HRS DOCUMENTATION RECORD (HRS)—COVER SHEET

Name of Site: COPPER BLUFF MINE

Contact Person: Sharon Bowen, EPA Region 9 (415) 947-4250

Site Investigation: Leslie Ramirez, EPA Region 9 (415) 972- 3978

Documentation Record: Christina Marquis, Weston Solutions, Inc. (562) 243-1776

Pathways, Components, or Threats Not Scored

The groundwater and air pathways were not scored because the listing decision is not significantly affected by those pathways. While there is some concern related to direct contact with the adit outflow, as tribe members may come into contact with the outflow while accessing fishing locations, the soil exposure and subsurface intrusion were not scored because the listing decision is not significantly affected by that pathway. The site score is sufficient to qualify the site for the NPL on the surface water pathway score.

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HRS DOCUMENTATION RECORD

Name of Site: COPPER BLUFF MINE

EPA ID#: CAD980638225

EPA Region: 9

Date Prepared: September 2018

Street Address of Site: Off Highway 96, approximately 0.9 mile north of Mill Creek Road

City, County and State: Hoopa, Humboldt County, California 95546

Topographic Map: Hoopa, CA USGS 7.5-Minute Quadrangle (Ref. 4)

Latitude: 41° 6' 35.9" North Longitude: 123°41' 09.6" West (Ref. 4; Ref. 5, p. 1708)

Latitude/Longitude Reference Point: The latitude and longitude correspond to sampling location CB-1 located at the Copper Bluff Mine adit (Ref. 5, p. 1708).

SCORES		
Air Pathway	=	Not scored
Ground Water Pathway[1]	=	Not scored
Soil Exposure and Subsurface Intrusion Pathway	=	Not scored
Surface Water Pathway	=	100.00
HRS SITE SCORE	**=**	50.00

*The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area where the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, placed, or otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

[1] “Ground water” and “groundwater” are synonymous: the spelling is different due to “ground water” being codified as part of the HRS, while “groundwater” is the modern spelling.

HAZARD RANKING SYSTEM SUMMARY SCORESHEETS

SITE NAME: COPPER BLUFF MINE

CITY/COUNTY/STATE: Hoopa, Humboldt County, California 95546

EPA ID #: CAD980638225

EVALUATOR: Christina Marquis **DATE:** September 2018

LATITUDE: 41° 6' 35.9" N **LONGITUDE:** 123°41' 9.6" W

	S	S^2
Ground Water Migration Pathway Score (S_{gw})	Not scored	Not scored
Surface Water Migration Pathway Score (S_{sw})	100.00	10,000
Soil Exposure and Subsurface Intrusion Pathway Score (S_{sessi})	Not scored	Not scored
Air Migration Pathway Score (S_a)	Not scored	Not scored
$S_{gw}^2 + S_{sw}^2 + S_{sessi}^2 + S_a^2$	XXXXXXX	10,000
$(S_{gw}^2 + S_{sw}^2 + S_{sessi}^2 + S_a^2) / 4$	XXXXXXX	2,500
SQRT $((S_{gw}^2 + S_{sw}^2 + S_{sessi}^2 + S_a^2) / 4)$	XXXXXXX	50.00

HRS TABLE 4-1
Surface Water Overland/Flood Migration Component Scoresheet

Factor Categories and Factors	Maximum Value	Value Assigned
Drinking Water Threat		
Likelihood of Release:		
1. Observed Release	550	550
2. Potential to Release by Overland Flow:		
2a. Containment	10	
2b. Runoff	25	
2c. Distance to Surface Water	25	
2d. Potential to Release by Overland Flow (lines 2a x [2b + 2c])	500	
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	
3b. Flood Frequency	50	
3c. Potential to Release by Flood (lines 3a x 3b)	500	
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	0
5. Likelihood of Release (higher of lines 1 and 4)	550	550
Waste Characteristics:		
6. Toxicity/Persistence	(a)	10,000
7. Hazardous Waste Quantity	(a)	100
8. Waste Characteristics	100	32
Targets:		
9. Nearest Intake	50	
10. Population:		
10a. Level I Concentrations	(b)	
10b. Level II Concentrations	(b)	
10c. Potential Contamination	(b)	
10d. Population (lines 10a + 10b + 10c)	(b)	
11. Resources	5	
12. Targets (lines 9 + 10d + 11)	(b)	
Drinking Water Threat Score:		
13. Drinking Water Threat Score ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100	
Human Food Chain Threat		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	550
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	(a)	500,000,000
16. Hazardous Waste Quantity	(a)	100
17. Waste Characteristics	1,000	320

HRS Table 4-1 – Surface Water Overland/Flood Migration Component Scoresheet (cont'd)

Factor Categories and Factors	Maximum Value	Value Assigned
Targets:		
18. Food Chain Individual	50	20
19. Population:		
19a. Level I Concentrations	(b)	0
19b. Level II Concentrations	(b)	0
19c. Potential Human Food Chain Contamination	(b)	0.0031
19d. Population (lines 19a + 19b + 19c)	(b)	0.0031
20. Targets (lines 18 + 19d)	(b)	20.0031
Human Food Chain Threat Score:		
21. Human Food Chain Threat Score ([lines 14 x 17 x 20]/82,500, subject to a maximum of 100)	100	42.67
Environmental Threat		
Likelihood of Release:		
22. Likelihood of Release (same value as line 5)	550	550
23. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	500,000,000
24. Hazardous Waste Quantity	(a)	100
25. Waste Characteristics	1,000	320
Targets:		
26. Sensitive Environments:		
26a. Level I Concentrations	(b)	0
26b. Level II Concentrations	(b)	50
26c. Potential Contamination	(b)	0
26d. Sensitive Environments (lines 26a + 26b + 26c)	(b)	50.00
27. Targets (value from 26d)	(b)	50.00
Environmental Threat Score:		
28. Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60	60
Surface Water Overland/Flood Migration Component Score for a Watershed		
29. Watershed Score[c] (lines 13 + 21 + 28, subject to a maximum of 100)	100	100.00
Surface Water Overland/Flood Migration Component Score		
30. Component Score (S_{of}), (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100) (c)	100	100.00

(a) Maximum value applies to waste characteristics category.
(b) Maximum value not applicable.
(c) Do not round to nearest integer.

