560	160
<b>Plant ECO-SSL Exceedance</b>	--	6.3x - 13,313.3x	--	0x - 10.4x	--	0x - 1.1x	0.7x - 104.3x	0x - 917.3x	0x - 0.5x	0.3x - 6.5x
<b>Soil Invertebrates ECO-SSL</b>	78	NA <sup>2</sup>	330 <sup>3</sup>	140	NA <sup>2</sup>	80	1700	4.1	NA <sup>2</sup>	120
<b>Soil Invertebrates ECO-SSL Exceedance</b>	0x - 14.6x	-	0x - 2.8x	0x - 2.4x	--	0x - 1x	0.0x - 7.4x	0x - 116.3x	--	0.4x - 8.7x
<b>Avian Wildlife ECO-SSL</b>	NA <sup>2</sup>	43	NA <sup>2</sup>	0.77	26 <sup>3</sup>	28	11 <sup>3</sup>	1.2 <sup>3</sup>	4.2	46
<b>Avian Wildlife ECO-SSL Exceedance</b>	--	3.1x - 5,573x	--	0x - 433.7x	0.3x - 11.1x	0x - 2.8x	7.5x - 1,137.5x	0x - 397.5x	0x - 70.2x	1.1x - 22.8x
<b>Mammalian Wildlife ECO-SSL</b>	0.27 <sup>3</sup>	46	2000	0.36	34 <sup>3</sup>	49	56	0.63 <sup>3</sup>	14	79
<b>Mammalian Wildlife ECO-SSL Exceedance</b>	0x - 4,207.4x	2.9x - 5,209.5x	0x - 0.5x	0x - 927.8x	0.2x - 8.5x	0x - 1.6x	1.5x - 223.4x	0x - 757.1x	0x - 21.1x	0.6x - 13.3x

<sup>1</sup> EPA Ecological Soil Screening Levels (ECO-SSLs) (<https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents>)

<sup>2</sup> NA = Not Available

<sup>3</sup>ECO-SSL Below Site XRF Background Concentrations

**Table 7: Summary of Laboratory for Constituents Exceeding Ecological Screening Levels**

	Antimony (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
<b>Laboratory Concentration Range</b>	ND - 38	400 - 60,000	ND - 334	50 - 8,300	ND - 5.5	ND - 82	51 - 1,047
<b>Plant ECO-SSL<sup>1</sup></b>	NA <sup>2</sup>	18	32	120	0.52 <sup>3</sup>	560	160
<b>Plant ECO-SSL Exceedance</b>	--	6.3x - 13,313.3x	0x - 10.4x	0.7x - 104.3x	0x - 10.6x	0x - 0.1x	0.3x - 6.5x
<b>Soil Invertebrates ECO-SSL</b>	78	NA <sup>2</sup>	140	1700	4.1	NA <sup>2</sup>	120
<b>Soil Invertebrates ECO-SSL Exceedance</b>	0x - 14.6x	-	0x - 2.4x	0.0x - 7.4x	0x - 1.3x	--	0.4x - 8.7x
<b>Avian Wildlife ECO-SSL</b>	NA <sup>2</sup>	43	0.77	11 <sup>3</sup>	1.2 <sup>3</sup>	4.2	46
<b>Avian Wildlife ECO-SSL Exceedance</b>	--	3.1x - 5,573x	0x - 433.7x	7.5x - 1,137.5x	0x - 4.6x	0x - 19.5x	1.1x - 22.8x
<b>Mammalian Wildlife ECO-SSL</b>	0.27 <sup>3</sup>	46	0.36	56	0.63 <sup>3</sup>	14	79
<b>Mammalian Wildlife ECO-SSL Exceedance</b>	0x - 4,207.4x	2.9x - 5,209.5x	0x - 927.8x	1.5x - 223.4x	0x - 8.7x	0x - 5.9x	0.6x - 13.3x

<sup>1</sup> EPA Ecological Soil Screening Levels (ECO-SSLs) (<https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents>)

