

Huntington Canyon Heavy Metal Concentrations

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ABSTRACT

The Huntington power plant is a coal power plant in a popular fishing area of central Utah. The purpose of this study is to determine whether airborne coal ash from the plant's landfills are affecting the concentrations of heavy metals in and around Huntington Canyon. Samples taken in November 2015 had arsenic at 11 ppm, cadmium at 28-52 ppm, mercury at 12 ppm, lead at 21 ppm, and antimony at 36 – 128 ppm. The highest concentrations of the metals were found adjacent to the power plant's research farm which is irrigated with wastewater from the plant, in the Huntington Lake sediments, and Huntington Creek sediments. We have concluded that these findings do not indicate airborne coal ash is contaminating the soil in Huntington Canyon nor Huntington, UT.

BACKGROUND

- Huntington power plant: 895 megawatts, 3 million tons of sub-bituminous coal burned annually, 320,000 tons of coal ash produced annually. (PacifiCorp, 2011)
- Utah Department of Environmental quality has two water monitoring stations for the town of Huntington which monitor surface waters of Huntington Creek and tributaries. Two of their water monitoring stations detected impairments in 2014. (A waterbody is considered impaired if it does not attain water quality standards. Standards may be violated due to an individual pollutant, multiple pollutants, thermal pollution, or an unknown cause of impairment.)
- Huntington Creek-1: Selenium. Huntington Creek-2: Cadmium, lead, pH, temperature, dissolved oxygen (DEQ, 2015)
- HEAL Utah and the Sierra Club have filed a Notice of Intent to sue Rocky Mountain Power (RMP) for violations of the Clean Water Act at the Huntington Plant. (Maffly, 2015; Pacenza, 2015)
- According to the data in the Notice of Intent to sue, a number of water sources owned by the plant or running through their property do not meet clean water regulations. RMP also cut off two streams running from their property into Huntington Creek due to pollution levels.
- Only information from the most impacted waters are included below. Many water bodies have been impacted in various years. The data is from 2003 – 2014.
- UPL-13 Irrigation Storage Pond: Boron levels from 2.0 - 9.68 mg/L, pH levels from 6.42 – 10.33, and nitrate levels from .51 – 9.82 mg/L.
- North Fork had boron levels from 29.0 – 59.0 mg/L and nitrate levels 5.94 – 51.00 mg/L.
- Concentrations of Boron in surface fresh waters are typically <0.1 – 0.5 mg/L. (Howe, 1998)
- Utah has an allowable range for pH of 6.5-9.0 and considers nitrate (NO₃) concentrations of 4 mg/L to be an indicator of pollution problems. Geiger & Mesner 2015)
- A 1980 USGS soil study of Huntington Canyon and Emery County had low levels of arsenic and below detectable (ND) limits of cadmium, mercury, and antimony. (Table 1)
- Research indicates that the highest concentrations of heavy metals should be located 2-4 km downwind if airborne coal ash is a source of pollution. (Agrawal et al., 2010)

HYPOTHESIS

Because the coal ash is stored in landfills we believed that we would find elevated levels of arsenic, cadmium, mercury, lead, and antimony in the surface soils of Huntington Canyon and surrounding areas, with the highest concentrations 2-4 km downwind. Test results confirming this hypothesis could indicate that airborne coal ash may be contaminating the soil.

METHODS

We collected soil samples from 23 different locations around the town of Huntington, UT and Huntington Canyon. These samples include soils upwind and downwind from the Huntington power plant and also sediments from Huntington Reservoir, Huntington Creek, and various seasonal washes in the area. We used the Niton XL2 field portable x-ray fluorescence (XRF) test our soil samples for heavy metal concentrations. (EPA, 2015)



RESULTS

The XRF detected arsenic, cadmium, mercury, lead, and antimony in some of our soil samples. One location had arsenic at 10.71 ppm adjacent to the plant property. Eight locations had detectable levels of cadmium ranging from 20.89 – 51.76 ppm. One location had mercury at 12.43 ppm located downwind of the plant. One location had lead at 20.62 ppm adjacent to the research farm property. And seven locations had antimony ranging from 40.16 – 128.05 ppm. (Figure 1 and Figure 2)