REFERENCES

Reference Number	Description of the Reference
1	40 CFR Part 300, Hazard Ranking System; Final Rule, 14 December 1990, Vol. 55, No. 241, http://semspub.epa.gov/work/11/174028.pdf, 138 pages.
2	EPA. Addition of a Subsurface Intrusion Component to the Hazard Ranking System, 40 Code of Federal Regulations Part 300, 82 Federal Register 2760. January 9, 2017. 48 Pages. Available online: https://www.regulations.gov/document?D=EPA-HQ-SFUND-2010-1086-0104.
3	U.S. Environmental Protection Agency (EPA), Superfund Chemical Data Matrix (SCDM) Methodology, Accessed July 27, 2018, 21 pages. Available online: http://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm.
4	U.S. Geological Survey, 7.5 Minute Topographic Map of Hoopa, California, 2012, 1 sheet.
5	Weston Solutions, Inc., Copper Bluff Mine (Bolivar Mine) Site Inspection Report, February 9, 2018, 1,710 pages.
6	U.S. Geological Survey, Reconnaissance of Acid Drainage Sources and Preliminary Evaluation of Remedial Alternatives at the Copper Bluff Mine, Hoopa Valley Reservation, California, Water-Resources Investigations Report 02-4253, 2003, 62 pages.
7	U.S. Geological Survey, Surface Water data for USA: USGS Surface-Water Annual Statistics, Annual statistics for USGS 11530000 TRINITY R A HOOPA CA, Accessed July 27, 2018, 3 pages. Available online: https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=11530000.
8	National Wild and Scenic Rivers System, Trinity River, California, Accessed March 16, 2018, 4 pages. Available online: https://www.rivers.gov/rivers/trinity.php.
9	U.S. Fish and Wildlife Service, National Wetlands Inventory, accessed March 16, 2018, 4 pages. Available online: https://www.fws.gov/wetlands/.
10	EPA, Site Reassessment Report, Copper Bluff Mine, Hoopa, California, September 15, 2003, 154 pages.
11	Hoopa Valley Tribe, Water Quality Control Plan, Hoopa Valley Indian Reservation, February 14, 2008, 285 pages.
12	Tetra Tech, Inc., Site Investigation Report, Copper Bluff Mine Site, Hoopa Valley Reservation, Hoopa, California, December 1987, 62 pages.
13	EPA, Site Reassessment Report – CADTSC Backlog Project, Project Site Information, Copper Bluff Mine (Bolivar Mine)-Hoopa, September 22, 2015, 174 pages.
14	Lindsey, Tonya, Hoopa Valley Tribal EPA, Email to John Hillenbrand, re: Fishing activities at Copper Bluff, March 22, 2018, 5 pages.
15	EPA, Region 9, Validation Review of Copper Bluff Site Investigation Data, July 13, 2017 Sampling Event, EPA Region 9 Laboratory Sample Delivery Group SDG 17195B, Humboldt County, California [DCN] SPFD00310V1, June 20, 2018, 2 pages.

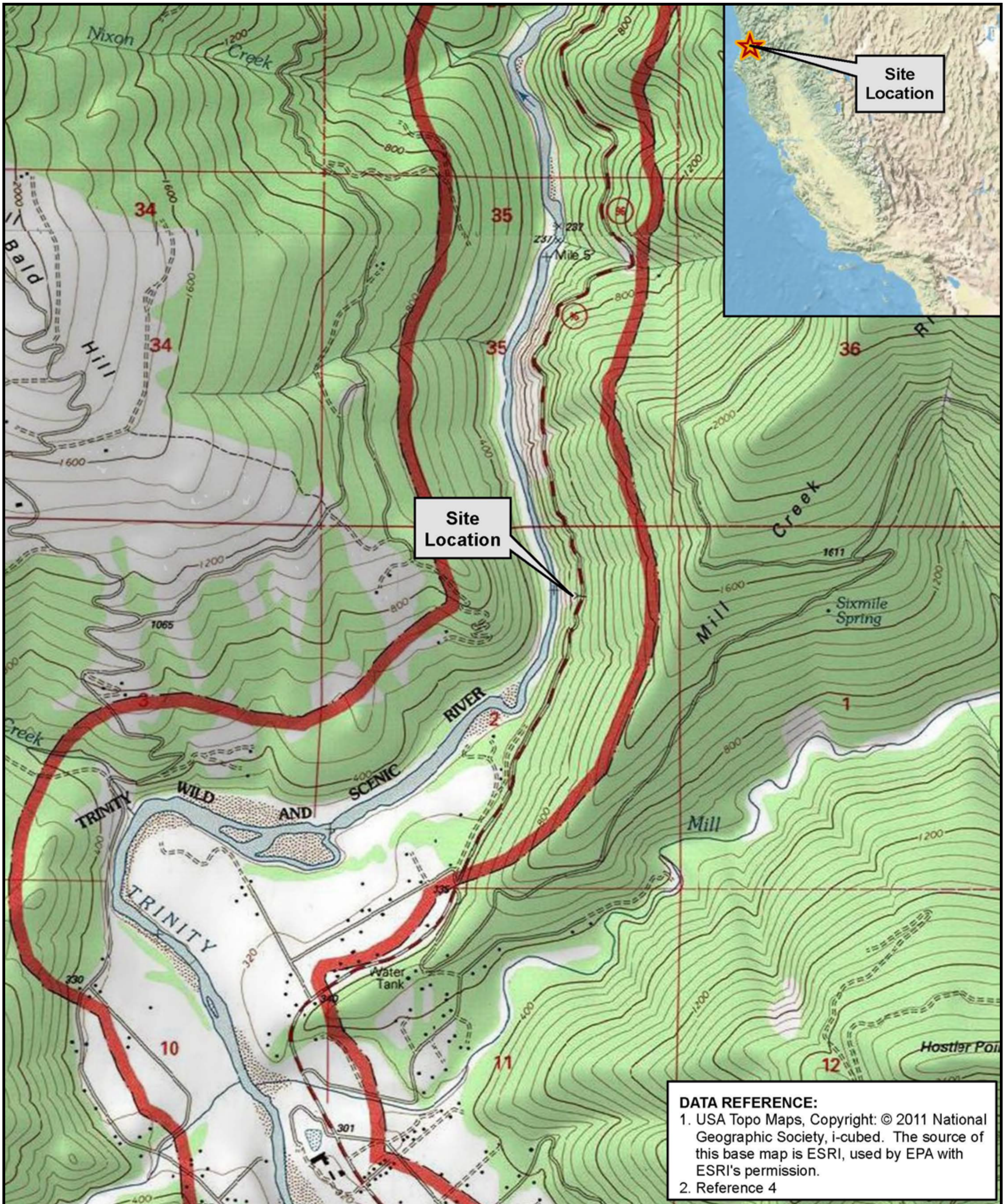
Reference Number	Description of the Reference
16	Pacific Fishery Management Council, Salmon Document Library: Historical Data of Ocean Salmon Fisheries “Blue Book,” Appendix B-5, Accessed July 27, 2018, 7 pages. Available online: https://www.pcouncil.org/salmon/background/document-library/historical-data-of-ocean-salmon-fisheries/.
17	GoogleEarth, Upper Klamath River from Trinity River Confluence to Surpur Creek, Accessed July 27, 2018, 1 page.
18	Lindsey, Tonya, Hoopa Valley Tribal EPA, Traditional Fishing Locations, May 10, 2018, 2 pages.
19	Hillenbrand, John, Project Manager, Mine Group Leader, EPA, email to Sharon Bowen, re: Flow from Copper Bluff Mine Adit, August 8, 2018, 1 page.
20	Bauer, Richard, EPA Region 9 Laboratory, email to Sharon Bowen, re: Sample Quantitation Limits, August 21, 2018, 1 page.