<sup>2</sup> NA = Not Available

<sup>3</sup>ECO-SSL Below Site XRF Background Concentrations

Initial site screening indicates that levels of antimony, arsenic, lead and zinc greatly exceed both site background levels and EPA Eco-SSLs. Mill waste and tailings are present in powdery surface deposits and soils and are readily accessible to wildlife. Some of the contaminated materials are un-vegetated and exposed on the banks of the Kern River and there is evidence of on-going erosion into the river. Additional ecological risk evaluation is warranted in order to fully assess the risks to wildlife posed by the Site.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

XRF values obtained during the Removal PA indicate that contamination is present as a result of historic mineral processing activities at the Site. Elevated concentrations of arsenic present in mill tailings exceed site background levels (up to 13,866x for arsenic, 393x for lead, and 487x for mercury) and indicates that a release of hazardous substances to the environment has occurred. The tailings are susceptible to migration because of water- and wind-borne influences. Mill waste and tailings are present in surface deposits and soils and are susceptible to migration because of water- and wind-borne influences. Some of the contaminated materials are un-vegetated and exposed on the banks of the Kern River and there is evidence of on-going erosion into the river.

Concentrations of arsenic, lead, and mercury in the mill tailings greatly exceed established human health risk screening thresholds for residential and recreational exposure scenarios and indicate that the site poses an exposure hazard to nearby populations. Contamination is present within 100 feet from an adjacent occupied residence on private land and within 500 feet and 1,000 feet of two other residences on separate private parcels. There is evidence of public visitation to the site and the area along the river bank where tailings are present is used by the public for fishing. Mill waste and tailings are present in powdery surface deposits and soils and

there is a high likelihood of transferring contamination to clothing, equipment and vehicles that would result in contaminated material being transported and deposited at off-site locations such as residences and offices. Mill tailings are also readily accessible to wildlife.

A full CERCLA Site Inspection (SI) is recommended in order to delineate the full nature and extent of contamination and human health and ecological risks posed by the Site.

Conditions represent a threat of release of CERCLA hazardous substances, threatening to public health, or welfare, or the environment based on the factors set forth in the NCP, 40 CFR § 300.415(b)(2). A Time-Critical Removal Action (TCRA) is recommended to implement institutional controls to restrict all public access to the Site and the area of contamination. It is recommended that these controls include a prohibition on all public entry to the Site. Based on available data, the recommended initial closure area includes former mill area east and northeast of the adjacent private Parcel APN 296-110-11-00-1 and the area between the Kern River and private Parcels APN 296-110-11-00-1 and 296-110-12-00-4 (see Figure 15 below).



Figure 15: Recommended Closure Area



### **References Cited**

September 15, 1896, Thirteenth Report (Third Biennial) of the State Mineralogist For The Two Years Ending September 15, 1896, California State Mining Bureau

January 1934, Volume 30 California Journal of Mines and Geology Quarterly Chapter of State Mineralogist's Report XXX, State Division of Mines

January 1940, Volume 36 California Journal of Mines and Geology Quarterly Chapter of State Mineralogist's Report XXXVI, State Division of Mines

1962, Mines and Mineral Resources of Kern County, California, California Division of Mines and Geology, County Report 1

October 2004, Technical Note 390, "Risk Management Criteria for Metals at BLM Mining Sites", Karl L. Ford, Ph.D., Bureau of Land Management, National Science and Technology Center

September 2017 Update, BLM Technical Memorandum: Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites

# **APPENDIX A**



**BABCOCK Laboratories, Inc.**  
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Client Name: USDA Forest Service-Region 5 Office  
 Contact: Noelle Graham-Wakoski  
 Address: 10845 Rancho Bernardo Rd  
 San Diego, CA 92127

Analytical Report: Page 1 of 11  
 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