The highest levels of cadmium were found in the soil adjacent to, and across the street from the Deer Creek power plant's research farm. The next highest reading was upstream and upwind from the plant and the other two readings came from sediments collected from Huntington Creek and Huntington Lake. Our highest level of antimony was found in the Huntington Lake sediments. The next 3 highest concentrations were found adjacent to the research farm and further downstream near Huntington Creek. (See Table 2)

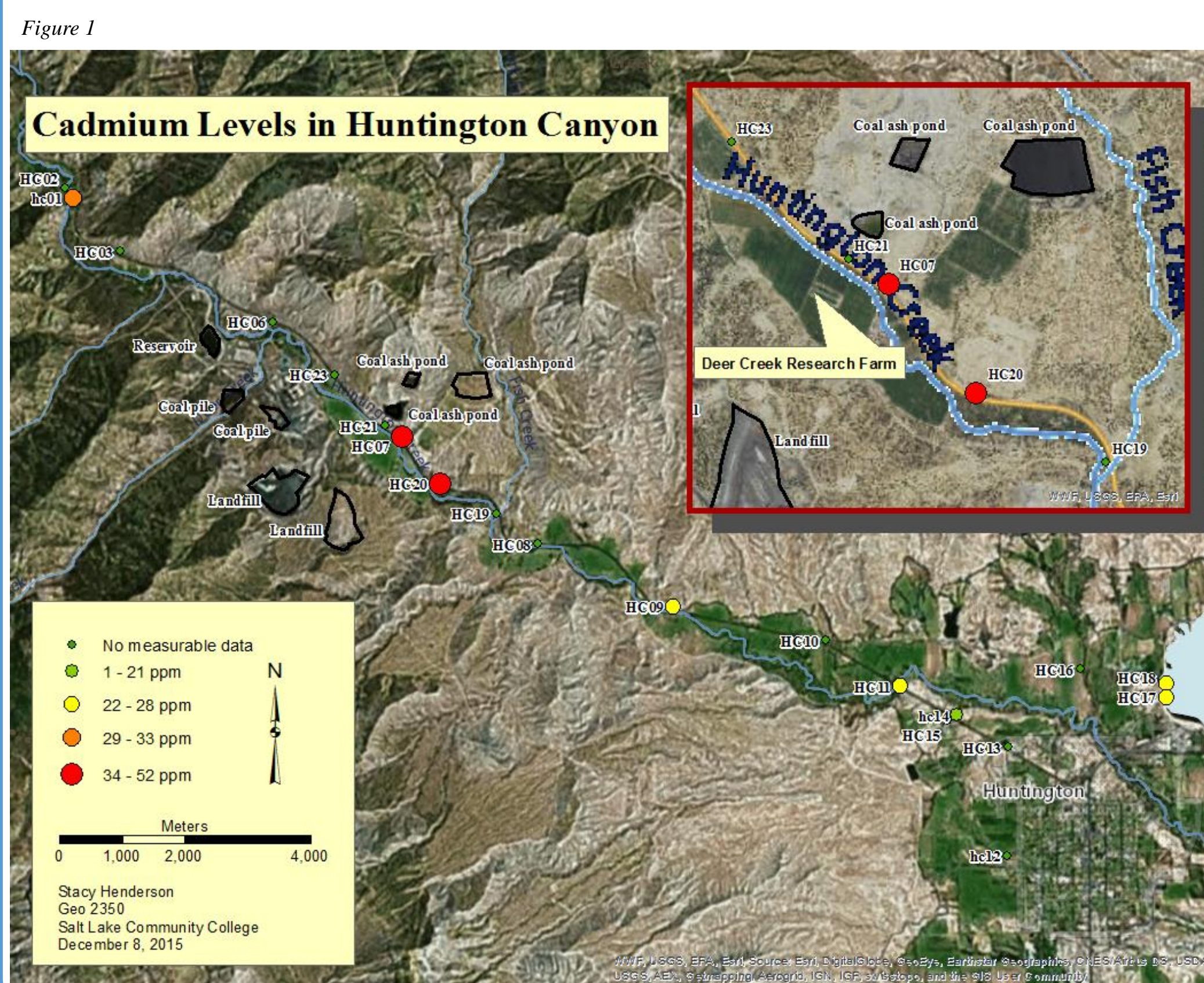
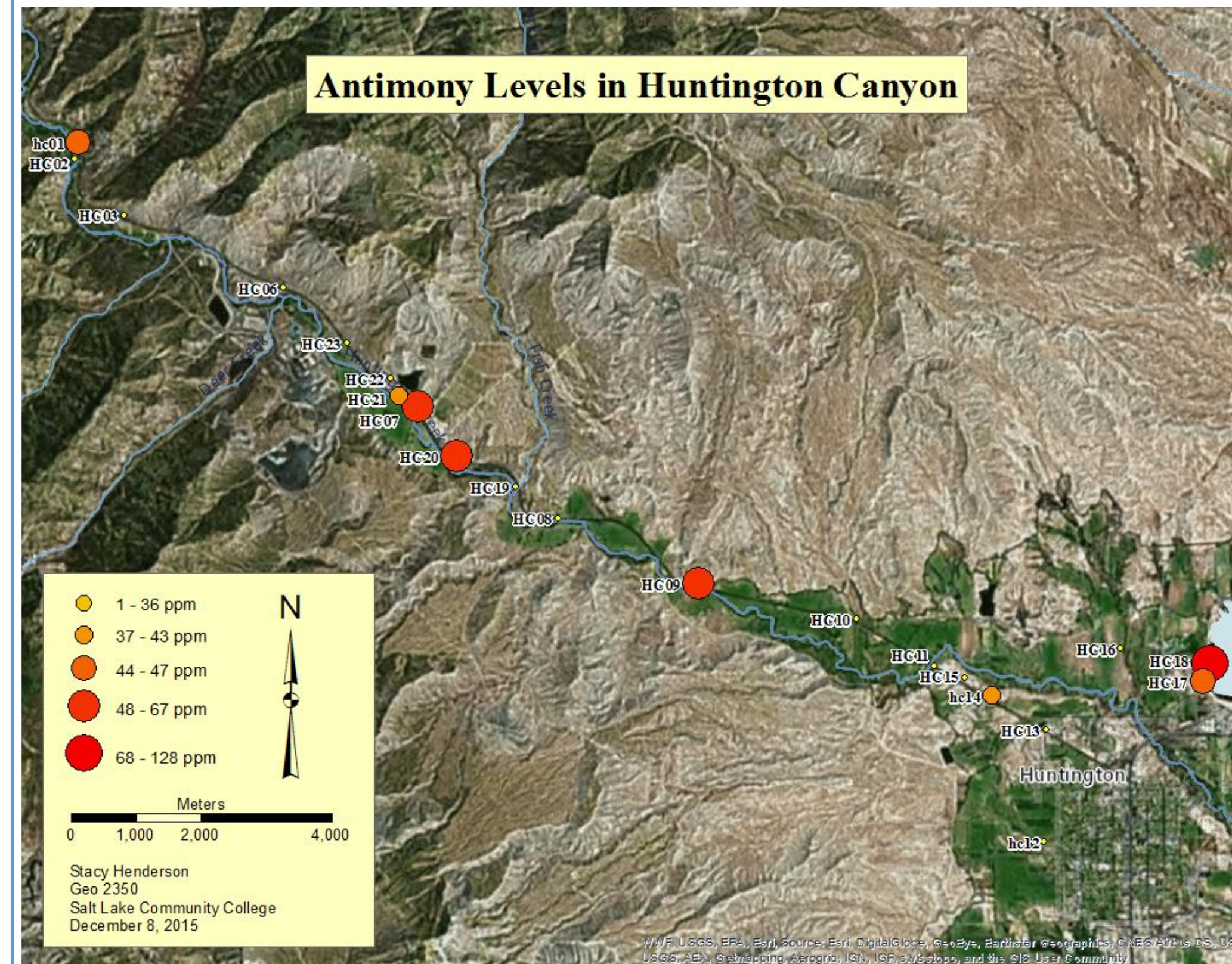


