

Appendix I  
Evaluation of Tailings Mixing in  
Chaparral Gulch and the  
Tailings Floodplain

# Appendix I

## Evaluation of Tailings Mixing in Chaparral Gulch and the Tailings Floodplain

This appendix evaluates where tailings from the former Iron King Mine property have contributed to the presence of tailings in the sediment of the Tailings Floodplain and Chaparral Gulch on the former Humboldt Smelter Property upstream of the Chaparral Gulch Dam. The primary potential sources of impacts to the Chaparral Gulch and Tailings Floodplain system are tailings associated with former Iron King Mine operations that migrated from the Main Tailings Pile (MTP) (primarily as a result of the 1964 MTP Blow Out) and the former Small Tailings Pile (which was removed and consolidated with the MTP in 2011), and tailings associated with operations at the former Humboldt Smelter property.

Potential transport mechanisms for these materials include:

- Direct discharges of water with high particulate loads during active periods of operation at the former Iron King Mine and former Humboldt Smelter properties
- Direct releases of tailings associated with failures of tailings impoundments
- Erosion of previously placed tailings and downstream sediment transport to and within Chaparral Gulch
- Accumulation of windblown tailings in the Chaparral Gulch watershed and subsequent erosion and downstream sediment transport to and within the gulch

Tailings-impacted sediment has accumulated upstream of the Chaparral Gulch Dam. While aerial photographic interpretation constrains the timing of significant downslope movement of tailings from the Smelter Tailings Swale into the Tailings Floodplain on the former Humboldt Smelter property, the volume of tailings upstream of the dam appears to be larger than could have been stored in the Smelter Tailings Swale. Operations at the former Humboldt Smelter property appear to have used the Tailings Floodplain for additional storage of tailings early in the operations history, but lead and zinc concentrations in some tailings samples from the floodplain area are substantially higher than in tailings exposed in the Smelter Tailings Swale that originated from former Humboldt Smelter property. Tailings from the former Iron King Mine property have elevated lead and zinc concentrations relative to the tailings associated with former Humboldt Smelter property and are interpreted to be a potential source of the additional tailings observed upstream of the dam.

### Objective

The objective of this evaluation was to assess whether tailings associated with the former Iron King Mine property mixed with sediment and tailings from the former Humboldt Smelter property that have accumulated in the Tailings Floodplain and Chaparral Gulch upstream of the Chaparral Gulch Dam. The differentiation of tailings from the former Iron King Mine and Humboldt Smelter properties is based on physical characteristics (color for example) and relative metals concentrations. However, differentiation of these tailings is complicated by mixing, redeposition, and other sediment transport processes, which can alter the physical characteristics. Therefore, a statistical comparison of key metals and ratios of metals was used to assess whether tailings from the former Iron King Mine contributed to these deposits.

## Recent and Quaternary Deposits in Chaparral Gulch

During the data gap phase of the remedial investigation, the U.S. Environmental Protection Agency installed 115 borings within and adjacent to the Chaparral Gulch channel and the Tailings Floodplain (Lockheed Martin SERAS, 2015). At most locations, the borings were advanced through the recent and Quaternary deposits that fill the gulch into the underlying Hickey Formation.

Six unconsolidated units (also referred to as hydrostratigraphic units) were observed and mapped in the subsurface. These included recent materials deposited after the Iron King Mine and Humboldt Smelter began operations, and older pre-existing materials that existed before these operations began. The units observed were as follows:

- Materials deposited after operations began at the former Iron King Mine and Humboldt Smelter properties:
  - Uppermost Channel Deposit (UCD)
  - Tailings
  - Humboldt Smelter Channel Deposit (HSCD)
  - Lowermost Channel Deposit (LCD)
- Materials deposited before operations began at the former Iron King Mine and Humboldt Smelter properties:
  - Brown Clay
  - Principle Fluvial Gravels (PFG)

These unconsolidated sediments are underlain by the Hickey Formation.

The characteristics of the recent materials are as follows:

- The UCD, HSCD, and LCD are interpreted to consist of mixed tailings and fluvium based on their stratigraphic position, physical characteristics, and elevated metals concentrations (Lockheed Martin SERAS, 2015). These were deposited after the operations began at the former Iron King Mine and Humboldt Smelter properties.
- The Brown Clay and PFG were interpreted to be native alluvium and are generally not impacted by Site contamination. These were deposited before operations began at the former Iron King Mine and Humboldt Smelter properties.
- Tailings in and around Chaparral Gulch are described as “HS” tailings based on their proximity to the former Humboldt Smelter property, but are not necessarily exclusive in origin to the Smelter Tailings Swale, as will be shown below. Both undisturbed and reworked (such as redeposited and mixed) tailings have been observed in the subsurface of Chaparral Gulch.

The UCD extends from the NR5 MTP Blow Out Path to the Smelter Tailings Swale where it thins to surface veneer. The LCD, HSCD, and tailings deposits extend from the Smelter Tailings Swale to the Chaparral Gulch Dam. Tailings deposits from the former Iron King Mine property also are interpreted to occur in Chaparral Gulch upstream of the Smelter Tailings Swale and in Chaparral Gulch downstream of the Smelter Tailings Swale to the dam (Tailings Floodplain) based on the findings of this evaluation.

## Technical Approach

Analytical data for the tailings samples collected from the former Iron King Mine property (labeled as “IKM Tailings” in the tables and figures of this appendix) and the Smelter Tailings Swale (labeled as “HS Tailings” in the tables and figures of this appendix), as well as the UCD, LCD, HSCD, and other

unconsolidated deposits in Chaparral Gulch upstream of the dam were compiled and categorized by unit or material (for example, Iron King Mine tailings, UCD, Brown Clay, etc.). Afterward, exploratory analysis was performed to identify geochemical signatures that most clearly differentiate Iron King Mine tailings from Humboldt Smelter tailings. At the former Iron King Mine property, a massive sulfide deposit was exploited that primarily produced lead and zinc (and some copper); the concentrations of these metals remain elevated in Iron King Mine tailings. Smelter operations at the former Humboldt Smelter property processed copper; the Humboldt Smelter tailings are concentrated in copper relative to other metals. Consequently, the concentrations of lead, zinc, and copper, as well as the ratios of lead to copper (Pb:Cu) and zinc to copper (Zn:Cu) concentrations, were used for the comparative statistical analysis of the samples from these sources and the geologic groupings for Chaparral Gulch. Finally, each of the samples for all material types was scored on the basis of how close its chemical properties resembled Iron King Mine tailings. After scoring, figures were developed to illustrate the spatial distribution of the samples for each material group and how closely they resembled tailings from the Iron King Mine property.

## Statistical Analysis

The following statistical tools were used to evaluate the presence of tailings that potentially could be derived from the former Iron King Mine property:

- **The Wilcoxon Rank Sum Comparison (WRS):** The WRS is a non-parametric method used to compare two samples and determine if they are drawn from populations with different means (Gilbert, 1987). The WRS was used to test whether the Pb:Cu and Zn:Cu for Iron King Mine tailings (from the MTP) and Humboldt Smelter tailings (from the Humboldt Smelter Tailings Swale) were significantly different, and therefore is useful for differentiating these sources. In addition, WRS tests were performed to compare the ratios for the other geologic groupings to those of the Iron King Mine and Humboldt Smelter tailings.
- **Box and Whisker Plot (BWP):** BWPs provide a visual idea of central tendency, variability, and skewness of each dataset for comparison (Swan and Sandilands, 1995). BWPs are used to assess differences in the concentrations of lead, copper, and zinc, as well as the concentration ratios between the two sources (former Iron King Mine and Humboldt Smelter properties), and potential influence of one source over another in mixtures (that is, geologic groupings for Chaparral Gulch).
- **Normality Quantile Plot (NQP):** The NQP is commonly used in testing the normality of a sample set, with a perfectly normal distribution plotting as a straight line (Gilbert, 1987). NQPs are also useful for visually comparing characteristics of sample distributions. NQPs were used to infer differences among the sample groupings and the degree of contribution (mixing) between sample groups based on distribution of their Pb:Cu and Zn:Cu ratios.

## Spatial Distribution Analysis

The following tools were used to evaluate the distribution of tailings potentially from the former Iron King Mine property:

- **Cross Plots:** Cross plots were developed for lead and copper concentrations versus zinc concentrations, along with the Pb:Cu and Zn:Cu ratios on an alternate y-axis. Concentrations and ratios were color coded for each of the material types (tailings sources and sediments in Chaparral Gulch) to allow a visual examination of how the populations of data compare to Iron King Mine tailings. The cross plots are log-log in scale, providing the advantage to view data of a broad range of scales, which allows for an examination of data clustering between material types.
- **Ranking:** Each of the samples for each of the material types was scored over a range of 1 to 7 with how closely they resembled Iron King Mine tailings: 1 being best and 7 being worst. After scoring,

figures were developed to illustrate the spatial distribution of the samples for each material group. A composite map also was developed to illustrate the combined spatial distribution for the materials deposited after operations began at the former Iron King Mine and Humboldt Smelter properties. The plots show the distribution of materials likely derived from the former Iron King Mine property.

## Findings

This section describes the findings from the statistical analysis and evaluation of the spatial distribution of contaminants in the tailings.

### Statistical Analysis

The findings of the statistical evaluation are presented in the following tables and figures:

- Table I-1 presents zinc, copper, and lead concentrations and their concentration ratios
- Table I-2 presents the WRS results for Pb:Cu ratios and their mean and median values
- Table I-3 presents the WRS results for Zn:Cu ratios and their mean and median values
- Figures I-1a through I-1e show the BWPs for copper, zinc, and lead concentrations and their concentration ratios
- Figures I-2a through I-2e show the NQPs for Pb:Cu ratios
- Figures I-3a through I-3e show the NQPs for Zn:Cu ratios

All analytical data were used for the statistical analysis, including duplicates. The results are discussed below.

### Wilcoxon Rank Sum Comparisons

Tables I-2 and I-3 summarize the results of the WRS test with respect to Pb:Cu and Zn:Cu ratios, respectively, for both the Iron King Mine and Humboldt Smelter tailings. Each table is organized into two groups of materials: (1) those that were deposited after operations began at the former Iron King Mine and Humboldt Smelter properties, and (2) those that were in place prior to Iron King Mine and Humboldt Smelter operations. The fourth column of each table shows the probability that differences between the two groups occurs by chance (that is, they are part of the same population). In this kind of test, a probability of greater than 0.05 would indicate that they are not significantly different at the 95 percent confidence level. Relevant findings from the WRS comparisons are summarized below:

- The mean Pb:Cu and Zn:Cu ratios for Iron King Mine tailings are, 35.3 and 71.1, respectively. The mean ratio values are larger than all other geologic groupings except the Pb:Cu for the reworked tailing group, which is slightly larger (42).
- The mean Pb:Cu and Zn:Cu ratios for Humboldt Smelter tailings are 1.93 and 5.67, respectively.
- The mean Pb:Cu and Zn:Cu ratios for other impacted units (UCD, LCD, and HSCD) are intermediate between those of the Iron King Mine tailings and Humboldt Smelter tailings.
- The probability that the Pb:Cu and Zn:Cu for the Iron King Mine tailings and Humboldt Smelter tailings are the same is small, on the order of  $10^{-12}$  for both Pb:Cu and Zn:Cu ratios. Based on this analysis, the Pb:Cu and Zn:Cu ratios for these materials are statistically distinct. In addition, the Pb:Cu and Zn:Cu ratios for the Iron King Mine tailings are different than the ratios for all other geologic groupings.
- The Pb:Cu and Zn:Cu ratios for the Humboldt Smelter tailings are similar (with no significant difference) to those of the HSCD (impacted), Brown Clay (not impacted), and PFG (not impacted). In

addition, the Pb:Cu ratios for the Humboldt Smelter tailings are similar to those of the Hickey Formation.

This analysis confirms that the Pb:Cu and Zn:Cu ratios of the Iron King Mine tailings are statistically different (larger) than those from those for Humboldt Smelter tailings, and are therefore useful geochemical signatures to distinguish contributions of Iron King Mine tailings in Chaparral Gulch from those caused by Humboldt Smelter tailings. On a related note, the Humboldt Smelter tailings are statistically similar to non-mine related deposits, demonstrating that only the Iron King Mine tailings contain elevated lead and zinc in comparison to copper levels.

### Box and Whisker Plots

The BWPs were prepared for each of the hydrostratigraphic units for Pb:Cu and Zn:Cu ratios, as well as lead, zinc, and copper concentrations. In each case, two sets of plots were prepared: one incorporating all data, and a second that removes elevated outlier results to allow for improved review of the main body of data. Figures I-1a through I-1e show the BWPs for copper, lead, and zinc concentrations along with the Pb:Cu and Zn:Cu ratios.

For the BWP, data values are plotted on the y-axis; the x-axis has no value, but instead the BWPs are distributed much like in a histogram. The following properties are displayed:

- The height of the box represents the interquartile range (IQR). The IQR is the distance between the 25th and the 75th percentiles.
- The horizontal line in the box interior represents the median.
- The vertical lines issuing from the box (the “whiskers”) extend to the minimum and maximum measured values (or 1.5 times the IQR, whichever is lower).
- Individual data symbols (asterisks in this case) are used for concentrations that exceed the whiskers (that is, they are either greater than 1.5 times the IQR or less than the IQR/1.5). These are often described as outliers, although they should not be interpreted as suspected erroneous data points, but rather as more extreme values compared to the main body of data.

Observations from the BWPs are summarized below:

- Although there is some degree of overlap among the groups, the BWPs show that median concentrations of lead, copper, and zinc are higher in Iron King Mine tailings than in Humboldt Smelter tailings, while copper is the dominant metal in the Humboldt Smelter tailings. There is clear separation in concentrations for lead and zinc between the two groups of tailings, making these good indicators of Iron King Mine tailings impacts. There is overlap in concentration for copper, making it a less useful indicator of Iron King Mine tailings impacts.
- Of the impacted geologic groups, the median concentration of lead and zinc are highest and the IQR of concentrations largest for the reworked tailings, while the median concentration of copper was larger in the undisturbed tailings. The median lead concentration for the reworked tailings actually exceeds that for the Iron King Mine tailings.
- The majority of the Pb:Cu and Zn:Cu ratios for Iron King Mine tailings exceed those of the Humboldt Smelter tailings, and there is very little overlap of the IQR for these groups, which is consistent with the findings of WRS comparisons.
- The reworked tailings have higher median Zn:Cu and Pb:Cu ratios and larger IQRs of these ratios than the undisturbed tailings, the Humboldt Smelter tailings from the Smelter Tailings Swale, and the other impacted units in the gulch. In addition, there is substantial overlap between the Zn:Cu and Pb:Cu IQRs for the Iron King Mine tailings and reworked tailings, and the median Pb:Cu ratio for the reworked tailings is actually higher than for the Iron King Mine tailings.

The Zn:Cu and Pb:Cu ratios of the reworked tailings (and the UCD) are higher than those for the Humboldt Smelter tailings. The higher ratios are consistent with source or contribution of Iron King Mine tailings to Chaparral Gulch. The median Pb:Cu ratio for the reworked tailings is higher than for the Iron King Mine tailings, but ratios for the Humboldt Smelter are almost completely below the range of the Iron King Mine tailings.

Lead is the most resistant to leaching of the three metals evaluated. One possible explanation for the higher median ratios in the reworked tailings is preferential leaching of copper versus lead during transport and after deposition in the gulch. The median lead concentration for the Iron King Mine tailings is higher than for the reworked tailings; thus, the higher ratios in the reworked tailings do not appear to be caused by enrichment of lead relative to source material that originates from former Iron King Mine property.

### Normality Quantile Plots

For the NQPs, the y-axis is the concentration or ratio; the x-axis is the normal quantile or Z-statistic, which splits the number of samples into roughly equal numbers arranged by distance from the median (negative indicates below the median and positive above). Figures I-2a through I-2e show the NQPs for Pb:Cu ratios, and Figures I-3a through I-3e show the NQPs for Zn:Cu ratios. Note that the blue points represent data for Iron King Mine tailings, the red points represent the data for Humboldt Smelter tailings, and the green points represent data for individual geologic units. Groups with a similar distribution of ratios would plot close together on an NQP. Groups containing mixtures of Iron King Mine and Humboldt Smelter tailings would plot between the two end-member distributions.

Observations from the NQPs are summarized below:

- The undisturbed tailings plot relatively close to the Humboldt Smelter tailings for both Zn:Cu and Pb:Cu ratios, suggesting little if any contribution from the Iron King Mine tailings. The data for the HSCD show similar trends.
- The reworked tailings show elevated Zn:Cu ratios that fall midway between the distribution of the Iron King Mine and Humboldt Smelter tailings. At high values, the ratios for the reworked tailings are nearly equivalent to those of the Iron King Mine tailings, suggesting a strong contribution of Iron King Mine tailings in these materials.
- For Pb:Cu ratios, the reworked tailings plot along the Iron King Mine tailings at the lower concentrations, then deviate to higher Pb:Cu ratios above the median. As discussed above, the anomalous high Pb:Cu ratios in the reworked tailings may have been caused by preferential leaching of copper versus lead during transport in the gulch.
- For the UCD, the Zn:Cu and Pb:Cu ratios plot between the data for Humboldt Smelter tailings and Iron King Mine tailings, suggesting mixing with Iron King Mine tailings. Note that there is no significant difference between the ratios for the Humboldt Smelter tailing and the native deposits (Brown Clay and PFG). The plot actually reflects mixing with native material rather than Humboldt Smelter tailings, as the UCD largely occurs upstream of the Tailings Swale. The data for LCD show similar trends.

These plots further demonstrate the source contribution of Iron King Mine tailings to floodplain sediment upstream of the Chaparral Gulch Dam. The reworked tailings, UCD, and LCD all appear to contain Iron King Mine tailings. The undisturbed tailings and HSCD have ratio characteristics similar to those of Humboldt Smelter tailings. There appears to be little Iron King Mine tailings source contribution in these materials.

## Spatial Distribution Analysis

The findings of the spatial distribution analysis are presented in the following tables and figures:

- Attachment I-1 (Figures I-1-1a through I-1-1l) provides the cross plots of zinc concentrations versus lead and copper concentrations and the Pb:Cu and Zn:Cu ratios. Figure I-1-1a illustrates the data for all material groups, Figure I-1-1b highlights the data for Iron King Mine tailings, Figure I-1-1c illustrates the “cut points” used for the ranking analysis (explained below), and Figures I-1-1d through I-1-1l illustrate the Iron King Mine tailings data versus the data for each of the other material types.
- Tables I-4 and I-5 rank the materials for each sample with how closely they resemble Iron King Mine tailings. Table I-4 sorts the ranking by material type, and Table I-5 sorts by sample location.
- Figure I-4 illustrates the distribution of samples for Iron King Mine tailings in the MTP for the combination of lead and zinc signatures. All of the samples have a ranking of “1”.
- Figure I-5 illustrates the distribution of samples for materials in the Smelter Tailings Swale, Chaparral Gulch, and the Tailings Floodplain to the dam. The samples for the recent materials deposited after operation of the Iron King Mine and Humboldt Smelter began are ranked from “1” through “7” (tailings and channel deposits). The materials deposited before Iron King Mine and Humboldt Smelter began operations are given a gray color because they are not impacted by the mining operations and are all ranked “7”.
- Figures I-6a through I-6j illustrate the distribution of samples in Figure I-5, broken by material type.

Analytical data for duplicates were omitted from the spatial distribution analysis. The results are discussed below.

### Cross Plots and Ranking

Based on examination of the cross plots, it was determined that Iron King Mine tailings had the following unique attributes compared to the other material types, including Humboldt Smelter tailings (Attachment I-1, Figures I-1-1b and I-1-1c):

- Lead concentrations were greater than 1,000 milligrams per kilogram (mg/kg), while the other material types were less.
- Zinc concentrations were greater than 1,000 mg/kg, while the other material types were less.
- Pb:Cu ratios were greater than 6, while the other material types were less.
- Zn:Cu ratios were greater than 20, while the other material types were less.

The tailings from the Iron King Mine are a clear end-member for these four parameters (especially lead and zinc concentrations and to a slightly lesser degree the two ratios) compared to the other material groups, and therefore a powerful tool to identify these tailings mixed with the other materials, including Humboldt Smelter tailings. Copper was not a useful attribute to distinguish Iron King Mine tailings from Humboldt Smelter tailings because the copper concentration ranges overlapped. Therefore, the Pb:Cu and Zn:Cu ratios were also slightly less useful than the simple lead and zinc concentrations to distinguish Iron King Mine tailings from Humboldt Smelter tailings, although the ratios were still useful.

Each of the samples for each of the material types were scored over a range of 1 to 7 with how close they resembled Iron King Mine tailings, with 1 being best and 7 being worst (Tables I-4 and I-5). A score of 1 was given if both lead and zinc were greater than 1,000 mg/kg, indicating high confidence that the material was from Iron King Mine. A score of 2 was given if each of the concentrations was greater than 900 mg/kg, indicating that some mixing with materials not from Iron King Mine could have occurred.



Scores of 3, 4, 5, 6, and 7 were given if the concentrations were greater than 800, 700, 600, 500, and 0 mg/kg, respectively. The range from 500 to 0 mg/kg was not further broken down because this encompasses the range of concentrations for Humboldt Smelter tailings and would not provide value in distinguishing between the two material types. The scoring was repeated to also include the two ratios, in addition to lead and zinc concentrations.

The scoring ranges for the zinc and lead concentrations, and the two ratios, are as follows. A color was also assigned to facilitate visual analysis with evaluating the spatial distribution of the scores:

Score	Color	Zinc (mg/kg)	Lead (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)
1	Light Pink	>1000	>1000	>20	>6
2	Orange	>900	>900	>18	>5.5
3	Yellow	>800	>800	>16	>5
4	Light Green	>700	>700	>14	>4.5
5	Light Blue	>600	>600	>12	>4
6	Very Light Blue	>500	>500	>10	>3.5
7	Light Grey	>0	>0	>0	>0

The results from the ranking analysis are consistent with the results from the statistical analysis. The ranking analysis show the following:

- Materials in the Smelter Tailings Swale (Humboldt tailings and HSCD) are distinctly different in chemical signature (lead and iron concentrations and Pb:Cu and Zn:Cu ratios) compared to the Iron King Mine tailings (Attachment I-1, Figures I-1-1d and I-1-1e). These materials are given a rank of 7. This is consistent with the statistical analysis above.
- Materials logged as channel deposits (UCD, LCD) and tailings (reworked, undisturbed) are variably similar or dissimilar in chemical signature compared to the Iron King Mine tailings (Attachment I-1, Figures I-1-1f through I-1-1i). Materials most resembling Iron King Mine tailings are given a rank of 1 and those least resembling Iron King Mine tailings are given a rank of 7. A portion of samples for each of these material groups was given a rank of 1, indicating Iron King Mine tailings presence. The UCD and upper tailings classified as reworked were given the highest percentage of high ranks while the LCD and lower tailings classified as undisturbed were given the lowest percentage of high ranks, indicating that Iron King Mine tailings were preferentially present in the UCD and reworked tailings compared to the deeper undisturbed tailings and LCD. This is consistent with the statistical analysis above.
- Materials logged as Brown Clay, PFG, and Hickey Formation (ash/cinder or conglomerate) are distinctly different in chemical signature compared to the Iron King Mine tailings (Attachment I-1, Figures I-1-1j and I-1-1l). These materials are given a rank of 7. This is consistent with the statistical analysis above.

## Spatial Distribution

The spatial distribution in Figures I-4, I-5, and I-6a through I-6J shows the following:

- Figure I-4 illustrates the distribution of samples for Iron King Mine tailings in the MTP for the combination of lead and zinc signatures. All of the samples have a ranking of “1”.
- Figure I-5 illustrates that samples strongly resembling Iron King Mine tailings (higher geochemical ranks) are continuously present along that path from the 1964 MTP Blow Out to Chaparral Gulch to the Tailings Floodplain to the dam. This figure illustrates that samples resembling Iron King Mine tailings are not present in the Smelter Tailings Swale.
- Figures I-6a and I-6b illustrate the Smelter materials in the Smelter Tailings Swale and the HSCD located at the mouth of the Smelter Tailings Swale do not resemble Iron King Mine tailings.
- Figures I-6c and I-6d illustrate the UCD and upper tailings classified as reworked that strongly resemble Iron King Mine tailings are continuously present along that path from the 1964 MTP Blow Out to Chaparral Gulch to the Tailings Floodplain to the dam.
- Figures I-6e and I-6f illustrate the lower tailings classified as undisturbed LCD are still impacted by materials resembling Iron King Mine tailings, but to a much lower degree than those of the UCD and tailings classified as reworked. This indicates that most tailings in these two deeper units originated from the former Humboldt Smelter property, although some are from Iron King Mine tailings. The signatures between the HSCD and the Humboldt Smelter tailings are similar to those of the tailings classified as undisturbed and the LCD.
- Figures I-6g through I-6j illustrate that the deeper materials (PFG, Brown Clay, Hickey Formation) deposited before operations at the former Iron King Mine and Humboldt Smelter properties began are not impacted by tailings.

## Conclusions

The results of the statistical and spatial distribution analysis of the Iron King Mine tailings, Humboldt Smelter tailings, and deposits in the Chaparral Gulch floodplain upstream of the dam demonstrate the following:

- Mixtures of Iron King Mine tailings and Humboldt Smelter tailings have accumulated in the Chaparral Gulch floodplain upstream of the dam.
- There is a strong differentiation in geochemical signature between these two material groups that allows Iron King Mine tailings to be differentiated from Humboldt Smelter tailings. The lead and zinc concentrations and Zn:Cu and Pb:Cu ratios for the Iron King Mine tailings are significantly different than the ratios for Humboldt Smelter tailings. These ratios can be used to differentiate relative contribution of the Iron King Mine and Humboldt Smelter tailings in the impacted sediment of Chaparral Gulch upstream of the dam.
- Based on the geochemical analysis, the UCD and reworked tailings have substantial Iron King Mine source contributions, whereas the undisturbed tailings and LCD have a lower degree of Iron King Mine source contribution and appear more similar to materials from the Humboldt Smelter and HSCD. Iron King Mine tailings are continuously present along the path from the 1964 MTP Blow Out to Chaparral Gulch to the Tailings Floodplain to the dam. Iron King Mine tailings are not present in the Smelter Tailings Swale.

## References

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## Attachments

### Tables

- I-1 Zinc, Copper, Lead Concentration and Ratios
- I-2 Wilcoxon Rank Sum Comparisons for Lead/Copper Ratios
- I-3 Wilcoxon Rank Sum Comparisons for Zinc/Copper Ratios
- I-4 Ranking of Zinc, Copper, Lead, and Ratios – Sorted by Material Type
- I-5 Ranking of Zinc, Copper, Lead, and Ratios – Sorted by Sample Location

### Figures

- I-1a Box and Whisker Plots for Lead/Copper Ratios
- I-1b Box and Whisker Plots for Zinc/Copper Ratios
- I-1c Box and Whisker Plots for Lead Concentrations
- I-1d Box and Whisker Plots for Copper Concentrations
- I-1e Box and Whisker Plots for Zinc Concentrations
- I-2a Probability Plots for Lead/Copper Ratios
- I-2b Probability Plots for Lead/Copper Ratios
- I-2c Probability Plots for Lead/Copper Ratios
- I-2d Probability Plots for Lead/Copper Ratios
- I-2e Probability Plots for Lead/Copper Ratios
- I-3a Probability Plots for Zinc/Copper Ratios
- I-3b Probability Plots for Zinc/Copper Ratios
- I-3c Probability Plots for Zinc/Copper Ratios
- I-3d Probability Plots for Zinc/Copper Ratios
- I-3e Probability Plots for Zinc/Copper Ratios
- I-4 Iron King Mine Tailings Signatures, Lead and Zinc Concentration Scores
- I-5 Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Recent Materials (Tailings and Channel Deposits)
- I-6a Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Smelter
- I-6b Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, UCD
- I-6c Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, HS Tailings (Reworked)
- I-6d Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, HSCD
- I-6e Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, HS Tailings (Undisturbed)
- I-6f Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, LCD
- I-6g Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, PFG
- I-6h Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Brown Clay

- I-6i Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Hickey Cgl
- I-6j Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Hickey Ash/  
Cinder

### Attachment I-1 Cross Plots

- I-1-1a All Data
- I-1-1b All Data, Iron King Mine Tailings Data Circled
- I-1-1c Cut Points for Tailings Mixing Evaluation
- I-1-1d Iron King Mine Tailings and Smelter Material
- I-1-1e Iron King Mine Tailings and Humboldt Smelter Channel Deposit (HSCD)
- I-1-1f Iron King Mine Tailings and Upper Channel Deposit (UCD)
- I-1-1g Iron King Mine Tailings and Humboldt Smelter Tailings (Reworked)
- I-1-1h Iron King Mine Tailings and Humboldt Smelter Tailings (Undisturbed)
- I-1-1i Iron King Mine Tailings and Lower Channel Deposit (LCD)
- I-1-1j Iron King Mine Tailings and Brown Clay (BC)
- I-1-1k Iron King Mine Tailings and Principal Fluvial Gravel (PFG)
- I-1-1l Iron King Mine Tailings, Hickey Cgl, and Hickey Ash/Cinder

Tables

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
IKM Tailings	B-3	14.5	15	2800	140	1900	20.00	13.57
IKM Tailings	B-3	24.5	25	18000	340	3200	52.94	9.41
IKM Tailings	B-5	14.5	15	26000	430	4500	60.47	10.47
IKM Tailings	B-5	24.5	25	17000	380	4100	44.74	10.79
IKM Tailings	IKJ-525	0	2	14600	227	3020	64.32	13.30
IKM Tailings	IKJ-525	4	7	11600	236	2810	49.15	11.91
IKM Tailings	IKJ-525	35	38	12300	281	3570	43.77	12.70
IKM Tailings	IKJ-526	0	2	4890	235	2390	20.81	10.17
IKM Tailings	IKJ-526	4	7	12500	315	2980	39.68	9.46
IKM Tailings	IKJ-526	39	40	33700	645	7310	52.25	11.33
IKM Tailings	IKJ-527	0	2	13900	608	4050	22.86	6.66
IKM Tailings	IKJ-527	4	7	19400	543	4920	35.73	9.06
IKM Tailings	IKJ-527	35	40	16500	377	8230	43.77	21.83
IKM Tailings	IKJ-529	0	2	10400	629	4460	16.53	7.09
IKM Tailings	IKJ-530	0	2	1890	88.8	1200	21.28	13.51
IKM Tailings	IKJ-555	0	0.5	4910	273	2050	17.99	7.51
IKM Tailings	IKJ-583	0	0.5	4530	148	2150	30.61	14.53
IKM Tailings	IK-S2	1	2	10000	197	2160	50.76	10.96
IKM Tailings	IK-S4	1	2	10900	1180	3500	9.24	2.97
IKM Tailings	IKV-102	0	2	3020	124	2740	24.35	22.10
IKM Tailings	IKV-102	4	7	8980	218	2730	41.19	12.52
IKM Tailings	IKV-103	0	2	7320	169	2850	43.31	16.86
IKM Tailings	IKV-104	0	2	4610	146	2100	31.58	14.38
IKM Tailings	IKV-104	4	7	11100	277	3480	40.07	12.56
IKM Tailings	IKV-105	0	2	8840	390	3240	22.67	8.31
IKM Tailings	IKV-106	0	2	2190	132	1250	16.59	9.47
IKM Tailings	IKV-106	4	7	7260	203	2340	35.76	11.53
IKM Tailings	IKV-108	0	2	16400	550	4650	29.82	8.45
IKM Tailings	IKV-108	4	7	17100	518	4980	33.01	9.61
IKM Tailings	IKV-109	0	2	10800	180	2230	60.00	12.39
IKM Tailings	IKV-112	0	2	6330	379	4370	16.70	11.53
IKM Tailings	IKV-112	4	7	18100	727	4840	24.90	6.66
IKM Tailings	MTP-SB01	5	5	13400	52.4	3290	255.73	62.79
IKM Tailings	MTP-SB01	27.5	27.5	4200	3.4	3050	1235.29	897.06
IKM Tailings	MTP-SB02	5	5	6140	171	3510	35.91	20.53
IKM Tailings	MTP-SB02	65	65	12400	319	4030	38.87	12.63
IKM Tailings	MTP-SB02	81	81	7350	404	3590	18.19	8.89
IKM Tailings	MTP-SB03	5	5	11200	180	3410	62.22	18.94
IKM Tailings	MTP-SB03	63.5	63.5	20000	400	4600	50.00	11.50
IKM Tailings	MTP-SB03	106	106	8180	270	4600	30.30	17.04
HS Tailings	STS-SB01	0	0	317	2370	122	0.13	0.05
HS Tailings	STS-SB02	0	0	316	77.6	291	4.07	3.75
HS Tailings	STS-SB03	0	0	419	70.9	215	5.91	3.03
HS Tailings	STS-SB03	4	4	378	95.3	29.6	3.97	0.31
HS Tailings	STS-SB04	0	0	330	75.1	283	4.39	3.77
HS Tailings	STS-SB05	0	0	583	83	188	7.02	2.27
HS Tailings	STS-SB05	3	3	1860	121	268	15.37	2.21
HS Tailings	STS-SB05	5	5	3120	201	23.6	15.52	0.12
HS Tailings	STS-SB06	0	0	150	1020	103	0.15	0.10
HS Tailings	STS-SB07	0	0	341	59	207	5.78	3.51
HS Tailings	STS-SB07	1	1	1080	194	56.7	5.57	0.29
HS Tailings	STS-SB08	0	0	238	718	63.5	0.33	0.09
HS Tailings	STS-SB08	5	5	493	69.3	138	7.11	1.99
HS Tailings	STS-SB08	9	9	543	126	218	4.31	1.73
HS Tailings	STS-SB09	0	0	481	91	218	5.29	2.40
HS Tailings	STS-SB09	2.5	2.5	34.5	23.4	13.8	1.47	0.59
HS Tailings	STS-SB09B	0	0	311	71.3	224	4.36	3.14
HS Tailings	STS-SB10	0	0	295	68.8	277	4.29	4.03
HS Tailings	STS-SB11	0	0	650	100	79.2	6.50	0.79
HS Tailings	STS-SB12	5.5	5.5	587	70.9	346	8.28	4.88
HS Tailings	STS-SB13	0	0	516	47.3	318	10.91	6.72
HS Tailings	STS-SB13	3	3	221	55.7	175	3.97	3.14
HS Tailings	STS-SB13	4.5	4.5	34.5	70	21.4	0.49	0.31
HS Tailings	STS-SB13	9	9	675	102	18.6	6.62	0.18
HS Tailings	STS-SB15	0	0	478	76.8	364	6.22	4.74
HS Tailings	STS-SB15	5	5	741	148	27.3	5.01	0.18
HS Tailings	STS-SB15	10	10	1540	190	14.5	8.11	0.08
HS Tailings	STS-SB15	15	15	391	57.3	29.6	6.82	0.52

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
HS Tailings	STS-SB15	20	20	495	53.5	26.6	9.25	0.50
HS Tailings	STS-SB15B	0	0	313	79.1	310	3.96	3.92
HS Tailings	STS-SB15B	10	10	228	48.9	22.9	4.66	0.47
HSCD	CHF-SB23	5	5	246	52.8	118	4.66	2.23
HSCD	CHF-SB30	5	5	1250	63.7	274	19.62	4.30
HSCD	CHF-SB36	10	10	855	69.9	113	12.23	1.62
HSCD	CHF-SB38	5	5	180	28.6	184	6.29	6.43
HSCD	STS-SB12	0	0	631	69	377	9.14	5.46
HSCD	STS-SB12	1	1	293	87.8	19.3	3.34	0.22
HSCD	STS-SB15	6	6	354	2510	76	0.14	0.03
HSCD	STS-SB15B	8	8	550	94.9	313	5.80	3.30
UCD	CHF-SB03	0	0	535	32.9	201	16.26	6.11
UCD	CHF-SB04	0	0	581	26.3	197	22.09	7.49
UCD	CHF-SB05	0	0	674	33.7	468	20.00	13.89
UCD	CHF-SB07	0	0	472	32	583	14.75	18.22
UCD	CHF-SB08	0	0	1250	36.6	613	34.15	16.75
UCD	CHF-SB09	0	0	354	32.9	248	10.76	7.54
UCD	CHF-SB10	0	0	903	36.6	1670	24.67	45.63
UCD	CHF-SB11	0	0	558	39.3	876	14.20	22.29
UCD	CHF-SB15	0	0	402	58.9	178	6.83	3.02
UCD	CHF-SB16	0	0	536	76.1	666	7.04	8.75
UCD	CHF-SB17	0	0	40.4	84.1	41.7	0.48	0.50
UCD	CHF-SB18	0	0	1340	37.3	1460	35.92	39.14
UCD	CHF-SB19	0	0	896	51.5	579	17.40	11.24
UCD	CHF-SB20	0	0	2940	328	349	8.96	1.06
UCD	CHF-SB21	0	0	407	62.4	343	6.52	5.50
UCD	CHF-SB23	0	0	617	63.2	414	9.76	6.55
UCD	CHF-SB24	0	0	474	71.8	401	6.60	5.58
UCD	CHF-SB25	0	0	1360	102	348	13.33	3.41
UCD	CHF-SB26	0	0	352	62.1	126	5.67	2.03
UCD	CHF-SB27	0	0	427	49.1	851	8.70	17.33
UCD	CHF-SB28	0	0	721	66.7	410	10.81	6.15
UCD	CHF-SB29	0	0	529	69.5	300	7.61	4.32
UCD	CHF-SB31	0	0	523	60.4	174	8.66	2.88
UCD	CHF-SB32	0	0	2320	62.7	284	37.00	4.53
UCD	CHF-SB33	0	0	814	40.6	601	20.05	14.80
UCD	CHF-SB34	0	0	1150	34.8	1180	33.05	33.91
UCD	CHF-SB36	0	0	896	34.7	228	25.82	6.57
UCD	CHF-SB37	0	0	666	34.1	196	19.53	5.75
UCD	CHF-SB39	0	0	213	43.8	236	4.86	5.39
UCD	CHF-SB40	0	0	584	51.6	187	11.32	3.62
UCD	CHF-SB41	0	0	742	37.3	474	19.89	12.71
UCD	CHF-SB42	0	0	561	31.3	131	17.92	4.19
UCD	CHF-SB43	0	0	862	39.1	827	22.05	21.15
UCD	CHF-SB44	0	0	449	47.3	146	9.49	3.09
UCD	CHF-SB45	0	0	678	35.7	1160	18.99	32.49
UCD	CHF-SB46	0	0	977	32.2	798	30.34	24.78
UCD	CHF-SB47	0	0	412	58	165	7.10	2.84
UCD	CH-SB01	0	0	588	35.8	494	16.42	13.80
UCD	CH-SB01	4	4	1170	45.9	5530	25.49	120.48
UCD	CH-SB01	6	6	280	34.6	17.2	8.09	0.50
UCD	CH-SB01	7.5	7.5	193	45.8	11.9	4.21	0.26
UCD	CH-SB01	8.5	8.5	821	39.4	2300	20.84	58.38
UCD	CH-SB02	0	0	677	30.7	197	22.05	6.42
UCD	CH-SB02	4	4	1280	37	1060	34.59	28.65
UCD	CH-SB03	0	0	470	29.7	229	15.82	7.71
UCD	CH-SB03	4.5	4.5	259	35.3	1090	7.34	30.88
UCD	CH-SB03	6	6	510	25.9	47.3	19.69	1.83
UCD	CH-SB04	0	0	457	27.3	213	16.74	7.80
UCD	CH-SB04	4	4	343	34.2	1110	10.03	32.46
UCD	CH-SB04	6	6	916	46.3	251	19.78	5.42
UCD	CH-SB04	8	8	268	77.6	17.9	3.45	0.23
UCD	CH-SB05	0	0	408	30.7	136	13.29	4.43
UCD	CH-SB05	4	4	579	24.4	202	23.73	8.28
UCD	CH-SB06	0	0	227	27.5	88.5	8.25	3.22
UCD	CH-SB07	0	0	444	26.7	210	16.63	7.87
UCD	CH-SB07	6	6	631	28.6	174	22.06	6.08