**Sample Identification**

<u>Lab Sample #</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>By</u>	<u>Date Submitted</u>	<u>By</u>
C0A1592-01	444	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-02	R-15	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-03	441	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-04	439	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-05	431	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-06	435	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-07	442	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-08	434	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski
C0A1592-09	445	Solid	01/14/20 00:00	Noelle Graham-Wako	01/15/20 14:04	Noelle Graham-Wakowski



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Analytical Report: Page 2 of 11  
 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-01**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
444	Solid	01/14/20 00:00	01/15/20 14:04

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
<b>Metals and Metalloids; EPA SW846 Series</b>							
Antimony	13	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Arsenic	31000	50	mg/kg	EPA 6020	01/24/20 14:06	MEL	
Barium	36	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Cadmium	3.9	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Total Chromium	2.4	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Cobalt	ND	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Copper	31	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Lead	1600	100	mg/kg	EPA 6020	01/24/20 14:06	MEL	
Mercury	100	100	mg/kg	EPA 7471A	01/22/20 14:03	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Nickel	1.1	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Selenium	ND	5.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Silver	33	10	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Vanadium	7.0	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	
Zinc	100	1.0	mg/kg	EPA 6020	01/21/20 18:04	MEL	





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Analytical Report: Page 3 of 11  
Project Name: CAM 17 Metals - Solid  
Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-02**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
R-15	Solid	01/14/20 00:00	01/15/20 14:04

<u>Analyte(s)</u>	<u>Result</u>	<u>RDL</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date</u>	<u>Analyst</u>	<u>Flag</u>
<b>Metals and Metalloids; EPA SW846 Series</b>							
Antimony	11	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Arsenic	55000	50	mg/kg	EPA 6020	01/24/20 14:08	MEL	
Barium	20	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Cadmium	6.7	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Total Chromium	1.8	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Cobalt	ND	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Copper	39	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Lead	8300	100	mg/kg	EPA 6020	01/24/20 14:08	MEL	
Mercury	470	250	mg/kg	EPA 7471A	01/22/20 14:05	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Nickel	1.3	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Selenium	5.5	5.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Silver	82	10	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Vanadium	2.3	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	
Zinc	110	1.0	mg/kg	EPA 6020	01/21/20 18:06	MEL	



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Analytical Report: Page 4 of 11  
 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-03**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
441	Solid	01/14/20 00:00	01/15/20 14:04

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Metals and Metalloids; EPA SW846 Series							
Antimony	ND	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Arsenic	400	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Barium	75	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Cadmium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Total Chromium	7.5	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Cobalt	5.3	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Copper	8.9	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Lead	50	2.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Mercury	4.6	2.5	mg/kg	EPA 7471A	01/24/20 15:06	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Nickel	5.1	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Selenium	ND	5.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Silver	ND	10	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Vanadium	28	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	
Zinc	52	1.0	mg/kg	EPA 6020	01/21/20 18:09	MEL	



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 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-04**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
439	Solid	01/14/20 00:00	01/15/20 14:04

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Metals and Metalloids; EPA SW846 Series							
Antimony	2.2	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Arsenic	7200	5.0	mg/kg	EPA 6020	01/24/20 14:11	MEL	
Barium	39	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Cadmium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Total Chromium	3.1	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Cobalt	1.6	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Copper	5.1	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Lead	710	2.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Mercury	160	120	mg/kg	EPA 7471A	01/22/20 14:09	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Nickel	2.1	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Selenium	ND	5.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Silver	10	10	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Vanadium	13	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	
Zinc	25	1.0	mg/kg	EPA 6020	01/21/20 18:11	MEL	



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Analytical Report: Page 6 of 11  
 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-05**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
431	Solid	01/14/20 00:00	01/15/20 14:04

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Metals and Metalloids; EPA SW846 Series							
Antimony	35	1.0	mg/kg	EPA 6020	01/24/20 13:19	MEL	
Arsenic	60000	50	mg/kg	EPA 6020	01/24/20 14:13	MEL	
Barium	7.8	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Cadmium	4.1	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Total Chromium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Cobalt	ND	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Copper	3.6	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Lead	2600	100	mg/kg	EPA 6020	01/24/20 14:13	MEL	
Mercury	1500	250	mg/kg	EPA 7471A	01/22/20 14:11	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Nickel	ND	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Selenium	ND	5.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Silver	41	10	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Vanadium	ND	1.0	mg/kg	EPA 6020	01/21/20 18:14	MEL	
Zinc	110	1.0	mg/kg	EPA 6020	01/24/20 13:19	MEL	