Table 2

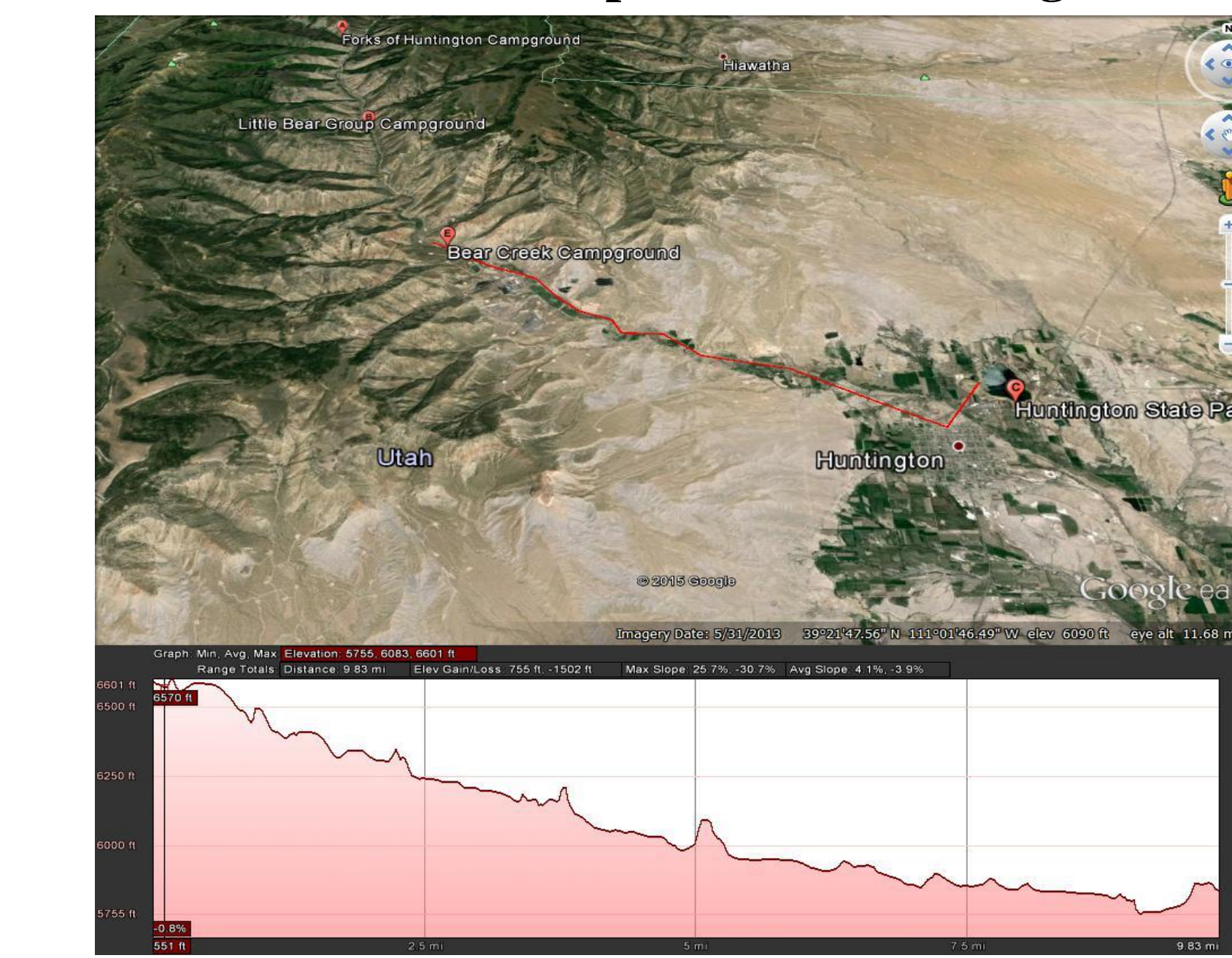
Reading No	Time	Sample	Latitude	Longitude	As	Cd	Sb	Hg	Pb
720	11/4/2015 16:20	HC03	39.39445	-111.10348	--	--	--	--	--
722	11/4/2015 16:27	HC04-1	39.39116	-111.02919	--	--	44.17	--	--
723	11/4/2015 16:30	HC07	39.37396	-111.06297	--	51.76	59.57*	--	--
724	11/4/2015 16:34	HC06	39.38668	-111.08156	--	--	--	--	--
726	11/4/2015 16:35	HC09	39.35511	-111.02403	--	28.25	58.27*	--	--
727	11/4/2015 16:38	HC09	39.35511	-111.02403	--	--	--	--	--
729	11/4/2015 16:41	HC10	39.35132	-111.00224	--	--	--	12.43	--
731	11/4/2015 16:45	HC11	39.34623	-110.99148	--	24.7	40.16	--	--
734	11/4/2015 16:49	HC12	39.32748	-110.97627	--	--	--	--	--
735	11/4/2015 16:50	HC08	39.36206	-111.0435	--	--	--	--	--
737	11/4/2015 16:53	HC13	39.33949	-110.976	--	--	--	--	--
749	11/4/2015 17:33	HC19	39.36543	-111.04944	--	--	--	--	--
750	11/4/2015 17:44	HC18	39.34655	-110.95336	--	25.62	128.05*	--	--