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
UCD	CH-SB08	0	0	482	30.5	250	15.80	8.20
UCD	CH-SB09	0	0	442	29.4	177	15.03	6.02
UCD	CH-SB10	0	0	438	33.3	188	13.15	5.65
UCD	CH-SB10	4	4	42.1	25.3	22.2	1.66	0.88
UCD	CH-SB11	0	0	458	29.7	423	15.42	14.24
UCD	CH-SB11	5	5	263	24.1	54.1	10.91	2.24
UCD	CH-SB12	0	0	420	27.5	216	15.27	7.85
UCD	CH-SB12	5	5	285	33.6	140	8.48	4.17
UCD	CH-SB12	7	7	563	36.9	3500	15.26	94.85
UCD	CH-SB13	0	0	445	28.6	124	15.56	4.34
UCD	CH-SB13	5.5	5.5	130	42.1	45.6	3.09	1.08
UCD	CH-SB14	0	0	169	35.6	36.7	4.75	1.03
UCD	CH-SB14B	0	0	498	44.8	467	11.12	10.42
UCD	CH-SB14B	4	4	55.8	27.8	17.9	2.01	0.64
UCD	CH-SB15	0	0	249	50.6	89.5	4.92	1.77
UCD	CH-SB15	4	4	51.6	27.1	17.9	1.90	0.66
UCD	CH-SB16	0	0	469	26.3	259	17.83	9.85
UCD	CH-SB16	4.5	4.5	293	27.1	78.2	10.81	2.89
UCD	CH-SB16	10	10	491	55.2	59.3	8.89	1.07
UCD	CH-SB17	0	0	423	29.7	274	14.24	9.23
UCD	CH-SB17	4.5	4.5	535	24.1	55	22.20	2.28
UCD	CH-SB17	8.5	8.5	1310	33.3	2950	39.34	88.59
UCD	CH-SB17	10	10	970	61.9	155	15.67	2.50
UCD	CH-SB17	13	13	288	32	124	9.00	3.88
UCD	CH-SB17	15	15	801	78.6	25.1	10.19	0.32
UCD	CH-SB18	0	0	306	25.5	94.2	12.00	3.69
UCD	CH-SB18	5	5	402	20.1	15.9	20.00	0.79
UCD	CH-SB19	0	0	374	32.7	719	11.44	21.99
UCD	CH-SB20	0	0	397	25	252	15.88	10.08
UCD	CH-SB20	5	5	438	34	62.7	12.88	1.84
UCD	CH-SB20	8.5	8.5	261	27.5	217	9.49	7.89
UCD	CH-SB20	11	11	524	30.5	134	17.18	4.39
UCD	CH-SB21	0	0	385	31.5	734	12.22	23.30
UCD	CH-SB21	2.5	2.5	724	25.7	90.4	28.17	3.52
UCD	CH-SB22	0	0	605	46.9	732	12.90	15.61
UCD	CH-SB23	0	0	425	29.2	306	14.55	10.48
UCD	CH-SB23	5	5	616	22.9	33.5	26.90	1.46
UCD	CH-SB23	10	10	509	35.8	79.2	14.22	2.21
UCD	CH-SB24	0	0	603	37.1	1620	16.25	43.67
UCD	CH-SB24	5	5	587	26.1	39.9	22.49	1.53
UCD	CH-SB24	8.5	8.5	585	74.4	446	7.86	5.99
UCD	CH-SB24	10	10	377	29.6	49	12.74	1.66
UCD	CH-SB25	0	0	583	32.7	830	17.83	25.38
UCD	CH-SB26	0	0	505	30.7	407	16.45	13.26
UCD	CH-SB27	0	0	293	39.1	190	7.49	4.86
UCD	CH-SB28	0	0	305	31.3	298	9.74	9.52
UCD	CH-SB29	0	0	478	33.4	891	14.31	26.68
UCD	CH-SB29	4	4	787	42.1	39.9	18.69	0.95
UCD	CH-SB30	0	0	731	29.1	739	25.12	25.40
UCD	CH-SB30	5	5	662	26.1	78.2	25.36	3.00
UCD	CH-SB30	9	9	185	28	254	6.61	9.07
UCD	CHU-SB01	0	0	553	35	256	15.80	7.31
UCD	CHU-SB02	0	0	407	31.5	165	12.92	5.24
UCD	CHU-SB02	3	3	398	82.1	302	4.85	3.68
UCD	CHU-SB03	0	0	256	20.7	67.3	12.37	3.25
UCD	CHU-SB03	2.5	2.5	301	31.9	23.6	9.44	0.74
UCD	CHU-SB04	0	0	511	29.6	517	17.26	17.47
UCD	CHU-SB05	0	0	311	26.1	71.8	11.92	2.75
UCD	CHU-SB05	4	4	301	24.1	140	12.49	5.81
UCD	CHU-SB06	0	0	288	25.7	105	11.21	4.09
UCD	CHU-SB07	0	0	446	31.3	761	14.25	24.31
UCD	CHU-SB08	0	0	260	30.5	70	8.52	2.30
UCD	CHU-SB09	0	0	1030	33.3	402	30.93	12.07
UCD	CHU-SB10	0	0	315	29.4	196	10.71	6.67
UCD	CHU-SB11	0	0	360	34.5	907	10.43	26.29
UCD	CHU-SB12	0	0	344	30.8	184	11.17	5.97
UCD	CHU-SB13	0	0	256	26.7	206	9.59	7.72



TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
UCD	CHU-SB13	2.5	2.5	458	41.6	70.8	11.01	1.70
UCD	CHU-SB14	0	0	348	47.6	257	7.31	5.40
UCD	CHU-SB15	0	0	410	34.3	297	11.95	8.66
UCD	DAM-SB01	0	0	448	64.3	169	6.97	2.63
UCD	DAM-SB01	5	5	1080	82.1	620	13.15	7.55
UCD	DAM-SB02	0	0	396	52.2	110	7.59	2.11
UCD	DAM-SB03	0	0	507	69.6	93.3	7.28	1.34
UCD	DAM-SB03	5	5	1160	99.6	233	11.65	2.34
UCD	DAM-SB04	0	0	628	54.3	4290	11.57	79.01
UCD	DAM-SB05	0	0	997	78.9	362	12.64	4.59
HS Tailings (reworked)	CHF-SB01	0	0	531	38.2	472	13.90	12.36
HS Tailings (reworked)	CHF-SB02	0	0	460	32.2	304	14.29	9.44
HS Tailings (reworked)	CHF-SB02	3.5	3.5	279	34.2	1350	8.16	39.47
HS Tailings (reworked)	CHF-SB03	5	5	235	29.2	523	8.05	17.91
HS Tailings (reworked)	CHF-SB03	7	7	216	66.9	15.5	3.23	0.23
HS Tailings (reworked)	CHF-SB04	5	5	425	29.9	396	14.21	13.24
HS Tailings (reworked)	CHF-SB04	7.5	7.5	1940	43.2	510	44.91	11.81
HS Tailings (reworked)	CHF-SB05	3	3	576	31	378	18.58	12.19
HS Tailings (reworked)	CHF-SB05	4	4	1170	37	953	31.62	25.76
HS Tailings (reworked)	CHF-SB06	0	0	534	31.3	929	17.06	29.68
HS Tailings (reworked)	CHF-SB06	5	5	662	33.7	1890	19.64	56.08
HS Tailings (reworked)	CHF-SB06	9	9	582	29.4	124	19.80	4.22
HS Tailings (reworked)	CHF-SB07	5	5	334	21.3	369	15.68	17.32
HS Tailings (reworked)	CHF-SB07	7.5	7.5	1850	51.9	784	35.65	15.11
HS Tailings (reworked)	CHF-SB08	2.5	2.5	963	34.5	4700	27.91	136.23
HS Tailings (reworked)	CHF-SB10	5	5	2770	52.7	1740	52.56	33.02
HS Tailings (reworked)	CHF-SB10	9	9	6250	229	1620	27.29	7.07
HS Tailings (reworked)	CHF-SB12	0	0	738	35.5	937	20.79	26.39
HS Tailings (reworked)	CHF-SB12	5	5	4220	77.8	3140	54.24	40.36
HS Tailings (reworked)	CHF-SB15	2.5	2.5	621	118	2390	5.26	20.25
HS Tailings (reworked)	CHF-SB15	5	5	5710	104	2710	54.90	26.06
HS Tailings (reworked)	CHF-SB17	5	5	455	53.8	438	8.46	8.14
HS Tailings (reworked)	CHF-SB18	5	5	6770	50.8	5030	133.27	99.02
HS Tailings (reworked)	CHF-SB19	2.5	2.5	842	42	13000	20.05	309.52
HS Tailings (reworked)	CHF-SB21	4.5	4.5	402	61.3	757	6.56	12.35
HS Tailings (reworked)	CHF-SB21	6	6	5690	67.8	3180	83.92	46.90
HS Tailings (reworked)	CHF-SB21	10	10	2240	74.7	1160	29.99	15.53
HS Tailings (reworked)	CHF-SB23	4	4	2170	90.5	1840	23.98	20.33
HS Tailings (reworked)	CHF-SB24	5	5	231	54.4	304	4.25	5.59
HS Tailings (reworked)	CHF-SB24	9	9	216	50.4	304	4.29	6.03
HS Tailings (reworked)	CHF-SB26	2.5	2.5	558	47.6	4010	11.72	84.24
HS Tailings (reworked)	CHF-SB27	5	5	4450	66.7	5830	66.72	87.41
HS Tailings (reworked)	CHF-SB32	5	5	382	51.1	372	7.48	7.28
HS Tailings (reworked)	CHF-SB32	10	10	141	44.6	155	3.16	3.48
HS Tailings (reworked)	CHF-SB34	4	4	500	31	1860	16.13	60.00
HS Tailings (reworked)	CHF-SB35	0	0	653	47	330	13.89	7.02
HS Tailings (reworked)	CHF-SB35	5	5	2510	78.1	1540	32.14	19.72
HS Tailings (reworked)	CHF-SB36	5	5	400	34.2	358	11.70	10.47
HS Tailings (reworked)	CHF-SB37	5	5	990	34.2	1510	28.95	44.15
HS Tailings (reworked)	CHF-SB38	0	0	770	40.2	575	19.15	14.30
HS Tailings (reworked)	CHF-SB43	5	5	883	38.4	3410	22.99	88.80
HS Tailings (reworked)	CHF-SB45	5	5	8150	55.2	4230	147.64	76.63
HS Tailings (reworked)	CHF-SB45	7.5	7.5	205	23.2	56.7	8.84	2.44
HS Tailings (reworked)	CH-SB31	0	0	592	38	463	15.58	12.18
HS Tailings (reworked)	DAM-SB01	10	10	31800	111	45900	286.49	413.51
HS Tailings (reworked)	DAM-SB03	13.5	13.5	1050	71.5	2220	14.69	31.05
HS Tailings (reworked)	DAM-SB03	20	20	3110	73.9	985	42.08	13.33
HS Tailings (reworked)	DAM-SB04	5	5	480	40.8	321	11.76	7.87
HS Tailings (reworked)	DAM-SB04	6	6	839	432	1240	1.94	2.87
HS Tailings (reworked)	DAM-SB05	5	5	783	52.9	2600	14.80	49.15
HS Tailings (reworked)	DAM-SB05	7.5	7.5	12600	402	4410	31.34	10.97
HS Tailings (reworked)	DAM-SB05	10	10	5500	76.1	4660	72.27	61.24
HS Tailings (undisturbed)	CHF-SB01	4	4	290	563	52.7	0.52	0.09
HS Tailings (undisturbed)	CHF-SB01	7.5	7.5	950	184	382	5.16	2.08
HS Tailings (undisturbed)	CHF-SB01	9	9	889	58.3	100	15.25	1.72
HS Tailings (undisturbed)	CHF-SB02	5	5	536	64.1	284	8.36	4.43
HS Tailings (undisturbed)	CHF-SB02	7.5	7.5	1480	142	195	10.42	1.37

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
HS Tailings (undisturbed)	CHF-SB09	5	5	225	50.2	156	4.48	3.11
HS Tailings (undisturbed)	CHF-SB09	8	8	216	53.2	32.7	4.06	0.61
HS Tailings (undisturbed)	CHF-SB12	8	8	349	55	115	6.35	2.09
HS Tailings (undisturbed)	CHF-SB13	0	0	292	44.9	188	6.50	4.19
HS Tailings (undisturbed)	CHF-SB13	2.5	2.5	113	37.7	81	3.00	2.15
HS Tailings (undisturbed)	CHF-SB13	5	5	943	73.4	282	12.85	3.84
HS Tailings (undisturbed)	CHF-SB14	0	0	550	74.9	157	7.34	2.10
HS Tailings (undisturbed)	CHF-SB14	2.5	2.5	404	53.1	172	7.61	3.24
HS Tailings (undisturbed)	CHF-SB14	4	4	566	59.9	298	9.45	4.97
HS Tailings (undisturbed)	CHF-SB14	5	5	707	179	9.38	3.95	0.05
HS Tailings (undisturbed)	CHF-SB15	9	9	1720	82.4	541	20.87	6.57
HS Tailings (undisturbed)	CHF-SB16	2.5	2.5	711	59.1	303	12.03	5.13
HS Tailings (undisturbed)	CHF-SB16	6	6	1360	105	738	12.95	7.03
HS Tailings (undisturbed)	CHF-SB16	6.5	6.5	1810	78.7	771	23.00	9.80
HS Tailings (undisturbed)	CHF-SB17	9.5	9.5	521	88.5	172	5.89	1.94
HS Tailings (undisturbed)	CHF-SB17	15	15	120	1980	36.3	0.06	0.02
HS Tailings (undisturbed)	CHF-SB18	9.5	9.5	272	65.8	117	4.13	1.78
HS Tailings (undisturbed)	CHF-SB19	4.5	4.5	1320	57.1	229	23.12	4.01
HS Tailings (undisturbed)	CHF-SB20	5	5	910	57.9	369	15.72	6.37
HS Tailings (undisturbed)	CHF-SB20	10	10	342	841	135	0.41	0.16
HS Tailings (undisturbed)	CHF-SB20	19	19	128	43.4	44	2.95	1.01
HS Tailings (undisturbed)	CHF-SB22	0	0	662	82.7	576	8.00	6.96
HS Tailings (undisturbed)	CHF-SB22	5	5	507	55.9	318	9.07	5.69
HS Tailings (undisturbed)	CHF-SB22	9	9	609	88.8	248	6.86	2.79
HS Tailings (undisturbed)	CHF-SB22	15	15	723	92.2	175	7.84	1.90
HS Tailings (undisturbed)	CHF-SB23	7.5	7.5	229	42.1	74.5	5.44	1.77
HS Tailings (undisturbed)	CHF-SB24	12.5	12.5	814	100	454	8.14	4.54
HS Tailings (undisturbed)	CHF-SB25	5	5	312	53.9	224	5.79	4.16
HS Tailings (undisturbed)	CHF-SB25	7.5	7.5	1480	166	395	8.92	2.38
HS Tailings (undisturbed)	CHF-SB26	5	5	565	89.5	448	6.31	5.01
HS Tailings (undisturbed)	CHF-SB26	8	8	1280	100	263	12.80	2.63
HS Tailings (undisturbed)	CHF-SB27	10	10	1470	89.8	639	16.37	7.12
HS Tailings (undisturbed)	CHF-SB28	5	5	883	66	523	13.38	7.92
HS Tailings (undisturbed)	CHF-SB28	10	10	116	35.8	62.8	3.24	1.75
HS Tailings (undisturbed)	CHF-SB28	15	15	155	44.5	132	3.48	2.97
HS Tailings (undisturbed)	CHF-SB29	5	5	295	50.9	247	5.80	4.85
HS Tailings (undisturbed)	CHF-SB29	10	10	1780	1580	763	1.13	0.48
HS Tailings (undisturbed)	CHF-SB29	15	15	344	70.6	100	4.87	1.42
HS Tailings (undisturbed)	CHF-SB29	19.5	19.5	842	90.3	243	9.32	2.69
HS Tailings (undisturbed)	CHF-SB30	0	0	610	74.8	345	8.16	4.61
HS Tailings (undisturbed)	CHF-SB30	10	10	614	88.3	176	6.95	1.99
HS Tailings (undisturbed)	CHF-SB31	5	5	1540	66.1	142	23.30	2.15
HS Tailings (undisturbed)	CHF-SB31	10	10	910	98.6	233	9.23	2.36
HS Tailings (undisturbed)	CHF-SB31	15	15	889	89.8	214	9.90	2.38
HS Tailings (undisturbed)	CHF-SB32	15	15	515	1190	164	0.43	0.14
HS Tailings (undisturbed)	CHF-SB33	5	5	1330	54.8	241	24.27	4.40
HS Tailings (undisturbed)	CHF-SB33	10	10	119	42	52.4	2.83	1.25
HS Tailings (undisturbed)	CHF-SB33	15	15	231	59.5	60.2	3.88	1.01
HS Tailings (undisturbed)	CHF-SB35	10	10	849	98.8	194	8.59	1.96
HS Tailings (undisturbed)	CHF-SB36	12.5	12.5	1460	109	325	13.39	2.98
HS Tailings (undisturbed)	CHF-SB38	10	10	4000	111	282	36.04	2.54
HS Tailings (undisturbed)	CHF-SB39	5	5	92.3	56.7	145	1.63	2.56
HS Tailings (undisturbed)	CHF-SB39	7.5	7.5	587	140	835	4.19	5.96
HS Tailings (undisturbed)	CHF-SB40	5	5	1230	106	246	11.60	2.32
HS Tailings (undisturbed)	CHF-SB44	4	4	388	51.4	262	7.55	5.10
HS Tailings (undisturbed)	CHF-SB44	5	5	2300	222	55.8	10.36	0.25
HS Tailings (undisturbed)	CHF-SB44	8	8	68.9	28.2	16.5	2.44	0.59
HS Tailings (undisturbed)	CHF-SB46	5	5	630	44.5	315	14.16	7.08
HS Tailings (undisturbed)	CHF-SB46	7.5	7.5	2490	81.8	1160	30.44	14.18
HS Tailings (undisturbed)	CHF-SB46	10	10	169	37.8	233	4.47	6.16
HS Tailings (undisturbed)	CHF-SB47	5	5	1490	91.2	284	16.34	3.11
HS Tailings (undisturbed)	DAM-SB02	6	6	807	72.7	758	11.10	10.43
HS Tailings (undisturbed)	DAM-SB02	11	11	1250	77.3	228	16.17	2.95
HS Tailings (undisturbed)	DAM-SB02	12.5	12.5	1540	138	694	11.16	5.03
HS Tailings (undisturbed)	DAM-SB04	10	10	492	71.1	139	6.92	1.95
HS Tailings (undisturbed)	DAM-SB04	15	15	2900	4260	332	0.68	0.08
HS Tailings (undisturbed)	DAM-SB05	12.5	12.5	387	67.6	126	5.72	1.86

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
HS Tailings (undisturbed)	DAM-SB06	0	0	547	57.5	154	9.51	2.68
HS Tailings (undisturbed)	DAM-SB06	5	5	330	53.3	127	6.19	2.38
HS Tailings (undisturbed)	DAM-SB06	10	10	740	67.4	685	10.98	10.16
HS Tailings (undisturbed)	DAM-SB06	15	15	429	55.8	1310	7.69	23.48
HS Tailings (undisturbed)	DAM-SB06	18.5	18.5	2010	70.1	183	28.67	2.61
HS Tailings (undisturbed)	DAM-SB06	23	23	1130	136	557	8.31	4.10
HS Tailings (undisturbed)	DAM-SB06	26	26	1300	51.6	57.6	25.19	1.12
LCD	CHF-SB01	10.5	10.5	301	54	226	5.57	4.19
LCD	CHF-SB02	11	11	698	65.1	31.2	10.72	0.48
LCD	CHF-SB03	10	10	497	38.4	70	12.94	1.82
LCD	CHF-SB03	15	15	543	42.8	17.9	12.69	0.42
LCD	CHF-SB04	10	10	950	36.2	77.3	26.24	2.14
LCD	CHF-SB04	11	11	835	95.6	208	8.73	2.18
LCD	CHF-SB08	5	5	6220	60.4	3010	102.98	49.83
LCD	CHF-SB08	10	10	731	59.8	50.7	12.22	0.85
LCD	CHF-SB12	14	14	1280	108	196	11.85	1.81
LCD	CHF-SB13	9	9	547	60.3	405	9.07	6.72
LCD	CHF-SB15	14	14	547	76.7	113	7.13	1.47
LCD	CHF-SB15	15	15	736	99.8	126	7.37	1.26
LCD	CHF-SB20	23.5	23.5	1220	98.1	250	12.44	2.55
LCD	CHF-SB21	12.5	12.5	1190	91	417	13.08	4.58
LCD	CHF-SB23	13	13	537	77.2	259	6.96	3.35
LCD	CHF-SB23	19	19	572	76.5	198	7.48	2.59
LCD	CHF-SB27	15	15	76.9	31.3	19.3	2.46	0.62
LCD	CHF-SB27	18.5	18.5	442	56.4	185	7.84	3.28
LCD	CHF-SB28	20	20	896	92.9	151	9.64	1.63
LCD	CHF-SB33	19	19	613	82.7	98.1	7.41	1.19
LCD	CHF-SB35	15	15	55.8	28.4	13.2	1.96	0.46
LCD	CHF-SB37	10	10	563	26.3	86.6	21.41	3.29
LCD	CHF-SB38	12.5	12.5	654	39.1	18.6	16.73	0.48
LCD	CHF-SB39	10	10	1810	114	27.3	15.88	0.24
LCD	CHF-SB40	5.5	5.5	3270	277	2660	11.81	9.60
LCD	CHF-SB41	5	5	561	49	363	11.45	7.41
LCD	CHF-SB41	7	7	2980	44.9	3720	66.37	82.85
LCD	CHF-SB41	12.5	12.5	310	29.2	159	10.62	5.45
LCD	CHF-SB42	5	5	372	30.5	1300	12.20	42.62
LCD	CHF-SB42	10	10	319	30.5	22.9	10.46	0.75
LCD	CHF-SB42	13	13	512	42	68.2	12.19	1.62
LCD	CHF-SB43	7.5	7.5	534	66.7	269	8.01	4.03
LCD	CHF-SB43	8.5	8.5	741	44.1	91.4	16.80	2.07
LCD	CHF-SB45	10	10	102	32.6	28.1	3.13	0.86
LCD	CHF-SB46	15	15	327	59.8	111	5.47	1.86
LCD	CH-SB11	7	7	1500	42.5	9500	35.29	223.53
LCD	CH-SB11	11	11	292	32.3	247	9.04	7.65
LCD	CH-SB11	12	12	519	51.2	30.4	10.14	0.59
LCD	CH-SB12	10	10	236	51.1	15.2	4.62	0.30
LCD	CH-SB12	11	11	307	32.3	291	9.50	9.01
LCD	CH-SB31	5	5	99	26.1	120	3.79	4.60
LCD	DAM-SB03	27	27	391	65.8	74.5	5.94	1.13
LCD	STS-SB12	16	16	260	29.2	20	8.90	0.68
Brown Clay	CHF-SB09	10	10	726	102	13.8	7.12	0.14
Brown Clay	CHF-SB09	19	19	675	58.1	22.2	11.62	0.38
Brown Clay	CHF-SB11	2.5	2.5	308	62.9	105	4.90	1.67
Brown Clay	CHF-SB13	13.5	13.5	306	52.4	129	5.84	2.46
Brown Clay	CHF-SB14	10	10	172	46.4	7	3.71	0.15
Brown Clay	CHF-SB16	13.5	13.5	83.7	27.1	7	3.09	0.26
Brown Clay	CHF-SB17	17.5	17.5	80.8	21	7	3.85	0.33
Brown Clay	CHF-SB19	6	6	126	24.4	90.4	5.16	3.70
Brown Clay	CHF-SB22	17.5	17.5	77.8	31.6	20	2.46	0.63
Brown Clay	CHF-SB30	13	13	71.9	22.9	11.3	3.14	0.49
Brown Clay	CHF-SB30	20	20	35.6	28.6	17.9	1.24	0.63
Brown Clay	CHF-SB31	20	20	123	31	30.4	3.97	0.98
Brown Clay	CHF-SB34	5	5	937	55.2	331	16.97	6.00
Brown Clay	CHF-SB34	7.5	7.5	745	29.9	22.2	24.92	0.74
Brown Clay	CHF-SB34	11	11	41	26.7	17.9	1.54	0.67
Brown Clay	CHF-SB44	10	10	119	33.2	37.5	3.58	1.13
Brown Clay	CHF-SB44	14.5	14.5	276	41.5	69.1	6.65	1.67

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
Brown Clay	CHF-SB47	10	10	85.6	30.1	17.9	2.84	0.59
Brown Clay	CH-SB19	5	5	538	30.8	15.2	17.47	0.49
Brown Clay	CH-SB19	9	9	75.9	28.2	17.9	2.69	0.63
Brown Clay	CH-SB21	5	5	440	34.1	33.5	12.90	0.98
Brown Clay	CH-SB22	5	5	70.9	34.6	25.8	2.05	0.75
Brown Clay	CH-SB25	5	5	566	25.3	50.7	22.37	2.00
Brown Clay	CH-SB27	5	5	47.4	29.4	14.5	1.61	0.49
Brown Clay	CH-SB29	8.5	8.5	350	24.4	19.3	14.34	0.79
Brown Clay	CHU-SB02	4	4	463	33.4	20	13.86	0.60
Brown Clay	CHU-SB03	5	5	1450	42.7	11.9	33.96	0.28
Brown Clay	CHU-SB03	8	8	312	43.9	15.9	7.11	0.36
Brown Clay	CHU-SB04	5	5	114	42.9	15.1	2.66	0.35
Brown Clay	CHU-SB04	9	9	1710	60.9	20	28.08	0.33
Brown Clay	CHU-SB06	5	5	66.9	26.9	14.5	2.49	0.54
Brown Clay	CHU-SB06	9.5	9.5	63.9	27.7	17.9	2.31	0.65
Brown Clay	CHU-SB07	5	5	50.6	27.1	20	1.87	0.74
Brown Clay	CHU-SB07	9	9	59.9	21.3	17.2	2.81	0.81
Brown Clay	CHU-SB08	5	5	45.3	21.6	16.5	2.10	0.76
Brown Clay	CHU-SB08	10	10	35.6	21.6	16.5	1.65	0.76
Brown Clay	CHU-SB09	5	5	39.9	25.3	17.2	1.58	0.68
Brown Clay	CHU-SB10	5	5	278	29.1	17.2	9.55	0.59
Brown Clay	CHU-SB10	8.5	8.5	61.9	23.4	15.9	2.65	0.68
Brown Clay	CHU-SB10	15	15	34.5	22.9	10	1.51	0.44
Brown Clay	CHU-SB13	5	5	46.4	22.9	12.5	2.03	0.55
Brown Clay	STS-SB01	5	5	522	36.4	20.7	14.34	0.57
Brown Clay	STS-SB02	4	4	451	42.3	16.5	10.66	0.39
Brown Clay	STS-SB04	5	5	1470	222	182	6.62	0.82
Brown Clay	STS-SB05	6	6	166	47.5	25.1	3.49	0.53
Brown Clay	STS-SB07	3	3	53.7	30.7	13.2	1.75	0.43
Brown Clay	STS-SB10	4.5	4.5	59.9	30.2	20.7	1.98	0.69
Brown Clay	STS-SB12	9	9	57.5	43.5	9.6	1.32	0.22
Brown Clay	STS-SB14	0	0	52.7	27.7	14.5	1.90	0.52
PFG	CHF-SB01	11.5	11.5	394	40.2	80.1	9.80	1.99
PFG	CHF-SB02	13	13	580	39.3	15.2	14.76	0.39
PFG	CHF-SB04	12	12	373	58.5	66.4	6.38	1.14
PFG	CHF-SB04	15	15	172	25.9	16.5	6.64	0.64
PFG	CHF-SB06	12.5	12.5	137	27.7	44	4.95	1.59
PFG	CHF-SB07	10	10	186	38.6	65.5	4.82	1.70
PFG	CHF-SB07	13	13	286	60.1	104	4.76	1.73
PFG	CHF-SB08	12	12	930	60.1	95.2	15.47	1.58
PFG	CHF-SB09	21.5	21.5	791	208	7.4	3.80	0.04
PFG	CHF-SB12	22.5	22.5	56.8	30.8	11.9	1.84	0.39
PFG	CHF-SB15	19	19	1390	110	279	12.64	2.54
PFG	CHF-SB18	12.5	12.5	162	35.8	81	4.53	2.26
PFG	CHF-SB20	25.5	25.5	43.2	21	21.4	2.06	1.02
PFG	CHF-SB21	19	19	81.7	23.4	15.9	3.49	0.68
PFG	CHF-SB23	24.5	24.5	672	89.5	120	7.51	1.34
PFG	CHF-SB29	25	25	883	99.6	183	8.87	1.84
PFG	CHF-SB32	19.5	19.5	533	86.8	101	6.14	1.16
PFG	CHF-SB34	13.5	13.5	224	27.5	187	8.15	6.80
PFG	CHF-SB35	19.5	19.5	215	29.4	14.5	7.31	0.49
PFG	CHF-SB36	15	15	451	36.6	15.9	12.32	0.43
PFG	CHF-SB36	20	20	66.9	21	15.9	3.19	0.76
PFG	CHF-SB37	15	15	665	45.6	100	14.58	2.19
PFG	CHF-SB39	15	15	722	62.6	21.4	11.53	0.34
PFG	CHF-SB41	17	17	492	35.7	18.6	13.78	0.52
PFG	CHF-SB41	20	20	204	28	17.2	7.29	0.61
PFG	CHF-SB42	15	15	666	40.3	16.5	16.53	0.41
PFG	CHF-SB42	18	18	641	46.5	18.6	13.78	0.40
PFG	CHF-SB43	10	10	479	43.2	67.3	11.09	1.56
PFG	CHF-SB43	11.5	11.5	559	42.3	166	13.22	3.92
PFG	CHF-SB43	15	15	377	38	13.2	9.92	0.35
PFG	CHF-SB45	12	12	268	53.9	69.1	4.97	1.28
PFG	CHF-SB45	17	17	169	56	74.5	3.02	1.33
PFG	CHF-SB46	19	19	213	43	50.7	4.95	1.18
PFG	CHF-SB47	15	15	188	22.7	15.9	8.28	0.70
PFG	CHF-SB47	20	20	156	25.3	16.5	6.17	0.65

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
PFG	CH-SB01	10	10	221	39.1	13.2	5.65	0.34
PFG	CH-SB01	12	12	597	34.7	401	17.20	11.56
PFG	CH-SB01	13	13	232	42.9	17.9	5.41	0.42
PFG	CH-SB02	4.5	4.5	509	26.3	121	19.35	4.60
PFG	CH-SB03	8	8	223	31.5	22.2	7.08	0.70
PFG	CH-SB03	11	11	128	25.9	11.9	4.94	0.46
PFG	CH-SB08	5	5	387	28.7	55	13.48	1.92
PFG	CH-SB09	5	5	205	26.7	22.9	7.68	0.86
PFG	CH-SB09	8.5	8.5	271	30.8	85.7	8.80	2.78
PFG	CH-SB13	10.5	10.5	64.9	23.4	16.5	2.77	0.71
PFG	CH-SB18	10	10	184	23.4	13.8	7.86	0.59
PFG	CH-SB18	16	16	243	48.1	17.2	5.05	0.36
PFG	CH-SB21	7.5	7.5	64.9	26.5	20	2.45	0.75
PFG	CH-SB23	15	15	263	45.9	17.9	5.73	0.39
PFG	CH-SB24	15	15	605	43	16.5	14.07	0.38
PFG	CH-SB25	10	10	216	47.4	15.9	4.56	0.34
PFG	CH-SB28	5	5	54.7	24.1	18.6	2.27	0.77
PFG	CH-SB29	13	13	66.9	30.5	17.9	2.19	0.59
PFG	CH-SB29	18.5	18.5	113	29.9	12.5	3.78	0.42
PFG	CH-SB31	10	10	700	347	28.6	2.02	0.08
PFG	CH-SB31	11.5	11.5	564	55.8	19.3	10.11	0.35
PFG	CHU-SB02	9	9	604	36.7	23.6	16.46	0.64
PFG	CHU-SB02	13.5	13.5	738	59.9	24.4	12.32	0.41
PFG	CHU-SB05	9	9	58.8	26.3	26.6	2.24	1.01
PFG	CHU-SB06	14	14	63.9	24.8	17.2	2.58	0.69
PFG	CHU-SB06	18	18	35.6	25.3	16.5	1.41	0.65
PFG	CHU-SB07	14	14	51.6	24.4	15.9	2.11	0.65
PFG	CHU-SB07	17	17	52.7	22.9	15.2	2.30	0.66
PFG	CHU-SB08	15	15	44.2	23.2	8.77	1.91	0.38
PFG	CHU-SB08	17.5	17.5	51.6	22.7	16.5	2.27	0.73
PFG	CHU-SB08	19	19	34.5	25	18.6	1.38	0.74
PFG	CHU-SB09	10	10	37.8	24.6	12.5	1.54	0.51
PFG	CHU-SB10	20	20	42.1	26.3	16.5	1.60	0.63
PFG	CHU-SB11	5	5	121	22.4	25.8	5.40	1.15
PFG	CHU-SB11	8	8	58.8	23.4	22.2	2.51	0.95
PFG	CHU-SB11	10	10	58.8	28.4	13.8	2.07	0.49
PFG	CHU-SB11	14	14	37.8	25.3	16.5	1.49	0.65
PFG	CHU-SB12	5	5	422	28	371	15.07	13.25
PFG	CHU-SB12	10	10	59.9	17.2	14.5	3.48	0.84
PFG	CHU-SB12	14.5	14.5	41	24.4	18.6	1.68	0.76
PFG	CHU-SB13	10	10	49.5	25	11.9	1.98	0.48
PFG	CHU-SB13	15	15	126	26.5	29.6	4.75	1.12
PFG	CHU-SB14	3.5	3.5	71.9	26.7	37.5	2.69	1.40
PFG	CHU-SB14	5	5	34.5	24.1	19.3	1.43	0.80
PFG	CHU-SB14	10	10	34.5	22.1	16.5	1.56	0.75
PFG	STS-SB10	7	7	61.9	30.1	21.4	2.06	0.71
PFG	STS-SB10	10	10	144	20.7	11.3	6.96	0.55
PFG	STS-SB15	25	25	51.6	30.1	13.8	1.71	0.46
Hickey Ash/Cinder	CHF-SB06	15	15	59.9	33.7	23.6	1.78	0.70
Hickey Ash/Cinder	CHF-SB14	15	15	112	34.7	7	3.23	0.20
Hickey Ash/Cinder	CHF-SB16	15.5	15.5	69.9	26.3	7	2.66	0.27
Hickey Ash/Cinder	CHF-SB40	10	10	56.8	30.1	14.5	1.89	0.48
Hickey Cgl	CHF-SB01	13	13	110	25.7	11.9	4.28	0.46
Hickey Cgl	CHF-SB19	16	16	62.9	29.2	19.3	2.15	0.66
Hickey Cgl	CH-SB05	10	10	50.6	30.5	20.7	1.66	0.68
Hickey Cgl	CH-SB07	7	7	370	38.8	27.3	9.54	0.70
Hickey Cgl	CH-SB26	4.5	4.5	49.5	21.3	16.5	2.32	0.77
Hickey Cgl	CH-SB26	10	10	51.6	29.2	17.2	1.77	0.59
Hickey Cgl	CH-SB27	10	10	52.7	27.8	11.9	1.90	0.43
Hickey Cgl	CH-SB31	13	13	669	41.5	16.5	16.12	0.40
Hickey Cgl	CHU-SB03	9	9	414	40	15.9	10.35	0.40
Hickey Cgl	CHU-SB03	13	13	41	31	14.5	1.32	0.47
Hickey Cgl	CHU-SB04	11.5	11.5	51.6	27.8	21.4	1.86	0.77
Hickey Cgl	CHU-SB05	13.5	13.5	51.6	28	21.4	1.84	0.76
Hickey Cgl	CHU-SB09	15	15	34.5	21.3	15.2	1.62	0.71
Hickey Cgl	CHU-SB15	2	2	58.8	26.3	15.9	2.24	0.60
Hickey Cgl	STS-SB01	10	10	45.3	24.1	20.7	1.88	0.86

TABLE I-1

**Zinc, Copper, Lead Concentration and Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona*

Material Type	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu	Pb/Cu
Hickey Cgl	STS-SB02	10	10	37.8	24.6	18.6	1.54	0.76
Hickey Cgl	STS-SB04	12	12	39.9	25	14.5	1.60	0.58
Hickey Cgl	STS-SB05	10	10	62.9	45.7	13.4	1.38	0.29
Hickey Cgl	STS-SB06	5	5	79.8	61	18.8	1.31	0.31
Hickey Cgl	STS-SB06	10	10	52.7	23.9	14.5	2.21	0.61
Hickey Cgl	STS-SB07	5	5	42.1	23.4	17.2	1.80	0.74
Hickey Cgl	STS-SB07	10	10	57.8	23.4	20.7	2.47	0.88
Hickey Cgl	STS-SB10	12	12	47.4	29.1	14.5	1.63	0.50
Hickey Cgl	STS-SB11	2	2	39.9	29.7	12.5	1.34	0.42
Hickey Cgl	STS-SB11	5	5	34.5	26.3	13.8	1.31	0.52

Notes:

Cu = Copper

HS = Humboldt Smelter

IKM = Iron King Mine

LCD = Lowermost Channel Deposit

mg/kg = milligrams per kilogram

Pb = Lead

PFG = Principle Fluvial Gravels

UCD = Uppermost Channel Deposit

Zn= Zinc

TABLE I-2

**Wilcoxon Rank Sum Comparisons for Lead/Copper Ratios***Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona***Wilcoxon Rank Sum Comparisons for Lead/Copper Ratios - IKM Tailings vs. Other Units**

Grouping1	Grouping2	Parameter Considered	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision with 0.05 Significance Level	Mean IKM Tailings	Mean Grouping2	Median IKM Tailings	Median Grouping2	Number of Mine Results	Number of Grouping2 Results
<b>Materials Deposited after Iron King Mine and Humboldt Smelter began Operations</b>										
IKM Tailings	HS Tailings	Lead/Copper Ratio	2.0E-12	Mine > Grouping2	35.3	1.93	11.5	1.73	40	31
IKM Tailings	HSCD	Lead/Copper Ratio	1.7E-05	Mine > Grouping2	35.3	2.95	11.5	2.77	40	8
IKM Tailings	UCD	Lead/Copper Ratio	1.4E-05	Mine > Grouping2	35.3	12	11.5	5.97	40	133
IKM Tailings	HS Tailings (reworked)	Lead/Copper Ratio	1.8E-02	Grouping2 > Mine	35.3	42	11.5	17.6	40	52
IKM Tailings	HS Tailings (undisturbed)	Lead/Copper Ratio	9.3E-16	Mine > Grouping2	35.3	3.68	11.5	2.63	40	79
IKM Tailings	LCD	Lead/Copper Ratio	1.3E-09	Mine > Grouping2	35.3	11.7	11.5	2.07	40	43
<b>Materials In Place prior to Iron King Mine and Humboldt Smelter Operations</b>										
IKM Tailings	Brown Clay	Lead/Copper Ratio	7.5E-16	Mine > Grouping2	35.3	0.858	11.5	0.626	40	49
IKM Tailings	PFG	Lead/Copper Ratio	4.2E-18	Mine > Grouping2	35.3	1.29	11.5	0.705	40	83
IKM Tailings	Hickey Ash/Cinder	Lead/Copper Ratio	1.2E-03	Mine > Grouping2	35.3	0.412	11.5	0.374	40	4
IKM Tailings	Hickey Cgl	Lead/Copper Ratio	1.6E-11	Mine > Grouping2	35.3	0.595	11.5	0.605	40	25