ACRONYM LIST

AMD	Acid Mine Drainage
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
EPA	United States Environmental Protection Agency
gpm	gallons per minute
HRS	Hazard Ranking System
PPE	Probable Point of Entry
SAP	Sampling and Analysis Plan
SI	Site Inspection
SQL	Sample Quantitation Limit
TDL	Target Distance Limit
USGS	United States Geological Survey
WESTON	Weston Solutions, Inc.
μg/l	micrograms per liter

NOTES TO THE READER

Page numbers have been added to the references in the lower right corner. For reference citations, please refer to the page numbers in this location.



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WESTON SOLUTIONS

0 Scale in Miles 0.5

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Concord, CA 94520

PREPARED FOR:
EPA Region 9
Site Assessment Program

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FIGURE 1
SITE LOCATION MAP
Copper Bluff Mine
Hoopa, Humboldt County, California

N

0 Scale in Feet 100

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FIGURE 2
SITE LAYOUT & SAMPLING LOCATIONS
Copper Bluff Mine
Hoopa, Humboldt County, California

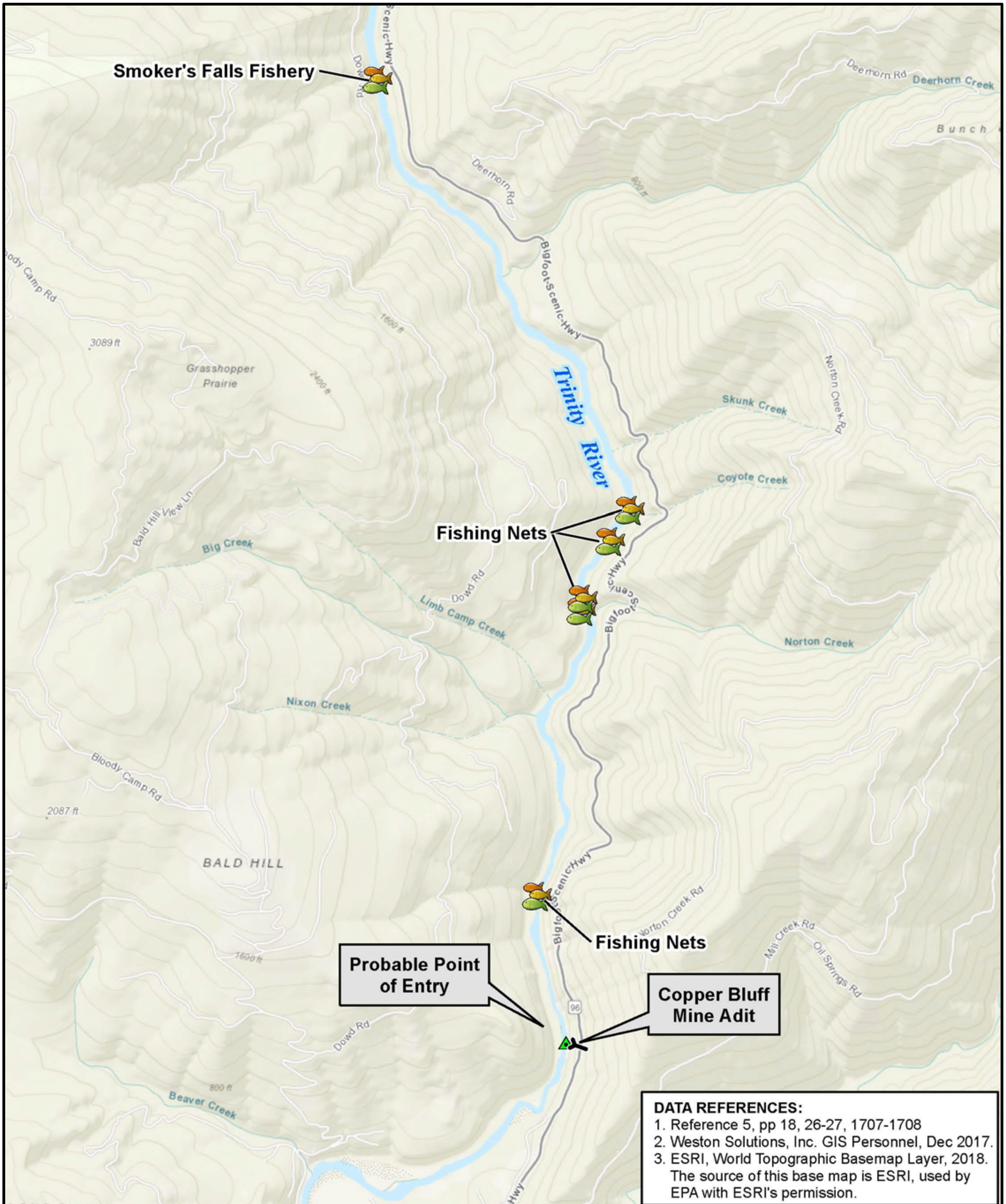

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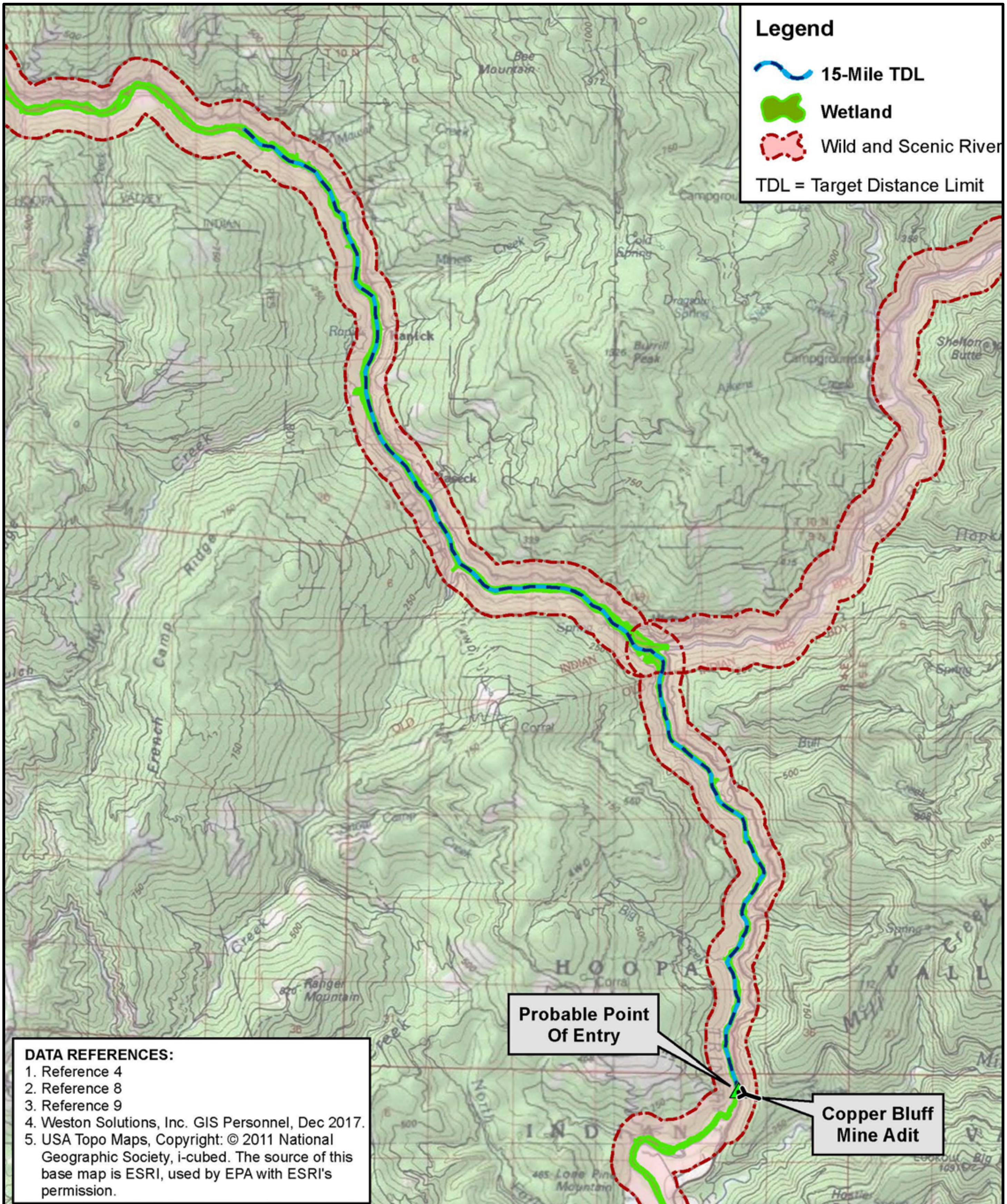
FIGURE 3
FISHERY LOCATION MAP
Copper Bluff Mine
Hoopa, Humboldt County, California



DATA REFERENCES:

1. Reference 4
2. Reference 8
3. Reference 9
4. Weston Solutions, Inc. GIS Personnel, Dec 2017.
5. USA Topo Maps, Copyright: © 2011 National Geographic Society, i-cubed. The source of this base map is ESRI, used by EPA with ESRI's permission.

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FIGURE 4
SURFACE WATER TDL
Copper Bluff Mine
Hoopa, Humboldt County, California

SITE DESCRIPTION

For HRS scoring purposes, the Copper Bluff Mine site consists of the release of hazardous substances from former operations associated with the mine. The source of hazardous substances is acid mine drainage (AMD) flowing from the Copper Bluff Mine adit directly downslope into the Trinity River (Figure 2; Ref. 5, pp. 26-27, 30, 34, 41-45; Ref. 6, pp. 10, 14-15). Hazardous substances associated with the source include cadmium, copper, nickel, and zinc (see Section 2.2, Source Characterization). An observed release of these hazardous substances is documented to the Trinity River (see Section 4.1.2.1.1, Observed Release). Targets affected by the release from this source include fisheries and wetlands within the Trinity and Klamath Rivers (Ref. 5, pp. 27, 31, 34; Ref. 9; Ref. 11, p. 40). In addition, these rivers are federal designated Wild and Scenic Rivers (Ref. 8).