751	11/4/2015 17:53	HC02	39.40223	-111.10986	--	--	--	--	--
752	11/4/2015 18:03	HC17	39.34655	-110.95336	--	27.68	47.01	--	--
753	11/5/2015 14:56	HC23	39.3808	-111.07211	10.71	--	--	--	--
754	11/5/2015 15:08	HC04	39.39116	-111.02919	--	--	41.65	--	--
757	11/5/2015 15:20	HC20	39.36871	-111.05751	--	44.01	67.39*	--	--
759	11/5/2015 15:28	HC21	39.37516	-111.06544	--	--	40.96	--	20.62
761	11/5/2015 15:34	HC22	39.37516	-111.06544	--	--	--	--	--
763	11/5/2015 16:15	HC15	39.34241	-110.98471	--	--	--	--	--
765	11/5/2015 16:39	hc12	39.32748	-110.97627	--	--	--	--	--
767	11/5/2015 16:47	hc05	39.39116	-111.02919	--	--	--	--	--
769	11/5/2015 16:53	hc14	39.34308	-110.9835	--	20.89	42.89	--	--
771	11/5/2015 17:02	hc01	39.40223	-111.10986	--	32.89	46.31	--	--
776	11/9/2015 17:47	HC16	39.34816	-110.9657	--	--	--	--	--
BLM Recreational Screening Levels for Campers					20	70	50	40	1000
BLM Recreational Screening Levels for Residents					1	3	3	2	400