**Wilcoxon Rank Sum Comparisons for Lead/Copper Ratios - HS Tailings vs. Other Units**

Grouping1	Grouping2	Parameter Considered	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision with 0.05 Significance Level	Mean HS Smelter Tailings	Mean Grouping2	Median HS Tailings	Median Grouping2	Number of Smelter Results	Number of Grouping2 Results
<b>Materials Deposited after Iron King Mine and Humboldt Smelter began Operations</b>										
HS Tailings	HSCD	Lead/Copper Ratio	3.6E-01	nsd	1.93	2.95	1.73	2.77	31	8
HS Tailings	IKM Tailings	Lead/Copper Ratio	2.0E-12	Grouping2 > Smelter	1.93	35.3	1.73	11.5	31	40
HS Tailings	UCD	Lead/Copper Ratio	8.9E-09	Grouping2 > Smelter	1.93	12	1.73	5.97	31	133
HS Tailings	HS Tailings (reworked)	Lead/Copper Ratio	2.1E-12	Grouping2 > Smelter	1.93	42	1.73	17.6	31	52
HS Tailings	HS Tailings (undisturbed)	Lead/Copper Ratio	5.4E-03	Grouping2 > Smelter	1.93	3.68	1.73	2.63	31	79
HS Tailings	LCD	Lead/Copper Ratio	3.4E-02	Grouping2 > Smelter	1.93	11.7	1.73	2.07	31	43
<b>Materials In Place prior to Iron King Mine and Humboldt Smelter Operations</b>										
HS Tailings	Brown Clay	Lead/Copper Ratio	2.5E-01	nsd	1.93	0.858	1.73	0.626	31	49
HS Tailings	PFG	Lead/Copper Ratio	4.6E-01	nsd	1.93	1.29	1.73	0.705	31	83
HS Tailings	Hickey Ash/Cinder	Lead/Copper Ratio	2.4E-01	nsd	1.93	0.412	1.73	0.374	31	4
HS Tailings	Hickey Cgl	Lead/Copper Ratio	2.2E-01	nsd	1.93	0.595	1.73	0.605	31	25

## Notes:

HCSD = Humboldt Smelter Channel Deposit

HS = Humboldt Smelter

IKM = Iron King Mine

LCD = Lowermost Channel Deposit

nsd = no significant difference

PFG = Principle Fluvial Gravels

UCD = Uppermost Channel Deposit

TABLE I-3

**Wilcoxon Rank Sum Comparisons for Zinc/Copper Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona*

**Wilcoxon Rank Sum Comparisons for Zinc/Copper Ratios - IKM Tailings vs. Other Units**

Grouping1	Grouping2	Parameter Considered	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision with 0.05 Significance Level	Mean IKM Tailings	Mean Grouping2	Median IKM Tailings	Median Grouping2	Number of Mine Results	Number of Grouping2 Results
<b>Materials Deposited after Iron King Mine and Humboldt Smelter began Operations</b>										
IKM Mine Tailings	HS Smelter Tailings	Lead/Copper Ratio	9.6E-13	Mine > Grouping2	71.1	5.67	35.8	5.29	40	31
IKM Mine Tailings	HSCD	Lead/Copper Ratio	2.5E-05	Mine > Grouping2	71.1	7.65	35.8	6.04	40	8
IKM Mine Tailings	UCD	Lead/Copper Ratio	2.2E-15	Mine > Grouping2	71.1	14.4	35.8	12.9	40	133
IKM Mine Tailings	HS Tailings (reworked)	Lead/Copper Ratio	3.0E-04	Mine > Grouping2	71.1	32.8	35.8	18.9	40	52
IKM Mine Tailings	HS Tailings (undisturbed)	Lead/Copper Ratio	4.6E-16	Mine > Grouping2	71.1	9.64	35.8	8	40	79
IKM Mine Tailings	LCD	Lead/Copper Ratio	5.8E-11	Mine > Grouping2	71.1	14.1	35.8	10.1	40	43
<b>Materials In Place prior to Iron King Mine and Humboldt Smelter Operations</b>										
IKM Mine Tailings	Brown Clay	Lead/Copper Ratio	5.6E-14	Mine > Grouping2	71.1	7.03	35.8	3.49	40	49
IKM Mine Tailings	PFG	Lead/Copper Ratio	1.3E-18	Mine > Grouping2	71.1	6.55	35.8	4.97	40	83
IKM Mine Tailings	Hickey Ash/Cinder	Lead/Copper Ratio	1.2E-03	Mine > Grouping2	71.1	2.39	35.8	2.27	40	4
IKM Mine Tailings	Hickey Cgl	Lead/Copper Ratio	2.2E-11	Mine > Grouping2	71.1	3.1	35.8	1.84	40	25

**Wilcoxon Rank Sum Comparisons for Zinc/Copper Ratios - HS Tailings vs. Other Units**

Grouping1	Grouping2	Parameter Considered	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision with 0.05 Significance Level	Mean HS Smelter Tailings	Mean Grouping2	Median HS Tailings	Median Grouping2	Number of Smelter Results	Number of Grouping2 Results
<b>Materials Deposited after Iron King Mine and Humboldt Smelter began Operations</b>										
HS Smelter Tailings	HSCD	Lead/Copper Ratio	5.0E-01	nsd	5.67	7.65	5.29	6.04	31	8
HS Smelter Tailings	IKM Mine Tailings	Lead/Copper Ratio	9.6E-13	Grouping2 > Smelter	5.67	71.1	5.29	35.8	31	40
HS Smelter Tailings	UCD	Lead/Copper Ratio	7.5E-11	Grouping2 > Smelter	5.67	14.4	5.29	12.9	31	133
HS Smelter Tailings	HS Tailings (reworked)	Lead/Copper Ratio	7.3E-09	Grouping2 > Smelter	5.67	32.8	5.29	18.9	31	52
HS Smelter Tailings	HS Tailings (undisturbed)	Lead/Copper Ratio	3.6E-03	Grouping2 > Smelter	5.67	9.64	5.29	8	31	79
HS Smelter Tailings	LCD	Lead/Copper Ratio	9.1E-06	Grouping2 > Smelter	5.67	14.1	5.29	10.1	31	43
<b>Materials In Place prior to Iron King Mine and Humboldt Smelter Operations</b>										
HS Smelter Tailings	Brown Clay	Lead/Copper Ratio	4.0E-01	nsd	5.67	7.03	5.29	3.49	31	49
HS Smelter Tailings	PFG	Lead/Copper Ratio	7.3E-01	nsd	5.67	6.55	5.29	4.97	31	83
HS Smelter Tailings	Hickey Ash/Cinder	Lead/Copper Ratio	3.1E-02	Smelter > Grouping2	5.67	2.39	5.29	2.27	31	4
HS Smelter Tailings	Hickey Cgl	Lead/Copper Ratio	1.6E-03	Smelter > Grouping2	5.67	3.1	5.29	1.84	31	25

Notes:

HSCD = Humboldt Smelter Channel Deposit

HS = Humboldt Smelter

IKM = Iron King Mine

LCD = Lowermost Channel Deposit

nsd = no significant difference

PFG = Principle Fluvial Gravels

UCD = Uppermost Channel Deposit



TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

											BIN Ranges (> than)										
											Score	Color	Concentration Range								
											1		1000		1000	20	6				
											2		900		900	18	5.5				
											3		800	Not	800	16	5				
											4		700	Used	700	14	4.5				
											5		600		600	12	4				
											6		500		500	10	3.5				
											7		0		0	0	0				
											Score										
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu											
IKM Tailings	IKJ-525	0	2	12700	209	2710	60.77	12.97	1	1											
IKM Tailings	IKJ-525	4	7	11600	236	2810	49.15	11.91	1	1											
IKM Tailings	IKJ-525	35	38	12300	281	3570	43.77	12.71	1	1											
IKM Tailings	IKJ-526	0	2	4890	235	2390	20.81	10.17	1	1											
IKM Tailings	IKJ-526	4	7	12500	315	2980	39.68	9.46	1	1											
IKM Tailings	IKJ-526	39	40	33700	645	7310	52.25	11.33	1	1											
IKM Tailings	IKJ-527	0	2	13900	608	4050	22.86	6.66	1	1											
IKM Tailings	IKJ-527	4	7	19400	543	4920	35.73	9.06	1	1											
IKM Tailings	IKJ-527	35	40	16500	377	8230	43.77	21.83	1	1											
IKM Tailings	IKJ-529	0	2	10400	629	4460	16.53	7.09	1	3											
IKM Tailings	IKJ-530	0	2	1520	88.8	1200	17.12	13.51	1	3											
IKM Tailings	IKJ-555	0	0.5	4910	273	2050	17.99	7.51	1	3											
IKM Tailings	IKJ-583	0	0.5	3800	148	2150	25.68	14.53	1	1											
IKM Tailings	IK-S2	1	2	9170	197	2160	46.55	10.96	1	1											
IKM Tailings	IK-S4	1	2	10900	1180	3500	9.24	2.97	1	7											
IKM Tailings	IKV-102	0	2	3020	124	2740	24.36	22.10	1	1											
IKM Tailings	IKV-102	4	7	8980	218	2730	41.19	12.52	1	1											
IKM Tailings	IKV-103	0	2	7320	169	2850	43.31	16.86	1	1											
IKM Tailings	IKV-104	0	2	4610	146	2100	31.58	14.38	1	1											
IKM Tailings	IKV-104	4	7	11100	277	3480	40.07	12.56	1	1											
IKM Tailings	IKV-105	0	2	8840	390	3240	22.67	8.31	1	1											
IKM Tailings	IKV-106	0	2	2190	132	1250	16.59	9.47	1	3											
IKM Tailings	IKV-106	4	7	7260	203	2340	35.76	11.53	1	1											
IKM Tailings	IKV-108	0	2	16400	550	4650	29.82	8.46	1	1											
IKM Tailings	IKV-108	4	7	17100	518	4980	33.01	9.61	1	1											
IKM Tailings	IKV-109	0	2	9480	180	2230	52.67	12.39	1	1											
IKM Tailings	IKV-112	0	2	6330	379	4370	16.70	11.53	1	3											
IKM Tailings	IKV-112	4	7	18100	727	4840	24.90	6.66	1	1											
IKM Tailings	MTP-SB01	5	5	14100	291	3200	48.45	11.00	1	1											
IKM Tailings	MTP-SB01	27.5	27.5	4200		3050															
IKM Tailings	MTP-SB02	5	5	6140	171	3510	35.91	20.53	1	1											
IKM Tailings	MTP-SB02	65	65	12400	319	4030	38.87	12.63	1	1											
IKM Tailings	MTP-SB02	81	81	7350	404	3590	18.19	8.89	1	2											
IKM Tailings	MTP-SB03	5	5	11200	180	3410	62.22	18.94	1	1											
IKM Tailings	MTP-SB03	63.5	63.5	20000	400	4600	50.00	11.50	1	1											
IKM Tailings	MTP-SB03	106	106	8180	270	4600	30.30	17.04	1	1											
IKM Tailings	B-3	14.5	15	2800	140	1900	20.00	13.57	1	2											
IKM Tailings	B-3	24.5	25	18000	340	3200	52.94	9.41	1	1											
IKM Tailings	B-5	14.5	15	26000	430	4500	60.47	10.47	1	1											
IKM Tailings	B-5	24.5	25	17000	380	4100	44.74	10.79	1	1											
Smelter	STS-SB01	0	0	317	2370	122	0.13	0.05	7	7											
Smelter	STS-SB02	0	0	316	77.6	291	4.07	3.75	7	7											
Smelter	STS-SB03	0	0	419	77.1	215	5.44	2.79	7	7											
Smelter	STS-SB03	4	4	378	95.3	29.6	3.97	0.31	7	7											
Smelter	STS-SB04	0	0	330	75.1	283	4.39	3.77	7	7											
Smelter	STS-SB05	0	0	583	83	188	7.02	2.27	7	7											
Smelter	STS-SB05	3	3	1860	121	268	15.37	2.22	7	7											
Smelter	STS-SB05	5	5	3120	201	23.6	15.52	0.12	7	7											
Smelter	STS-SB06	0	0	150	1020	103	0.15	0.10	7	7											
Smelter	STS-SB07	0	0	341	60.6	207	5.63	3.42	7	7											
Smelter	STS-SB07	1	1	1080	194	56.7	5.57	0.29	7	7											
Smelter	STS-SB08	0	0	238	718	63.5	0.33	0.09	7	7											
Smelter	STS-SB08	5	5	493	69.3	138	7.11	1.99	7	7											

TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
Smelter	STS-SB08	9	9	543	134	218	4.05	1.63	7	7
Smelter	STS-SB09	0	0	481	91	218	5.29	2.40	7	7
Smelter	STS-SB09	2.5	2.5		26.1	13.8		0.53		
Smelter	STS-SB09B	0	0	311	71.3	224	4.36	3.14	7	7
Smelter	STS-SB10	0	0	295	68.8	277	4.29	4.03	7	7
Smelter	STS-SB11	0	0	650	103	79.2	6.31	0.77	7	7
Smelter	STS-SB12	5.5	5.5	587	70.9	346	8.28	4.88	7	7
Smelter	STS-SB13	0	0	516	47.3	318	10.91	6.72	7	7
Smelter	STS-SB13	3	3	221	55.8	175	3.96	3.14	7	7
Smelter	STS-SB13	4.5	4.5		73.4	21.4		0.29		
Smelter	STS-SB13	9	9	675	102	18.6	6.62	0.18	7	7
Smelter	STS-SB15	0	0	478	77.2	364	6.19	4.72	7	7
Smelter	STS-SB15	5	5	741	152	27.3	4.88	0.18	7	7
Smelter	STS-SB15	10	10	1540	190	14.5	8.11	0.08	7	7
Smelter	STS-SB15	15	15	391	62.5	29.6	6.26	0.47	7	7
Smelter	STS-SB15	20	20	495	53.5	26.6	9.25	0.50	7	7
Smelter	STS-SB15B	0	0	313	79.1	310	3.96	3.92	7	7
Smelter	STS-SB15B	10	10	228	49.8	22.9	4.58	0.46	7	7
HSCD	CHF-SB23	5	5	246	55.7	118	4.42	2.12	7	7
HSCD	CHF-SB30	5	5	1250	63.7	274	19.62	4.30	7	7
HSCD	CHF-SB36	10	10	855	78.9	113	10.84	1.43	7	7
HSCD	CHF-SB38	5	5	180	31.5	184	5.71	5.84	7	7
HSCD	STS-SB12	0	0	631	69	377	9.15	5.46	7	7
HSCD	STS-SB12	1	1	293	87.8	19.3	3.34	0.22	7	7
HSCD	STS-SB15	6	6	354	2510	76	0.14	0.03	7	7
HSCD	STS-SB15B	8	8	550	94.9	313	5.80	3.30	7	7
UCD	CHF-SB03	0	0	535	32.9	201	16.26	6.11	7	7
UCD	CHF-SB04	0	0	581	26.3	197	22.09	7.49	7	7
UCD	CHF-SB05	0	0	674	33.7	468	20.00	13.89	7	7
UCD	CHF-SB07	0	0	472	32	583	14.75	18.22	7	7
UCD	CHF-SB08	0	0	1250	38.8	613	32.22	15.80	5	5
UCD	CHF-SB09	0	0	354	32.9	248	10.76	7.54	7	7
UCD	CHF-SB10	0	0	903	36.6	1670	24.67	45.63	2	2
UCD	CHF-SB11	0	0	558	39.7	876	14.06	22.07	6	6
UCD	CHF-SB15	0	0	402	58.9	178	6.83	3.02	7	7
UCD	CHF-SB16	0	0	536	79.3	666	6.76	8.40	6	7
UCD	CHF-SB17	0	0	40.4	84.1	41.7	0.48	0.50	7	7
UCD	CHF-SB18	0	0	1340	38.7	1460	34.63	37.73	1	1
UCD	CHF-SB19	0	0	896	51.5	579	17.40	11.24	6	6
UCD	CHF-SB20	0	0	2940	328	349	8.96	1.06	7	7
UCD	CHF-SB21	0	0	407	62.4	343	6.52	5.50	7	7
UCD	CHF-SB23	0	0	617	66	414	9.35	6.27	7	7
UCD	CHF-SB24	0	0	474	71.8	401	6.60	5.59	7	7
UCD	CHF-SB25	0	0	1360	102	348	13.33	3.41	7	7
UCD	CHF-SB26	0	0	352	62.1	126	5.67	2.03	7	7
UCD	CHF-SB27	0	0	427	49.1	851	8.70	17.33	7	7
UCD	CHF-SB28	0	0	721	66.7	410	10.81	6.15	7	7
UCD	CHF-SB29	0	0	529	69.5	300	7.61	4.32	7	7
UCD	CHF-SB31	0	0	523	60.4	174	8.66	2.88	7	7
UCD	CHF-SB32	0	0	2320	64.7	284	35.86	4.39	7	7
UCD	CHF-SB33	0	0	814	41.6	601	19.57	14.45	5	5
UCD	CHF-SB34	0	0	1150	34.8	1180	33.05	33.91	1	1

TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine -- Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
UCD	CHF-SB36	0	0	896	38.1	228	23.52	5.98	7	7
UCD	CHF-SB37	0	0	666	34.1	196	19.53	5.75	7	7
UCD	CHF-SB39	0	0	213	45	236	4.73	5.24	7	7
UCD	CHF-SB40	0	0	584	53	187	11.02	3.53	7	7
UCD	CHF-SB41	0	0	742	39	474	19.03	12.15	7	7
UCD	CHF-SB42	0	0	561	31.3	131	17.92	4.19	7	7
UCD	CHF-SB43	0	0	862	39.1	827	22.05	21.15	3	3
UCD	CHF-SB44	0	0	449	47.3	146	9.49	3.09	7	7
UCD	CHF-SB45	0	0	678	35.7	1160	18.99	32.49	5	5
UCD	CHF-SB46	0	0	977	35.5	798	27.52	22.48	4	4
UCD	CHF-SB47	0	0	412	58	165	7.10	2.85	7	7
UCD	CH-SB01	0	0	588	35.8	494	16.43	13.80	7	7
UCD	CH-SB01	4	4	1170	48.1	5530	24.32	114.97	1	1
UCD	CH-SB01	6	6	280	35	17.2	8.00	0.49	7	7
UCD	CH-SB01	7.5	7.5	193	45.8	11.9	4.21	0.26	7	7
UCD	CH-SB01	8.5	8.5	821	39.4	2300	20.84	58.38	3	3
UCD	CH-SB02	0	0	677	30.7	197	22.05	6.42	7	7
UCD	CH-SB02	4	4	1280	37	1060	34.60	28.65	1	1
UCD	CH-SB03	0	0	470	33	229	14.24	6.94	7	7
UCD	CH-SB03	4.5	4.5	259	35.3	1090	7.34	30.88	7	7
UCD	CH-SB03	6	6	510	29.6	47.3	17.23	1.60	7	7
UCD	CH-SB04	0	0	457	29.2	213	15.65	7.30	7	7
UCD	CH-SB04	4	4	343	35.2	1110	9.74	31.53	7	7
UCD	CH-SB04	6	6	916	46.7	251	19.62	5.38	7	7
UCD	CH-SB04	8	8	268	77.6	17.9	3.45	0.23	7	7
UCD	CH-SB05	0	0	408	30.7	136	13.29	4.43	7	7
UCD	CH-SB05	4	4	579	24.4	202	23.73	8.28	7	7
UCD	CH-SB06	0	0	227	31.5	88.5	7.21	2.81	7	7
UCD	CH-SB07	0	0	444	26.7	210	16.63	7.87	7	7
UCD	CH-SB07	6	6	631	30.1	174	20.96	5.78	7	7
UCD	CH-SB08	0	0	482	30.5	250	15.80	8.20	7	7
UCD	CH-SB09	0	0	442	29.4	177	15.03	6.02	7	7
UCD	CH-SB10	0	0	438	33.3	188	13.15	5.65	7	7
UCD	CH-SB10	4	4	42.1	25.3	22.2	1.66	0.88	7	7
UCD	CH-SB11	0	0	458	31.2	423	14.68	13.56	7	7
UCD	CH-SB11	5	5	263	25.7	54.1	10.23	2.11	7	7
UCD	CH-SB12	0	0	420	32.3	216	13.00	6.69	7	7
UCD	CH-SB12	5	5	285	33.6	140	8.48	4.17	7	7
UCD	CH-SB12	7	7	563	39	3500	14.44	89.74	6	6
UCD	CH-SB13	0	0	445	28.6	124	15.56	4.34	7	7
UCD	CH-SB13	5.5	5.5	130	44.8	45.6	2.90	1.02	7	7
UCD	CH-SB14	0	0	169	35.6	36.7	4.75	1.03	7	7
UCD	CH-SB14B	0	0	498	45.9	467	10.85	10.17	7	7
UCD	CH-SB14B	4	4	55.8	27.8	17.9	2.01	0.64	7	7
UCD	CH-SB15	0	0	249	54.8	89.5	4.54	1.63	7	7
UCD	CH-SB15	4	4	51.6	27.1	17.9	1.90	0.66	7	7
UCD	CH-SB16	0	0	469	26.3	259	17.83	9.85	7	7
UCD	CH-SB16	4.5	4.5	293	27.1	78.2	10.81	2.89	7	7
UCD	CH-SB16	10	10	491	55.2	59.3	8.90	1.07	7	7
UCD	CH-SB17	0	0	423	29.7	274	14.24	9.23	7	7
UCD	CH-SB17	4.5	4.5	535	24.1	55	22.20	2.28	7	7
UCD	CH-SB17	8.5	8.5	1310	35.8	2950	36.59	82.40	1	1

TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine -- Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
UCD	CH-SB17	10	10	970	61.9	155	15.67	2.50	7	7
UCD	CH-SB17	13	13	288	32	124	9.00	3.88	7	7
UCD	CH-SB17	15	15	801	78.6	25.1	10.19	0.32	7	7
UCD	CH-SB18	0	0	306	25.5	94.2	12.00	3.69	7	7
UCD	CH-SB18	5	5	402	28.6	15.9	14.06	0.56	7	7
UCD	CH-SB19	0	0	374	32.7	719	11.44	21.99	7	7
UCD	CH-SB20	0	0	397	26.1	252	15.21	9.66	7	7
UCD	CH-SB20	5	5	438	34	62.7	12.88	1.84	7	7
UCD	CH-SB20	8.5	8.5	261	27.5	217	9.49	7.89	7	7
UCD	CH-SB20	11	11	524	30.5	134	17.18	4.39	7	7
UCD	CH-SB21	0	0	385	31.5	734	12.22	23.30	7	7
UCD	CH-SB21	2.5	2.5	724	25.7	90.4	28.17	3.52	7	7
UCD	CH-SB22	0	0	605	47.3	732	12.79	15.48	5	5
UCD	CH-SB23	0	0	425	31	306	13.71	9.87	7	7
UCD	CH-SB23	5	5	616	23.4	33.5	26.33	1.43	7	7
UCD	CH-SB23	10	10	509	35.8	79.2	14.22	2.21	7	7
UCD	CH-SB24	0	0	603	37.1	1620	16.25	43.67	5	5
UCD	CH-SB24	5	5	587	28.9	39.9	20.31	1.38	7	7
UCD	CH-SB24	8.5	8.5	585	74.4	446	7.86	6.00	7	7
UCD	CH-SB24	10	10	377	29.6	49	12.74	1.66	7	7
UCD	CH-SB25	0	0	583	37	830	15.76	22.43	6	6
UCD	CH-SB26	0	0	505	34.2	407	14.77	11.90	7	7
UCD	CH-SB27	0	0	293	41.7	190	7.03	4.56	7	7
UCD	CH-SB28	0	0	305	31.3	298	9.74	9.52	7	7
UCD	CH-SB29	0	0	478	33.4	891	14.31	26.68	7	7
UCD	CH-SB29	4	4	787	42.1	39.9	18.69	0.95	7	7
UCD	CH-SB30	0	0	731	34.3	739	21.31	21.55	4	4
UCD	CH-SB30	5	5	662	26.1	78.2	25.36	3.00	7	7
UCD	CH-SB30	9	9	185	29.4	254	6.29	8.64	7	7
UCD	CHU-SB01	0	0	553	35	256	15.80	7.31	7	7
UCD	CHU-SB02	0	0	407	31.5	165	12.92	5.24	7	7
UCD	CHU-SB02	3	3	398	82.1	302	4.85	3.68	7	7
UCD	CHU-SB03	0	0	256	23.7	67.3	10.80	2.84	7	7
UCD	CHU-SB03	2.5	2.5	301	33.3	23.6	9.04	0.71	7	7
UCD	CHU-SB04	0	0	511	30.7	517	16.65	16.84	6	6
UCD	CHU-SB05	0	0	311	26.1	71.8	11.92	2.75	7	7
UCD	CHU-SB05	4	4	301	29.1	140	10.34	4.81	7	7
UCD	CHU-SB06	0	0	288	25.7	105	11.21	4.09	7	7
UCD	CHU-SB07	0	0	446	35.6	761	12.53	21.38	7	7
UCD	CHU-SB08	0	0	260	30.5	70	8.53	2.30	7	7
UCD	CHU-SB09	0	0	1030	36	402	28.61	11.17	7	7
UCD	CHU-SB10	0	0	315	30.5	196	10.33	6.43	7	7
UCD	CHU-SB11	0	0	360	34.5	907	10.44	26.29	7	7
UCD	CHU-SB12	0	0	344	30.8	184	11.17	5.97	7	7
UCD	CHU-SB13	0	0	256	26.9	206	9.52	7.66	7	7
UCD	CHU-SB13	2.5	2.5	458	41.6	70.8	11.01	1.70	7	7
UCD	CHU-SB14	0	0	348	47.6	257	7.31	5.40	7	7
UCD	CHU-SB15	0	0	410	34.3	297	11.95	8.66	7	7
UCD	DAM-SB01	0	0	448	65.7	169	6.82	2.57	7	7
UCD	DAM-SB01	5	5	1080	86.5	620	12.49	7.17	5	5
UCD	DAM-SB02	0	0	396	54.2	110	7.31	2.03	7	7
UCD	DAM-SB03	0	0	507	69.6	93.3	7.28	1.34	7	7

TABLE I-4

**Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type**  
*Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona*

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
UCD	DAM-SB03	5	5	1160	99.6	233	11.65	2.34	7	7
UCD	DAM-SB04	0	0	1190	345	6730	3.45	19.51	1	7
UCD	DAM-SB05	0	0	997	78.9	362	12.64	4.59	7	7
HS Tailings (reworked)	CHF-SB01	0	0	531	40.3	472	13.18	11.71	7	7
HS Tailings (reworked)	CHF-SB02	0	0	460	34.2	304	13.45	8.89	7	7
HS Tailings (reworked)	CHF-SB02	3.5	3.5	279	39.6	1350	7.05	34.09	7	7
HS Tailings (reworked)	CHF-SB03	5	5	235	31.7	523	7.41	16.50	7	7
HS Tailings (reworked)	CHF-SB03	7	7	216	66.9	15.5	3.23	0.23	7	7
HS Tailings (reworked)	CHF-SB04	5	5	425	29.9	396	14.21	13.24	7	7
HS Tailings (reworked)	CHF-SB04	7.5	7.5	1940	46.7	510	41.54	10.92	6	6
HS Tailings (reworked)	CHF-SB05	3	3	576	31.3	378	18.40	12.08	7	7
HS Tailings (reworked)	CHF-SB05	4	4	1170	37	953	31.62	25.76	2	2
HS Tailings (reworked)	CHF-SB06	0	0	534	35.7	929	14.96	26.02	6	6
HS Tailings (reworked)	CHF-SB06	5	5	662	33.7	1890	19.64	56.08	5	5
HS Tailings (reworked)	CHF-SB06	9	9	582	29.7	124	19.60	4.18	7	7
HS Tailings (reworked)	CHF-SB07	5	5	334	23.2	369	14.40	15.91	7	7
HS Tailings (reworked)	CHF-SB07	7.5	7.5	1850	53.4	784	34.64	14.68	4	4
HS Tailings (reworked)	CHF-SB08	2.5	2.5	963	34.5	4700	27.91	136.23	2	2
HS Tailings (reworked)	CHF-SB10	5	5	2770	52.7	1740	52.56	33.02	1	1
HS Tailings (reworked)	CHF-SB10	9	9	6250	229	1620	27.29	7.07	1	1
HS Tailings (reworked)	CHF-SB12	0	0	738	35.5	937	20.79	26.39	4	4
HS Tailings (reworked)	CHF-SB12	5	5	4220	77.8	3140	54.24	40.36	1	1
HS Tailings (reworked)	CHF-SB15	2.5	2.5	621	118	2390	5.26	20.25	5	7
HS Tailings (reworked)	CHF-SB15	5	5	5710	104	2710	54.90	26.06	1	1
HS Tailings (reworked)	CHF-SB17	5	5	455	53.8	438	8.46	8.14	7	7
HS Tailings (reworked)	CHF-SB18	5	5	6770	50.8	5030	133.27	99.02	1	1
HS Tailings (reworked)	CHF-SB19	2.5	2.5	842	42	13000	20.05	309.52	3	3
HS Tailings (reworked)	CHF-SB21	4.5	4.5	402	61.5	757	6.54	12.31	7	7
HS Tailings (reworked)	CHF-SB21	6	6	5690	67.8	3180	83.92	46.90	1	1
HS Tailings (reworked)	CHF-SB21	10	10	2240	77.8	1160	28.79	14.91	1	1
HS Tailings (reworked)	CHF-SB23	4	4	2170	90.5	1840	23.98	20.33	1	1
HS Tailings (reworked)	CHF-SB24	5	5	231	54.4	304	4.25	5.59	7	7
HS Tailings (reworked)	CHF-SB24	9	9	216	50.4	304	4.29	6.03	7	7
HS Tailings (reworked)	CHF-SB26	2.5	2.5	558	47.6	4010	11.72	84.24	6	6
HS Tailings (reworked)	CHF-SB27	5	5	4450	75.3	5830	59.10	77.42	1	1
HS Tailings (reworked)	CHF-SB32	5	5	382	51.1	372	7.48	7.28	7	7
HS Tailings (reworked)	CHF-SB32	10	10	141	44.6	155	3.16	3.48	7	7
HS Tailings (reworked)	CHF-SB34	4	4	500	35	1860	14.29	53.14	7	7
HS Tailings (reworked)	CHF-SB35	0	0	653	49	330	13.33	6.74	7	7
HS Tailings (reworked)	CHF-SB35	5	5	2510	78.1	1540	32.14	19.72	1	1
HS Tailings (reworked)	CHF-SB36	5	5	400	34.8	358	11.49	10.29	7	7
HS Tailings (reworked)	CHF-SB37	5	5	990	34.2	1510	28.95	44.15	2	2
HS Tailings (reworked)	CHF-SB38	0	0	770	40.2	575	19.15	14.30	6	6
HS Tailings (reworked)	CHF-SB43	5	5	883	38.4	3410	23.00	88.80	3	3
HS Tailings (reworked)	CHF-SB45	5	5	8150	55.2	4230	147.65	76.63	1	1
HS Tailings (reworked)	CHF-SB45	7.5	7.5	205	28	56.7	7.32	2.03	7	7
HS Tailings (reworked)	CH-SB31	0	0	592	38	463	15.58	12.18	7	7
HS Tailings (reworked)	DAM-SB01	10	10	31800	111	45900	286.49	413.51	1	1
HS Tailings (reworked)	DAM-SB03	13.5	13.5	1050	71.7	2220	14.64	30.96	1	4
HS Tailings (reworked)	DAM-SB03	20	20	3110	74.6	985	41.69	13.20	2	2
HS Tailings (reworked)	DAM-SB04	5	5	480	41.7	321	11.51	7.70	7	7
HS Tailings (reworked)	DAM-SB04	6	6	839	432	1240	1.94	2.87	3	7

TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
HS Tailings (reworked)	DAM-SB05	5	5	783	53	2600	14.77	49.06	4	4
HS Tailings (reworked)	DAM-SB05	7.5	7.5	12600	402	4410	31.34	10.97	1	1
HS Tailings (reworked)	DAM-SB05	10	10	5500	77.5	4660	70.97	60.13	1	1
HS Tailings (undisturbed)	CHF-SB01	4	4	290	563	52.7	0.52	0.09	7	7
HS Tailings (undisturbed)	CHF-SB01	7.5	7.5	950	184	382	5.16	2.08	7	7
HS Tailings (undisturbed)	CHF-SB01	9	9	889	59.3	100	14.99	1.69	7	7
HS Tailings (undisturbed)	CHF-SB02	5	5	536	64.1	284	8.36	4.43	7	7
HS Tailings (undisturbed)	CHF-SB02	7.5	7.5	1480	142	195	10.42	1.37	7	7
HS Tailings (undisturbed)	CHF-SB09	5	5	225	53.5	156	4.21	2.92	7	7
HS Tailings (undisturbed)	CHF-SB09	8	8	216	53.2	32.7	4.06	0.62	7	7
HS Tailings (undisturbed)	CHF-SB12	8	8	349	56.6	115	6.17	2.03	7	7
HS Tailings (undisturbed)	CHF-SB13	0	0	292	45.2	188	6.46	4.16	7	7
HS Tailings (undisturbed)	CHF-SB13	2.5	2.5	113	38.8	81	2.91	2.09	7	7
HS Tailings (undisturbed)	CHF-SB13	5	5	943	94.2	282	10.01	2.99	7	7
HS Tailings (undisturbed)	CHF-SB14	0	0	550	74.9	157	7.34	2.10	7	7
HS Tailings (undisturbed)	CHF-SB14	2.5	2.5	404	57.1	172	7.08	3.01	7	7
HS Tailings (undisturbed)	CHF-SB14	4	4	566	62.8	298	9.01	4.75	7	7
HS Tailings (undisturbed)	CHF-SB14	5	5	707	186	9.38	3.80	0.05	7	7
HS Tailings (undisturbed)	CHF-SB15	9	9	1720	82.4	541	20.87	6.57	6	6
HS Tailings (undisturbed)	CHF-SB16	2.5	2.5	711	59.1	303	12.03	5.13	7	7
HS Tailings (undisturbed)	CHF-SB16	6	6	1360	105	738	12.95	7.03	4	5
HS Tailings (undisturbed)	CHF-SB16	6.5	6.5	1810	78.7	771	23.00	9.80	4	4
HS Tailings (undisturbed)	CHF-SB17	9.5	9.5	521	89.5	172	5.82	1.92	7	7
HS Tailings (undisturbed)	CHF-SB17	15	15	120	1980	36.3	0.06	0.02	7	7
HS Tailings (undisturbed)	CHF-SB18	9.5	9.5	272	65.8	117	4.13	1.78	7	7
HS Tailings (undisturbed)	CHF-SB19	4.5	4.5	1320	57.1	229	23.12	4.01	7	7
HS Tailings (undisturbed)	CHF-SB20	5	5	910	61.9	369	14.70	5.96	7	7
HS Tailings (undisturbed)	CHF-SB20	10	10	342	841	135	0.41	0.16	7	7
HS Tailings (undisturbed)	CHF-SB20	19	19	128	43.4	44	2.95	1.01	7	7
HS Tailings (undisturbed)	CHF-SB22	0	0	662	82.7	576	8.01	6.97	6	7
HS Tailings (undisturbed)	CHF-SB22	5	5	507	56	318	9.05	5.68	7	7
HS Tailings (undisturbed)	CHF-SB22	9	9	609	88.8	248	6.86	2.79	7	7
HS Tailings (undisturbed)	CHF-SB22	15	15	723	92.2	175	7.84	1.90	7	7
HS Tailings (undisturbed)	CHF-SB23	7.5	7.5	229	46	74.5	4.98	1.62	7	7
HS Tailings (undisturbed)	CHF-SB24	12.5	12.5	814	101	454	8.06	4.50	7	7
HS Tailings (undisturbed)	CHF-SB25	5	5	312	55.9	224	5.58	4.01	7	7
HS Tailings (undisturbed)	CHF-SB25	7.5	7.5	1480	166	395	8.92	2.38	7	7
HS Tailings (undisturbed)	CHF-SB26	5	5	565	89.5	448	6.31	5.01	7	7
HS Tailings (undisturbed)	CHF-SB26	8	8	1280	100	263	12.80	2.63	7	7
HS Tailings (undisturbed)	CHF-SB27	10	10	1470	89.8	639	16.37	7.12	5	5
HS Tailings (undisturbed)	CHF-SB28	5	5	883	70.3	523	12.56	7.44	6	6
HS Tailings (undisturbed)	CHF-SB28	10	10	116	35.8	62.8	3.24	1.75	7	7
HS Tailings (undisturbed)	CHF-SB28	15	15	155	44.5	132	3.48	2.97	7	7
HS Tailings (undisturbed)	CHF-SB29	5	5	295	58	247	5.09	4.26	7	7
HS Tailings (undisturbed)	CHF-SB29	10	10	1780	1580	763	1.13	0.48	4	7
HS Tailings (undisturbed)	CHF-SB29	15	15	344	70.6	100	4.87	1.42	7	7
HS Tailings (undisturbed)	CHF-SB29	19.5	19.5	842	90.3	243	9.32	2.69	7	7
HS Tailings (undisturbed)	CHF-SB30	0	0	610	74.8	345	8.16	4.61	7	7
HS Tailings (undisturbed)	CHF-SB30	10	10	614	88.8	176	6.91	1.98	7	7
HS Tailings (undisturbed)	CHF-SB31	5	5	1540	66.1	142	23.30	2.15	7	7
HS Tailings (undisturbed)	CHF-SB31	10	10	910	99.6	233	9.14	2.34	7	7
HS Tailings (undisturbed)	CHF-SB31	15	15	889	89.8	214	9.90	2.38	7	7

TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
HS Tailings (undisturbed)	CHF-SB32	15	15	515	1190	164	0.43	0.14	7	7
HS Tailings (undisturbed)	CHF-SB33	5	5	1330	54.8	241	24.27	4.40	7	7
HS Tailings (undisturbed)	CHF-SB33	10	10	119	42	52.4	2.83	1.25	7	7
HS Tailings (undisturbed)	CHF-SB33	15	15	231	59.5	60.2	3.88	1.01	7	7
HS Tailings (undisturbed)	CHF-SB35	10	10	849	98.8	194	8.59	1.96	7	7
HS Tailings (undisturbed)	CHF-SB36	12.5	12.5	1460	111	325	13.15	2.93	7	7
HS Tailings (undisturbed)	CHF-SB38	10	10	4000	111	282	36.04	2.54	7	7
HS Tailings (undisturbed)	CHF-SB39	5	5	92.3	56.7	145	1.63	2.56	7	7
HS Tailings (undisturbed)	CHF-SB39	7.5	7.5	587	140	835	4.19	5.96	6	7
HS Tailings (undisturbed)	CHF-SB40	5	5	1230	106	246	11.60	2.32	7	7
HS Tailings (undisturbed)	CHF-SB44	4	4	388	51.4	262	7.55	5.10	7	7
HS Tailings (undisturbed)	CHF-SB44	5	5	2300	260	55.8	8.85	0.22	7	7
HS Tailings (undisturbed)	CHF-SB44	8	8	68.9	28.2	16.5	2.44	0.59	7	7
HS Tailings (undisturbed)	CHF-SB46	5	5	630	64	315	9.84	4.92	7	7
HS Tailings (undisturbed)	CHF-SB46	7.5	7.5	2490	83.3	1160	29.89	13.93	1	1
HS Tailings (undisturbed)	CHF-SB46	10	10	169	40.8	233	4.14	5.71	7	7
HS Tailings (undisturbed)	CHF-SB47	5	5	1490	97.1	284	15.35	2.93	7	7
HS Tailings (undisturbed)	DAM-SB02	6	6	807	73.3	758	11.01	10.34	4	6
HS Tailings (undisturbed)	DAM-SB02	11	11	1250	81.6	228	15.32	2.79	7	7
HS Tailings (undisturbed)	DAM-SB02	12.5	12.5	1540	138	694	11.16	5.03	5	6
HS Tailings (undisturbed)	DAM-SB04	10	10	492	72.6	139	6.78	1.92	7	7
HS Tailings (undisturbed)	DAM-SB04	15	15	2900	4260	332	0.68	0.08	7	7
HS Tailings (undisturbed)	DAM-SB05	12.5	12.5	387	67.6	126	5.73	1.86	7	7
HS Tailings (undisturbed)	DAM-SB06	0	0	547	58.4	154	9.37	2.64	7	7
HS Tailings (undisturbed)	DAM-SB06	5	5	330	54.5	127	6.06	2.33	7	7
HS Tailings (undisturbed)	DAM-SB06	10	10	740	69	685	10.73	9.93	5	6
HS Tailings (undisturbed)	DAM-SB06	15	15	429	55.8	1310	7.69	23.48	7	7
HS Tailings (undisturbed)	DAM-SB06	18.5	18.5	2010	71.6	183	28.07	2.56	7	7
HS Tailings (undisturbed)	DAM-SB06	23	23	1130	136	557	8.31	4.10	6	7
HS Tailings (undisturbed)	DAM-SB06	26	26	1300	51.9	57.6	25.05	1.11	7	7
LCD	CHF-SB01	10.5	10.5	301	54.9	226	5.48	4.12	7	7
LCD	CHF-SB02	11	11	698	65.1	31.2	10.72	0.48	7	7
LCD	CHF-SB03	10	10	497	39.5	70	12.58	1.77	7	7
LCD	CHF-SB03	15	15	543	46	17.9	11.80	0.39	7	7
LCD	CHF-SB04	10	10	950	36.2	77.3	26.24	2.14	7	7
LCD	CHF-SB04	11	11	835	95.6	208	8.73	2.18	7	7
LCD	CHF-SB08	5	5	6220	60.4	3010	102.98	49.83	1	1
LCD	CHF-SB08	10	10	731	59.8	50.7	12.22	0.85	7	7
LCD	CHF-SB12	14	14	1280	108	196	11.85	1.82	7	7
LCD	CHF-SB13	9	9	547	60.3	405	9.07	6.72	7	7
LCD	CHF-SB15	14	14	547	78	113	7.01	1.45	7	7
LCD	CHF-SB15	15	15	736	100	126	7.36	1.26	7	7
LCD	CHF-SB20	23.5	23.5	1220	98.1	250	12.44	2.55	7	7
LCD	CHF-SB21	12.5	12.5	1190	91	417	13.08	4.58	7	7
LCD	CHF-SB23	13	13	537	77.2	259	6.96	3.36	7	7
LCD	CHF-SB23	19	19	572	76.5	198	7.48	2.59	7	7
LCD	CHF-SB27	15	15	76.9	31.3	19.3	2.46	0.62	7	7
LCD	CHF-SB27	18.5	18.5	442	56.4	185	7.84	3.28	7	7
LCD	CHF-SB28	20	20	896	92.9	151	9.65	1.63	7	7
LCD	CHF-SB33	19	19	613	82.7	98.1	7.41	1.19	7	7
LCD	CHF-SB35	15	15	55.8	28.4	13.2	1.97	0.47	7	7
LCD	CHF-SB37	10	10	563	30.7	86.6	18.34	2.82	7	7

TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

											BIN Ranges (> than)						
											Score	Color	Concentration Range				
											1		1000		1000	20	6
											2		900		900	18	5.5
											3		800	Not	800	16	5
											4		700	Used	700	14	4.5
											5		600		600	12	4
											6		500		500	10	3.5
											7		0		0	0	0
											Score						
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu							
LCD	CHF-SB38	12.5	12.5	654	39.1	18.6	16.73	0.48	7	7							
LCD	CHF-SB39	10	10	1810	114	27.3	15.88	0.24	7	7							
LCD	CHF-SB40	5.5	5.5	3270	277	2660	11.81	9.60	1	6							
LCD	CHF-SB41	5	5	561	50	363	11.22	7.26	7	7							
LCD	CHF-SB41	7	7	2980	44.9	3720	66.37	82.85	1	1							
LCD	CHF-SB41	12.5	12.5	310	32	159	9.69	4.97	7	7							
LCD	CHF-SB42	5	5	372	30.5	1300	12.20	42.62	7	7							
LCD	CHF-SB42	10	10	319	30.5	22.9	10.46	0.75	7	7							
LCD	CHF-SB42	13	13	512	42	68.2	12.19	1.62	7	7							
LCD	CHF-SB43	7.5	7.5	534	66.7	269	8.01	4.03	7	7							
LCD	CHF-SB43	8.5	8.5	741	49.2	91.4	15.06	1.86	7	7							
LCD	CHF-SB45	10	10	102	32.6	28.1	3.13	0.86	7	7							
LCD	CHF-SB46	15	15	327	61.7	111	5.30	1.80	7	7							
LCD	CH-SB11	7	7	1500	42.5	9500	35.29	223.53	1	1							
LCD	CH-SB11	11	11	292	32.3	247	9.04	7.65	7	7							
LCD	CH-SB11	12	12	519	52	30.4	9.98	0.59	7	7							
LCD	CH-SB12	10	10	236	51.1	15.2	4.62	0.30	7	7							
LCD	CH-SB12	11	11	307	33.6	291	9.14	8.66	7	7							
LCD	CH-SB31	5	5	99	28.2	120	3.51	4.26	7	7							
LCD	DAM-SB03	27	27	391	65.8	74.5	5.94	1.13	7	7							
LCD	STS-SB12	16	16	260	29.2	20	8.90	0.69	7	7							
Brown Clay	CHF-SB09	10	10	726	103	13.8	7.05	0.13	7	7							
Brown Clay	CHF-SB09	19	19	675	58.5	22.2	11.54	0.38	7	7							
Brown Clay	CHF-SB11	2.5	2.5	308	62.9	105	4.90	1.67	7	7							
Brown Clay	CHF-SB13	13.5	13.5	306	52.4	129	5.84	2.46	7	7							
Brown Clay	CHF-SB14	10	10	172	46.4	7	3.71	0.15	7	7							
Brown Clay	CHF-SB16	13.5	13.5	83.7	27.1		3.09										
Brown Clay	CHF-SB17	17.5	17.5	80.8	24.4		3.31										
Brown Clay	CHF-SB19	6	6	126	32.6	90.4	3.87	2.77	7	7							
Brown Clay	CHF-SB22	17.5	17.5	77.8	31.6	20	2.46	0.63	7	7							
Brown Clay	CHF-SB30	13	13	71.9	27.7	11.3	2.60	0.41	7	7							
Brown Clay	CHF-SB30	20	20	35.6	28.6	17.9	1.25	0.63	7	7							
Brown Clay	CHF-SB31	20	20	123	32.7	30.4	3.76	0.93	7	7							
Brown Clay	CHF-SB34	5	5	937	56.3	331	16.64	5.88	7	7							
Brown Clay	CHF-SB34	7.5	7.5	745	29.9	22.2	24.92	0.74	7	7							
Brown Clay	CHF-SB34	11	11	41	26.7	17.9	1.54	0.67	7	7							
Brown Clay	CHF-SB44	10	10	119	33.2	37.5	3.58	1.13	7	7							
Brown Clay	CHF-SB44	14.5	14.5	276	43.4	69.1	6.36	1.59	7	7							
Brown Clay	CHF-SB47	10	10	85.6	30.1	17.9	2.84	0.60	7	7							
Brown Clay	CH-SB19	5	5	538	30.8	15.2	17.47	0.49	7	7							
Brown Clay	CH-SB19	9	9	75.9	28.2	17.9	2.69	0.64	7	7							
Brown Clay	CH-SB21	5	5	440	34.1	33.5	12.90	0.98	7	7							
Brown Clay	CH-SB22	5	5	70.9	34.8	25.8	2.04	0.74	7	7							
Brown Clay	CH-SB25	5	5	566	26.1	50.7	21.69	1.94	7	7							
Brown Clay	CH-SB27	5	5	47.4	29.4	14.5	1.61	0.49	7	7							
Brown Clay	CH-SB29	8.5	8.5	350	25.7	19.3	13.62	0.75	7	7							
Brown Clay	CHU-SB02	4	4	463	34.7	20	13.34	0.58	7	7							
Brown Clay	CHU-SB03	5	5	1450	46.9	11.9	30.92	0.25	7	7							
Brown Clay	CHU-SB03	8	8	312	43.9	15.9	7.11	0.36	7	7							
Brown Clay	CHU-SB04	5	5	114	42.9	15.1	2.66	0.35	7	7							
Brown Clay	CHU-SB04	9	9	1710	60.9	20	28.08	0.33	7	7							
Brown Clay	CHU-SB06	5	5	66.9	26.9	14.5	2.49	0.54	7	7							



TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine -- Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
Brown Clay	CHU-SB06	9.5	9.5	63.9	27.8	17.9	2.30	0.64	7	7
Brown Clay	CHU-SB07	5	5	50.6	27.1	20	1.87	0.74	7	7
Brown Clay	CHU-SB07	9	9	59.9	27.5	17.2	2.18	0.63	7	7
Brown Clay	CHU-SB08	5	5	45.3	26.9	16.5	1.68	0.61	7	7
Brown Clay	CHU-SB08	10	10	35.6	21.6	16.5	1.65	0.76	7	7
Brown Clay	CHU-SB09	5	5	39.9	28.2	17.2	1.42	0.61	7	7
Brown Clay	CHU-SB10	5	5	278	29.1	17.2	9.55	0.59	7	7
Brown Clay	CHU-SB10	8.5	8.5	61.9	27.8	15.9	2.23	0.57	7	7
Brown Clay	CHU-SB10	15	15		25	10		0.40		
Brown Clay	CHU-SB13	5	5	46.4	28	12.5	1.66	0.45	7	7
Brown Clay	STS-SB01	5	5	522	36.4	20.7	14.34	0.57	7	7
Brown Clay	STS-SB02	4	4	451	42.3	16.5	10.66	0.39	7	7
Brown Clay	STS-SB04	5	5	1470	222	182	6.62	0.82	7	7
Brown Clay	STS-SB05	6	6	166	47.5	25.1	3.50	0.53	7	7
Brown Clay	STS-SB07	3	3	53.7	33	13.2	1.63	0.40	7	7
Brown Clay	STS-SB10	4.5	4.5	59.9	30.7	20.7	1.95	0.67	7	7
Brown Clay	STS-SB12	9	9	57.5	43.5	9.6	1.32	0.22	7	7
Brown Clay	STS-SB14	0	0	52.7	27.7	14.5	1.90	0.52	7	7
PFG	CHF-SB01	11.5	11.5	394	40.5	80.1	9.73	1.98	7	7
PFG	CHF-SB02	13	13	580	40.8	15.2	14.22	0.37	7	7
PFG	CHF-SB04	12	12	373	58.5	66.4	6.38	1.14	7	7
PFG	CHF-SB04	15	15	172	27.3	16.5	6.30	0.60	7	7
PFG	CHF-SB06	12.5	12.5	137	29.4	44	4.66	1.50	7	7
PFG	CHF-SB07	10	10	186	49.9	65.5	3.73	1.31	7	7
PFG	CHF-SB07	13	13	286	60.1	104	4.76	1.73	7	7
PFG	CHF-SB08	12	12	930	61.1	95.2	15.22	1.56	7	7
PFG	CHF-SB09	21.5	21.5	791	208	7.4	3.80	0.04	7	7
PFG	CHF-SB12	22.5	22.5	56.8	30.8	11.9	1.84	0.39	7	7
PFG	CHF-SB15	19	19	1390	110	279	12.64	2.54	7	7
PFG	CHF-SB18	12.5	12.5	162	35.8	81	4.53	2.26	7	7
PFG	CHF-SB20	25.5	25.5	43.2	29.7	21.4	1.46	0.72	7	7
PFG	CHF-SB21	19	19	81.7	24.6	15.9	3.32	0.65	7	7
PFG	CHF-SB23	24.5	24.5	672	89.5	120	7.51	1.34	7	7
PFG	CHF-SB29	25	25	883	99.6	183	8.87	1.84	7	7
PFG	CHF-SB32	19.5	19.5	533	86.8	101	6.14	1.16	7	7
PFG	CHF-SB34	13.5	13.5	224	27.5	187	8.15	6.80	7	7
PFG	CHF-SB35	19.5	19.5	215	29.9	14.5	7.19	0.49	7	7
PFG	CHF-SB36	15	15	451	36.6	15.9	12.32	0.43	7	7
PFG	CHF-SB36	20	20	66.9	24.1	15.9	2.78	0.66	7	7
PFG	CHF-SB37	15	15	665	45.6	100	14.58	2.19	7	7
PFG	CHF-SB39	15	15	722	62.6	21.4	11.53	0.34	7	7
PFG	CHF-SB41	17	17	492	35.7	18.6	13.78	0.52	7	7
PFG	CHF-SB41	20	20	204	33.2	17.2	6.15	0.52	7	7
PFG	CHF-SB42	15	15	666	40.9	16.5	16.28	0.40	7	7
PFG	CHF-SB42	18	18	641	46.5	18.6	13.79	0.40	7	7
PFG	CHF-SB43	10	10	479	43.2	67.3	11.09	1.56	7	7
PFG	CHF-SB43	11.5	11.5	559	42.5	166	13.15	3.91	7	7
PFG	CHF-SB43	15	15	377	38	13.2	9.92	0.35	7	7
PFG	CHF-SB45	12	12	268	53.9	69.1	4.97	1.28	7	7
PFG	CHF-SB45	17	17	169	56	74.5	3.02	1.33	7	7
PFG	CHF-SB46	19	19	213	48.2	50.7	4.42	1.05	7	7
PFG	CHF-SB47	15	15	188	30.7	15.9	6.12	0.52	7	7

TABLE I-4

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type

Iron King Mine -- Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

											BIN Ranges (> than)										
											Score	Color	Concentration Range								
											1		1000		1000	20	6				
											2		900		900	18	5.5				
											3		800	Not	800	16	5				
											4		700	Used	700	14	4.5				
											5		600		600	12	4				
											6		500		500	10	3.5				
											7		0		0	0	0				
											Score										
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu											
PFG	CHF-SB47	20	20	156	25.3	16.5	6.17	0.65	7	7											
PFG	CH-SB01	10	10	221	39.1	13.2	5.65	0.34	7	7											
PFG	CH-SB01	12	12	597	36.3	401	16.45	11.05	7	7											
PFG	CH-SB01	13	13	232	44.9	17.9	5.17	0.40	7	7											
PFG	CH-SB02	4.5	4.5	509	29.1	121	17.49	4.16	7	7											
PFG	CH-SB03	8	8	223	31.5	22.2	7.08	0.71	7	7											
PFG	CH-SB03	11	11	128	25.9	11.9	4.94	0.46	7	7											
PFG	CH-SB08	5	5	387	28.7	55	13.48	1.92	7	7											
PFG	CH-SB09	5	5	205	29.6	22.9	6.93	0.77	7	7											
PFG	CH-SB09	8.5	8.5	271	30.8	85.7	8.80	2.78	7	7											
PFG	CH-SB13	10.5	10.5	64.9	29.2	16.5	2.22	0.57	7	7											
PFG	CH-SB18	10	10	184	25.5	13.8	7.22	0.54	7	7											
PFG	CH-SB18	16	16	243	48.1	17.2	5.05	0.36	7	7											
PFG	CH-SB21	7.5	7.5	64.9	26.5	20	2.45	0.76	7	7											
PFG	CH-SB23	15	15	263	45.9	17.9	5.73	0.39	7	7											
PFG	CH-SB24	15	15	605	43	16.5	14.07	0.38	7	7											
PFG	CH-SB25	10	10	216	48	15.9	4.50	0.33	7	7											
PFG	CH-SB28	5	5	54.7	25.9	18.6	2.11	0.72	7	7											
PFG	CH-SB29	13	13	66.9	30.5	17.9	2.19	0.59	7	7											
PFG	CH-SB29	18.5	18.5	113	33.2	12.5	3.40	0.38	7	7											
PFG	CH-SB31	10	10	700	347	28.6	2.02	0.08	7	7											
PFG	CH-SB31	11.5	11.5	564	59.7	19.3	9.45	0.32	7	7											
PFG	CHU-SB02	9	9	604	36.9	23.6	16.37	0.64	7	7											
PFG	CHU-SB02	13.5	13.5	738	59.9	24.4	12.32	0.41	7	7											
PFG	CHU-SB05	9	9	58.8	26.3	26.6	2.24	1.01	7	7											
PFG	CHU-SB06	14	14	63.9	29.1	17.2	2.20	0.59	7	7											
PFG	CHU-SB06	18	18	35.6	25.3	16.5	1.41	0.65	7	7											
PFG	CHU-SB07	14	14	51.6	20.1	15.9	2.57	0.79	7	7											
PFG	CHU-SB07	17	17	52.7	27.1	15.2	1.95	0.56	7	7											
PFG	CHU-SB08	15	15	44.2	23.2	8.77	1.91	0.38	7	7											
PFG	CHU-SB08	17.5	17.5	51.6	24.6	16.5	2.10	0.67	7	7											
PFG	CHU-SB08	19	19		25	18.6		0.74													
PFG	CHU-SB09	10	10	37.8	27.3	12.5	1.39	0.46	7	7											
PFG	CHU-SB10	20	20	42.1	27.8	16.5	1.51	0.59	7	7											
PFG	CHU-SB11	5	5	121	22.4	25.8	5.40	1.15	7	7											
PFG	CHU-SB11	8	8	58.8	26.3	22.2	2.24	0.84	7	7											
PFG	CHU-SB11	10	10	58.8	28.4	13.8	2.07	0.49	7	7											
PFG	CHU-SB11	14	14	37.8	25.3	16.5	1.49	0.65	7	7											
PFG	CHU-SB12	5	5	422	29.4	371	14.35	12.62	7	7											
PFG	CHU-SB12	10	10	59.9	20.7	14.5	2.89	0.70	7	7											
PFG	CHU-SB12	14.5	14.5	41	27.7	18.6	1.48	0.67	7	7											
PFG	CHU-SB13	10	10	49.5	25	11.9	1.98	0.48	7	7											
PFG	CHU-SB13	15	15	126	26.5	29.6	4.76	1.12	7	7											
PFG	CHU-SB14	3.5	3.5	71.9	26.7	37.5	2.69	1.40	7	7											
PFG	CHU-SB14	5	5		24.1	19.3		0.80													
PFG	CHU-SB14	10	10		23.9	16.5		0.69													
PFG	STS-SB10	7	7	61.9	30.1	21.4	2.06	0.71	7	7											
PFG	STS-SB10	10	10	144	25.5	11.3	5.65	0.44	7	7											
PFG	STS-SB15	25	25	51.6	31	13.8	1.67	0.45	7	7											

TABLE I-4

**Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Material Type**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

BIN Ranges (> than)										
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
Hickey Ash/Cinder	CHF-SB06	15	15	59.9	33.7	23.6	1.78	0.70	7	7
Hickey Ash/Cinder	CHF-SB14	15	15	112	34.7	Not Detected	3.23	Not Detected	Not Detected	Not Detected
Hickey Ash/Cinder	CHF-SB16	15.5	15.5	69.9	26.3	Not Detected	2.66	Not Detected	Not Detected	Not Detected
Hickey Ash/Cinder	CHF-SB40	10	10	56.8	30.1	14.5	1.89	0.48	7	7
Hickey Cgl	CHF-SB01	13	13	110	27.8	11.9	3.96	0.43	7	7
Hickey Cgl	CHF-SB19	16	16	62.9	30.1	19.3	2.09	0.64	7	7
Hickey Cgl	CH-SB05	10	10	50.6	30.5	20.7	1.66	0.68	7	7
Hickey Cgl	CH-SB07	7	7	370	38.8	27.3	9.54	0.70	7	7
Hickey Cgl	CH-SB26	4.5	4.5	49.5	24.8	16.5	2.00	0.67	7	7
Hickey Cgl	CH-SB26	10	10	51.6	29.2	17.2	1.77	0.59	7	7
Hickey Cgl	CH-SB27	10	10	52.7	27.8	11.9	1.90	0.43	7	7
Hickey Cgl	CH-SB31	13	13	669	44.6	16.5	15.00	0.37	7	7
Hickey Cgl	CHU-SB03	9	9	414	43.6	15.9	9.50	0.37	7	7
Hickey Cgl	CHU-SB03	13	13	41	31	14.5	1.32	0.47	7	7
Hickey Cgl	CHU-SB04	11.5	11.5	51.6	30.2	21.4	1.71	0.71	7	7
Hickey Cgl	CHU-SB05	13.5	13.5	51.6	28	21.4	1.84	0.76	7	7
Hickey Cgl	CHU-SB09	15	15	Not Detected	25.9	15.2	Not Detected	0.59	Not Detected	Not Detected
Hickey Cgl	CHU-SB15	2	2	58.8	26.3	15.9	2.24	0.61	7	7
Hickey Cgl	STS-SB01	10	10	45.3	24.1	20.7	1.88	0.86	7	7
Hickey Cgl	STS-SB02	10	10	37.8	26.3	18.6	1.44	0.71	7	7
Hickey Cgl	STS-SB04	12	12	39.9	25	14.5	1.60	0.58	7	7
Hickey Cgl	STS-SB05	10	10	62.9	45.7	13.4	1.38	0.29	7	7
Hickey Cgl	STS-SB06	5	5	79.8	61	18.8	1.31	0.31	7	7
Hickey Cgl	STS-SB06	10	10	52.7	26.5	14.5	1.99	0.55	7	7
Hickey Cgl	STS-SB07	5	5	42.1	26.1	17.2	1.61	0.66	7	7
Hickey Cgl	STS-SB07	10	10	57.8	23.4	20.7	2.47	0.89	7	7
Hickey Cgl	STS-SB10	12	12	47.4	29.1	14.5	1.63	0.50	7	7
Hickey Cgl	STS-SB11	2	2	39.9	29.7	12.5	1.34	0.42	7	7
Hickey Cgl	STS-SB11	5	5	Not Detected	26.3	13.8	Not Detected	0.53	Not Detected	Not Detected

Notes:

Cu = Copper

Not Detected

HCS D = Humboldt Smelter Channel Deposit

HS = Humboldt Smelter

IKM = Iron King Mine

LCD = Lowermost Channel Deposit

mg/kg = milligrams per kilogram

Pb = Lead

PFG = Principle Fluvial Gravels

UCD = Uppermost Channel Deposit

Zn = Zinc

TABLE I-5

**Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location**  
*Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona*

											BIN Ranges (> than)										
											Score	Color	Concentration Range								
											1		1000		1000	20	6				
											2		900		900	18	5.5				
											3		800	Not	800	16	5				
											4		700	Used	700	14	4.5				
											5		600		600	12	4				
											6		500		500	10	3.5				
											7		0		0	0	0				
											Score										
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu											
IKM Tailings	IKJ-525	0	2	12700	209	2710	60.77	12.97	1	1											
IKM Tailings	IKJ-525	4	7	11600	236	2810	49.15	11.91	1	1											
IKM Tailings	IKJ-525	35	38	12300	281	3570	43.77	12.71	1	1											
IKM Tailings	IKJ-526	0	2	4890	235	2390	20.81	10.17	1	1											
IKM Tailings	IKJ-526	4	7	12500	315	2980	39.68	9.46	1	1											
IKM Tailings	IKJ-526	39	40	33700	645	7310	52.25	11.33	1	1											
IKM Tailings	IKJ-527	0	2	13900	608	4050	22.86	6.66	1	1											
IKM Tailings	IKJ-527	4	7	19400	543	4920	35.73	9.06	1	1											
IKM Tailings	IKJ-527	35	40	16500	377	8230	43.77	21.83	1	1											
IKM Tailings	IKJ-529	0	2	10400	629	4460	16.53	7.09	1	3											
IKM Tailings	IKJ-530	0	2	1520	88.8	1200	17.12	13.51	1	3											
IKM Tailings	IKJ-555	0	0.5	4910	273	2050	17.99	7.51	1	3											
IKM Tailings	IKJ-583	0	0.5	3800	148	2150	25.68	14.53	1	1											
IKM Tailings	IK-S2	1	2	9170	197	2160	46.55	10.96	1	1											
IKM Tailings	IK-S4	1	2	10900	1180	3500	9.24	2.97	1	7											
IKM Tailings	IKV-102	0	2	3020	124	2740	24.36	22.10	1	1											
IKM Tailings	IKV-102	4	7	8980	218	2730	41.19	12.52	1	1											
IKM Tailings	IKV-103	0	2	7320	169	2850	43.31	16.86	1	1											
IKM Tailings	IKV-104	0	2	4610	146	2100	31.58	14.38	1	1											
IKM Tailings	IKV-104	4	7	11100	277	3480	40.07	12.56	1	1											
IKM Tailings	IKV-105	0	2	8840	390	3240	22.67	8.31	1	1											
IKM Tailings	IKV-106	0	2	2190	132	1250	16.59	9.47	1	3											
IKM Tailings	IKV-106	4	7	7260	203	2340	35.76	11.53	1	1											
IKM Tailings	IKV-108	0	2	16400	550	4650	29.82	8.46	1	1											
IKM Tailings	IKV-108	4	7	17100	518	4980	33.01	9.61	1	1											
IKM Tailings	IKV-109	0	2	9480	180	2230	52.67	12.39	1	1											
IKM Tailings	IKV-112	0	2	6330	379	4370	16.70	11.53	1	3											
IKM Tailings	IKV-112	4	7	18100	727	4840	24.90	6.66	1	1											
IKM Tailings	MTP-SB01	5	5	14100	291	3200	48.45	11.00	1	1											
IKM Tailings	MTP-SB01	27.5	27.5	4200		3050															
IKM Tailings	MTP-SB02	5	5	6140	171	3510	35.91	20.53	1	1											
IKM Tailings	MTP-SB02	65	65	12400	319	4030	38.87	12.63	1	1											
IKM Tailings	MTP-SB02	81	81	7350	404	3590	18.19	8.89	1	2											
IKM Tailings	MTP-SB03	5	5	11200	180	3410	62.22	18.94	1	1											
IKM Tailings	MTP-SB03	63.5	63.5	20000	400	4600	50.00	11.50	1	1											
IKM Tailings	MTP-SB03	106	106	8180	270	4600	30.30	17.04	1	1											
IKM Tailings	B-3	14.5	15	2800	140	1900	20.00	13.57	1	2											
IKM Tailings	B-3	24.5	25	18000	340	3200	52.94	9.41	1	1											
IKM Tailings	B-5	14.5	15	26000	430	4500	60.47	10.47	1	1											
IKM Tailings	B-5	24.5	25	17000	380	4100	44.74	10.79	1	1											
HS Tailings (reworked)	CHF-SB01	0	0	531	40.3	472	13.18	11.71	7	7											
HS Tailings (undisturbed)	CHF-SB01	4	4	290	563	52.7	0.52	0.09	7	7											
HS Tailings (undisturbed)	CHF-SB01	7.5	7.5	950	184	382	5.16	2.08	7	7											
HS Tailings (undisturbed)	CHF-SB01	9	9	889	59.3	100	14.99	1.69	7	7											
LCD	CHF-SB01	10.5	10.5	301	54.9	226	5.48	4.12	7	7											
PFG	CHF-SB01	11.5	11.5	394	40.5	80.1	9.73	1.98	7	7											
Hickey Cgl	CHF-SB01	13	13	110	27.8	11.9	3.96	0.43	7	7											
HS Tailings (reworked)	CHF-SB02	0	0	460	34.2	304	13.45	8.89	7	7											
HS Tailings (reworked)	CHF-SB02	3.5	3.5	279	39.6	1350	7.05	34.09	7	7											
HS Tailings (undisturbed)	CHF-SB02	5	5	536	64.1	284	8.36	4.43	7	7											
HS Tailings (undisturbed)	CHF-SB02	7.5	7.5	1480	142	195	10.42	1.37	7	7											
LCD	CHF-SB02	11	11	698	65.1	31.2	10.72	0.48	7	7											
PFG	CHF-SB02	13	13	580	40.8	15.2	14.22	0.37	7	7											

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)									
		Score	Color	Concentration Range							
		1		1000		1000	20	6			
		2		900		900	18	5.5			
		3		800	Not	800	16	5			
		4		700	Used	700	14	4.5			
		5		600		600	12	4			
		6		500		500	10	3.5			
		7		0		0	0	0	Score		
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu	
UCD	CHF-SB03	0	0	535	32.9	201	16.26	6.11	7	7	
HS Tailings (reworked)	CHF-SB03	5	5	235	31.7	523	7.41	16.50	7	7	
HS Tailings (reworked)	CHF-SB03	7	7	216	66.9	15.5	3.23	0.23	7	7	
LCD	CHF-SB03	10	10	497	39.5	70	12.58	1.77	7	7	
LCD	CHF-SB03	15	15	543	46	17.9	11.80	0.39	7	7	
UCD	CHF-SB04	0	0	581	26.3	197	22.09	7.49	7	7	
HS Tailings (reworked)	CHF-SB04	5	5	425	29.9	396	14.21	13.24	7	7	
HS Tailings (reworked)	CHF-SB04	7.5	7.5	1940	46.7	510	41.54	10.92	6	6	
LCD	CHF-SB04	10	10	950	36.2	77.3	26.24	2.14	7	7	
LCD	CHF-SB04	11	11	835	95.6	208	8.73	2.18	7	7	
PFG	CHF-SB04	12	12	373	58.5	66.4	6.38	1.14	7	7	
PFG	CHF-SB04	15	15	172	27.3	16.5	6.30	0.60	7	7	
UCD	CHF-SB05	0	0	674	33.7	468	20.00	13.89	7	7	
HS Tailings (reworked)	CHF-SB05	3	3	576	31.3	378	18.40	12.08	7	7	
HS Tailings (reworked)	CHF-SB05	4	4	1170	37	953	31.62	25.76	2	2	
HS Tailings (reworked)	CHF-SB06	0	0	534	35.7	929	14.96	26.02	6	6	
HS Tailings (reworked)	CHF-SB06	5	5	662	33.7	1890	19.64	56.08	5	5	
HS Tailings (reworked)	CHF-SB06	9	9	582	29.7	124	19.60	4.18	7	7	
PFG	CHF-SB06	12.5	12.5	137	29.4	44	4.66	1.50	7	7	
Hickey Ash/Cinder	CHF-SB06	15	15	59.9	33.7	23.6	1.78	0.70	7	7	
UCD	CHF-SB07	0	0	472	32	583	14.75	18.22	7	7	
HS Tailings (reworked)	CHF-SB07	5	5	334	23.2	369	14.40	15.91	7	7	
HS Tailings (reworked)	CHF-SB07	7.5	7.5	1850	53.4	784	34.64	14.68	4	4	
PFG	CHF-SB07	10	10	186	49.9	65.5	3.73	1.31	7	7	
PFG	CHF-SB07	13	13	286	60.1	104	4.76	1.73	7	7	
UCD	CHF-SB08	0	0	1250	38.8	613	32.22	15.80	5	5	
HS Tailings (reworked)	CHF-SB08	2.5	2.5	963	34.5	4700	27.91	136.23	2	2	
LCD	CHF-SB08	5	5	6220	60.4	3010	102.98	49.83	1	1	
LCD	CHF-SB08	10	10	731	59.8	50.7	12.22	0.85	7	7	
PFG	CHF-SB08	12	12	930	61.1	95.2	15.22	1.56	7	7	
UCD	CHF-SB09	0	0	354	32.9	248	10.76	7.54	7	7	
HS Tailings (undisturbed)	CHF-SB09	5	5	225	53.5	156	4.21	2.92	7	7	
HS Tailings (undisturbed)	CHF-SB09	8	8	216	53.2	32.7	4.06	0.62	7	7	
Brown Clay	CHF-SB09	10	10	726	103	13.8	7.05	0.13	7	7	
Brown Clay	CHF-SB09	19	19	675	58.5	22.2	11.54	0.38	7	7	
PFG	CHF-SB09	21.5	21.5	791	208	7.4	3.80	0.04	7	7	
UCD	CHF-SB10	0	0	903	36.6	1670	24.67	45.63	2	2	
HS Tailings (reworked)	CHF-SB10	5	5	2770	52.7	1740	52.56	33.02	1	1	
HS Tailings (reworked)	CHF-SB10	9	9	6250	229	1620	27.29	7.07	1	1	
UCD	CHF-SB11	0	0	558	39.7	876	14.06	22.07	6	6	
Brown Clay	CHF-SB11	2.5	2.5	308	62.9	105	4.90	1.67	7	7	
HS Tailings (reworked)	CHF-SB12	0	0	738	35.5	937	20.79	26.39	4	4	
HS Tailings (reworked)	CHF-SB12	5	5	4220	77.8	3140	54.24	40.36	1	1	
HS Tailings (undisturbed)	CHF-SB12	8	8	349	56.6	115	6.17	2.03	7	7	
LCD	CHF-SB12	14	14	1280	108	196	11.85	1.82	7	7	
PFG	CHF-SB12	22.5	22.5	56.8	30.8	11.9	1.84	0.39	7	7	
HS Tailings (undisturbed)	CHF-SB13	0	0	292	45.2	188	6.46	4.16	7	7	
HS Tailings (undisturbed)	CHF-SB13	2.5	2.5	113	38.8	81	2.91	2.09	7	7	
HS Tailings (undisturbed)	CHF-SB13	5	5	943	94.2	282	10.01	2.99	7	7	
LCD	CHF-SB13	9	9	547	60.3	405	9.07	6.72	7	7	
Brown Clay	CHF-SB13	13.5	13.5	306	52.4	129	5.84	2.46	7	7	
HS Tailings (undisturbed)	CHF-SB14	0	0	550	74.9	157	7.34	2.10	7	7	

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
HS Tailings (undisturbed)	CHF-SB14	2.5	2.5	404	57.1	172	7.08	3.01	7	7
HS Tailings (undisturbed)	CHF-SB14	4	4	566	62.8	298	9.01	4.75	7	7
HS Tailings (undisturbed)	CHF-SB14	5	5	707	186	9.38	3.80	0.05	7	7
Brown Clay	CHF-SB14	10	10	172	46.4	7	3.71	0.15	7	7
Hickey Ash/Cinder	CHF-SB14	15	15	112	34.7		3.23			
UCD	CHF-SB15	0	0	402	58.9	178	6.83	3.02	7	7
HS Tailings (reworked)	CHF-SB15	2.5	2.5	621	118	2390	5.26	20.25	5	7
HS Tailings (reworked)	CHF-SB15	5	5	5710	104	2710	54.90	26.06	1	1
HS Tailings (undisturbed)	CHF-SB15	9	9	1720	82.4	541	20.87	6.57	6	6
LCD	CHF-SB15	14	14	547	78	113	7.01	1.45	7	7
LCD	CHF-SB15	15	15	736	100	126	7.36	1.26	7	7
PFG	CHF-SB15	19	19	1390	110	279	12.64	2.54	7	7
UCD	CHF-SB16	0	0	536	79.3	666	6.76	8.40	6	7
HS Tailings (undisturbed)	CHF-SB16	2.5	2.5	711	59.1	303	12.03	5.13	7	7
HS Tailings (undisturbed)	CHF-SB16	6	6	1360	105	738	12.95	7.03	4	5
HS Tailings (undisturbed)	CHF-SB16	6.5	6.5	1810	78.7	771	23.00	9.80	4	4
Brown Clay	CHF-SB16	13.5	13.5	83.7	27.1		3.09			
Hickey Ash/Cinder	CHF-SB16	15.5	15.5	69.9	26.3		2.66			
UCD	CHF-SB17	0	0	40.4	84.1	41.7	0.48	0.50	7	7
HS Tailings (reworked)	CHF-SB17	5	5	455	53.8	438	8.46	8.14	7	7
HS Tailings (undisturbed)	CHF-SB17	9.5	9.5	521	89.5	172	5.82	1.92	7	7
HS Tailings (undisturbed)	CHF-SB17	15	15	120	1980	36.3	0.06	0.02	7	7
Brown Clay	CHF-SB17	17.5	17.5	80.8	24.4		3.31			
UCD	CHF-SB18	0	0	1340	38.7	1460	34.63	37.73	1	1
HS Tailings (reworked)	CHF-SB18	5	5	6770	50.8	5030	133.27	99.02	1	1
HS Tailings (undisturbed)	CHF-SB18	9.5	9.5	272	65.8	117	4.13	1.78	7	7
PFG	CHF-SB18	12.5	12.5	162	35.8	81	4.53	2.26	7	7
UCD	CHF-SB19	0	0	896	51.5	579	17.40	11.24	6	6
HS Tailings (reworked)	CHF-SB19	2.5	2.5	842	42	13000	20.05	309.52	3	3
HS Tailings (undisturbed)	CHF-SB19	4.5	4.5	1320	57.1	229	23.12	4.01	7	7
Brown Clay	CHF-SB19	6	6	126	32.6	90.4	3.87	2.77	7	7
Hickey Cgl	CHF-SB19	16	16	62.9	30.1	19.3	2.09	0.64	7	7
UCD	CHF-SB20	0	0	2940	328	349	8.96	1.06	7	7
HS Tailings (undisturbed)	CHF-SB20	5	5	910	61.9	369	14.70	5.96	7	7
HS Tailings (undisturbed)	CHF-SB20	10	10	342	841	135	0.41	0.16	7	7
HS Tailings (undisturbed)	CHF-SB20	19	19	128	43.4	44	2.95	1.01	7	7
LCD	CHF-SB20	23.5	23.5	1220	98.1	250	12.44	2.55	7	7
PFG	CHF-SB20	25.5	25.5	43.2	29.7	21.4	1.46	0.72	7	7
UCD	CHF-SB21	0	0	407	62.4	343	6.52	5.50	7	7
HS Tailings (reworked)	CHF-SB21	4.5	4.5	402	61.5	757	6.54	12.31	7	7
HS Tailings (reworked)	CHF-SB21	6	6	5690	67.8	3180	83.92	46.90	1	1
HS Tailings (reworked)	CHF-SB21	10	10	2240	77.8	1160	28.79	14.91	1	1
LCD	CHF-SB21	12.5	12.5	1190	91	417	13.08	4.58	7	7
PFG	CHF-SB21	19	19	81.7	24.6	15.9	3.32	0.65	7	7
HS Tailings (undisturbed)	CHF-SB22	0	0	662	82.7	576	8.01	6.97	6	7
HS Tailings (undisturbed)	CHF-SB22	5	5	507	56	318	9.05	5.68	7	7
HS Tailings (undisturbed)	CHF-SB22	9	9	609	88.8	248	6.86	2.79	7	7
HS Tailings (undisturbed)	CHF-SB22	15	15	723	92.2	175	7.84	1.90	7	7
Brown Clay	CHF-SB22	17.5	17.5	77.8	31.6	20	2.46	0.63	7	7
UCD	CHF-SB23	0	0	617	66	414	9.35	6.27	7	7
HS Tailings (reworked)	CHF-SB23	4	4	2170	90.5	1840	23.98	20.33	1	1
HSCD	CHF-SB23	5	5	246	55.7	118	4.42	2.12	7	7

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
HS Tailings (undisturbed)	CHF-SB23	7.5	7.5	229	46	74.5	4.98	1.62	7	7
LCD	CHF-SB23	13	13	537	77.2	259	6.96	3.36	7	7
LCD	CHF-SB23	19	19	572	76.5	198	7.48	2.59	7	7
PFG	CHF-SB23	24.5	24.5	672	89.5	120	7.51	1.34	7	7
UCD	CHF-SB24	0	0	474	71.8	401	6.60	5.59	7	7
HS Tailings (reworked)	CHF-SB24	5	5	231	54.4	304	4.25	5.59	7	7
HS Tailings (reworked)	CHF-SB24	9	9	216	50.4	304	4.29	6.03	7	7
HS Tailings (undisturbed)	CHF-SB24	12.5	12.5	814	101	454	8.06	4.50	7	7
UCD	CHF-SB25	0	0	1360	102	348	13.33	3.41	7	7
HS Tailings (undisturbed)	CHF-SB25	5	5	312	55.9	224	5.58	4.01	7	7
HS Tailings (undisturbed)	CHF-SB25	7.5	7.5	1480	166	395	8.92	2.38	7	7
UCD	CHF-SB26	0	0	352	62.1	126	5.67	2.03	7	7
HS Tailings (reworked)	CHF-SB26	2.5	2.5	558	47.6	4010	11.72	84.24	6	6
HS Tailings (undisturbed)	CHF-SB26	5	5	565	89.5	448	6.31	5.01	7	7
HS Tailings (undisturbed)	CHF-SB26	8	8	1280	100	263	12.80	2.63	7	7
UCD	CHF-SB27	0	0	427	49.1	851	8.70	17.33	7	7
HS Tailings (reworked)	CHF-SB27	5	5	4450	75.3	5830	59.10	77.42	1	1
HS Tailings (undisturbed)	CHF-SB27	10	10	1470	89.8	639	16.37	7.12	5	5
LCD	CHF-SB27	15	15	76.9	31.3	19.3	2.46	0.62	7	7
LCD	CHF-SB27	18.5	18.5	442	56.4	185	7.84	3.28	7	7
UCD	CHF-SB28	0	0	721	66.7	410	10.81	6.15	7	7
HS Tailings (undisturbed)	CHF-SB28	5	5	883	70.3	523	12.56	7.44	6	6
HS Tailings (undisturbed)	CHF-SB28	10	10	116	35.8	62.8	3.24	1.75	7	7
HS Tailings (undisturbed)	CHF-SB28	15	15	155	44.5	132	3.48	2.97	7	7
LCD	CHF-SB28	20	20	896	92.9	151	9.65	1.63	7	7
UCD	CHF-SB29	0	0	529	69.5	300	7.61	4.32	7	7
HS Tailings (undisturbed)	CHF-SB29	5	5	295	58	247	5.09	4.26	7	7
HS Tailings (undisturbed)	CHF-SB29	10	10	1780	1580	763	1.13	0.48	4	7
HS Tailings (undisturbed)	CHF-SB29	15	15	344	70.6	100	4.87	1.42	7	7
HS Tailings (undisturbed)	CHF-SB29	19.5	19.5	842	90.3	243	9.32	2.69	7	7
PFG	CHF-SB29	25	25	883	99.6	183	8.87	1.84	7	7
HS Tailings (undisturbed)	CHF-SB30	0	0	610	74.8	345	8.16	4.61	7	7
HSCD	CHF-SB30	5	5	1250	63.7	274	19.62	4.30	7	7
HS Tailings (undisturbed)	CHF-SB30	10	10	614	88.8	176	6.91	1.98	7	7
Brown Clay	CHF-SB30	13	13	71.9	27.7	11.3	2.60	0.41	7	7
Brown Clay	CHF-SB30	20	20	35.6	28.6	17.9	1.25	0.63	7	7
UCD	CHF-SB31	0	0	523	60.4	174	8.66	2.88	7	7
HS Tailings (undisturbed)	CHF-SB31	5	5	1540	66.1	142	23.30	2.15	7	7
HS Tailings (undisturbed)	CHF-SB31	10	10	910	99.6	233	9.14	2.34	7	7
HS Tailings (undisturbed)	CHF-SB31	15	15	889	89.8	214	9.90	2.38	7	7
Brown Clay	CHF-SB31	20	20	123	32.7	30.4	3.76	0.93	7	7
UCD	CHF-SB32	0	0	2320	64.7	284	35.86	4.39	7	7
HS Tailings (reworked)	CHF-SB32	5	5	382	51.1	372	7.48	7.28	7	7
HS Tailings (reworked)	CHF-SB32	10	10	141	44.6	155	3.16	3.48	7	7
HS Tailings (undisturbed)	CHF-SB32	15	15	515	1190	164	0.43	0.14	7	7
PFG	CHF-SB32	19.5	19.5	533	86.8	101	6.14	1.16	7	7
UCD	CHF-SB33	0	0	814	41.6	601	19.57	14.45	5	5
HS Tailings (undisturbed)	CHF-SB33	5	5	1330	54.8	241	24.27	4.40	7	7
HS Tailings (undisturbed)	CHF-SB33	10	10	119	42	52.4	2.83	1.25	7	7
HS Tailings (undisturbed)	CHF-SB33	15	15	231	59.5	60.2	3.88	1.01	7	7
LCD	CHF-SB33	19	19	613	82.7	98.1	7.41	1.19	7	7
UCD	CHF-SB34	0	0	1150	34.8	1180	33.05	33.91	1	1