The Copper Bluff Mine is an inactive copper-zinc-gold mine located in Humboldt County along California State Highway 96 in the northern portion of the Hoopa Valley Indian Reservation (Figure 1; Ref. 5, p. 9; Ref. 6, p. 11). The Copper Bluff adit is located below the highway on the east bank of the Trinity River, 5.9 miles upstream of its confluence with the Klamath River and about 4.5 miles north of the town of Hoopa (Figure 2; Figure 4; Ref. 5, p. 9; Ref. 6, pp. 13, 16). AMD from the mine flows continuously downslope from the adit to the Trinity River (Ref. 5, pp. 26-27, 30, 34, 41-45; Ref. 6, pp. 10, 14-15; Ref. 11, p. 23; Ref. 19). Discharge data collected from the adit outflow showed the flow rate varied seasonally, ranging from 5 gallons per minute (gpm) to a maximum of 486 gpm (Ref. 6, p. 55).

The Copper Bluff Mine was discovered and first worked for gold in 1928. Mining activity prior to 1957 mainly consisted of exploration and development of the ore bodies. The mine was operated from 1957 to 1962 under lease from the Bureau of Indian Affairs, acting in the role of trustee for the Hoopa Valley Tribe. The Copper Bluff Mine is developed on bodies of massive sulfide ore that occur as bedded replacements in quartz-sericite and chlorite schist. Veins within the ore bodies contain bands of copper, zinc, and iron sulfides containing gold and silver. The principal mineral within the ore bodies is pyrite. Minor amounts of other minerals, including chalcopyrite, sphalerite, and bornite, are also present. When exposed to air, metal sulfides, found in high concentrations in the mine, oxidize to liberate metal ions and free acids, thus forming AMD (Ref. 5, p. 9). The Copper Bluff Mine had several hundred feet of tunnels and crosscuts with multiple levels. The adit below Highway 96 was the main exploration tunnel. Waste rock and low-grade sulfide-bearing ore were deposited on the steep embankment below the adit on the east bank of the Trinity River (Ref. 6, p. 11).

The Copper Bluff Mine is downstream from the Celtor Chemical Works site (CAD980638860), also known as Celtor Mill, a NPL site that has been deleted from the NPL. It is the location of a former ore concentrating facility that processed sulfide ore from Copper Bluff Mine (Ref. 5, pp. 9, 101, 213, 236).

While no fish kills in the Trinity River have been documented as resulting from the Copper Bluff adit outflow, there is concern that dissolved and particulate metals in the adit outflow may have an adverse effect on the aquatic resources in the Trinity and Klamath Rivers. Fishing is an important source of food, tourism, and recreation for several native American tribes and other residents in the Trinity-Klamath watershed (Ref. 6, p. 15; Ref. 11, pp. 23, 37, 40; Ref. 14, pp. 1-2). The entire stretch of the Trinity River that runs through the Hoopa Valley Indian Reservation is fished year round, and each family has its traditional locations for nets (Ref. 5, pp. 27, 31; Ref. 14, pp. 1-2;

Ref. 18). Fish caught from the river include Coho salmon, Chinook salmon, steelhead trout, green steelhead, American shad, sturgeon, and lamprey eels (Ref. 5, p. 34; Ref. 10, pp. 28, 30). Direct contact with the adit outflow is also a concern, as tribe members may come into contact with the adit outflow while accessing fishing locations (Ref. 14, pp. 1-5).