Notes: Bolded Numbers indicate levels above BLM recommended levels for residents.
* indicates levels above BLM recommended levels for campers.
-- Below detection limit of instrument
ppm = metals measured in parts per million

Figure 2



Elevation Profile of Sample Area of Huntington Canyon

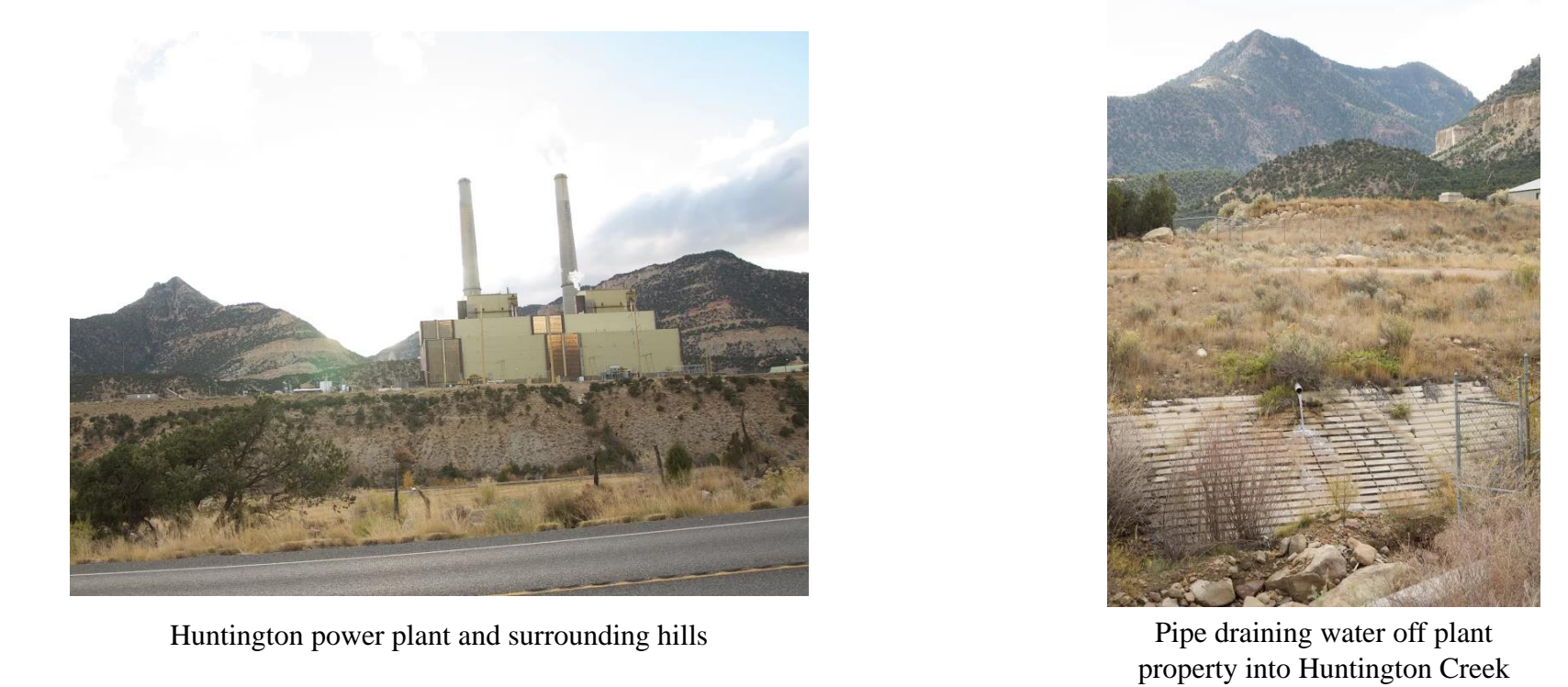


DISCUSSION

- Huntington Canyon levels of arsenic, cadmium, mercury, lead, and antimony exceed the BLM screening recommendations for recreation area residents and campers.
- The concentrations of heavy metals 2-4 km downwind from the plant are not consistent with airborne particulate contamination of soils. (Agrawal et al., 2010)
- Highest concentrations of contaminants are found adjacent to the Huntington plant's research farm and in stream and lake sediments.

CONCLUSIONS

- We have concluded that airborne coal ash from the Huntington power plant's coal ash landfills are not contaminating surface soils in the canyon nor the town of Huntington through the deposition of airborne particulates.
- Our results show that there are elevated levels of heavy metals in Huntington Canyon that were not present in 1980 at the time of the USGS study. This has raised further questions that are not covered in the scope of this project.
- Are the elevated levels of heavy metals in the canyon a result of water pollution due to disposal of waste water into the soil of the property which makes its way to Huntington Creek and surrounding areas?
- Is mining activity that took place in the canyon from 1980-2015 the cause of the elevated concentrations of metals found?
- Is precipitation causing groundwater contamination through the unlined landfills storing the coal ash?
- Are our findings a result of a combination of the above factors or something else all together?



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