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

											BIN Ranges (> than)										
											Score	Color	Concentration Range								
											1		1000		1000	20	6				
											2		900		900	18	5.5				
											3		800	Not	800	16	5				
											4		700	Used	700	14	4.5				
											5		600		600	12	4				
											6		500		500	10	3.5				
											7		0		0	0	0				
											Score										
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu											
HS Tailings (reworked)	CHF-SB34	4	4	500	35	1860	14.29	53.14	7	7											
Brown Clay	CHF-SB34	5	5	937	56.3	331	16.64	5.88	7	7											
Brown Clay	CHF-SB34	7.5	7.5	745	29.9	22.2	24.92	0.74	7	7											
Brown Clay	CHF-SB34	11	11	41	26.7	17.9	1.54	0.67	7	7											
PFG	CHF-SB34	13.5	13.5	224	27.5	187	8.15	6.80	7	7											
HS Tailings (reworked)	CHF-SB35	0	0	653	49	330	13.33	6.74	7	7											
HS Tailings (reworked)	CHF-SB35	5	5	2510	78.1	1540	32.14	19.72	1	1											
HS Tailings (undisturbed)	CHF-SB35	10	10	849	98.8	194	8.59	1.96	7	7											
LCD	CHF-SB35	15	15	55.8	28.4	13.2	1.97	0.47	7	7											
PFG	CHF-SB35	19.5	19.5	215	29.9	14.5	7.19	0.49	7	7											
UCD	CHF-SB36	0	0	896	38.1	228	23.52	5.98	7	7											
HS Tailings (reworked)	CHF-SB36	5	5	400	34.8	358	11.49	10.29	7	7											
HSCD	CHF-SB36	10	10	855	78.9	113	10.84	1.43	7	7											
HS Tailings (undisturbed)	CHF-SB36	12.5	12.5	1460	111	325	13.15	2.93	7	7											
PFG	CHF-SB36	15	15	451	36.6	15.9	12.32	0.43	7	7											
PFG	CHF-SB36	20	20	66.9	24.1	15.9	2.78	0.66	7	7											
UCD	CHF-SB37	0	0	666	34.1	196	19.53	5.75	7	7											
HS Tailings (reworked)	CHF-SB37	5	5	990	34.2	1510	28.95	44.15	2	2											
LCD	CHF-SB37	10	10	563	30.7	86.6	18.34	2.82	7	7											
PFG	CHF-SB37	15	15	665	45.6	100	14.58	2.19	7	7											
HS Tailings (reworked)	CHF-SB38	0	0	770	40.2	575	19.15	14.30	6	6											
HSCD	CHF-SB38	5	5	180	31.5	184	5.71	5.84	7	7											
HS Tailings (undisturbed)	CHF-SB38	10	10	4000	111	282	36.04	2.54	7	7											
LCD	CHF-SB38	12.5	12.5	654	39.1	18.6	16.73	0.48	7	7											
UCD	CHF-SB39	0	0	213	45	236	4.73	5.24	7	7											
HS Tailings (undisturbed)	CHF-SB39	5	5	92.3	56.7	145	1.63	2.56	7	7											
HS Tailings (undisturbed)	CHF-SB39	7.5	7.5	587	140	835	4.19	5.96	6	7											
LCD	CHF-SB39	10	10	1810	114	27.3	15.88	0.24	7	7											
PFG	CHF-SB39	15	15	722	62.6	21.4	11.53	0.34	7	7											
UCD	CHF-SB40	0	0	584	53	187	11.02	3.53	7	7											
HS Tailings (undisturbed)	CHF-SB40	5	5	1230	106	246	11.60	2.32	7	7											
LCD	CHF-SB40	5.5	5.5	3270	277	2660	11.81	9.60	1	6											
Hickey Ash/Cinder	CHF-SB40	10	10	56.8	30.1	14.5	1.89	0.48	7	7											
UCD	CHF-SB41	0	0	742	39	474	19.03	12.15	7	7											
LCD	CHF-SB41	5	5	561	50	363	11.22	7.26	7	7											
LCD	CHF-SB41	7	7	2980	44.9	3720	66.37	82.85	1	1											
LCD	CHF-SB41	12.5	12.5	310	32	159	9.69	4.97	7	7											
PFG	CHF-SB41	17	17	492	35.7	18.6	13.78	0.52	7	7											
PFG	CHF-SB41	20	20	204	33.2	17.2	6.15	0.52	7	7											
UCD	CHF-SB42	0	0	561	31.3	131	17.92	4.19	7	7											
LCD	CHF-SB42	5	5	372	30.5	1300	12.20	42.62	7	7											
LCD	CHF-SB42	10	10	319	30.5	22.9	10.46	0.75	7	7											
LCD	CHF-SB42	13	13	512	42	68.2	12.19	1.62	7	7											
PFG	CHF-SB42	15	15	666	40.9	16.5	16.28	0.40	7	7											
PFG	CHF-SB42	18	18	641	46.5	18.6	13.79	0.40	7	7											
UCD	CHF-SB43	0	0	862	39.1	827	22.05	21.15	3	3											
HS Tailings (reworked)	CHF-SB43	5	5	883	38.4	3410	23.00	88.80	3	3											
LCD	CHF-SB43	7.5	7.5	534	66.7	269	8.01	4.03	7	7											
LCD	CHF-SB43	8.5	8.5	741	49.2	91.4	15.06	1.86	7	7											
PFG	CHF-SB43	10	10	479	43.2	67.3	11.09	1.56	7	7											
PFG	CHF-SB43	11.5	11.5	559	42.5	166	13.15	3.91	7	7											
PFG	CHF-SB43	15	15	377	38	13.2	9.92	0.35	7	7											



TABLE I-5

**Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location**  
 Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
UCD	CHF-SB44	0	0	449	47.3	146	9.49	3.09	7	7
HS Tailings (undisturbed)	CHF-SB44	4	4	388	51.4	262	7.55	5.10	7	7
HS Tailings (undisturbed)	CHF-SB44	5	5	2300	260	55.8	8.85	0.22	7	7
HS Tailings (undisturbed)	CHF-SB44	8	8	68.9	28.2	16.5	2.44	0.59	7	7
Brown Clay	CHF-SB44	10	10	119	33.2	37.5	3.58	1.13	7	7
Brown Clay	CHF-SB44	14.5	14.5	276	43.4	69.1	6.36	1.59	7	7
UCD	CHF-SB45	0	0	678	35.7	1160	18.99	32.49	5	5
HS Tailings (reworked)	CHF-SB45	5	5	8150	55.2	4230	147.65	76.63	1	1
HS Tailings (reworked)	CHF-SB45	7.5	7.5	205	28	56.7	7.32	2.03	7	7
LCD	CHF-SB45	10	10	102	32.6	28.1	3.13	0.86	7	7
PFG	CHF-SB45	12	12	268	53.9	69.1	4.97	1.28	7	7
PFG	CHF-SB45	17	17	169	56	74.5	3.02	1.33	7	7
UCD	CHF-SB46	0	0	977	35.5	798	27.52	22.48	4	4
HS Tailings (undisturbed)	CHF-SB46	5	5	630	64	315	9.84	4.92	7	7
HS Tailings (undisturbed)	CHF-SB46	7.5	7.5	2490	83.3	1160	29.89	13.93	1	1
HS Tailings (undisturbed)	CHF-SB46	10	10	169	40.8	233	4.14	5.71	7	7
LCD	CHF-SB46	15	15	327	61.7	111	5.30	1.80	7	7
PFG	CHF-SB46	19	19	213	48.2	50.7	4.42	1.05	7	7
UCD	CHF-SB47	0	0	412	58	165	7.10	2.85	7	7
HS Tailings (undisturbed)	CHF-SB47	5	5	1490	97.1	284	15.35	2.93	7	7
Brown Clay	CHF-SB47	10	10	85.6	30.1	17.9	2.84	0.60	7	7
PFG	CHF-SB47	15	15	188	30.7	15.9	6.12	0.52	7	7
PFG	CHF-SB47	20	20	156	25.3	16.5	6.17	0.65	7	7
UCD	CH-SB01	0	0	588	35.8	494	16.43	13.80	7	7
UCD	CH-SB01	4	4	1170	48.1	5530	24.32	114.97	1	1
UCD	CH-SB01	6	6	280	35	17.2	8.00	0.49	7	7
UCD	CH-SB01	7.5	7.5	193	45.8	11.9	4.21	0.26	7	7
UCD	CH-SB01	8.5	8.5	821	39.4	2300	20.84	58.38	3	3
PFG	CH-SB01	10	10	221	39.1	13.2	5.65	0.34	7	7
PFG	CH-SB01	12	12	597	36.3	401	16.45	11.05	7	7
PFG	CH-SB01	13	13	232	44.9	17.9	5.17	0.40	7	7
UCD	CH-SB02	0	0	677	30.7	197	22.05	6.42	7	7
UCD	CH-SB02	4	4	1280	37	1060	34.60	28.65	1	1
PFG	CH-SB02	4.5	4.5	509	29.1	121	17.49	4.16	7	7
UCD	CH-SB03	0	0	470	33	229	14.24	6.94	7	7
UCD	CH-SB03	4.5	4.5	259	35.3	1090	7.34	30.88	7	7
UCD	CH-SB03	6	6	510	29.6	47.3	17.23	1.60	7	7
PFG	CH-SB03	8	8	223	31.5	22.2	7.08	0.71	7	7
PFG	CH-SB03	11	11	128	25.9	11.9	4.94	0.46	7	7
UCD	CH-SB04	0	0	457	29.2	213	15.65	7.30	7	7
UCD	CH-SB04	4	4	343	35.2	1110	9.74	31.53	7	7
UCD	CH-SB04	6	6	916	46.7	251	19.62	5.38	7	7
UCD	CH-SB04	8	8	268	77.6	17.9	3.45	0.23	7	7
UCD	CH-SB05	0	0	408	30.7	136	13.29	4.43	7	7
UCD	CH-SB05	4	4	579	24.4	202	23.73	8.28	7	7
Hickey Cgl	CH-SB05	10	10	50.6	30.5	20.7	1.66	0.68	7	7
UCD	CH-SB06	0	0	227	31.5	88.5	7.21	2.81	7	7
UCD	CH-SB07	0	0	444	26.7	210	16.63	7.87	7	7
UCD	CH-SB07	6	6	631	30.1	174	20.96	5.78	7	7
Hickey Cgl	CH-SB07	7	7	370	38.8	27.3	9.54	0.70	7	7
UCD	CH-SB08	0	0	482	30.5	250	15.80	8.20	7	7
PFG	CH-SB08	5	5	387	28.7	55	13.48	1.92	7	7

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

											BIN Ranges (> than)										
											Score	Color	Concentration Range								
											1		1000		1000	20	6				
											2		900		900	18	5.5				
											3		800	Not	800	16	5				
											4		700	Used	700	14	4.5				
											5		600		600	12	4				
											6		500		500	10	3.5				
											7		0		0	0	0				
											Score										
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu											
UCD	CH-SB09	0	0	442	29.4	177	15.03	6.02	7	7											
PFG	CH-SB09	5	5	205	29.6	22.9	6.93	0.77	7	7											
PFG	CH-SB09	8.5	8.5	271	30.8	85.7	8.80	2.78	7	7											
UCD	CH-SB10	0	0	438	33.3	188	13.15	5.65	7	7											
UCD	CH-SB10	4	4	42.1	25.3	22.2	1.66	0.88	7	7											
UCD	CH-SB11	0	0	458	31.2	423	14.68	13.56	7	7											
UCD	CH-SB11	5	5	263	25.7	54.1	10.23	2.11	7	7											
LCD	CH-SB11	7	7	1500	42.5	9500	35.29	223.53	1	1											
LCD	CH-SB11	11	11	292	32.3	247	9.04	7.65	7	7											
LCD	CH-SB11	12	12	519	52	30.4	9.98	0.59	7	7											
UCD	CH-SB12	0	0	420	32.3	216	13.00	6.69	7	7											
UCD	CH-SB12	5	5	285	33.6	140	8.48	4.17	7	7											
UCD	CH-SB12	7	7	563	39	3500	14.44	89.74	6	6											
LCD	CH-SB12	10	10	236	51.1	15.2	4.62	0.30	7	7											
LCD	CH-SB12	11	11	307	33.6	291	9.14	8.66	7	7											
UCD	CH-SB13	0	0	445	28.6	124	15.56	4.34	7	7											
UCD	CH-SB13	5.5	5.5	130	44.8	45.6	2.90	1.02	7	7											
PFG	CH-SB13	10.5	10.5	64.9	29.2	16.5	2.22	0.57	7	7											
UCD	CH-SB14	0	0	169	35.6	36.7	4.75	1.03	7	7											
UCD	CH-SB14B	0	0	498	45.9	467	10.85	10.17	7	7											
UCD	CH-SB14B	4	4	55.8	27.8	17.9	2.01	0.64	7	7											
UCD	CH-SB15	0	0	249	54.8	89.5	4.54	1.63	7	7											
UCD	CH-SB15	4	4	51.6	27.1	17.9	1.90	0.66	7	7											
UCD	CH-SB16	0	0	469	26.3	259	17.83	9.85	7	7											
UCD	CH-SB16	4.5	4.5	293	27.1	78.2	10.81	2.89	7	7											
UCD	CH-SB16	10	10	491	55.2	59.3	8.90	1.07	7	7											
UCD	CH-SB17	0	0	423	29.7	274	14.24	9.23	7	7											
UCD	CH-SB17	4.5	4.5	535	24.1	55	22.20	2.28	7	7											
UCD	CH-SB17	8.5	8.5	1310	35.8	2950	36.59	82.40	1	1											
UCD	CH-SB17	10	10	970	61.9	155	15.67	2.50	7	7											
UCD	CH-SB17	13	13	288	32	124	9.00	3.88	7	7											
UCD	CH-SB17	15	15	801	78.6	25.1	10.19	0.32	7	7											
UCD	CH-SB18	0	0	306	25.5	94.2	12.00	3.69	7	7											
UCD	CH-SB18	5	5	402	28.6	15.9	14.06	0.56	7	7											
PFG	CH-SB18	10	10	184	25.5	13.8	7.22	0.54	7	7											
PFG	CH-SB18	16	16	243	48.1	17.2	5.05	0.36	7	7											
UCD	CH-SB19	0	0	374	32.7	719	11.44	21.99	7	7											
Brown Clay	CH-SB19	5	5	538	30.8	15.2	17.47	0.49	7	7											
Brown Clay	CH-SB19	9	9	75.9	28.2	17.9	2.69	0.64	7	7											
UCD	CH-SB20	0	0	397	26.1	252	15.21	9.66	7	7											
UCD	CH-SB20	5	5	438	34	62.7	12.88	1.84	7	7											
UCD	CH-SB20	8.5	8.5	261	27.5	217	9.49	7.89	7	7											
UCD	CH-SB20	11	11	524	30.5	134	17.18	4.39	7	7											
UCD	CH-SB21	0	0	385	31.5	734	12.22	23.30	7	7											
UCD	CH-SB21	2.5	2.5	724	25.7	90.4	28.17	3.52	7	7											
Brown Clay	CH-SB21	5	5	440	34.1	33.5	12.90	0.98	7	7											
PFG	CH-SB21	7.5	7.5	64.9	26.5	20	2.45	0.76	7	7											
UCD	CH-SB22	0	0	605	47.3	732	12.79	15.48	5	5											
Brown Clay	CH-SB22	5	5	70.9	34.8	25.8	2.04	0.74	7	7											
UCD	CH-SB23	0	0	425	31	306	13.71	9.87	7	7											
UCD	CH-SB23	5	5	616	23.4	33.5	26.33	1.43	7	7											
UCD	CH-SB23	10	10	509	35.8	79.2	14.22	2.21	7	7											

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
PFG	CH-SB23	15	15	263	45.9	17.9	5.73	0.39	7	7
UCD	CH-SB24	0	0	603	37.1	1620	16.25	43.67	5	5
UCD	CH-SB24	5	5	587	28.9	39.9	20.31	1.38	7	7
UCD	CH-SB24	8.5	8.5	585	74.4	446	7.86	6.00	7	7
UCD	CH-SB24	10	10	377	29.6	49	12.74	1.66	7	7
PFG	CH-SB24	15	15	605	43	16.5	14.07	0.38	7	7
UCD	CH-SB25	0	0	583	37	830	15.76	22.43	6	6
Brown Clay	CH-SB25	5	5	566	26.1	50.7	21.69	1.94	7	7
PFG	CH-SB25	10	10	216	48	15.9	4.50	0.33	7	7
UCD	CH-SB26	0	0	505	34.2	407	14.77	11.90	7	7
Hickey Cgl	CH-SB26	4.5	4.5	49.5	24.8	16.5	2.00	0.67	7	7
Hickey Cgl	CH-SB26	10	10	51.6	29.2	17.2	1.77	0.59	7	7
UCD	CH-SB27	0	0	293	41.7	190	7.03	4.56	7	7
Brown Clay	CH-SB27	5	5	47.4	29.4	14.5	1.61	0.49	7	7
Hickey Cgl	CH-SB27	10	10	52.7	27.8	11.9	1.90	0.43	7	7
UCD	CH-SB28	0	0	305	31.3	298	9.74	9.52	7	7
PFG	CH-SB28	5	5	54.7	25.9	18.6	2.11	0.72	7	7
UCD	CH-SB29	0	0	478	33.4	891	14.31	26.68	7	7
UCD	CH-SB29	4	4	787	42.1	39.9	18.69	0.95	7	7
Brown Clay	CH-SB29	8.5	8.5	350	25.7	19.3	13.62	0.75	7	7
PFG	CH-SB29	13	13	66.9	30.5	17.9	2.19	0.59	7	7
PFG	CH-SB29	18.5	18.5	113	33.2	12.5	3.40	0.38	7	7
UCD	CH-SB30	0	0	731	34.3	739	21.31	21.55	4	4
UCD	CH-SB30	5	5	662	26.1	78.2	25.36	3.00	7	7
UCD	CH-SB30	9	9	185	29.4	254	6.29	8.64	7	7
HS Tailings (reworked)	CH-SB31	0	0	592	38	463	15.58	12.18	7	7
LCD	CH-SB31	5	5	99	28.2	120	3.51	4.26	7	7
PFG	CH-SB31	10	10	700	347	28.6	2.02	0.08	7	7
PFG	CH-SB31	11.5	11.5	564	59.7	19.3	9.45	0.32	7	7
Hickey Cgl	CH-SB31	13	13	669	44.6	16.5	15.00	0.37	7	7
UCD	CHU-SB01	0	0	553	35	256	15.80	7.31	7	7
UCD	CHU-SB02	0	0	407	31.5	165	12.92	5.24	7	7
UCD	CHU-SB02	3	3	398	82.1	302	4.85	3.68	7	7
Brown Clay	CHU-SB02	4	4	463	34.7	20	13.34	0.58	7	7
PFG	CHU-SB02	9	9	604	36.9	23.6	16.37	0.64	7	7
PFG	CHU-SB02	13.5	13.5	738	59.9	24.4	12.32	0.41	7	7
UCD	CHU-SB03	0	0	256	23.7	67.3	10.80	2.84	7	7
UCD	CHU-SB03	2.5	2.5	301	33.3	23.6	9.04	0.71	7	7
Brown Clay	CHU-SB03	5	5	1450	46.9	11.9	30.92	0.25	7	7
Brown Clay	CHU-SB03	8	8	312	43.9	15.9	7.11	0.36	7	7
Hickey Cgl	CHU-SB03	9	9	414	43.6	15.9	9.50	0.37	7	7
Hickey Cgl	CHU-SB03	13	13	41	31	14.5	1.32	0.47	7	7
UCD	CHU-SB04	0	0	511	30.7	517	16.65	16.84	6	6
Brown Clay	CHU-SB04	5	5	114	42.9	15.1	2.66	0.35	7	7
Brown Clay	CHU-SB04	9	9	1710	60.9	20	28.08	0.33	7	7
Hickey Cgl	CHU-SB04	11.5	11.5	51.6	30.2	21.4	1.71	0.71	7	7
UCD	CHU-SB05	0	0	311	26.1	71.8	11.92	2.75	7	7
UCD	CHU-SB05	4	4	301	29.1	140	10.34	4.81	7	7
PFG	CHU-SB05	9	9	58.8	26.3	26.6	2.24	1.01	7	7
Hickey Cgl	CHU-SB05	13.5	13.5	51.6	28	21.4	1.84	0.76	7	7
UCD	CHU-SB06	0	0	288	25.7	105	11.21	4.09	7	7
Brown Clay	CHU-SB06	5	5	66.9	26.9	14.5	2.49	0.54	7	7

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
Brown Clay	CHU-SB06	9.5	9.5	63.9	27.8	17.9	2.30	0.64	7	7
PFG	CHU-SB06	14	14	63.9	29.1	17.2	2.20	0.59	7	7
PFG	CHU-SB06	18	18	35.6	25.3	16.5	1.41	0.65	7	7
UCD	CHU-SB07	0	0	446	35.6	761	12.53	21.38	7	7
Brown Clay	CHU-SB07	5	5	50.6	27.1	20	1.87	0.74	7	7
Brown Clay	CHU-SB07	9	9	59.9	27.5	17.2	2.18	0.63	7	7
PFG	CHU-SB07	14	14	51.6	20.1	15.9	2.57	0.79	7	7
PFG	CHU-SB07	17	17	52.7	27.1	15.2	1.95	0.56	7	7
UCD	CHU-SB08	0	0	260	30.5	70	8.53	2.30	7	7
Brown Clay	CHU-SB08	5	5	45.3	26.9	16.5	1.68	0.61	7	7
Brown Clay	CHU-SB08	10	10	35.6	21.6	16.5	1.65	0.76	7	7
PFG	CHU-SB08	15	15	44.2	23.2	8.77	1.91	0.38	7	7
PFG	CHU-SB08	17.5	17.5	51.6	24.6	16.5	2.10	0.67	7	7
PFG	CHU-SB08	19	19		25	18.6		0.74		
UCD	CHU-SB09	0	0	1030	36	402	28.61	11.17	7	7
Brown Clay	CHU-SB09	5	5	39.9	28.2	17.2	1.42	0.61	7	7
PFG	CHU-SB09	10	10	37.8	27.3	12.5	1.39	0.46	7	7
Hickey Cgl	CHU-SB09	15	15	0	25.9	15.2	0.00	0.59	0	0
UCD	CHU-SB10	0	0	315	30.5	196	10.33	6.43	7	7
Brown Clay	CHU-SB10	5	5	278	29.1	17.2	9.55	0.59	7	7
Brown Clay	CHU-SB10	8.5	8.5	61.9	27.8	15.9	2.23	0.57	7	7
Brown Clay	CHU-SB10	15	15		25	10		0.40		
PFG	CHU-SB10	20	20	42.1	27.8	16.5	1.51	0.59	7	7
UCD	CHU-SB11	0	0	360	34.5	907	10.44	26.29	7	7
PFG	CHU-SB11	5	5	121	22.4	25.8	5.40	1.15	7	7
PFG	CHU-SB11	8	8	58.8	26.3	22.2	2.24	0.84	7	7
PFG	CHU-SB11	10	10	58.8	28.4	13.8	2.07	0.49	7	7
PFG	CHU-SB11	14	14	37.8	25.3	16.5	1.49	0.65	7	7
UCD	CHU-SB12	0	0	344	30.8	184	11.17	5.97	7	7
PFG	CHU-SB12	5	5	422	29.4	371	14.35	12.62	7	7
PFG	CHU-SB12	10	10	59.9	20.7	14.5	2.89	0.70	7	7
PFG	CHU-SB12	14.5	14.5	41	27.7	18.6	1.48	0.67	7	7
UCD	CHU-SB13	0	0	256	26.9	206	9.52	7.66	7	7
UCD	CHU-SB13	2.5	2.5	458	41.6	70.8	11.01	1.70	7	7
Brown Clay	CHU-SB13	5	5	46.4	28	12.5	1.66	0.45	7	7
PFG	CHU-SB13	10	10	49.5	25	11.9	1.98	0.48	7	7
PFG	CHU-SB13	15	15	126	26.5	29.6	4.76	1.12	7	7
UCD	CHU-SB14	0	0	348	47.6	257	7.31	5.40	7	7
PFG	CHU-SB14	3.5	3.5	71.9	26.7	37.5	2.69	1.40	7	7
PFG	CHU-SB14	5	5		24.1	19.3		0.80		
PFG	CHU-SB14	10	10		23.9	16.5		0.69		
UCD	CHU-SB15	0	0	410	34.3	297	11.95	8.66	7	7
Hickey Cgl	CHU-SB15	2	2	58.8	26.3	15.9	2.24	0.61	7	7
UCD	DAM-SB01	0	0	448	65.7	169	6.82	2.57	7	7
UCD	DAM-SB01	5	5	1080	86.5	620	12.49	7.17	5	5
HS Tailings (reworked)	DAM-SB01	10	10	31800	111	45900	286.49	413.51	1	1
UCD	DAM-SB02	0	0	396	54.2	110	7.31	2.03	7	7
HS Tailings (undisturbed)	DAM-SB02	6	6	807	73.3	758	11.01	10.34	4	6
HS Tailings (undisturbed)	DAM-SB02	11	11	1250	81.6	228	15.32	2.79	7	7
HS Tailings (undisturbed)	DAM-SB02	12.5	12.5	1540	138	694	11.16	5.03	5	6
UCD	DAM-SB03	0	0	507	69.6	93.3	7.28	1.34	7	7
UCD	DAM-SB03	5	5	1160	99.6	233	11.65	2.34	7	7

TABLE I-5

Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

		BIN Ranges (> than)								
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
HS Tailings (reworked)	DAM-SB03	13.5	13.5	1050	71.7	2220	14.64	30.96	1	4
HS Tailings (reworked)	DAM-SB03	20	20	3110	74.6	985	41.69	13.20	2	2
LCD	DAM-SB03	27	27	391	65.8	74.5	5.94	1.13	7	7
UCD	DAM-SB04	0	0	1190	345	6730	3.45	19.51	1	7
HS Tailings (reworked)	DAM-SB04	5	5	480	41.7	321	11.51	7.70	7	7
HS Tailings (reworked)	DAM-SB04	6	6	839	432	1240	1.94	2.87	3	7
HS Tailings (undisturbed)	DAM-SB04	10	10	492	72.6	139	6.78	1.92	7	7
HS Tailings (undisturbed)	DAM-SB04	15	15	2900	4260	332	0.68	0.08	7	7
UCD	DAM-SB05	0	0	997	78.9	362	12.64	4.59	7	7
HS Tailings (reworked)	DAM-SB05	5	5	783	53	2600	14.77	49.06	4	4
HS Tailings (reworked)	DAM-SB05	7.5	7.5	12600	402	4410	31.34	10.97	1	1
HS Tailings (reworked)	DAM-SB05	10	10	5500	77.5	4660	70.97	60.13	1	1
HS Tailings (undisturbed)	DAM-SB05	12.5	12.5	387	67.6	126	5.73	1.86	7	7
HS Tailings (undisturbed)	DAM-SB06	0	0	547	58.4	154	9.37	2.64	7	7
HS Tailings (undisturbed)	DAM-SB06	5	5	330	54.5	127	6.06	2.33	7	7
HS Tailings (undisturbed)	DAM-SB06	10	10	740	69	685	10.73	9.93	5	6
HS Tailings (undisturbed)	DAM-SB06	15	15	429	55.8	1310	7.69	23.48	7	7
HS Tailings (undisturbed)	DAM-SB06	18.5	18.5	2010	71.6	183	28.07	2.56	7	7
HS Tailings (undisturbed)	DAM-SB06	23	23	1130	136	557	8.31	4.10	6	7
HS Tailings (undisturbed)	DAM-SB06	26	26	1300	51.9	57.6	25.05	1.11	7	7
Smelter	STS-SB01	0	0	317	2370	122	0.13	0.05	7	7
Brown Clay	STS-SB01	5	5	522	36.4	20.7	14.34	0.57	7	7
Hickey Cgl	STS-SB01	10	10	45.3	24.1	20.7	1.88	0.86	7	7
Smelter	STS-SB02	0	0	316	77.6	291	4.07	3.75	7	7
Brown Clay	STS-SB02	4	4	451	42.3	16.5	10.66	0.39	7	7
Hickey Cgl	STS-SB02	10	10	37.8	26.3	18.6	1.44	0.71	7	7
Smelter	STS-SB03	0	0	419	77.1	215	5.44	2.79	7	7
Smelter	STS-SB03	4	4	378	95.3	29.6	3.97	0.31	7	7
Smelter	STS-SB04	0	0	330	75.1	283	4.39	3.77	7	7
Brown Clay	STS-SB04	5	5	1470	222	182	6.62	0.82	7	7
Hickey Cgl	STS-SB04	12	12	39.9	25	14.5	1.60	0.58	7	7
Smelter	STS-SB05	0	0	583	83	188	7.02	2.27	7	7
Smelter	STS-SB05	3	3	1860	121	268	15.37	2.22	7	7
Smelter	STS-SB05	5	5	3120	201	23.6	15.52	0.12	7	7
Brown Clay	STS-SB05	6	6	166	47.5	25.1	3.50	0.53	7	7
Hickey Cgl	STS-SB05	10	10	62.9	45.7	13.4	1.38	0.29	7	7
Smelter	STS-SB06	0	0	150	1020	103	0.15	0.10	7	7
Hickey Cgl	STS-SB06	5	5	79.8	61	18.8	1.31	0.31	7	7
Hickey Cgl	STS-SB06	10	10	52.7	26.5	14.5	1.99	0.55	7	7
Smelter	STS-SB07	0	0	341	60.6	207	5.63	3.42	7	7
Smelter	STS-SB07	1	1	1080	194	56.7	5.57	0.29	7	7
Brown Clay	STS-SB07	3	3	53.7	33	13.2	1.63	0.40	7	7
Hickey Cgl	STS-SB07	5	5	42.1	26.1	17.2	1.61	0.66	7	7
Hickey Cgl	STS-SB07	10	10	57.8	23.4	20.7	2.47	0.89	7	7
Smelter	STS-SB08	0	0	238	718	63.5	0.33	0.09	7	7
Smelter	STS-SB08	5	5	493	69.3	138	7.11	1.99	7	7
Smelter	STS-SB08	9	9	543	134	218	4.05	1.63	7	7
Smelter	STS-SB09	0	0	481	91	218	5.29	2.40	7	7
Smelter	STS-SB09	2.5	2.5	26.1	13.8	0.53				
Smelter	STS-SB09B	0	0	311	71.3	224	4.36	3.14	7	7
Smelter	STS-SB10	0	0	295	68.8	277	4.29	4.03	7	7
Brown Clay	STS-SB10	4.5	4.5	59.9	30.7	20.7	1.95	0.67	7	7

TABLE I-5

**Ranking of Zinc, Copper, Lead Concentration and Ratios -- Sorted by Sample Location**

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

BIN Ranges (> than)										
		Score	Color	Concentration Range						
		1		1000		1000	20	6		
		2		900		900	18	5.5		
		3		800	Not	800	16	5		
		4		700	Used	700	14	4.5		
		5		600		600	12	4		
		6		500		500	10	3.5		
		7		0		0	0	0	Score	
Material Group	Sample ID	Start Depth (feet)	End Depth (feet)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn/Cu (ratio)	Pb/Cu (ratio)	Pb, Zn	Pb, Zn, Zn/Cu, Pb/Cu
PFG	STS-SB10	7	7	61.9	30.1	21.4	2.06	0.71	7	7
PFG	STS-SB10	10	10	144	25.5	11.3	5.65	0.44	7	7
Hickey Cgl	STS-SB10	12	12	47.4	29.1	14.5	1.63	0.50	7	7
Smelter	STS-SB11	0	0	650	103	79.2	6.31	0.77	7	7
Hickey Cgl	STS-SB11	2	2	39.9	29.7	12.5	1.34	0.42	7	7
Hickey Cgl	STS-SB11	5	5		26.3	13.8		0.53		
HSCD	STS-SB12	0	0	631	69	377	9.15	5.46	7	7
HSCD	STS-SB12	1	1	293	87.8	19.3	3.34	0.22	7	7
Smelter	STS-SB12	5.5	5.5	587	70.9	346	8.28	4.88	7	7
Brown Clay	STS-SB12	9	9	57.5	43.5	9.6	1.32	0.22	7	7
LCD	STS-SB12	16	16	260	29.2	20	8.90	0.69	7	7
Smelter	STS-SB13	0	0	516	47.3	318	10.91	6.72	7	7
Smelter	STS-SB13	3	3	221	55.8	175	3.96	3.14	7	7
Smelter	STS-SB13	4.5	4.5		73.4	21.4		0.29		
Smelter	STS-SB13	9	9	675	102	18.6	6.62	0.18	7	7
Brown Clay	STS-SB14	0	0	52.7	27.7	14.5	1.90	0.52	7	7
Smelter	STS-SB15	0	0	478	77.2	364	6.19	4.72	7	7
Smelter	STS-SB15	5	5	741	152	27.3	4.88	0.18	7	7
HSCD	STS-SB15	6	6	354	2510	76	0.14	0.03	7	7
Smelter	STS-SB15	10	10	1540	190	14.5	8.11	0.08	7	7
Smelter	STS-SB15	15	15	391	62.5	29.6	6.26	0.47	7	7
Smelter	STS-SB15	20	20	495	53.5	26.6	9.25	0.50	7	7
PFG	STS-SB15	25	25	51.6	31	13.8	1.67	0.45	7	7
Smelter	STS-SB15B	0	0	313	79.1	310	3.96	3.92	7	7
HSCD	STS-SB15B	8	8	550	94.9	313	5.80	3.30	7	7
Smelter	STS-SB15B	10	10	228	49.8	22.9	4.58	0.46	7	7

Notes:

Cu = Copper

 Not Detected

HSCD = Humboldt Smelter Channel Deposit

HS = Humboldt Smelter

IKM = Iron King Mine

LCD = Lowermost Channel Deposit

mg/kg = milligrams per kilogram

Pb = Lead

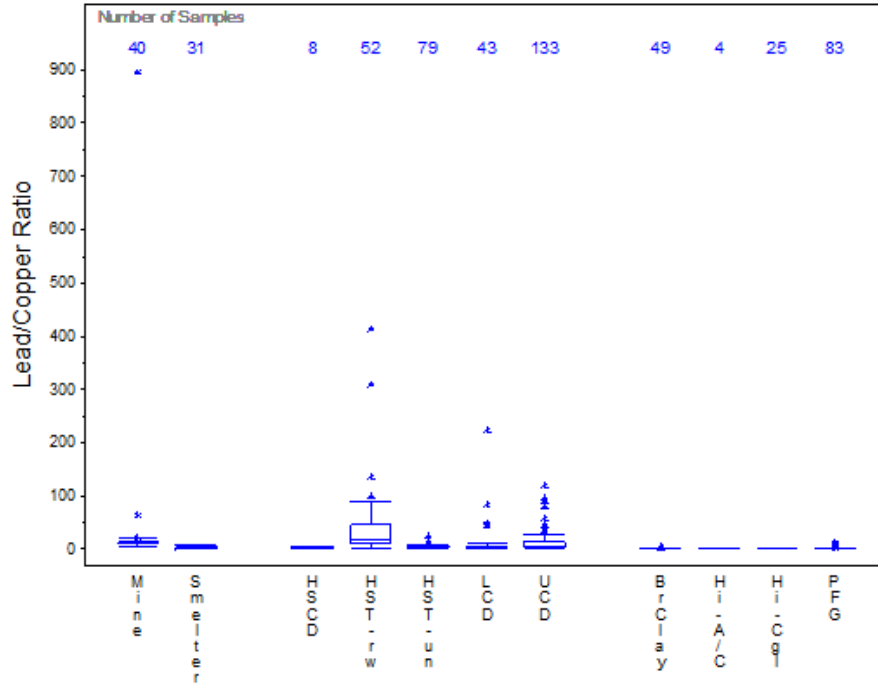
PFG = Principle Fluvial Gravels

UCD = Uppermost Channel Deposit

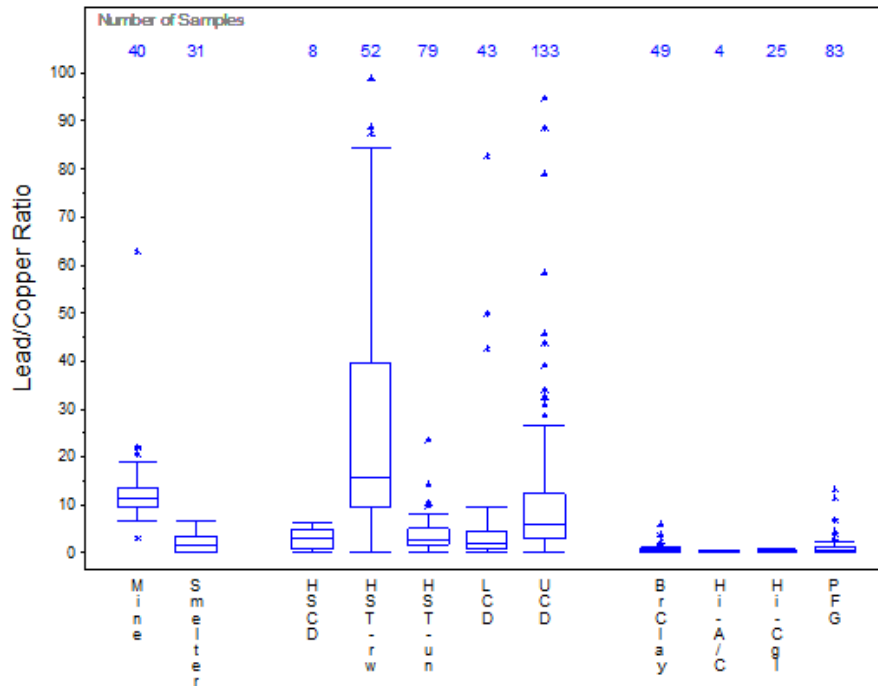
Zn= Zinc

Figures

Box and Whisker Plots for Lead/Copper Ratios



Box and Whisker Plots for Lead/Copper Ratios <100



Units Suspected to be Impacted

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

Native Material Units

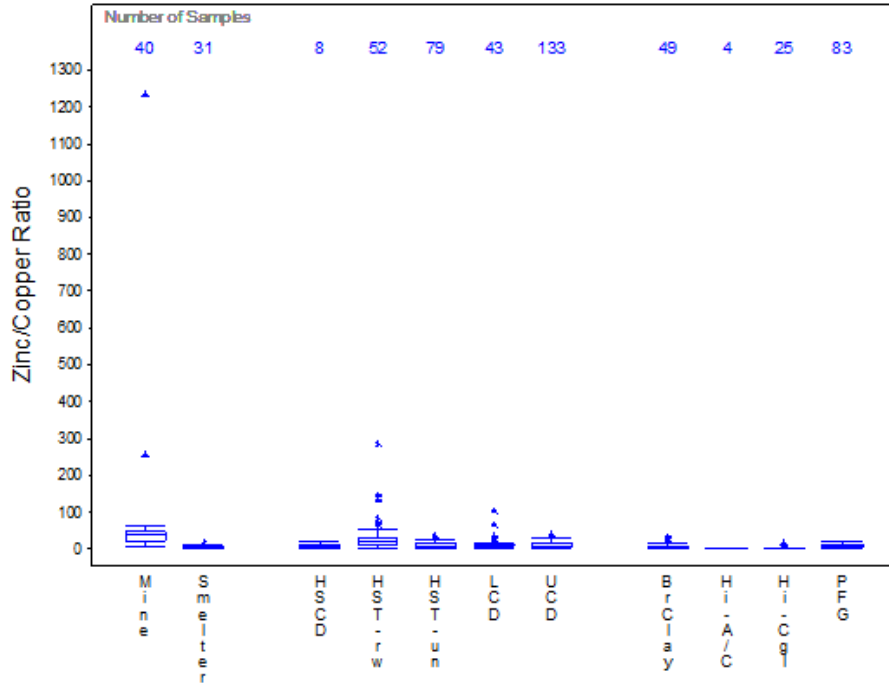
- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