EPA prepared a Potential Hazardous Waste Site Inspection Report for the Copper Bluff Mine in September 1981 (Ref. 10, p. 12). In January 1983, a Preliminary Assessment was performed by EPA (Ref. 10, p. 12). In 1987, Tetra Tech, Inc. completed a SI Report (Ref. 12, p. 1). A Site Reassessment, including additional sampling, was completed in 2003 (Ref. 10, p. 3). An additional Site Reassessment was completed in 2015 (Ref. 13, p. 1). An additional Site Inspection was completed in February 2018 (Ref. 5, p. 1).

SITE SOURCES

2.2 SOURCE CHARACTERIZATION

2.2.1 SOURCE IDENTIFICATION

Name of source: Adit Outflow **Number of source:** 1

Source Type: Other

Description and Location of Source (see Figure 2):

Source 1 consists of AMD that continuously flows out of the Copper Bluff Mine adit into the Trinity River (Figure 2; Ref. 5, pp. 16, 34, 42-43). The main Copper Bluff Mine adit is located below State Highway 96, along the east side of the canyon above the Trinity River (Figure 2; Ref. 5, p. 26). A metal gate over the adit prohibits individuals from entering the mine. The opening is approximately 6 feet tall and 7 feet wide, with orange-yellow staining, and AMD continuously flowing from within (Ref. 5, pp. 26, 28, 39, 41). Discharge from the Copper Bluff Mine flows downslope from the adit directly to the Trinity River (Ref. 5, pp. 26, 30, 42-43). The U.S. Geological Survey (USGS) collected discharge data for the Copper Bluff adit outflow from September 1994 through May 1996. During this time, the flow rate ranged from a minimum of 5 gpm in November 1995 to a maximum of 486 gpm in January 1996 (Ref. 6, p. 55). Current flow rates are comparable to flow rates measured in 1995 and 1996 (Ref. 19).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

2017 EPA SI Sampling

Under the authority of CERCLA, EPA tasked WESTON to conduct a Site Inspection (SI) of the Copper Bluff Mine (Ref. 5, p. 8). To establish an observed release to surface water by direct observation, surface water samples were collected and submitted for laboratory analysis of total and dissolved metals (Ref. 5, p. 14). Sampling was conducted under a Sampling and Analysis Plan (SAP) approved by EPA on July 5, 2017 (Ref. 5, pp. 14, 517).

On July 13, 2017, samples were collected from the adit outflow where it exits the adit, and where it enters the Trinity River (Figure 2; Ref. 5, pp. 14, 26, 1707). Sampling locations are provided in Figure 2. Samples were analyzed for total and dissolved metals by the EPA Region 9 laboratory, using EPA Methods 200.7 and 245.1 for metals and mercury (Ref. 5, pp. 14, 567).

Source 1 - Adit Outflow Analytical Results							
Sample ID	**Sampling Location**	**Sample Type**	**Sampling Date**	**Hazardous Substance**	**Concentration (µg/L)**	**Quantitation Limit* (µg/L)**	**References**
CB-1-F	Adit	Dissolved Metals	7/13/17	Cadmium	84	5	Ref. 5, pp. 26, 28-29, 575, 600, 610, 701, 1689-1690, 1707-1708; Ref. 15
				Copper	4,600	10	
				Nickel	52	10	
				Zinc	27,000	10	
CB-1-T	Adit	Total Metals	7/13/17	Cadmium	85	5	Ref. 5, pp. 26, 28-29, 569, 600, 607, 698, 1689-1690, 1707-1708
				Copper	4,700	10	
				Nickel	53	10	
				Zinc	27,000	10	
CB-2-F	Above Trinity River	Dissolved Metals	7/13/17	Cadmium	86	5	Ref. 5, pp. 27, 30, 570, 600, 610, 701, 1689-1690, 1707-1708
				Copper	4,900	10	
				Nickel	55	10	
				Zinc	27,000	10	
CB-2-T	Above Trinity River	Total Metals	7/13/17	Cadmium	88	5	Ref. 5, pp. 27, 30, 571, 600, 607, 698, 1689-1690, 1707-1708
				Copper	5,100	10	
				Nickel	55	10	
				Zinc	27,000	10	

µg/L: micrograms analyte per liter surface water

*: Equivalent to an HRS Sample Quantitation Limit (SQL) (Ref. 1, Section 1.1; Ref. 20)

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

All hazardous substances associated with Source 1 are available to the surface water pathway based on a containment factor value of greater than zero (Ref 1, Section 2.2.3).

Containment Description	Containment Factor Value	References
Release to surface water: Based on evidence of hazardous substance migration (contamination detected in Source 1, which was observed flowing directly into the Trinity River), a containment factor of 10 is assigned.	10	Ref. 1, Table 4-2; Ref. 5, pp. 26-30, 34, 39, 42-43, 45, 569-571, 575, 600, 607, 610, 698, 701, 1689-1690, 1707-1708

2.4.2. HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity (Tier A)

The hazardous constituent quantity for the Copper Bluff adit outflow (Source 1) could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for Source 1 with reasonable confidence. Scoring proceeds to the evaluation of Tier B, hazardous wastestream quantity (Ref. 1, Section 2.4.2.1.1).

Hazardous Constituent Quantity Value: Not Evaluated

2.4.2.1.2 Hazardous Wastestream Quantity (Tier B)

The hazardous wastestream quantity was calculated based on the continuous flow from the adit that contains dissolved metals for cadmium, copper, nickel, and zinc. The USGS collected discharge data for the Copper Bluff adit outflow (Source 1) from September 1994 through May 1996. During this time, the flow rate ranged from a minimum of 5 gpm in November 1995 to a maximum of 486 gpm in January 1996 (Ref. 6, pp. 53-55). Current flow rates are comparable to flow rates measured in 1995 and 1996 (Ref. 19). For a conservative estimate of the hazardous wastestream quantity, the lowest value of 5 gpm was used to calculate the number of gallons discharged in a single year (Ref. 1, Section 2.4.2.1.2).

5 gpm * 525,600 minutes per year = 2,628,000 gallons per year
2,628,000 gallons = 26,280,000 pounds (Ref. 1, Table 2-5)
26,280,000 pounds / 5,000 = 5,256 (Ref. 1, Table 2-5)

Hazardous Wastestream Quantity Value: 5,256

2.4.2.1.3 Volume (Tier C)

The volume is not evaluated (Ref. 1, Section 2.4.2.1.2).

Volume Assigned Value: Not Evaluated

2.4.2.1.4 Area (Tier D)

Area is not evaluated for source type “other” and because a hazardous wastestream quantity estimate was made (Ref. 1, Section 2.4.2.1.2).