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Client Name: USDA Forest Service-Region 5 Office
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Analytical Report: Page 7 of 11
Project Name: CAM 17 Metals - Solid
Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

Work Order Number: C0A1592

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

C0A1592-06

Sample Description: 435 Matrix: Solid Sampled Date/Time: 01/14/20 00:00 Received Date/Time: 01/15/20 14:04

Table with 8 columns: Analyte(s), Result, RDL, Units, Method, Analysis Date, Analyst, Flag. Rows include Metals and Metalloids; EPA SW846 Series with various elements like Antimony, Arsenic, Barium, Beryllium, Cadmium, etc.



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Client Name: USDA Forest Service-Region 5 Office  
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 San Diego, CA 92127

Analytical Report: Page 8 of 11  
 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-07**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
442	Solid	01/14/20 00:00	01/15/20 14:04

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Metals and Metalloids; EPA SW846 Series							
Antimony	38	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Arsenic	49000	100	mg/kg	EPA 6020	01/24/20 16:43	MEL	
Barium	32	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Cadmium	5.4	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Total Chromium	2.5	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Cobalt	ND	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Copper	14	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Lead	2400	200	mg/kg	EPA 6020	01/24/20 16:43	MEL	
Mercury	870	250	mg/kg	EPA 7471A	01/22/20 14:15	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Nickel	ND	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Selenium	5.4	5.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Silver	69	10	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Vanadium	4.8	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	
Zinc	170	1.0	mg/kg	EPA 6020	01/24/20 13:34	MEL	



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Client Name: USDA Forest Service-Region 5 Office  
 Contact: Noelle Graham-Wakoski  
 Address: 10845 Rancho Bernardo Rd  
 San Diego, CA 92127

Analytical Report: Page 9 of 11  
 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-08**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
434	Solid	01/14/20 00:00	01/15/20 14:04

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Metals and Metalloids; EPA SW846 Series							
Antimony	7.3	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Arsenic	16000	100	mg/kg	EPA 6020	01/24/20 16:45	MEL	
Barium	190	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Cadmium	8.4	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Total Chromium	1.8	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Cobalt	ND	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Copper	13	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Lead	1300	200	mg/kg	EPA 6020	01/24/20 16:45	MEL	
Mercury	190	50	mg/kg	EPA 7471A	01/24/20 16:24	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Nickel	3.1	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Selenium	ND	5.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Silver	20	10	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Vanadium	4.5	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	
Zinc	140	1.0	mg/kg	EPA 6020	01/24/20 13:36	MEL	



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 San Diego, CA 92127

Analytical Report: Page 10 of 11  
 Project Name: CAM 17 Metals - Solid  
 Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

Laboratory Reference Number

**C0A1592-09**

<u>Sample Description</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>	<u>Received Date/Time</u>
445	Solid	01/14/20 00:00	01/15/20 14:04

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Metals and Metalloids; EPA SW846 Series							
Antimony	8.4	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Arsenic	21000	100	mg/kg	EPA 6020	01/24/20 16:48	MEL	
Barium	270	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Beryllium	ND	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Cadmium	12	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Total Chromium	2.2	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Cobalt	ND	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Copper	15	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Lead	1700	200	mg/kg	EPA 6020	01/24/20 16:48	MEL	
Mercury	240	50	mg/kg	EPA 7471A	01/24/20 16:26	KSL	
Molybdenum	ND	5.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Nickel	4.1	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Selenium	ND	5.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Silver	24	10	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Thallium	ND	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Vanadium	5.9	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	
Zinc	180	1.0	mg/kg	EPA 6020	01/24/20 13:39	MEL	