**Figure I-1a**

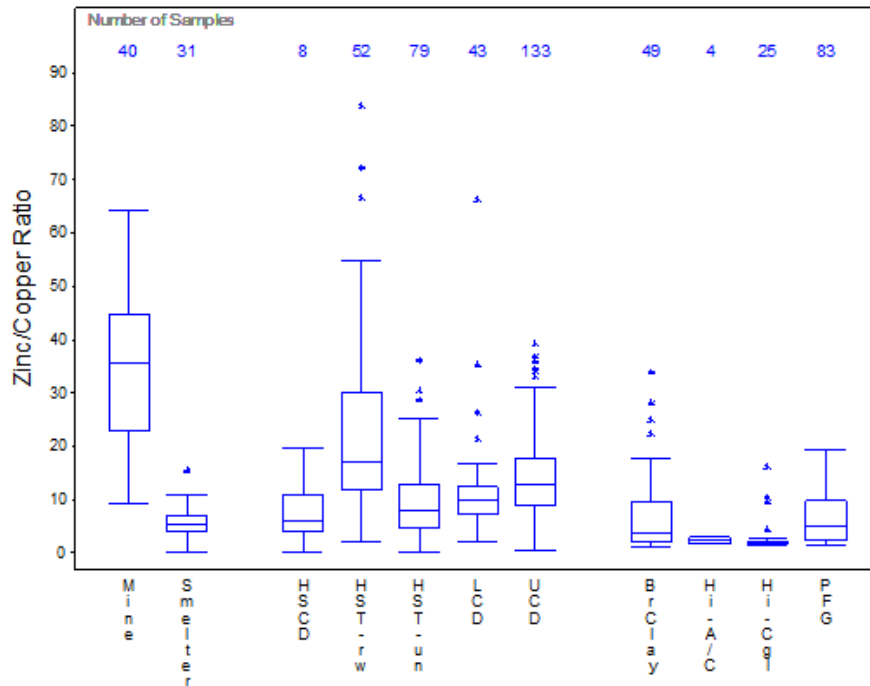
**Box and Whisker Plots for Lead/Copper Ratios**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



Box and Whisker Plots for Zinc/Copper Ratios



Box and Whisker Plots for Zinc/Copper Ratios <100



Units Suspected to be Impacted

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

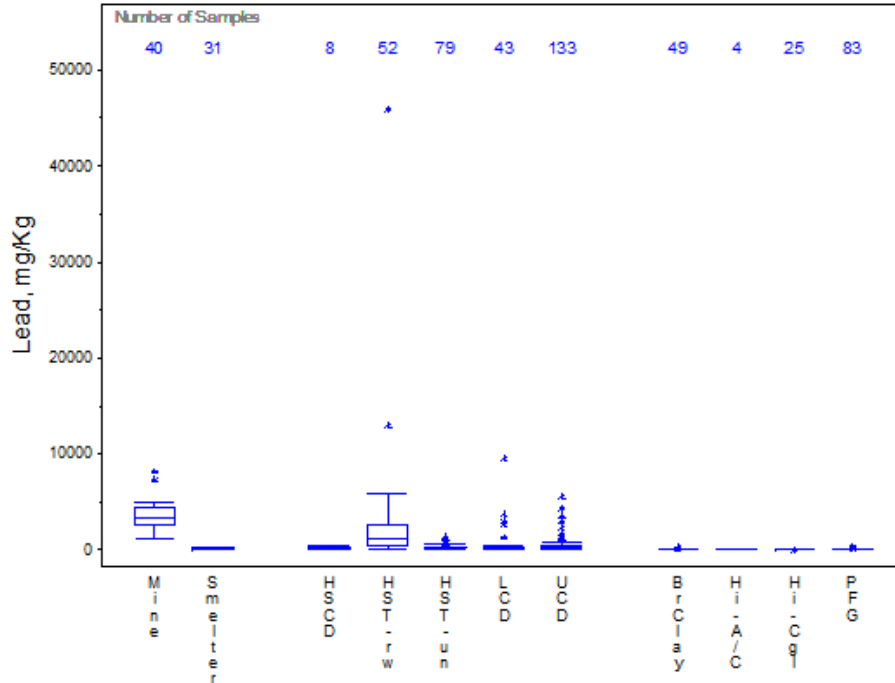
Native Material Units

- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

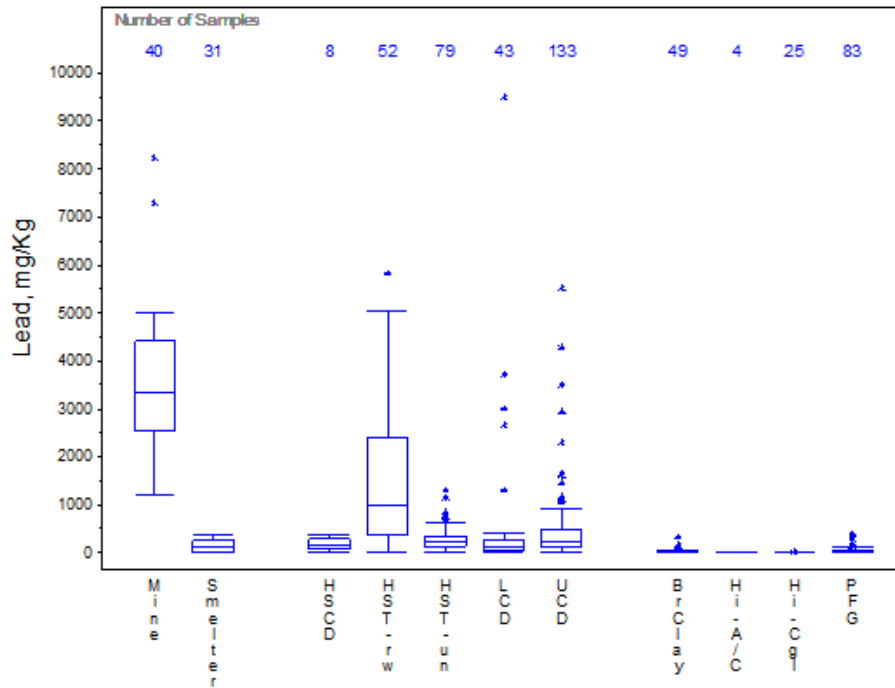
**Figure I-1b**

**Box and Whisker Plots for Zinc/Copper Ratios**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

Box and Whisker Plots for Lead Concentrations



Box and Whisker Plots for Lead Concentrations <10,000



Units Suspected to be Impacted

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

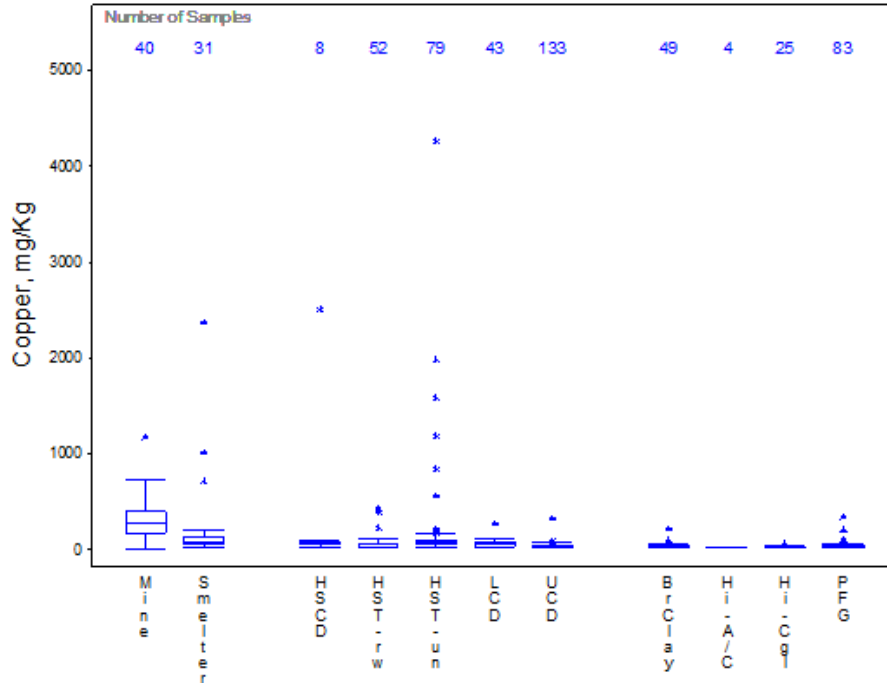
Native Material Units

- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

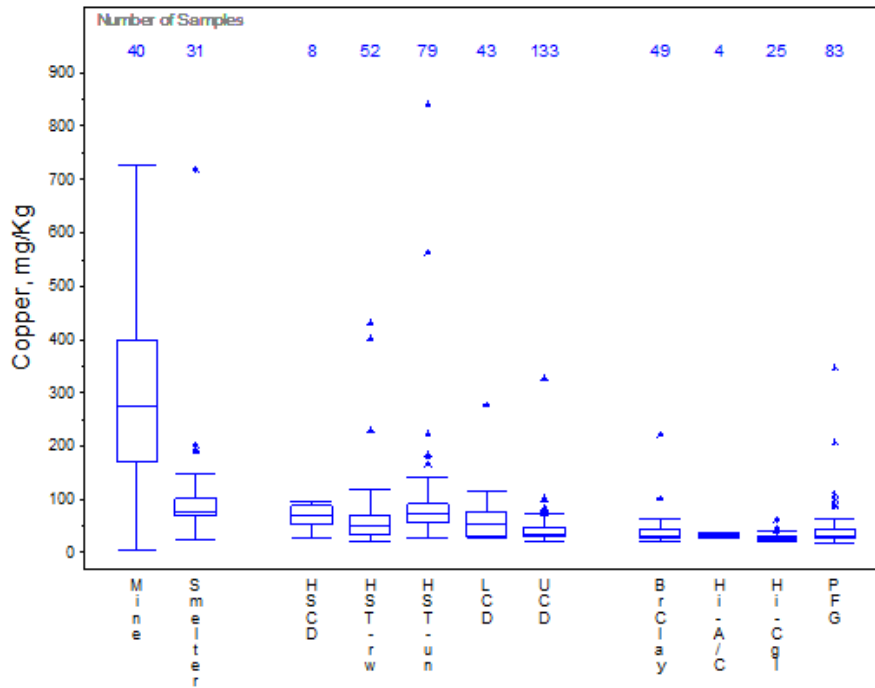
**Figure I-1c**

**Box and Whisker Plots for Lead Concentrations**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

Box and Whisker Plots for Copper Concentrations



Box and Whisker Plots for Copper Concentrations <1,000

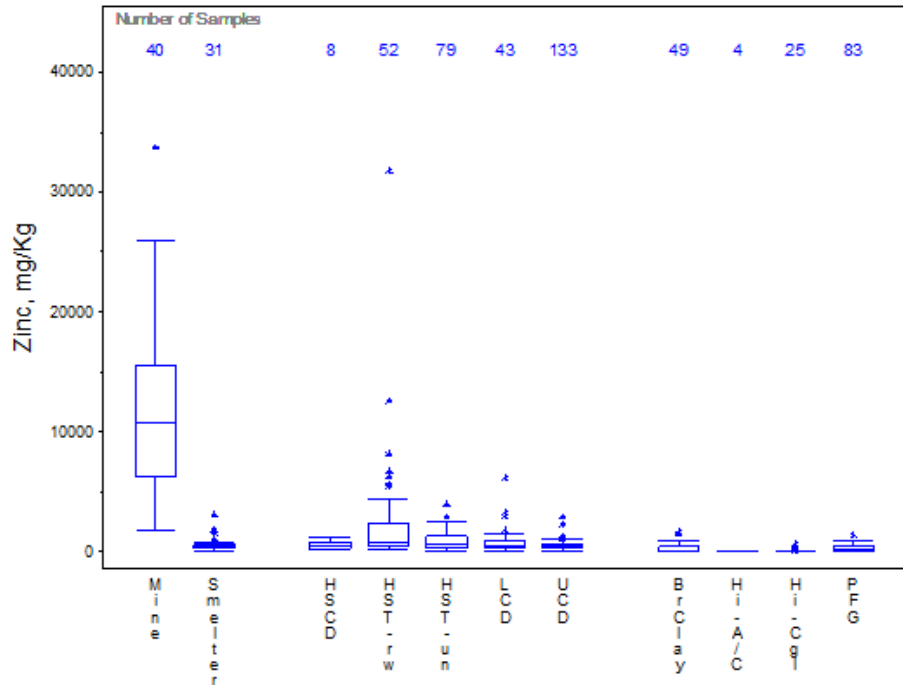


Units Suspected to be Impacted  
 HSCD = HSCD  
 HST(rw) = HS Tailings (reworked)  
 HST(un) = HS Tailings (undisturbed)  
 LCD = LCD  
 UCD = UCD

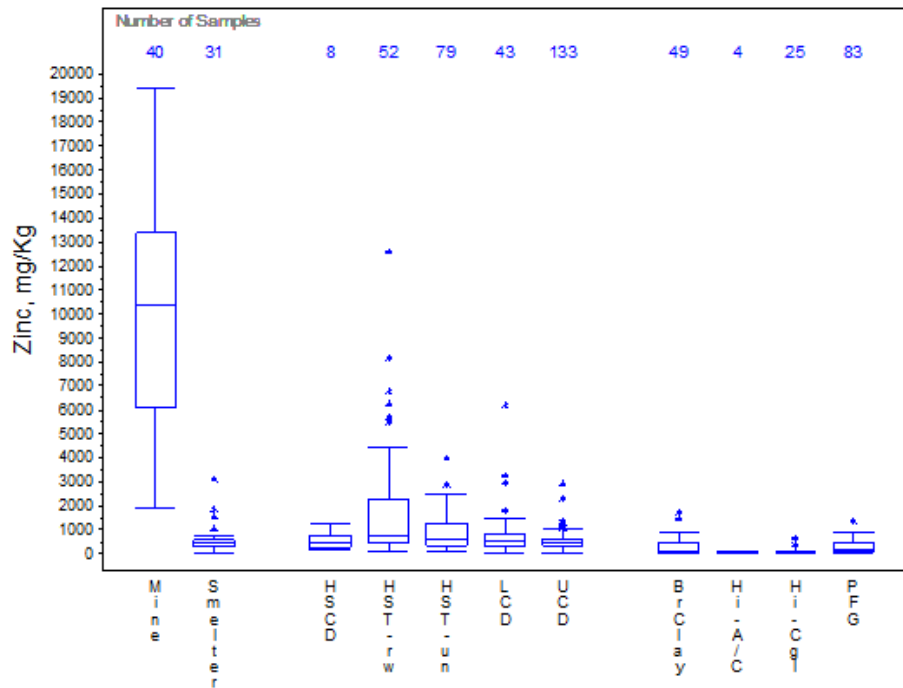
Native Material Units  
 BrClay = Brown Clay  
 Hi(A/C) = Hickey Ash/Cinder  
 Hi(Cgl) = Hickey Cgl  
 PFG = PFG

**Figure I-1d**  
**Box and Whisker Plots for Copper Concentrations**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

Box and Whisker Plots for Zinc Concentrations



Box and Whisker Plots for Zinc Concentrations <20,000

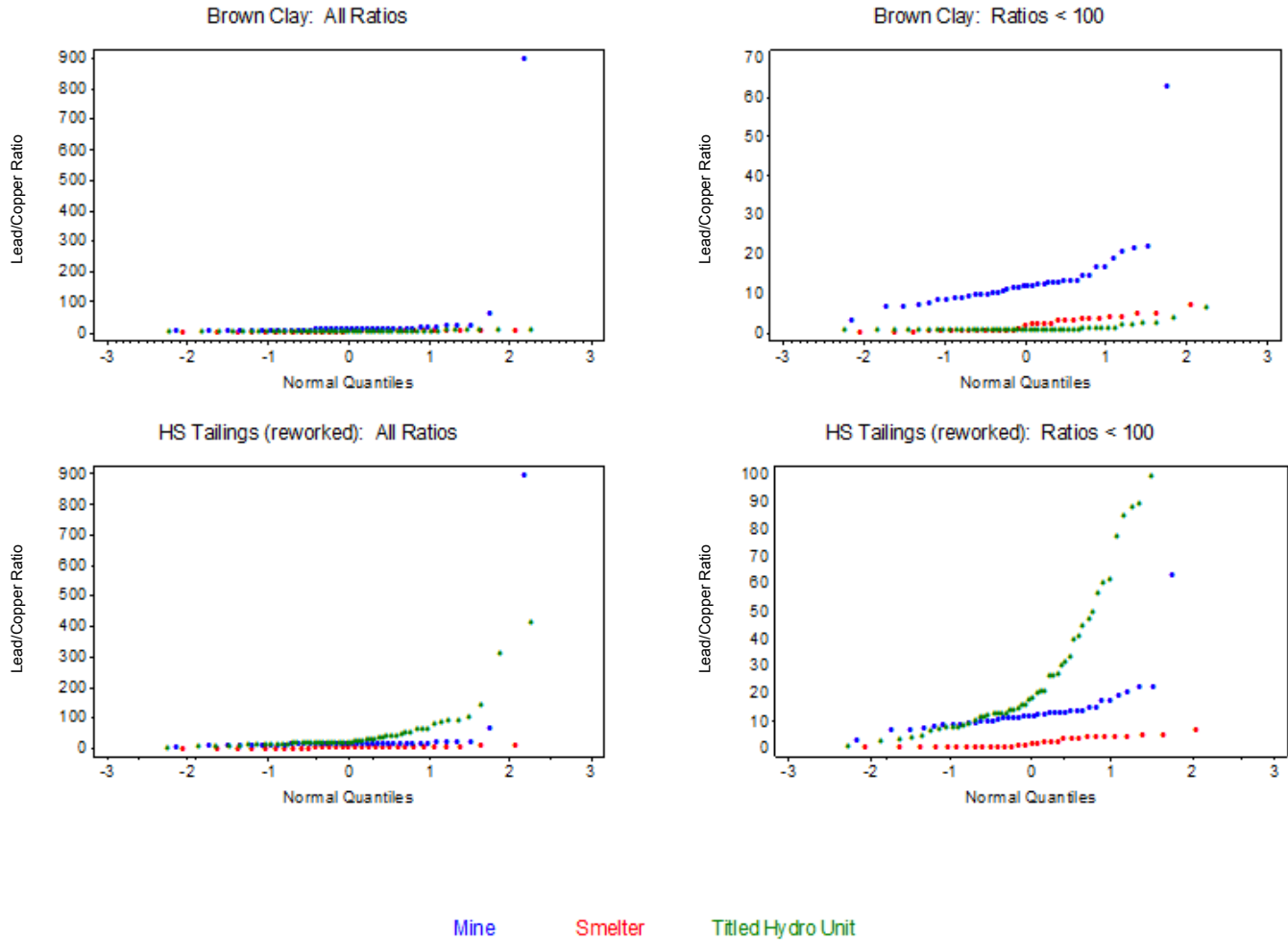


Units Suspected to be Impacted  
 HSCD = HSCD  
 HST(rw) = HS Tailings (reworked)  
 HST(un) = HS Tailings (undisturbed)  
 LCD = LCD  
 UCD = UCD

Native Material Units  
 BrClay = Brown Clay  
 Hi(A/C) = Hickey Ash/Cinder  
 Hi(Cgl) = Hickey Cgl  
 PFG = PFG

**Figure I-1e**  
**Box and Whisker Plots for Zinc Concentrations**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

## Probability Plots for Lead/Copper Ratios



**Figure I-2a**

**Probability Plots for Lead/Copper Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona*

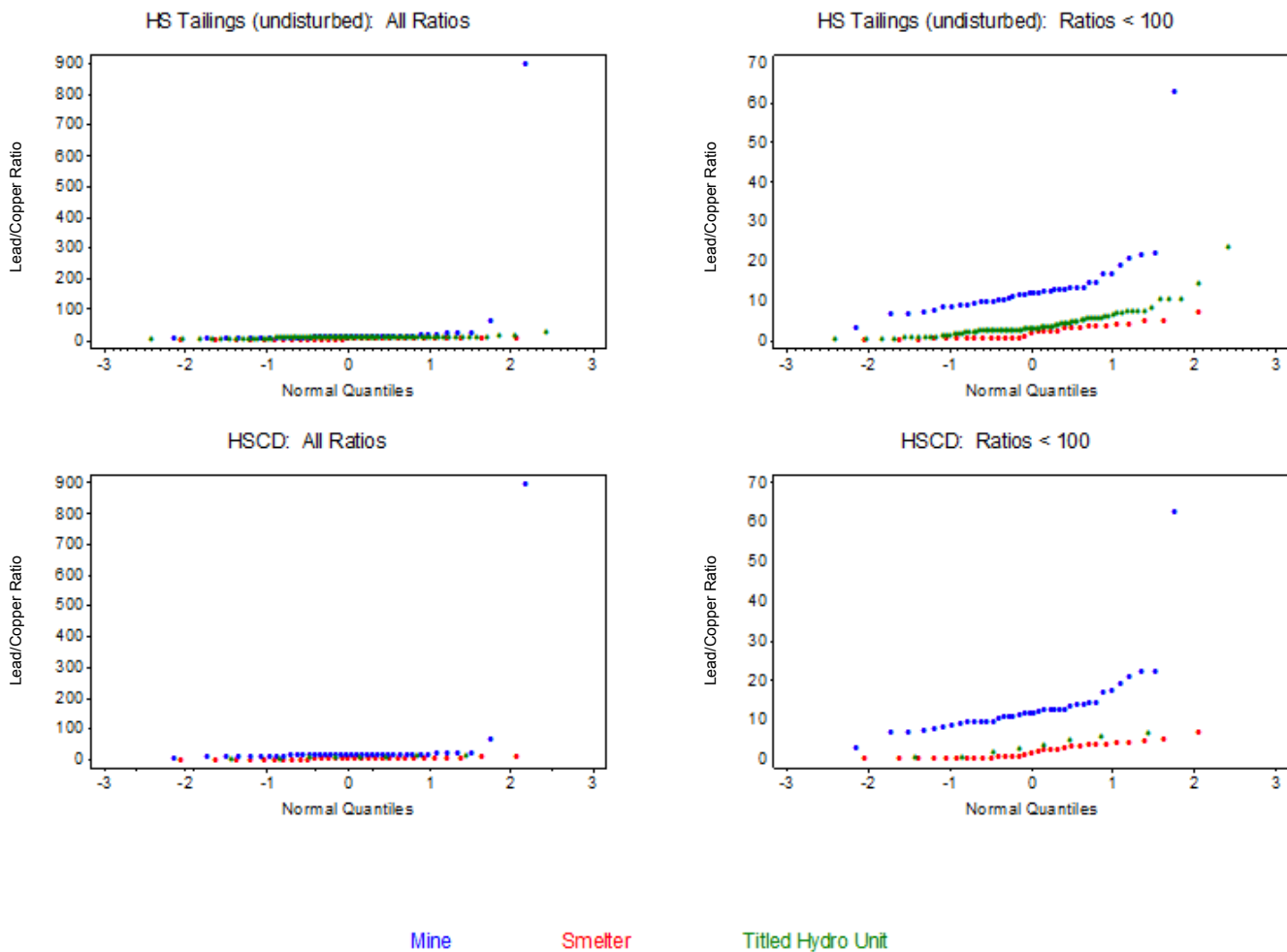
Units Suspected to be Impacted

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

Native Material Units

- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

## Probability Plots for Lead/Copper Ratios



**Figure I-2b**

**Probability Plots for Lead/Copper Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona*

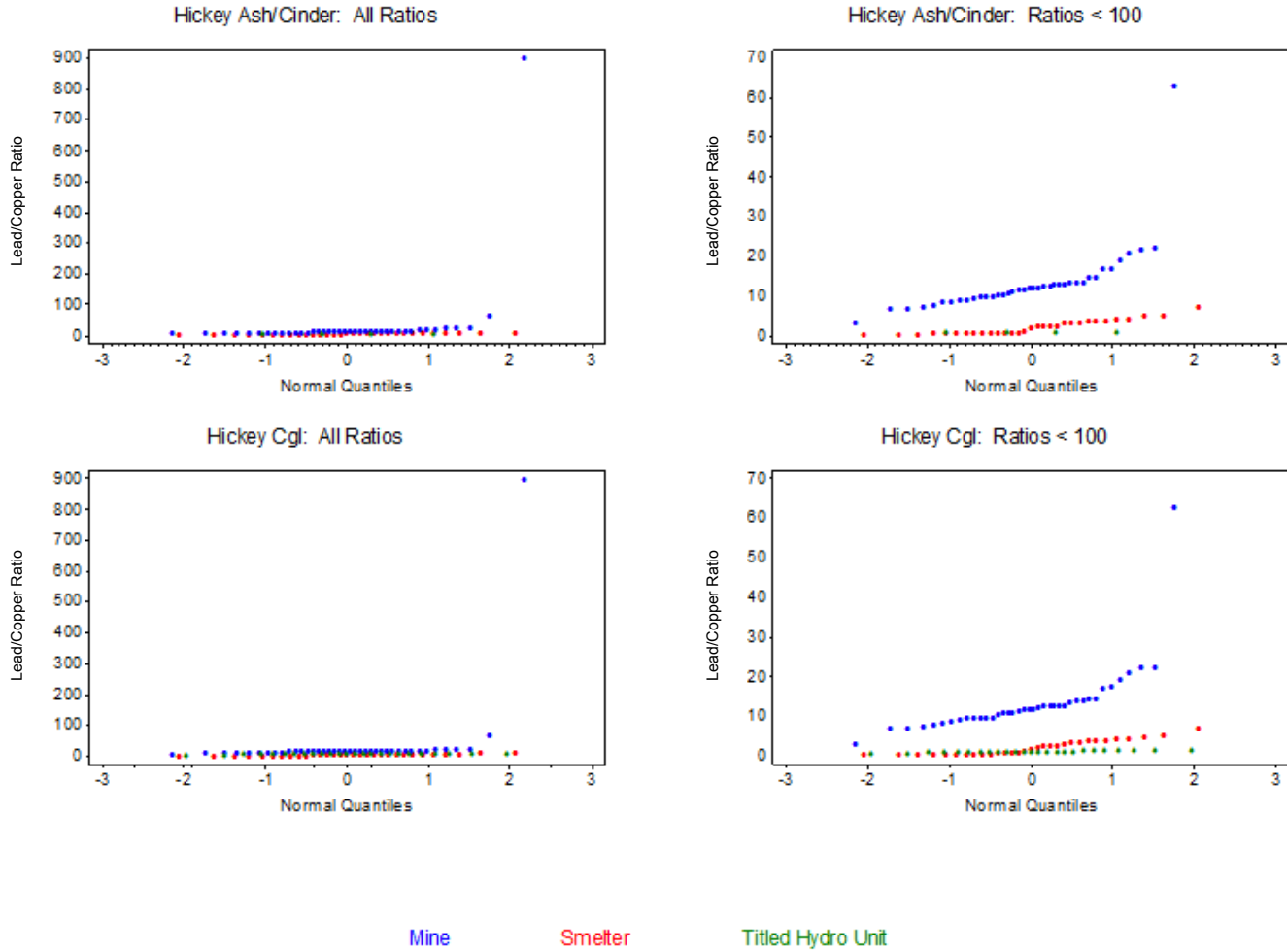
**Units Suspected to be Impacted**

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

**Native Material Units**

- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

## Probability Plots for Lead/Copper Ratios



**Figure I-2c**  
**Probability Plots for Lead/Copper Ratios**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

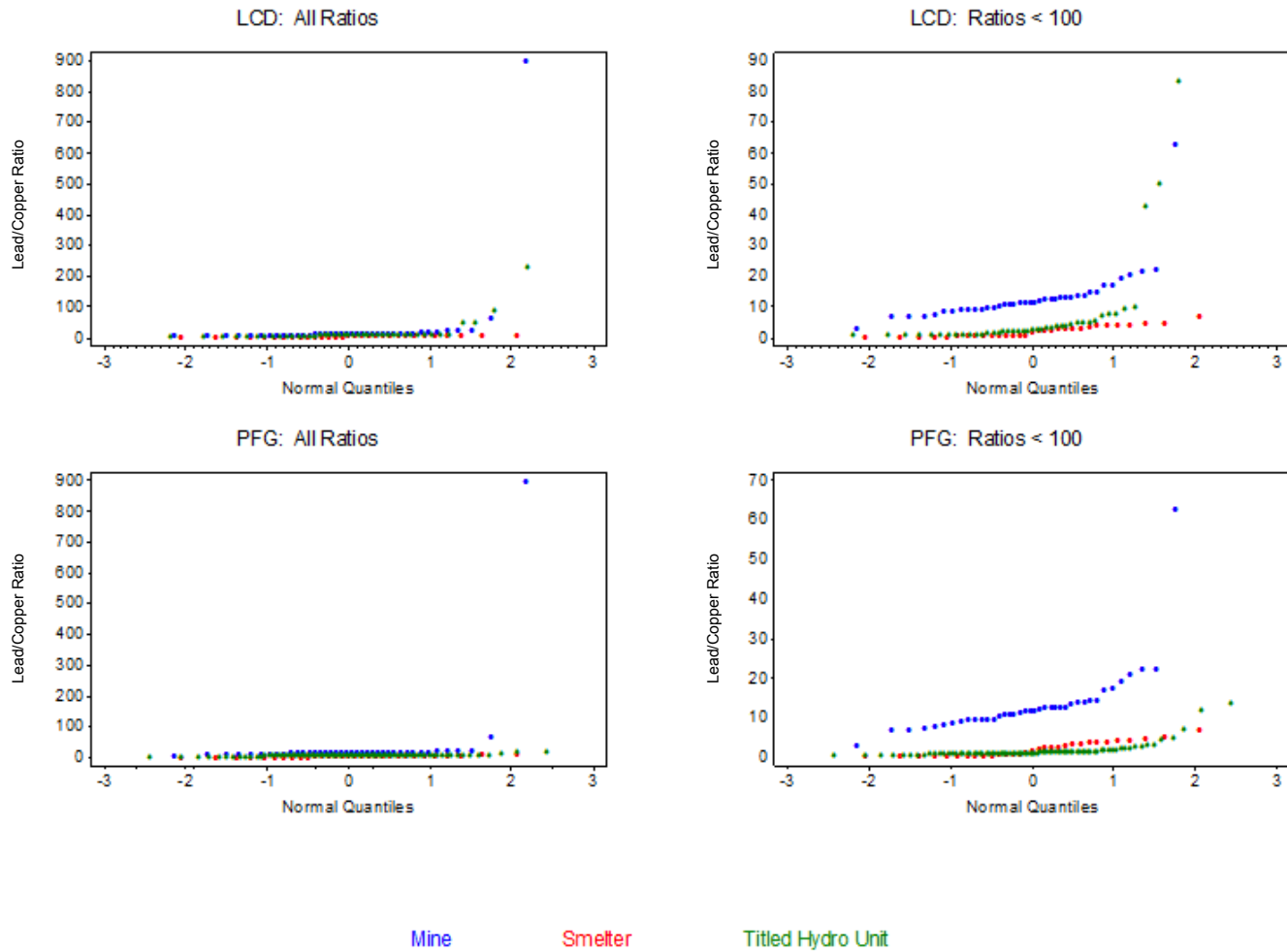
**Units Suspected to be Impacted**

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

**Native Material Units**

- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

## Probability Plots for Lead/Copper Ratios



**Units Suspected to be Impacted**

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

**Native Material Units**

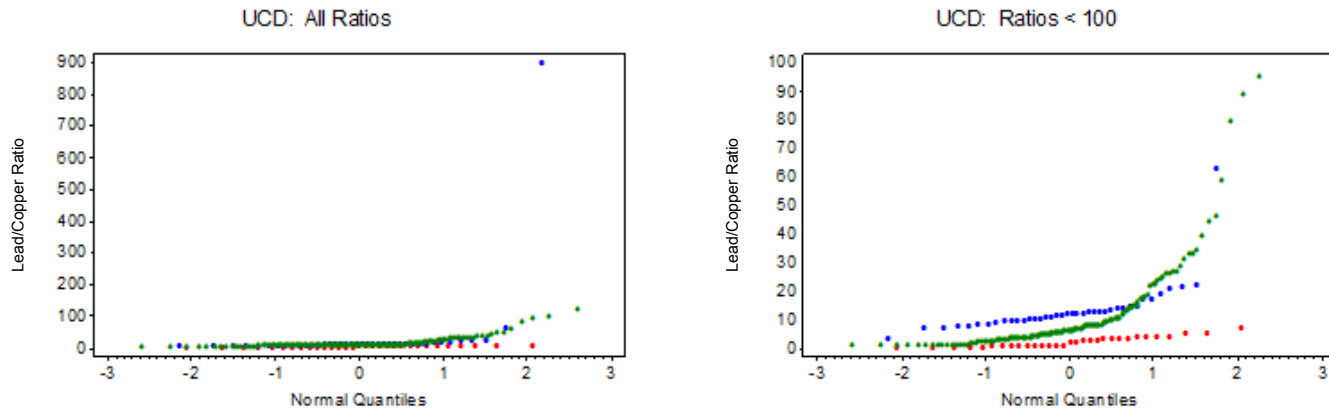
- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

**Figure I-2d**

**Probability Plots for Lead/Copper Ratios**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*



## Probability Plots for Lead/Copper Ratios



Mine

Smelter

Titled Hydro Unit

**Units Suspected to be Impacted**

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

**Native Material Units**

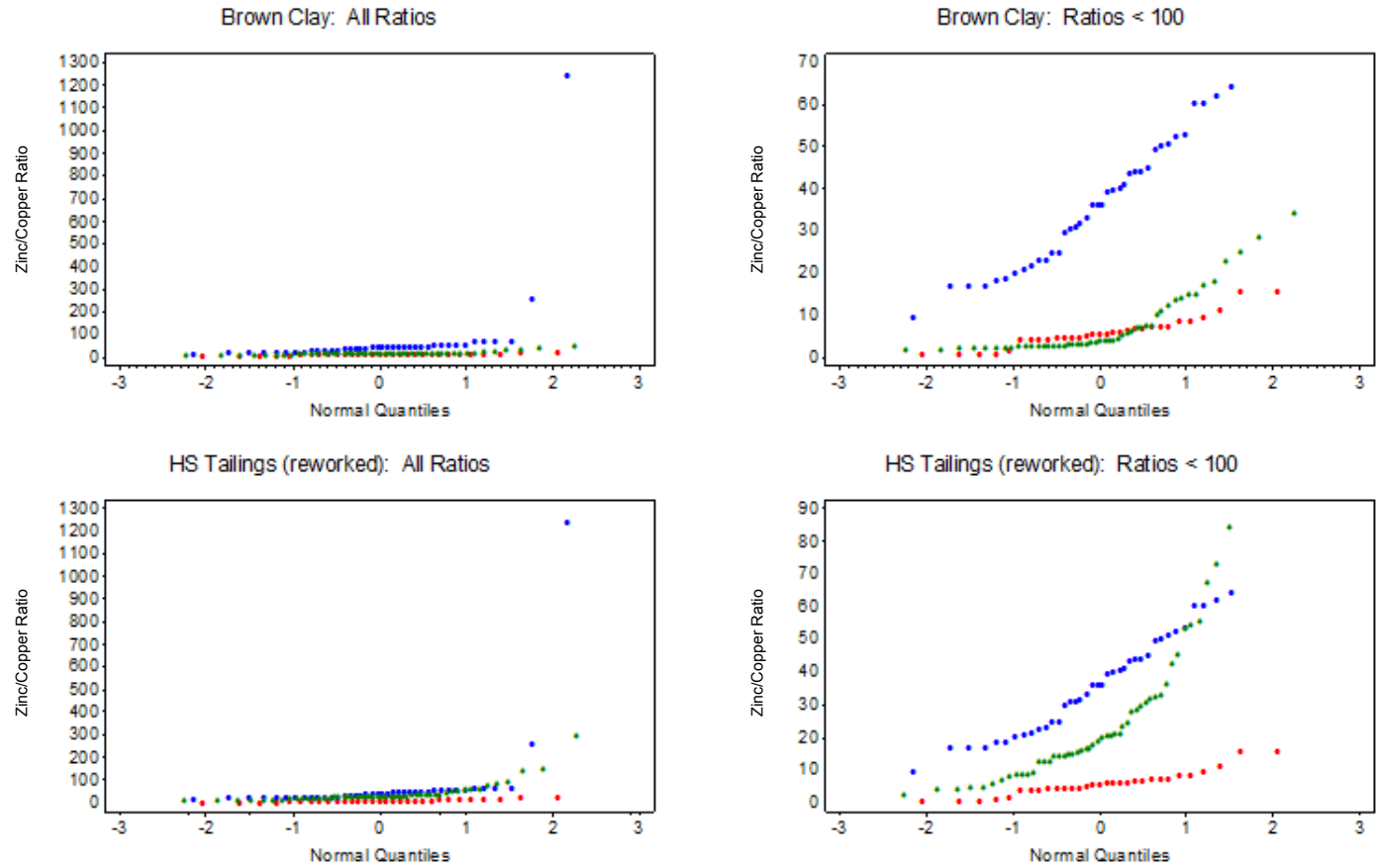
- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