Area Assigned Value: 0

Source Hazardous Waste Quantity Value

According to the Hazard Ranking System (HRS), the highest of the values assigned to the source for hazardous constituent quantity (Tier A), hazardous wastestream quantity (Tier B), Volume (Tier C), and Area (Tier D) is assigned as the source hazardous waste quantity value (Ref. 1, Section 2.4.2.1.5).

Tier Evaluated	Source 1 Values
A	Not Evaluated
B	5,256
C	Not Evaluated
D	0

Source Hazardous Waste Quantity Value: 5,256

SITE SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value (see Section 2.4.2)	Containment			
		Groundwater	Surface Water	Gas	Air Particulate
1	5,256	NE	10	NE	NE
TOTAL	5,256				

Notes:
NE = Not Evaluated.

OTHER POSSIBLE ONSITE SOURCES NOT SCORED

Hillside Tailings Below the Copper Bluff Adit: Possible tailings have been observed on the hillside below the adit, above the Trinity River. The deposits are loose on the hillside, and are not covered or contained (Ref. 5, pp. 43-44). These deposits have not been evaluated for hazardous substances, and their extent has not been determined.

4.0 SURFACE WATER MIGRATION PATHWAY

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

The overland/flood migration component evaluates surface water threats that result from overland migration of hazardous substances from a source at the site to surface water. Three types of threats are evaluated for this component: drinking water threat, human food chain threat, and environmental threat (Ref. 1, Section 4.1).

The Copper Bluff adit outflow (Source 1) continuously flows from the Copper Bluff adit directly downslope into the Trinity River (Ref. 5, pp. 26-27, 30, 34, 41-45; Ref. 6, pp. 10, 14-15). An observed release by direct observation of hazardous substances is documented at the point where Source 1 is observed to flow into the Trinity River (see Section 4.1.2.1.1 Observed Release for documentation of the observed release). The Trinity River and its tributaries are the primary water resources in the Hoopa Valley (Ref. 6, p. 16). The Trinity River downstream of the adit outflow is used for subsistence fishing by the Hoopa Tribe (Figure 3; Ref. 5, pp. 27, 31, 34; Ref. 14, pp. 1-2; Ref. 18). The Trinity River at the point of the adit outflow is classified as a Wild and Scenic River (Figure 4; Ref. 8, p. 4). In addition, wetlands are present along the Trinity and Klamath Rivers within the target distance limit (Figure 4; Ref. 9, p. 4).

4.1.1 GENERAL CONSIDERATIONS

4.1.1.1 Definition of Hazardous Substance Migration Path for Overland/flood Component

The hazardous substance migration path includes both the overland segment and the in-water segment that hazardous substances would take as they migrate away from sources at the site. The overland segment begins at a source and proceeds downgradient to the probable point of entry (PPE) to the surface water. The in-water segment begins at this PPE. For rivers, the in-water segment continues in the direction of flow for the distance established by the target distance limit (Ref. 1, Section 4.1.1.1).

The overland segment consists of the path of the adit outflow from the adit (Source 1) downslope to the Trinity River (Figure 2; Ref. 5, pp. 26-27, 30, 34, 41-45; Ref. 6, pp. 10, 14-15). Discharge data collected from the adit outflow showed the flow rate varied seasonally, ranging from 5 gpm to a maximum of 486 gpm (Ref. 6, p. 55). The PPE is the point where the adit outflow meets the Trinity River.

The Trinity River flows northward through the Hoopa Valley Reservation, entering the valley about 3.7 miles south of Hoopa. Trinity River flows are controlled by releases from Lewiston Dam, which is operated by the Bureau of Reclamation. The river meanders through alluvial terraces in the Hoopa Valley before exiting into a steep, narrow canyon about 0.6 mile upstream of the Copper Bluff Mine (Ref. 6, pp. 13, 16). The Copper Bluff adit outflow enters the Trinity River 5.9 miles upstream of the confluence with the Klamath River (Figure 4). Therefore, the in-water segment begins at the PPE in the Trinity River and includes the portion of the Trinity and Klamath Rivers downstream of the PPE within the target distance limit (Figure 4).

4.1.1.2 Target Distance Limit

The target distance limit defines the maximum distance over which targets are considered in evaluating the site. If there is an observed release only by direct observation, the beginning of the target distance limit is measured at the PPE, and extends for 15 miles along the surface water from that point (Ref. 1, Section 4.1.1.2).

The PPE is located 5.9 miles upstream of the confluence of the Trinity and Klamath Rivers. Therefore, 5.9 miles of the Trinity River downstream of the PPE, and 9.1 miles of the Klamath River downstream of the confluence with the Trinity River, are within the target distance limit (Figure 4).

4.1.2.1 Likelihood of Release

4.1.2.1.1 Observed Release

Observed Release by Direct Observation

An observed release to surface water may be established when a material that contains one or more hazardous substances has been seen entering surface water through migration or is known to have entered surface water through direct deposition (Ref. 1, Section 4.1.2.1.1).

Basis for Direct Observation:

The Copper Bluff adit outflow (Source 1) was observed to flow directly into surface water of the Trinity River (Figure 2; Ref. 5, pp. 26-27, 30, 34, 41-45; Ref. 6, pp. 10, 14-15). Analytical data documenting the presence of hazardous substances in the adit outflow are presented in Section 2.2.2 Hazardous Substances Associated with the Source. The point of the observed release is the location where Source 1 meets the Trinity River, also referred to as the PPE.

Hazardous Substances in Release:

Hazardous substances documented in the adit outflow include cadmium, copper, nickel, and zinc (see Section 2.2.2, Hazardous Substances Associated with the Source).

Hazardous Substances Released

An observed release of cadmium, copper, nickel, and zinc to surface water is documented by direct observation.

Surface Water Observed Release Factor Value: 550

4.1.2.1.2 Potential to Release

Potential to Release was not scored, because an Observed Release was established (Ref. 1, Section 4.1.2.1.2).

4.1.2.2 Drinking Water Threat Waste Characteristics

The drinking water threat waste characteristics factor category value is based on hazardous waste quantity, toxicity, and surface water persistence for the hazardous substances documented in the site source in the release to surface water (Ref. 1, Section 4.1.2.2).

4.1.2.2.1 Toxicity/Persistence

HRS Toxicity and Persistence Factor Values are presented below for the hazardous substances documented in Source 1. Factor Values are provided in the Superfund Chemical Data Matrix (Ref. 3).