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Analytical Report: Page 11 of 11  
Project Name: CAM 17 Metals - Solid  
Project Number: Big Blue Mill - Sequoia NF

Report Date: 29-Jan-2020

**Work Order Number: C0A1592**

Received on Ice (Y/N): Yes Temp: °C

**Notes and Definitions**

- ND: Analyte NOT DETECTED at or above the Method Detection Limit (if MDL is reported), otherwise at or above the Reportable Detection Limit (RDL)
- NR: Not Reported
- RDL: Reportable Detection Limit
- MDL: Method Detection Limit
- \* / " : NELAP does not offer accreditation for this analyte/method/matrix combination

**Approval**

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

**Angela E. Brown For KayeLani A. Marshall**

cc:

e-Short\_No Alias.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

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EPA No. CA00102  
NELAP No. OR4035  
LACSD No. 10119



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Client Name: USDA Forest Service-Region 5 Office  
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Analytical Report: Page 1 of 1  
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www.babcocklabs.com

**Chain of Custody & Sample Information Record**

Client: <u>US Forest Service</u>	Contact: <u>Noelle Graham-Wakoski</u> Fax No. <u>858 673-6192</u>	Additional Reporting Requests:
Phone No. <u>(858) 735-7728</u>	email: <u>noelle.graham@usda.gov</u>	Include QC Data Package: <input type="checkbox"/> Yes <input type="checkbox"/> No
Project Name: <u>Big Blue Mill</u>	Turn Around Time: Routine *72 Hour Rush *48 Hour Rush *24 Hour Rush	FAX Results: <input type="checkbox"/> Yes <input type="checkbox"/> No
Project Location: <u>Sequoia NF</u>	*Lab TAT Approval: _____ By: _____ *Additional Charges Apply	Email Results: <input type="checkbox"/> Yes <input type="checkbox"/> No
		State EDT: <input type="checkbox"/> Yes <input type="checkbox"/> No
		(Include Source Number in Notes)

Sampler Information			# of Containers & Preservatives						Sample Type			Analysis Requested	Matrix	Notes					
Name:	Employer:	Signature:	Unpreserved	H <sub>2</sub> SO <sub>4</sub>	HCl	HNO <sub>3</sub>	Na <sub>2</sub> S <sub>2</sub> O <sub>8</sub>	NaOH	NaOH/Zn Acetate	NH <sub>4</sub> Cl	PDC	Total # of Containers	Routine	Resample	Special				
<u>Noelle Graham-Wakoski</u>	<u>US Forest Service</u>	<u>[Signature]</u>																	
Sample ID	Date	Time																	
<u>444</u>	<u>1/15/20</u>																		<u>Soil</u>
<u>R-15</u>																			
<u>441</u>																			
<u>439</u>																			
<u>431</u>																			
<u>435</u>																			
<u>442</u>																			
<u>434</u>																			
<u>445</u>																			

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (sign)	Print Name / Company
<u>[Signature]</u>	<u>Noelle Graham-Wakoski</u> <u>US Forest Service</u> <u>% Cleveland National Forest</u> <u>10845 Rancho Bernardo Rd, San Diego 92127</u>	<u>1/15/2020 14:04</u>	<u>[Signature]</u>	<u>Wakoski L / ESB</u>

By signing on behalf of your organization and relinquishing this chain of custody you agree to abide by the Babcock Laboratories, Inc. Terms and Conditions.

(For Lab Use Only) Sample Integrity Upon Receipt/Acceptance Criteria

Sample(s) Submitted on Ice?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Sample meets laboratory acceptance criteria?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Custody Seal(s) Intact?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA	Permission to continue:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Sample(s) Intact?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Deviation/Notes:	<u>Per analysis no temp. req.</u>
Temperature: _____ °C <input type="checkbox"/> Cooler Blank		Signature/Date:	<u>[Signature] 1/15/2020</u>

**C0A1592**  
Rc'd: 01/15/2020 14:04  
JMG