**Figure I-2e**

**Probability Plots for Lead/Copper Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona*

## Probability Plots for Zinc/Copper Ratios



Mine     Smelter     Titled Hydro Unit

**Units Suspected to be Impacted**

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

**Native Material Units**

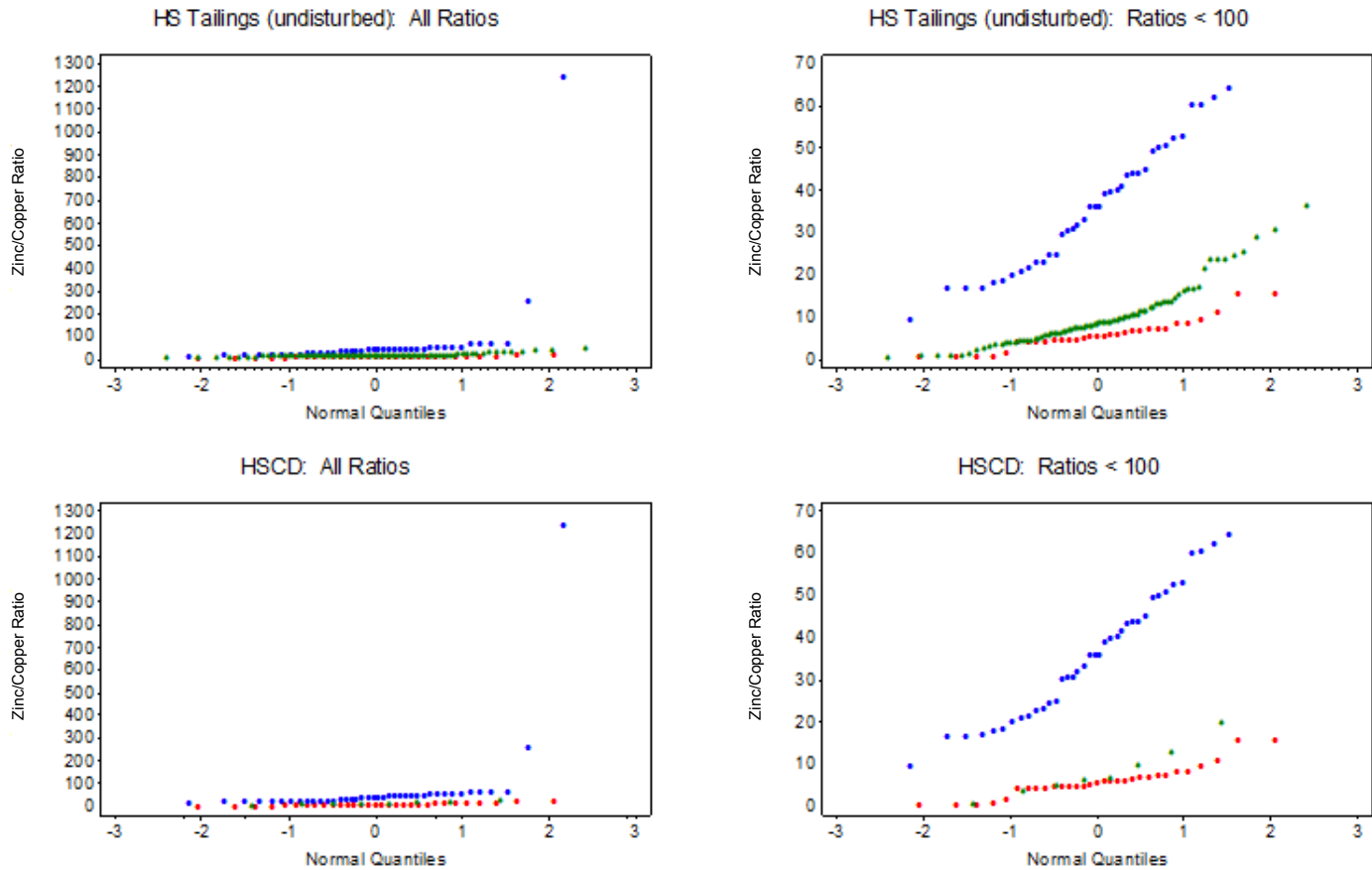
- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

**Figure I-3a**

**Probability Plots for Zinc/Copper Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona*

## Probability Plots for Zinc/Copper Ratios



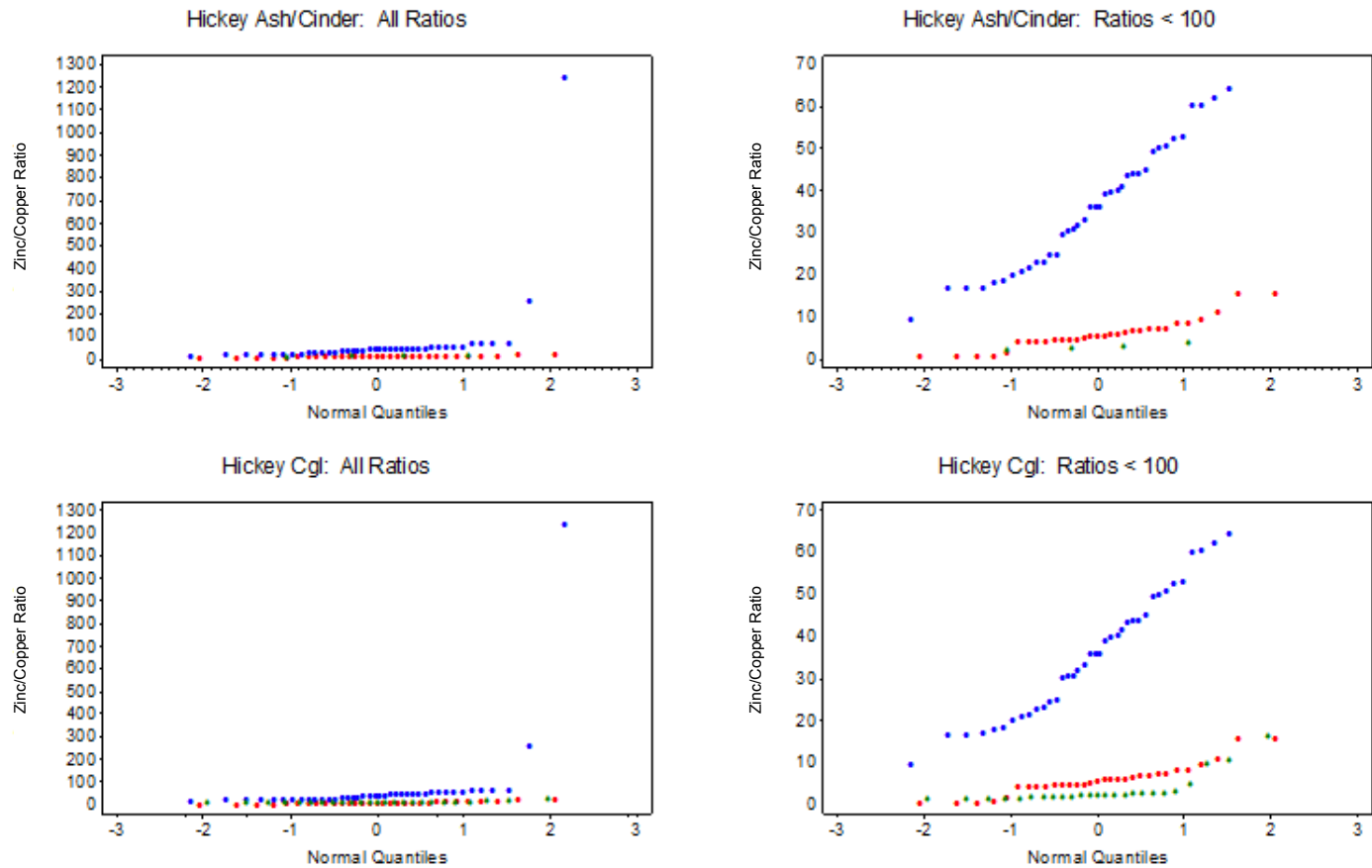
Mine     
 Smelter     
 Titled Hydro Unit

Units Suspected to be Impacted  
 HSCD = HSCD  
 HST(rw) = HS Tailings (reworked)  
 HST(un) = HS Tailings (undisturbed)  
 LCD = LCD  
 UCD = UCD

Native Material Units  
 BrClay = Brown Clay  
 Hi(A/C) = Hickey Ash/Cinder  
 Hi(Cgl) = Hickey Cgl  
 PFG = PFG

**Figure I-3b**  
**Probability Plots for Zinc/Copper Ratios**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

## Probability Plots for Zinc/Copper Ratios



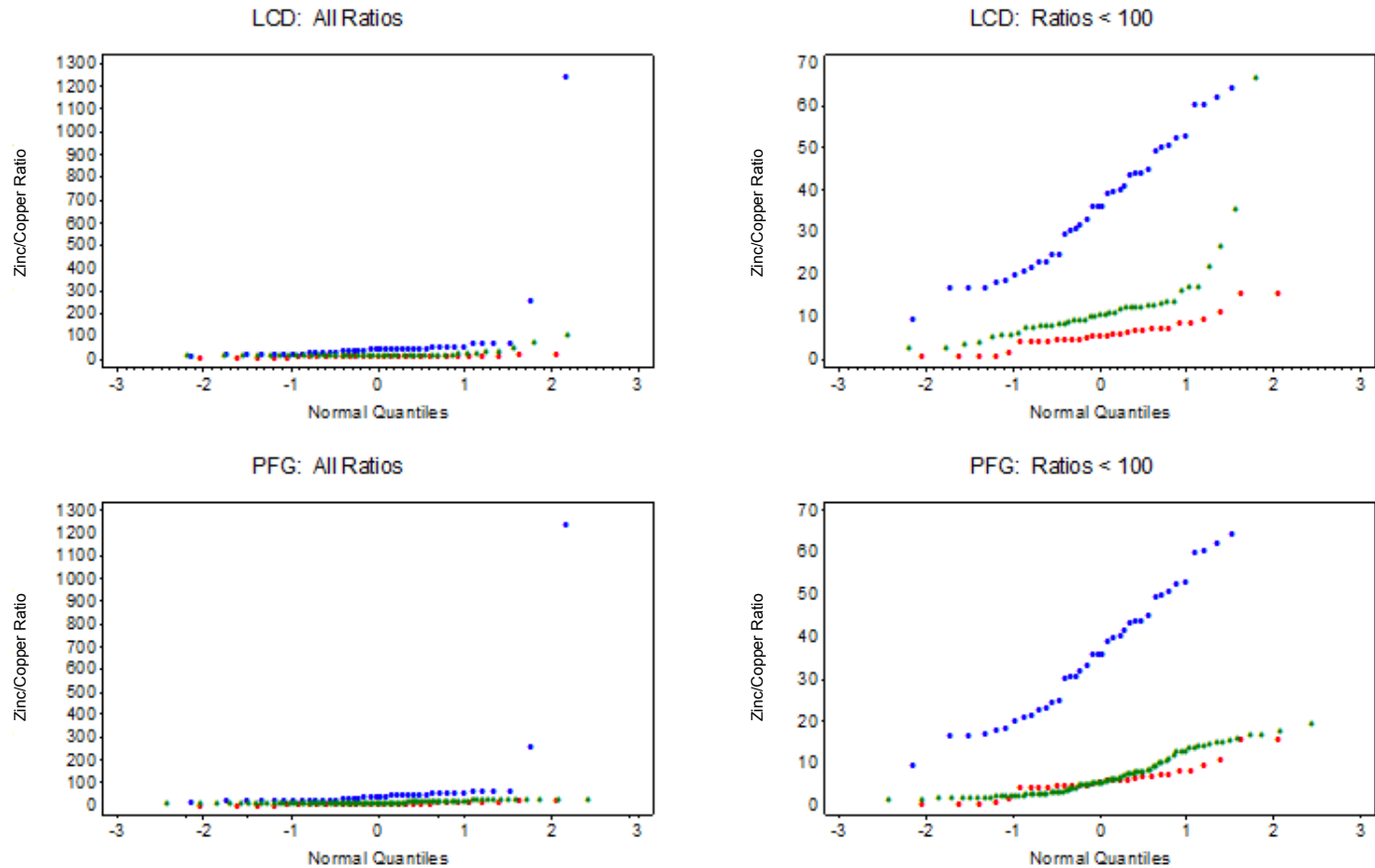
Mine                      Smelter                      Titled Hydro Unit

Units Suspected to be Impacted  
 HSCD = HSCD  
 HST(rw) = HS Tailings (reworked)  
 HST(un) = HS Tailings (undisturbed)  
 LCD = LCD  
 UCD = UCD

Native Material Units  
 BrClay = Brown Clay  
 Hi(A/C) = Hickey Ash/Cinder  
 Hi(Cgl) = Hickey Cgl  
 PFG = PFG

**Figure I-3c**  
**Probability Plots for Zinc/Copper Ratios**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

## Probability Plots for Zinc/Copper Ratios



Mine     
 Smelter     
 Titled Hydro Unit

**Units Suspected to be Impacted**

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

**Native Material Units**

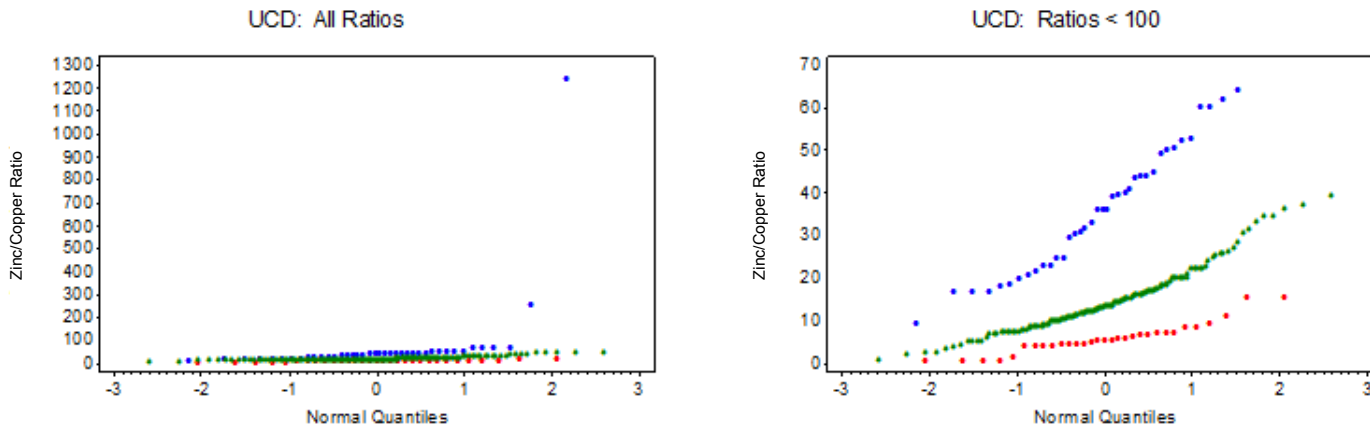
- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

**Figure I-3d**

**Probability Plots for Zinc/Copper Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona*

## Probability Plots for Zinc/Copper Ratios



Mine

Smelter

Titled Hydro Unit

**Units Suspected to be Impacted**

- HSCD = HSCD
- HST(rw) = HS Tailings (reworked)
- HST(un) = HS Tailings (undisturbed)
- LCD = LCD
- UCD = UCD

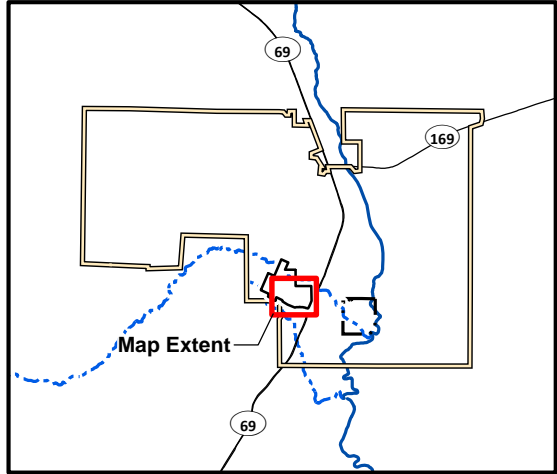
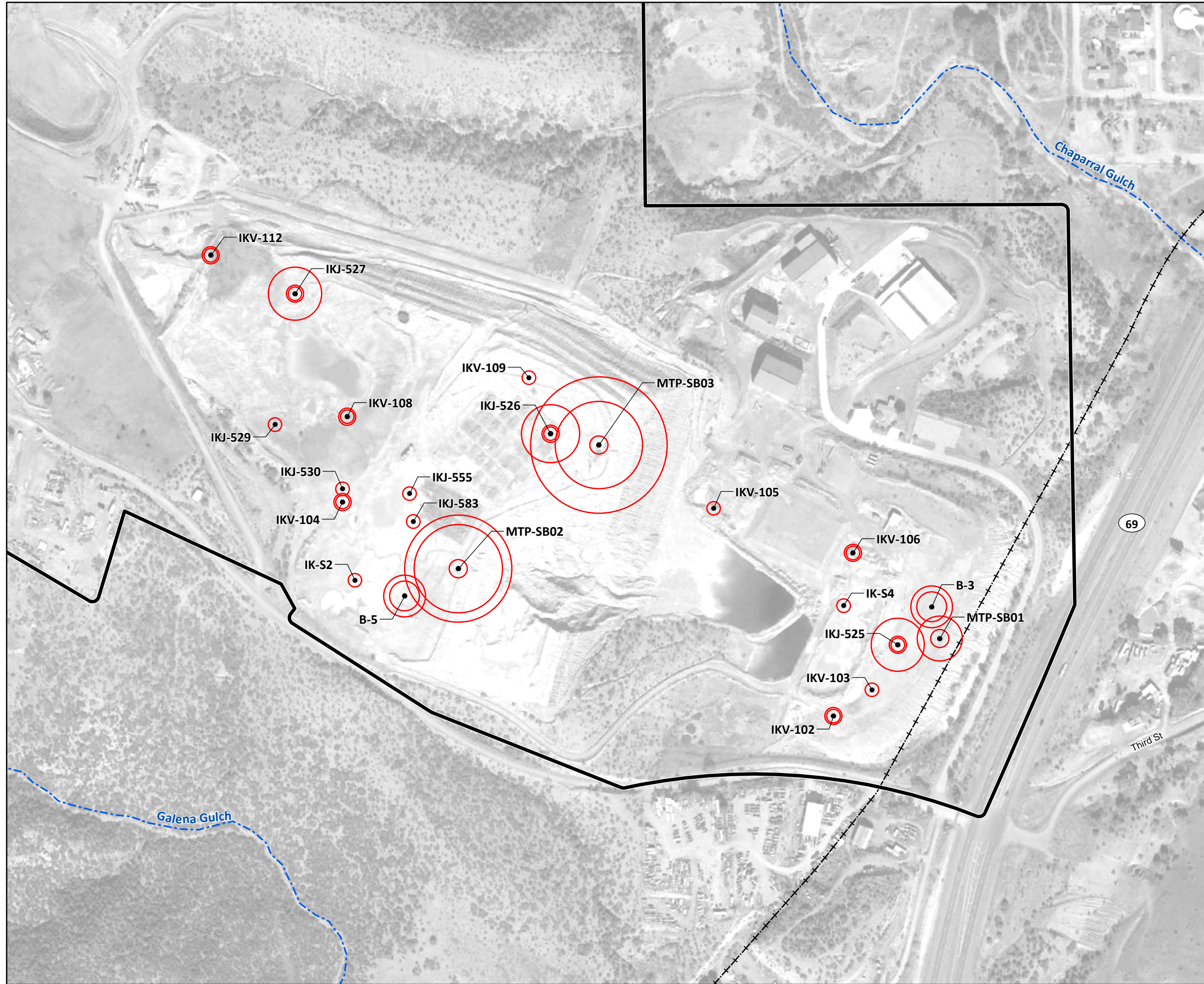
**Native Material Units**

- BrClay = Brown Clay
- Hi(A/C) = Hickey Ash/Cinder
- Hi(Cgl) = Hickey Cgl
- PFG = PFG

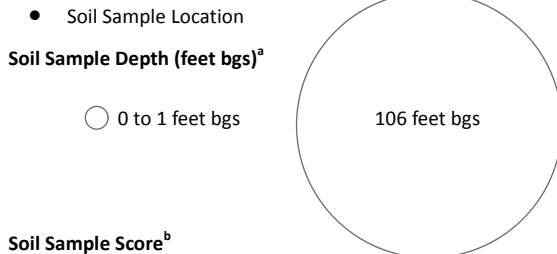
**Figure I-3e**

**Probability Plots for Zinc/Copper Ratios**

*Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona*



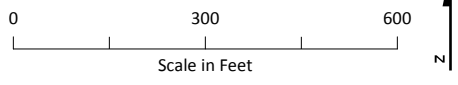
**LEGEND**



**Soil Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	--	--

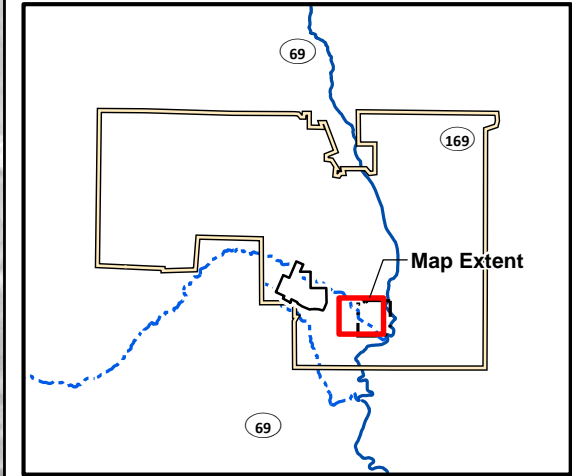
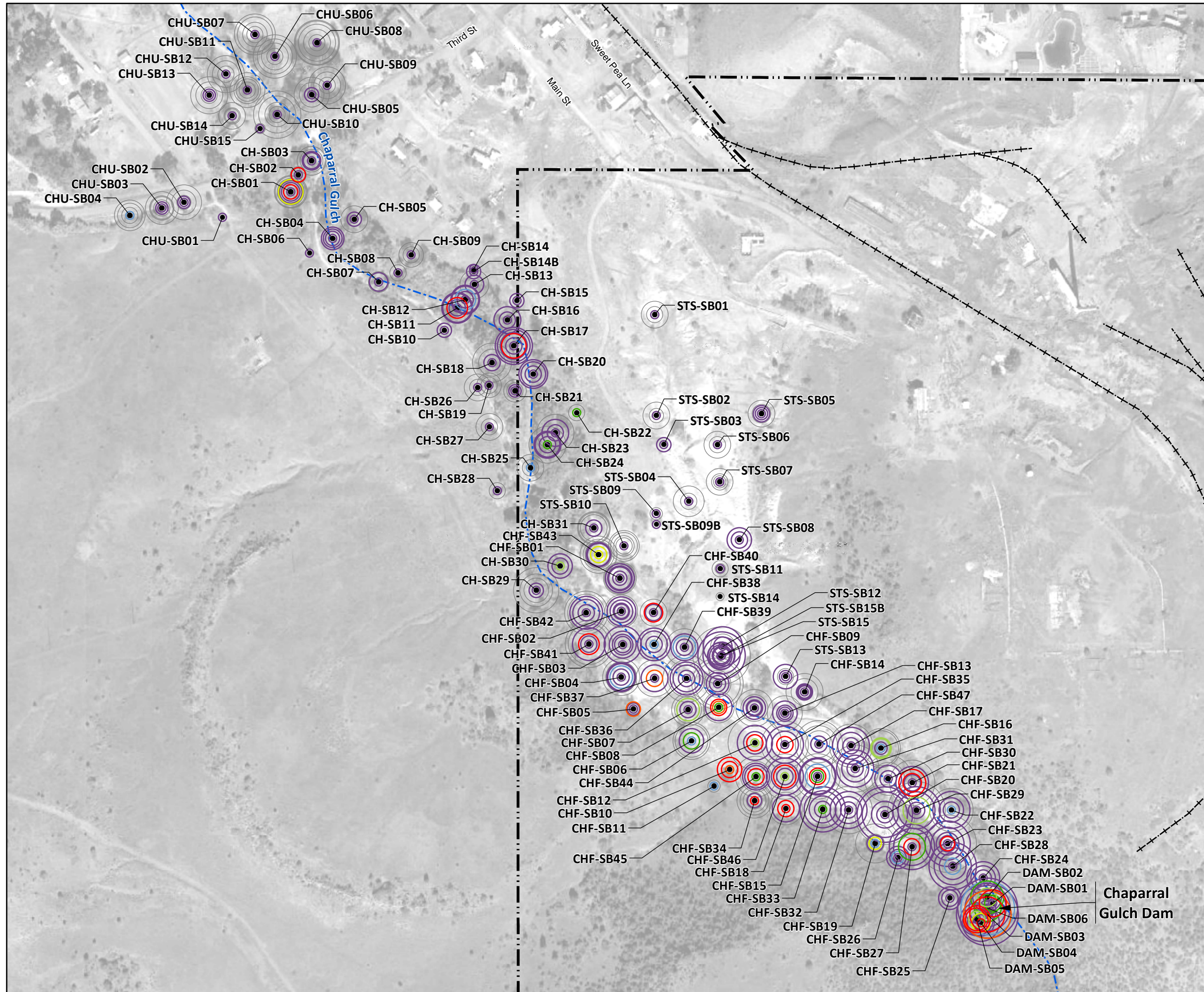
- Historic Rail Line
- River
- - - Intermittent Drainage
- ▭ Former Iron King Mine Property
- ▭ Former Humboldt Smelter Property
- ▭ Dewey-Humboldt Town Boundary



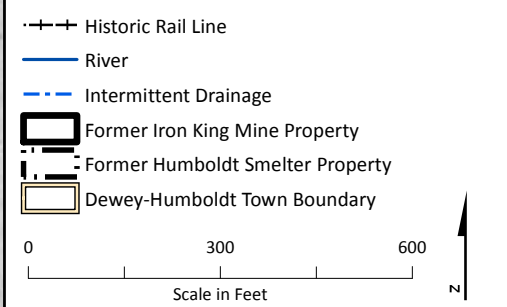
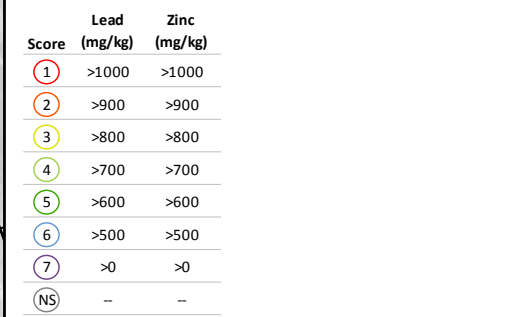
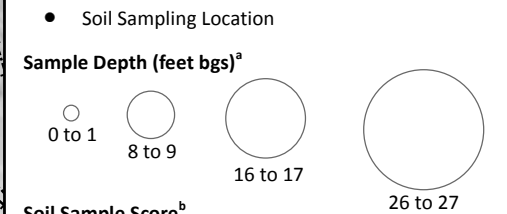
<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 106 feet bgs. Each symbol represents a separate sample.  
<sup>b</sup>Samples in Figures I-4 and I-5 are assigned a score of 1 to 7 using the lead and zinc sample concentrations. All samples in this figure are assigned a score of 1.

Notes:  
 feet bgs = feet below ground surface  
 Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-4**  
**Iron King Mine Tailings Signatures, Lead and Zinc Concentration Scores**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



**LEGEND**



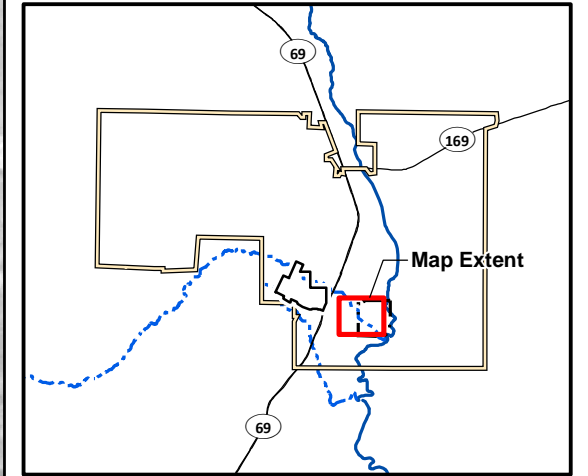
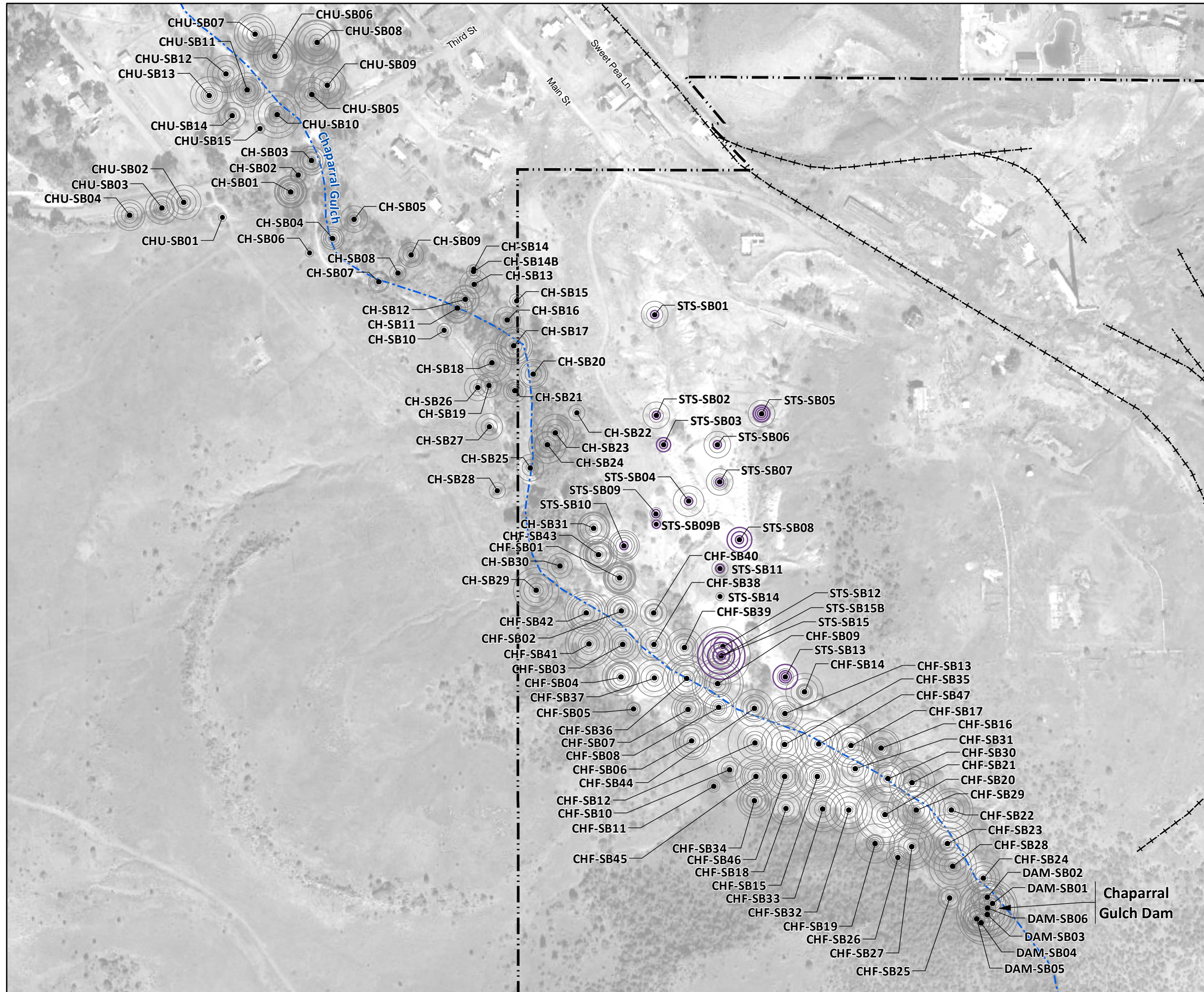
<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

<sup>b</sup>Samples characterized as recent materials are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Scores are only assigned for samples characterized as recent material and with detections of lead and zinc.

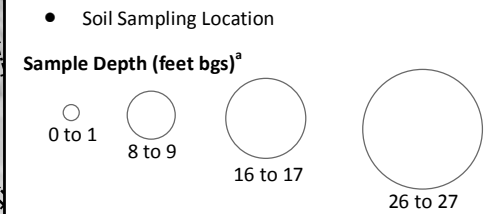
Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™, Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-5**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Recent Materials (Tailings and Channel Deposits)**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*





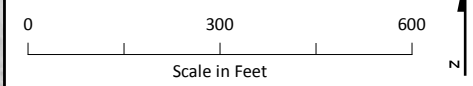
**LEGEND**



**Smelter Material Sample Soil Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

- Historic Rail Line
- River
- - - Intermittent Drainage
- ▭ Former Iron King Mine Property
- ▭ Former Humboldt Smelter Property
- ▭ Dewey-Humboldt Town Boundary

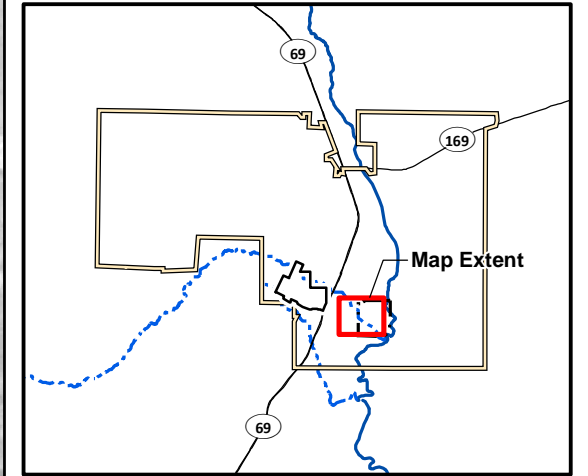
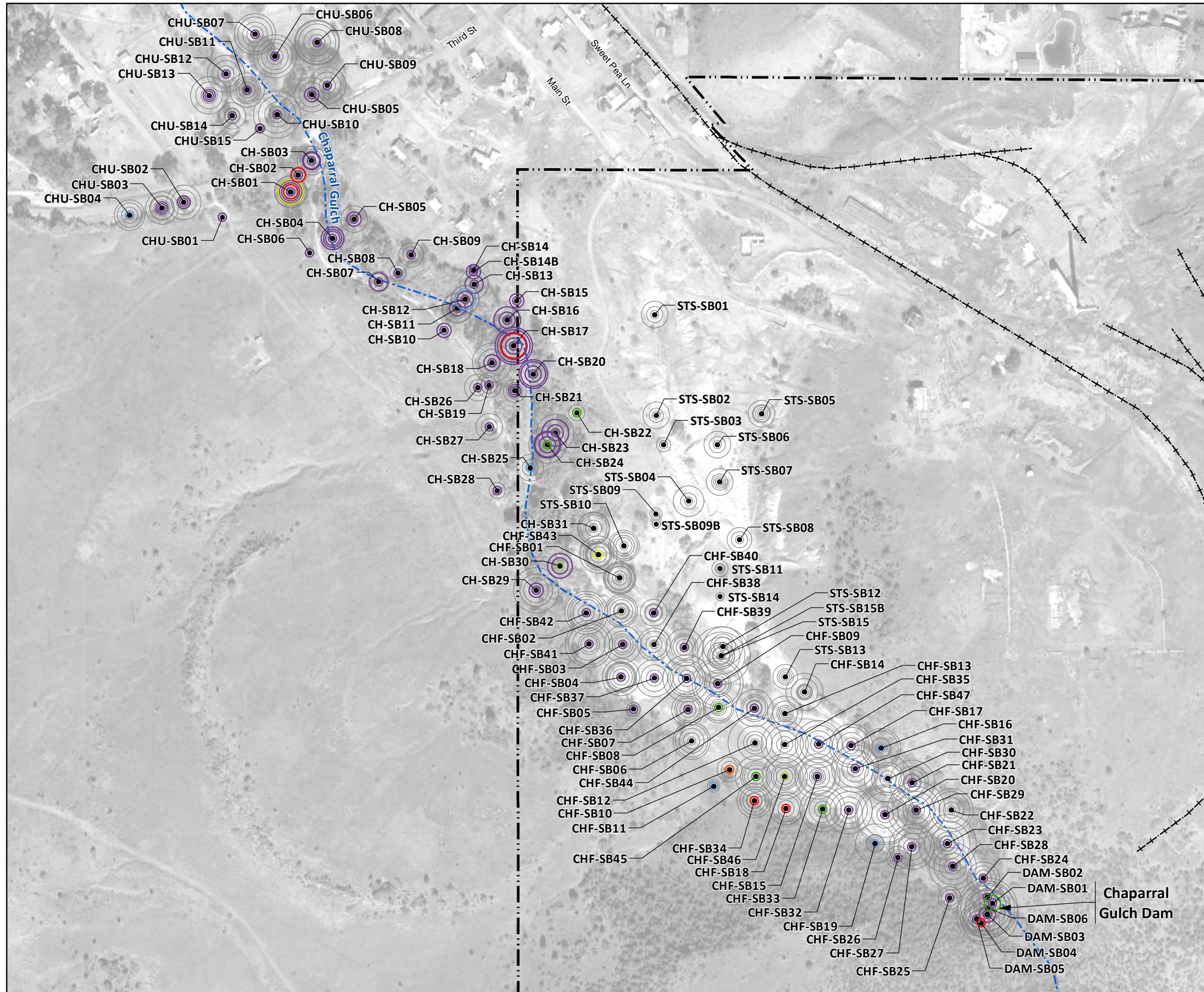


<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

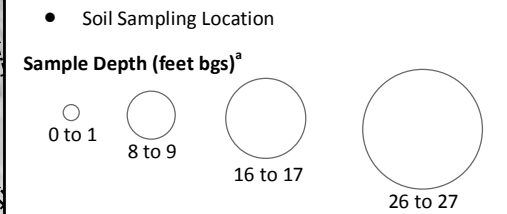
<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as Smelter Material and with detections of zinc and lead are scored on this figure.

Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6A**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Smelter**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

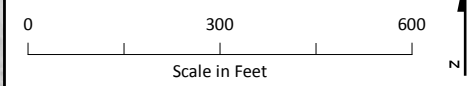
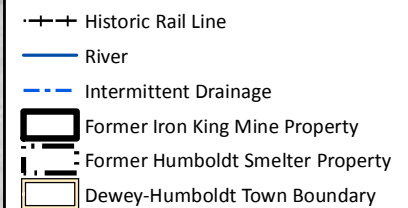


**LEGEND**



Uppermost Channel Deposit (UCD) Material Sample Soil Sample Score<sup>b</sup>

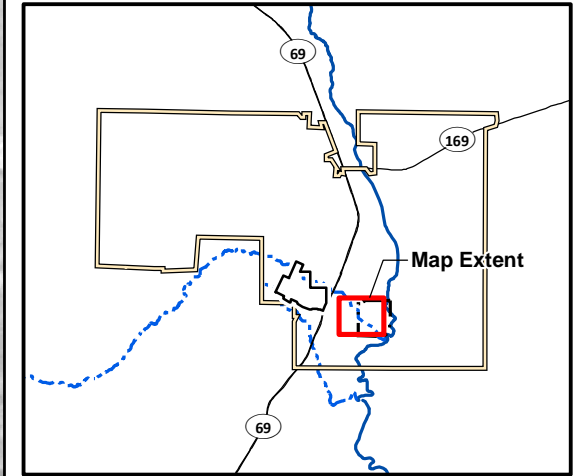
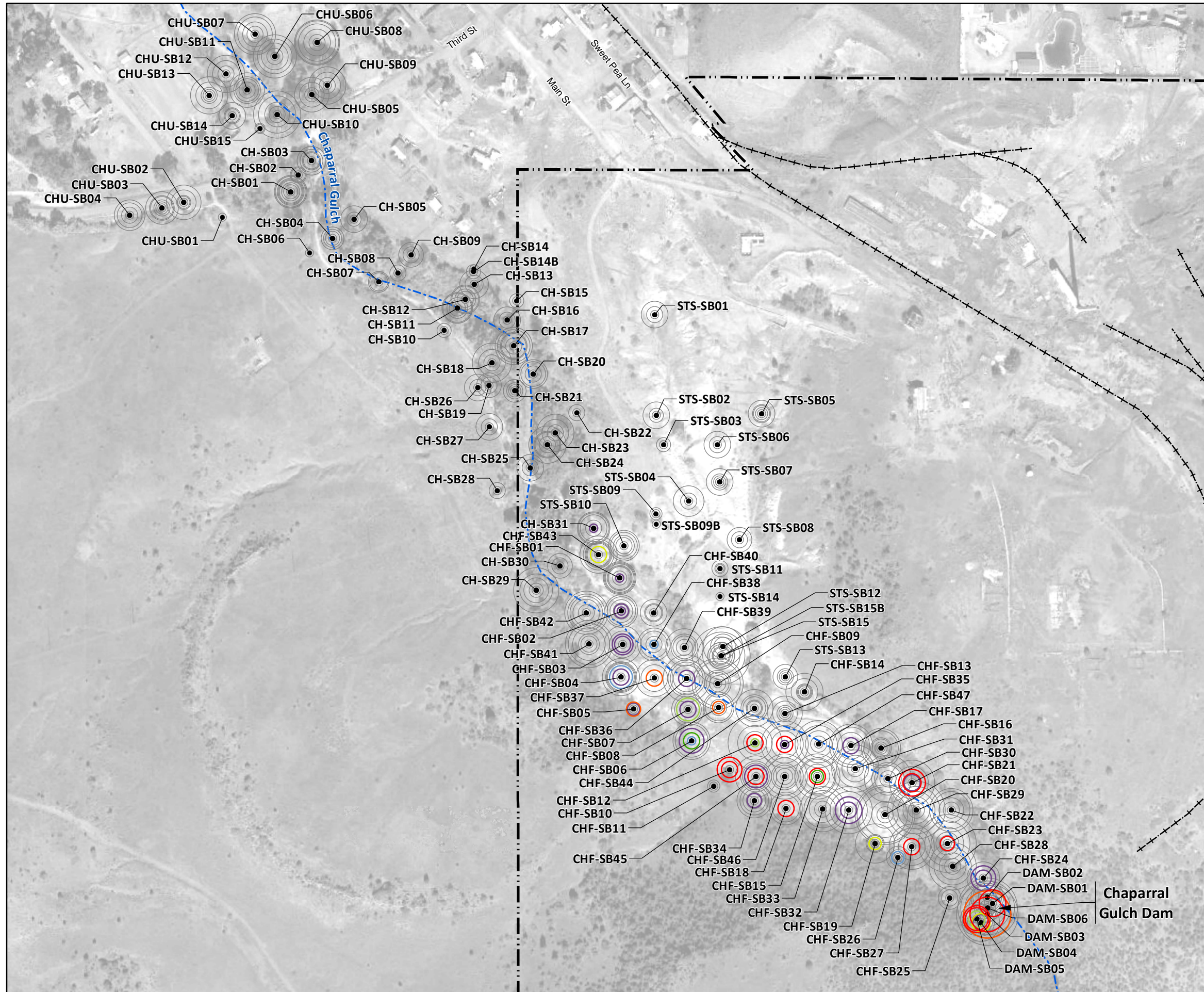
Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-



<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.  
<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as UCD Material and with detections of zinc and lead are scored on this figure.