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Does Haz. Substance Meet Observed Release? (Y/N)	Toxicity/ Persistence Factor Value (Ref. 1, Table 4-12)	References
Cadmium	1	10,000	1	Y	10,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 2
Copper	1	100	1	Y	100	Ref. 2, Section 2.4.1.1; Ref. 3, p. 7
Nickel	1	10,000	1	Y	10,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 12
Zinc	1	10	1	Y	10	Ref. 2, Section 2.4.1.1; Ref. 3, p. 17

Notes:
* Persistence factor value for Rivers

Toxicity/Persistence Factor Value: 10,000
(Ref. 1, Table 4-12)

4.1.2.2.2 Hazardous Waste Quantity

The calculation for hazardous waste quantity for Source 1 is presented in Section 2.4.2.

Source No.	Source Type	Source Hazardous Waste Quantity
1	Other	5,256
	sum:	5,256

Hazardous Waste Quantity Factor Value: 100
(Ref. 1, Table 2-6, Section 2.4.2.2)

4.1.2.2.3 Waste Characteristics Factor Category Value

Toxicity/Persistence Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 100

Toxicity/Persistence Factor Value X Hazardous Waste Quantity Factor Value: 1,000,000

Waste Characteristics Factor Category Value: 32
(Ref. 1, Table 2-7)

4.1.2.3 Drinking Water Threat Targets

No drinking water intakes are located within 15 miles downstream of the PPE. Therefore, the listing decision is not significantly affected by the drinking water threat to the surface water pathway.

4.1.3.2 Human Food Chain Threat Waste Characteristics

The human food chain threat waste characteristics factor category value is based on hazardous waste quantity, toxicity, surface water persistence, and bioaccumulation potential for the hazardous substances documented in the site source in the release to surface water.

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

HRS Toxicity, Persistence, and Bioaccumulation Potential Factor Values are presented below for the hazardous substances documented in Source 1. Factor Values are provided in the Superfund Chemical Data Matrix (Ref. 3).

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Bioaccumulation Potential Factor Value**	Toxicity/ Persistence/ Bioaccumulation Factor Value (Ref. 1, Table 4-16)	References
Cadmium	1	10,000	1	50,000	500,000,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 2
Copper	1	100	1	50,000	5,000,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 7
Nickel	1	10,000	1	5	50,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 12
Zinc	1	10	1	500	5,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 17

Notes:
* Persistence factor value for Rivers
** Bioaccumulation factor value for Freshwater

Cadmium has the highest toxicity/persistence/bioaccumulation factor value.

Toxicity/Persistence/Bioaccumulation Factor Value: 500,000,000
(Ref. 1, Table 4-16)

4.1.3.2.2 Hazardous Waste Quantity

The calculation for hazardous waste quantity for Source 1 is presented in Section 2.4.2.

Source No.	Source Type	Source Hazardous Waste Quantity
1	Other	5,256
	sum:	5,256

Hazardous Waste Quantity Factor Value: 100
(Ref. 1, Table 2-6, Section 2.4.2.2)

4.1.3.2.3 Waste Characteristics Factor Category Value

Toxicity/Persistence/Bioaccumulation Factor Value for cadmium: 500,000,000
Hazardous Waste Quantity Factor Value: 100

Toxicity/Persistence Factor Value = 10,000
Hazardous Waste Quantity (HWQ) Factor Value = 100
Bioaccumulation Potential Factor Value (BPFV) = 50,000

(Toxicity/Persistence Factor Value) × (Hazardous Waste Quantity Factor Value) = 10,000 × 100
= 1×10^{6}
subject to a maximum of 1×10^{8}
(Ref. 1, Section 2.4.3.2)

Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value)
× (Bioaccumulation Potential Factor Value) = (1,000,000) × (50,000) = 5×10^{10}
Subject to a maximum of 1×10^{12}
(Ref. 1, Section 2.4.3.2)

The value of 5×10^{10} corresponds to a Waste Characteristics Factor Category Value of 320.

Waste Characteristics Factor Category Value: 320
(Ref. 1, Table 2-7)

4.1.3.3 Human Food Chain Threat Targets

The Trinity River supports a fishery that provides an important food source for the Hoopa Valley Tribe (Ref. 6, p. 15; Ref. 11, p. 37). The entire stretch of the Trinity River that runs through the Hoopa Nation is fished year round, and each family has their traditional locations for nets (Ref. 5, pp. 27, 31). The area immediately around the confluence of the adit outflow is not fished because of concerns about contaminants from the site (Ref. 5, p. 27). The nearest fishing area is approximately 30 yards downstream of the PPE (Ref. 5, p. 34; Ref. 18). Fish caught from the river include Coho salmon, Chinook salmon, steelhead trout, green steelhead, American shad, sturgeon, and lamprey eels (Ref. 5, p. 34; Ref. 10, pp. 28, 30; Ref. 11, p. 41). In 2003, approximately 160,000 pounds of fish were caught and consumed by the Hoopa Valley Tribe, approximately 75 percent of which were chinook salmon (Ref. 10, p. 30).

Hoopa Valley Tribe fishing locations mapped during the 2017 SI sampling event are presented in Figure 3.

<u>Actual Human Food Chain Contamination</u>

The fishery within the target distance limit is not subject to actual contamination, as defined by the HRS (Ref. 1, Section 4.1.3.3). Fishing was not confirmed at the point of the observed release by direct observation, where the adit flow enters the Trinity River (Ref. 5, p. 27).

4.1.3.3.1 Food Chain Individual

Sample ID: Not applicable
Level I/Level II/or Potential: Potential
Hazardous Substance: Cadmium
Bioaccumulation Potential: 50,000

If there is an observed release of a hazardous substance having a bioaccumulation potential factor value of 500 or greater to surface water in the watershed, and there is a fishery (or portion of a fishery) present anywhere within the target distance limit, a Food Chain Individual Factor Value of 20 is assigned (Ref. 1, Section 4.1.3.3.1). An observed release is documented of cadmium, with a bioaccumulation potential of 50,000, to the Trinity River. Multiple fishing locations for the Hoopa Valley Tribe are located downstream of the point of the observed release (PPE), and within the target distance limit (see Figures 3 and 4).

Food Chain Individual Factor Value: 20

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

Level I actual contamination is not documented.

Level I Concentrations Factor Value: 0

4.1.3.3.2.2 Level II Concentrations

Level II actual contamination is not documented.

Level II Concentrations Factor Value: 0

4.1.3.3.2.3 Potential Human Food Chain Contamination

Potential Population Targets

Streamflow for the Trinity River is measured at a USGS gaging station located in Hoopa, approximately 4.5 miles upstream of the PPE (Ref. 5, p. 9; Ref. 6, p. 13; Ref. 7, p. 1). Although there are minor tributaries entering the Trinity River between the gaging station and the PPE, the total drainage from tributaries within the Hoopa Valley Reservation accounts for only 7 percent of the overall drainage area that discharges into the Trinity River (Ref. 11, p. 24), and are not expected to significantly affect the flow rate. Average annual flow at this gaging station for the last 10 years (2008 to 2017) is 4,524 cubic feet per second (cfs) (Ref. 7, pp. 2-3).

Total chinook salmon harvest for the Trinity River within the Hoopa Valley Reservation averaged 4,531 fish per year from 2008 to 2017 (Ref. 16, pp. 5-7). Average weight for chinook salmon caught within the Hoopa Valley Reservation is 18 pounds (Ref. 10, p. 30). 12.5 miles of the Trinity River is located within the boundaries of Hoopa Valley Reservation (Ref. 11, p. 24).

Approximately 5.9 miles of the Trinity River are downstream of the PPE (Figure 4). Therefore, approximately 47 percent of the Trinity River within the Hoopa Valley Reservation is within the target distance limit (TDL) from the PPE. For the Trinity River:

4,530.7 fish per year * 18 pounds per fish = 81,552.6 pounds caught per year
81,552.6 * 47% = 38,329.722 pounds per year downstream of PPE

Total chinook salmon harvest for the Upper Klamath River, defined as the stretch from the confluence with the Trinity River to Surpur Creek, averaged 2,431 fish per year from 2008 to 2017 (Ref. 16, pp. 5-7). This stretch of river measures approximately 22.7 miles (Ref. 17). Approximately 9.1 miles of this segment is located within the TDL (Figure 4). Therefore, approximately 40 percent of the Upper Klamath River is located within the TDL. For the Upper Klamath River:

2,430.9 fish per year * 18 pounds per fish = 43,756.2 pounds caught per year
43,756.2 * 40% = 17,502.48 pounds per year within TDL

38,329.722 (Trinity River) + 17,502.48 (Klamath River) = 55,832.202 pounds chinook salmon per year within the TDL.

Identity of Fishery	**Annual Production (pounds)**	**Type of Surface Water Body**	**Average Annual Flow (cfs)**	**References**	**Population Value (P_i) (Ref. 1, Table 4-18)**	**Dilution Weight (D_i) (Ref. 1, Table 4-13)**	**P_i x D_i**
Chinook salmon harvest from Trinity and Klamath Rivers within the TDL	10,000 to 100,000	Large stream to river	4,524	Ref. 7, pp. 2-3; Ref. 10, p. 30; Ref. 16, pp. 5-7	31	0.001	0.031

Sum of P_i x D_i: 0.031
(Sum of P_i x D_i)/10: 0.0031

Potential Human Food Chain Contamination Factor Value: 0.0031

4.1.4.2 Environmental Threat Waste Characteristics

The environmental threat waste characteristics factor category value is based on hazardous waste quantity, ecosystem toxicity, surface water persistence, and ecosystem bioaccumulation potential for the hazardous substances documented in the site source in the release to surface water.

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

HRS Ecosystem toxicity, Persistence, and Environmental Bioaccumulation Factor Values are presented below for the hazardous substances documented in Source 1. Factor Values are provided in the Superfund Chemical Data Matrix (Ref. 3).

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Environmental Bioaccumulation Factor Value**	Ecosystem Toxicity/ Persistence/ Environmental Bioaccumulation Factor Value (Ref. 1, Table 4-21)	References
Cadmium	1	10,000	1	50,000	500,000,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 2
Copper	1	1,000	1	50,000	50,000,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 7
Nickel	1	100	1	50,000	5,000,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 12
Zinc	1	10	1	50,000	500,000	Ref. 2, Section 2.4.1.1; Ref. 3, p. 17

Notes:
* Persistence factor value for Rivers
** Bioaccumulation factor value for Freshwater

Cadmium has the highest ecosystem toxicity/persistence/environmental bioaccumulation factor value.

Toxicity/Persistence/Bioaccumulation Factor Value: 500,000,000
(Ref. 1, Table 4-21)

4.1.2.2.2 Hazardous Waste Quantity

The calculation for hazardous waste quantity for Source 1 is presented in Section 2.4.2.

Source No.	Source Type	Source Hazardous Waste Quantity
1	Other	5,256
	sum:	5,256

Hazardous Waste Quantity Factor Value: 100
(Ref. 1, Table 2-6, Section 2.4.2.2)

4.1.2.2.3 Waste Characteristics Factor Category Value

Toxicity/Persistence/Bioaccumulation Factor Value for cadmium: 500,000,000
Hazardous Waste Quantity Factor Value: 100

Toxicity/Persistence Factor Value = 10,000
Hazardous Waste Quantity (HWQ) Factor Value = 100
Bioaccumulation Potential Factor Value (BPFV) = 50,000

(Toxicity/Persistence Factor Value) × (Hazardous Waste Quantity Factor Value) = 10,000 × 100
= 1×10^6
subject to a maximum of 1×10^8
(Ref. 1, Section 2.4.3.2)

Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value)
× (Bioaccumulation Potential Factor Value) = (1,000,000) × (50,000) = 5×10^{10}
Subject to a maximum of 1×10^{12}
(Ref. 1, Section 2.4.3.2)

The value of 5×10^{10} corresponds to a Waste Characteristics Factor Category Value of 320.

Waste Characteristics Factor Category Value: 320
(Ref. 1, Table 2-7)

4.1.4.3 Environmental Threat Targets

4.1.4.3.1 Sensitive Environments

The Trinity River at the point of the observed release (PPE) is a federally-designated Wild and Scenic River (Figure 4; Ref. 8, p. 4). In addition, there are freshwater emergent and freshwater forested/shrub wetlands present within the target distance limit along the Trinity and Klamath Rivers (Ref. 9, p. 4).

4.1.4.3.1.1 Level I Concentrations

Level I actual contamination is not documented.

Level I Concentrations Factor Value: 0

4.1.4.3.1.2. Level II Concentrations

Level II Sensitive Environment Targets

Sensitive Environment	Distance from PPE to Nearest Sensitive Environment	References	Sensitive Environment Value (Ref. 1, Table 4-23)
Wild & Scenic River	0	Ref. 8, p. 4, Figure 4	50

Sum of Level II Sensitive Environments Value: 50

Level II Wetland Frontages

No qualifying wetlands are present at the point of the observed release by direct observation (Ref. 9, p. 3). Therefore, the Level II Wetlands Rating Value is 0 (Ref. 1, Table 4-24).

Sum of Level II Wetland Frontages: 0
Wetlands Value (Ref. 1, Table 4-24): 0

Sum of Level II Sensitive Environments Value + Wetlands Value: 50

Level II Concentrations Factor Value: 50

4.1.4.3.1.3 Potential Contamination

Potential Sensitive Environment Targets

Additional sensitive environments, as defined in Reference 1, Table 4-23, are not evaluated within the target distance limit.

Potential Wetland Frontages

Freshwater emergent and freshwater forested/shrub wetlands are present along the Trinity and Klamath Rivers within the target distance limit (Ref. 9, p. 4) and potentially threatened by the release from the mine. However, the exact wetland frontages were not measured or included in the score at this time, and this threat will be considered in further actions.

Potential Contamination Factor Value: 0