Notes:  
 feet bgs = feet below ground surface  
 Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6B**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, UCD**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



**LEGEND**

- Soil Sampling Location

**Sample Depth (feet bgs)<sup>a</sup>**

- 0 to 1
- 8 to 9
- 16 to 17
- 26 to 27

**Humboldt Smelter (HS) Tailings (reworked) Material Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

- - - Historic Rail Line
- River
- - - Intermittent Drainage
- ▭ Former Iron King Mine Property
- ▭ Former Humboldt Smelter Property
- ▭ Dewey-Humboldt Town Boundary

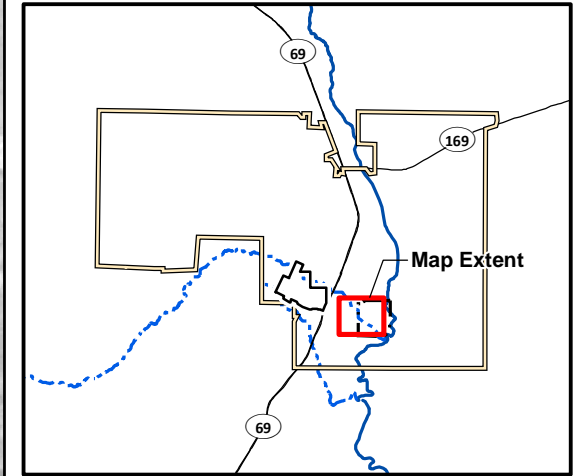
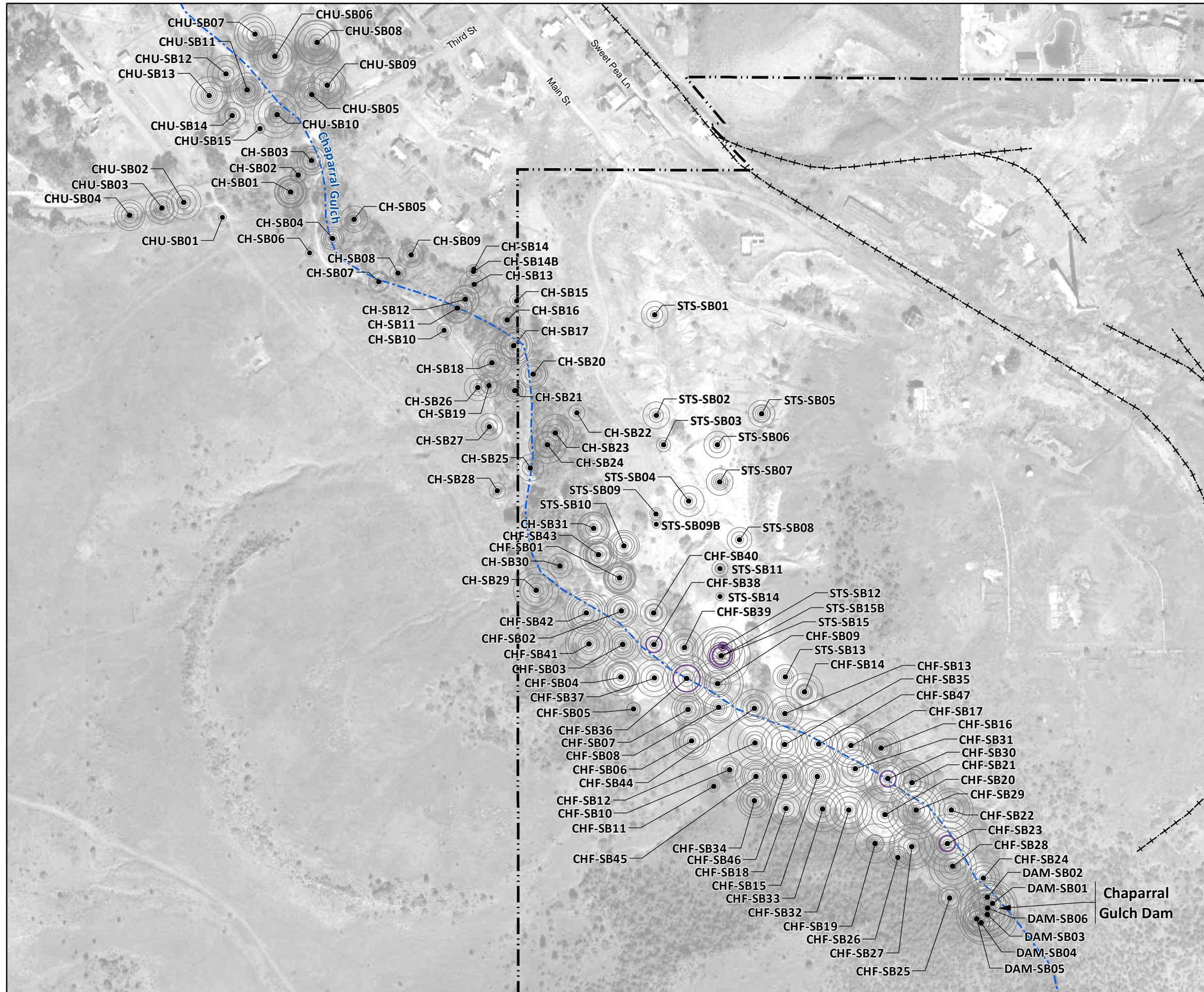
0 300 600  
Scale in Feet

<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as HS Tailings (Reworked) Material, and with detections of zinc and lead are scored on this figure.

Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6C**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, HS Tailings (Reworked)**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



**LEGEND**

- Soil Sampling Location

**Sample Depth (feet bgs)<sup>a</sup>**

- 0 to 1
- 8 to 9
- 16 to 17
- 26 to 27

**Humboldt Smelter Channel Deposit (HSCD) Material Sample Soil Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

- Historic Rail Line
- River
- - - Intermittent Drainage
- ▭ Former Iron King Mine Property
- ▭ Former Humboldt Smelter Property
- ▭ Dewey-Humboldt Town Boundary

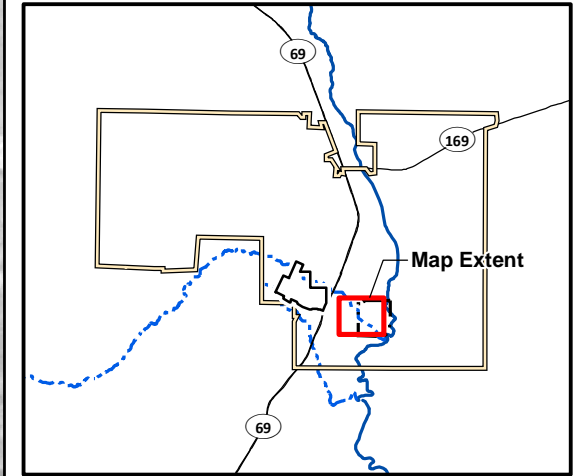
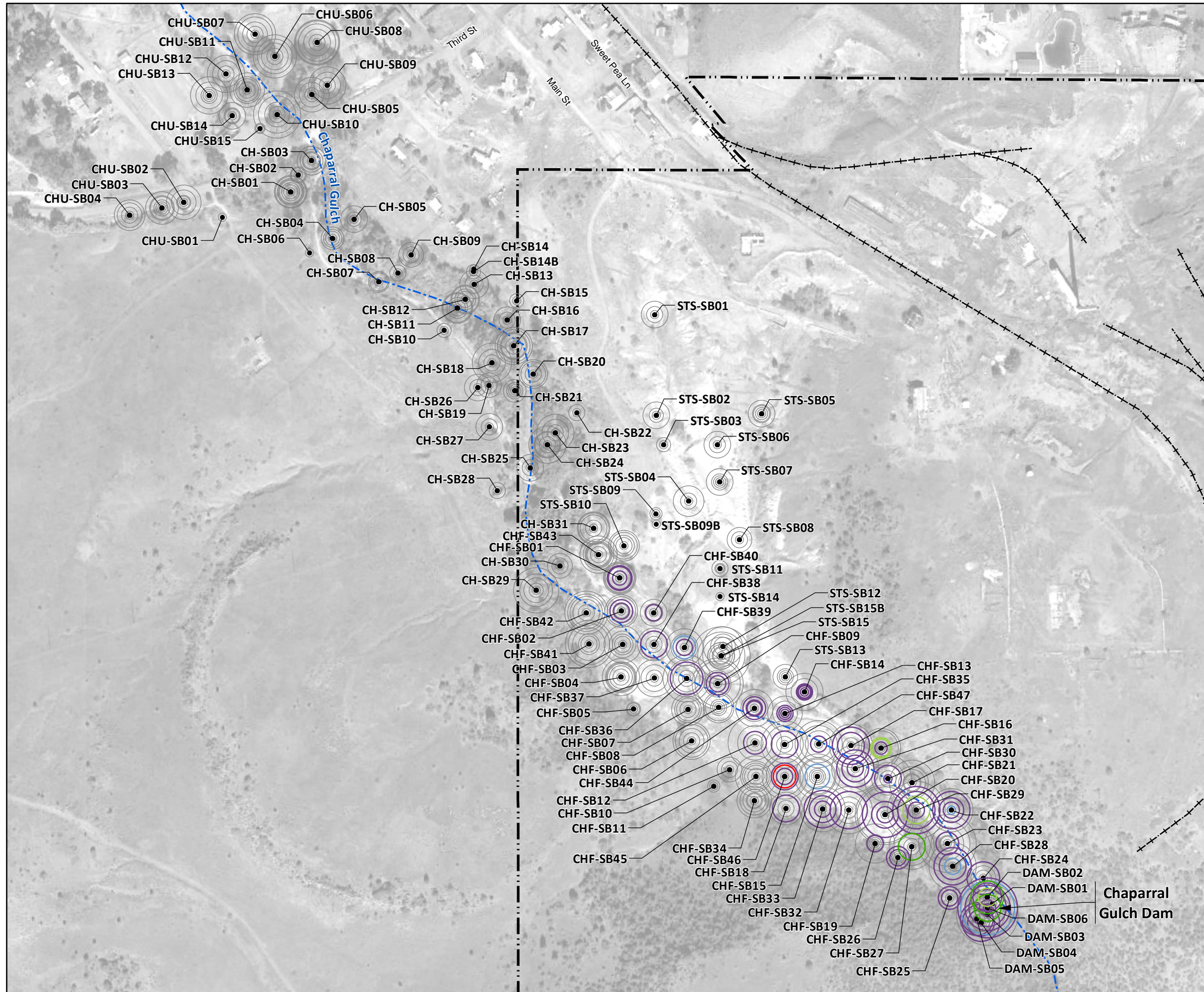
0 300 600  
Scale in Feet

<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as HSCD Material and with detections of zinc and lead are scored on this figure.

Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6D**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, HSCD**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



**LEGEND**

- Soil Sampling Location

**Sample Depth (feet bgs)<sup>a</sup>**

- 0 to 1
- 8 to 9
- 16 to 17
- 26 to 27

**Humboldt Smelter (HS) Tailings (undisturbed) Material Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

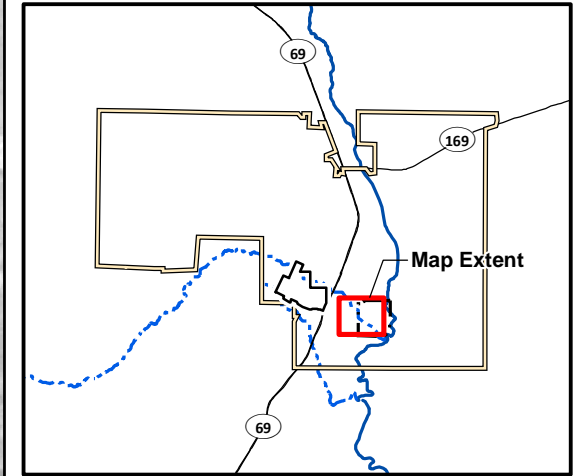
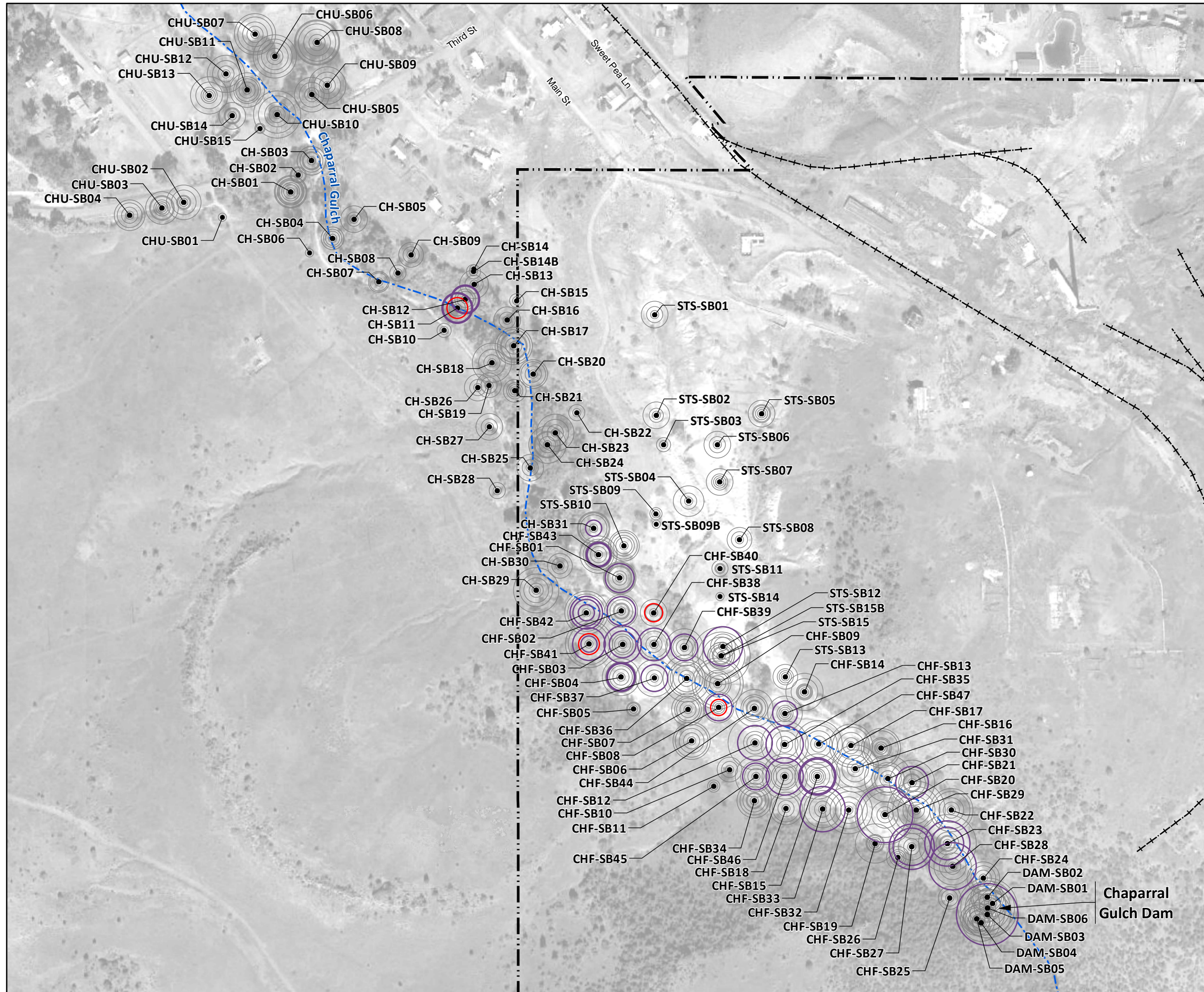
- - - Historic Rail Line
- River
- - - Intermittent Drainage
- ▭ Former Iron King Mine Property
- - - Former Humboldt Smelter Property
- ▭ Dewey-Humboldt Town Boundary

0 300 600  
Scale in Feet

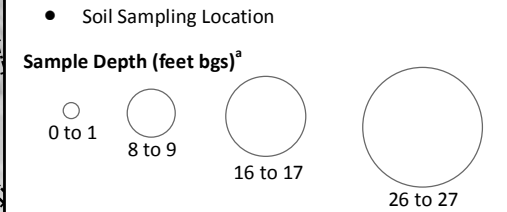
<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.  
<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as HS Tailings (Undisturbed) Material and with detections of zinc and lead are scored on this figure.

Notes:  
 feet bgs = feet below ground surface  
 Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6E**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, HS Tailings (Undisturbed)**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

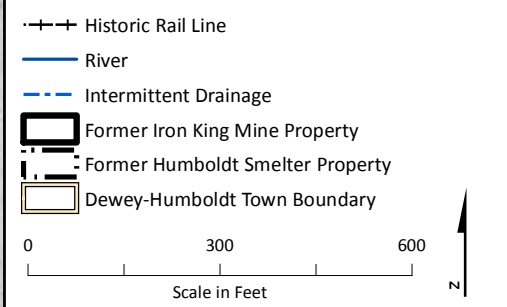


**LEGEND**



**Lowermost Channel Deposit (LCD) Material Sample Soil Sample Score<sup>b</sup>**

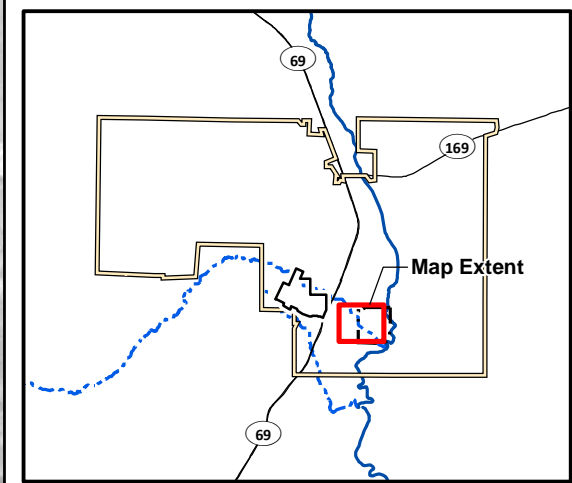
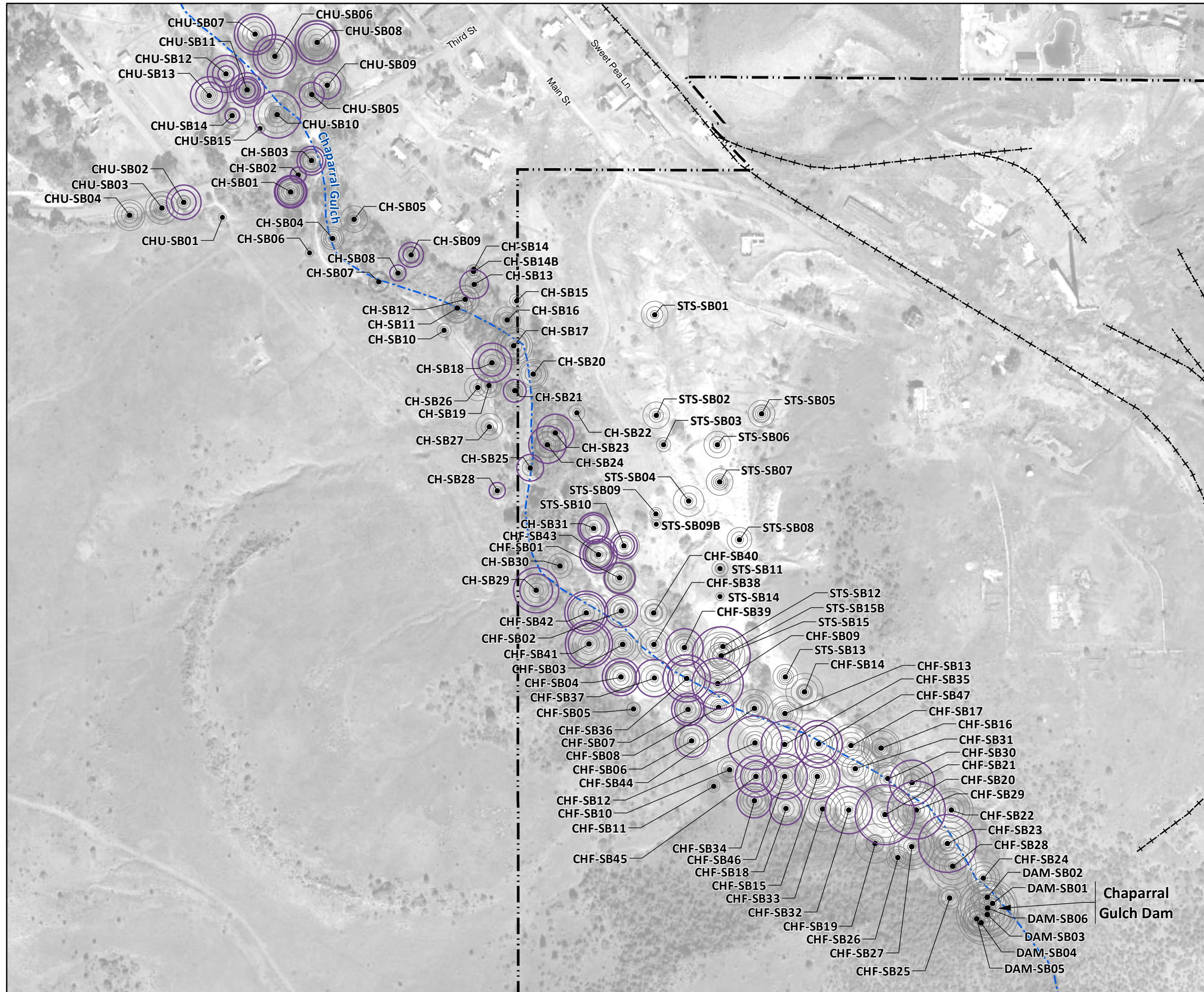
Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-



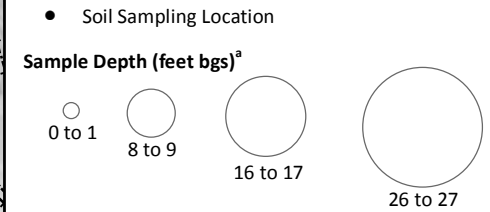
<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.  
<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as LCD Material and with detections of zinc and lead are scored on this figure.

Notes:  
 feet bgs = feet below ground surface  
 Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6F**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, LCD**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

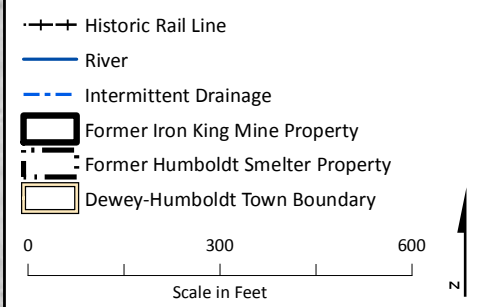


**LEGEND**



Principle Fluvial Gravels (PFG) Material Sample Soil Sample Score<sup>b</sup>

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

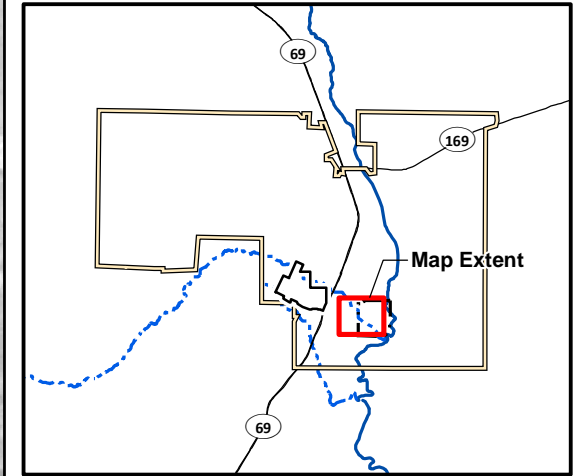
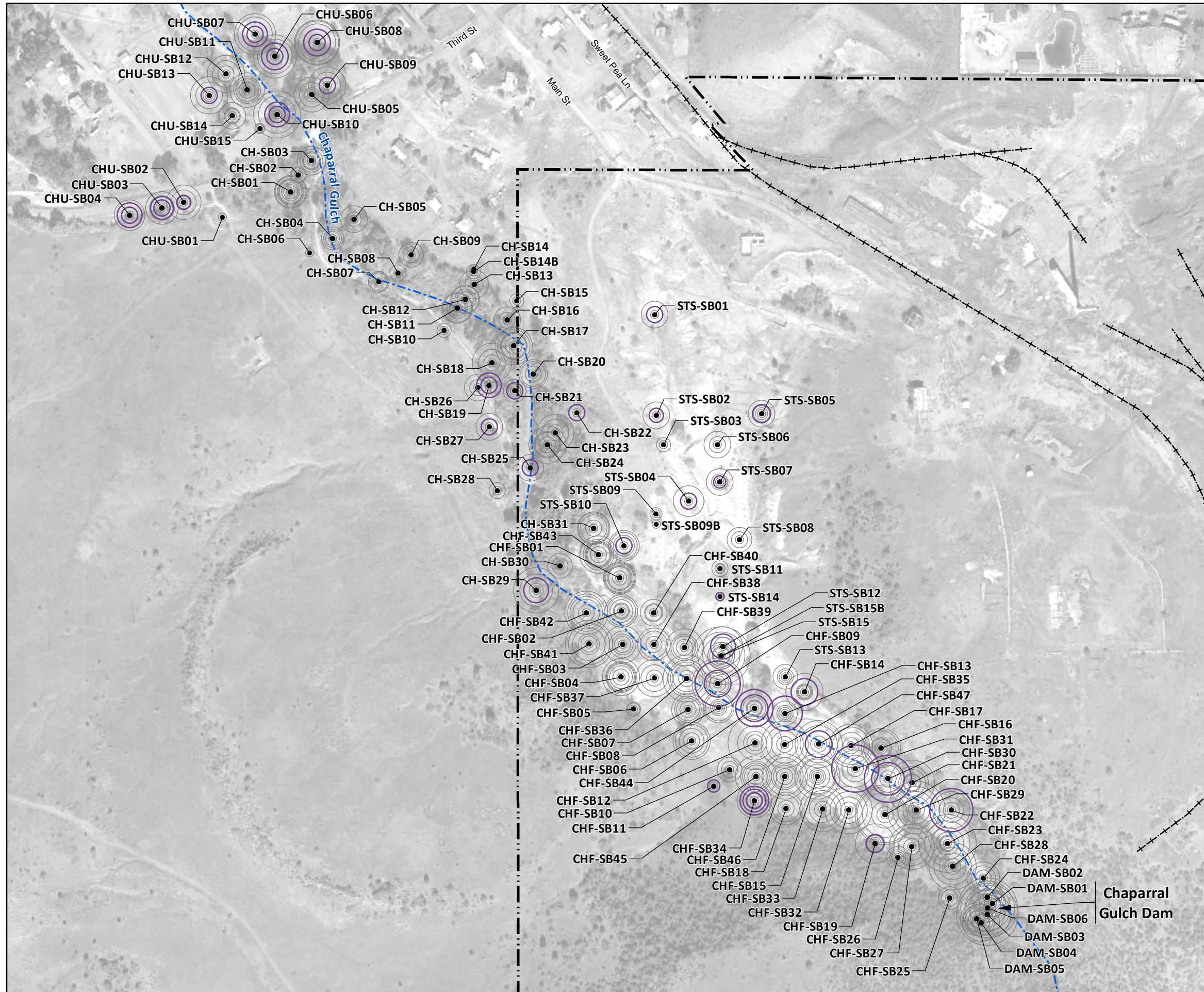


<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

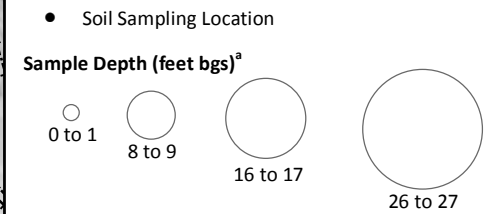
<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as PFG Material and with detections of zinc and lead are scored on this figure.

Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6G**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, PFG**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



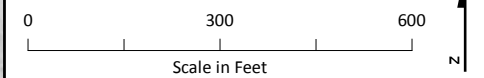
**LEGEND**



**Brown Clay Material Sample Soil Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

- Historic Rail Line
- River
- - - Intermittent Drainage
- ▭ Former Iron King Mine Property
- ▭ Former Humboldt Smelter Property
- ▭ Dewey-Humboldt Town Boundary



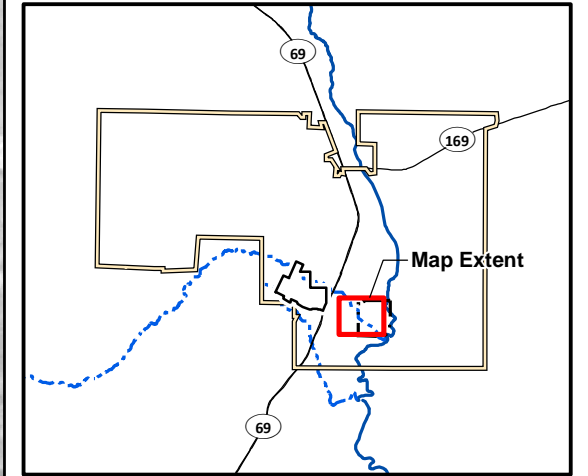
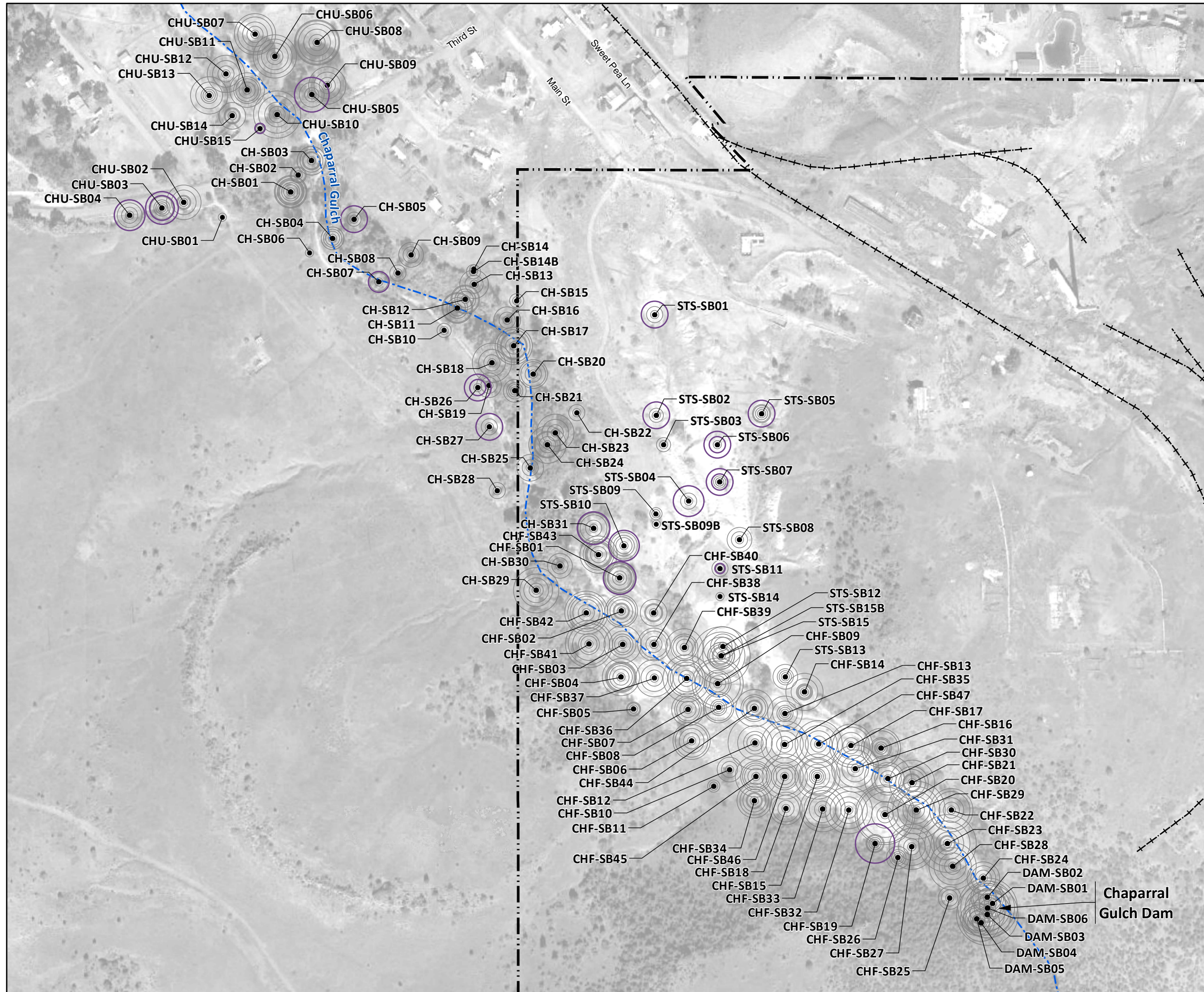
<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as *Brown Clay Material* and with detections of zinc and lead are scored on this figure.

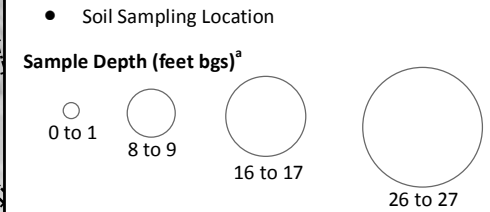
Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6H**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Brown Clay**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*



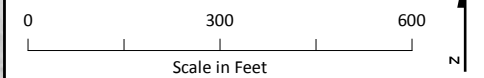
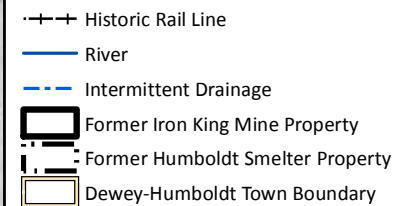


**LEGEND**



**Hickey Conglomerate (Cgl) Material Sample Soil Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

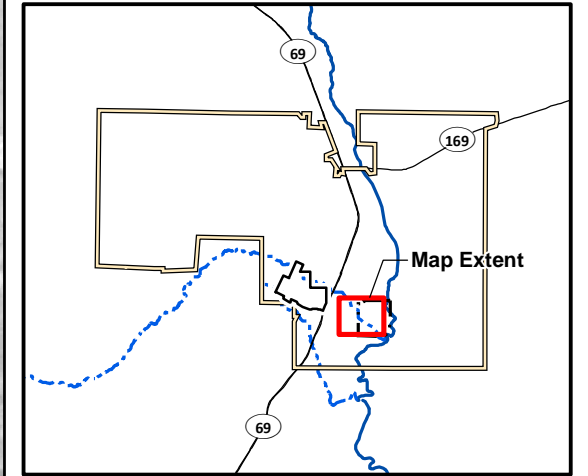
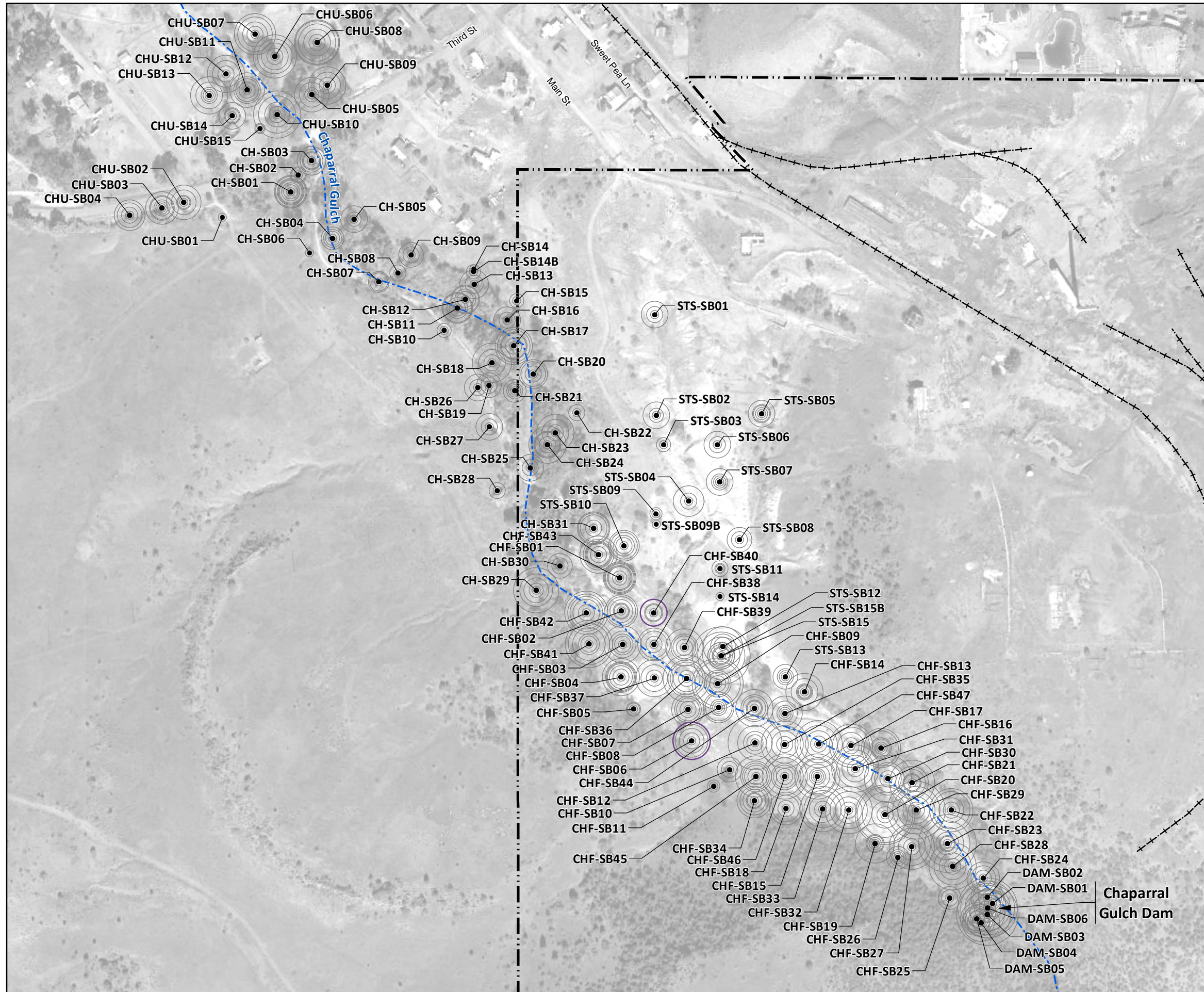


<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

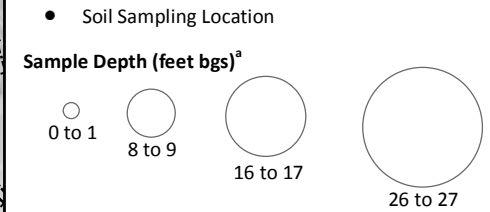
<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc sample concentrations. NS indicates no score is assigned. Only those materials characterized as Hickey Cgl Material and with detections of zinc and lead are scored on this figure.

Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-61**  
**Chaparral Gulch Materials and Signatures,**  
**Lead and Zinc Concentration Scores,**  
**Hickey Cgl**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*



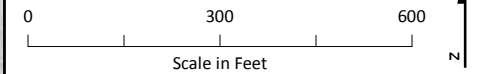
**LEGEND**



**Hickey Ash/Cinder Material Sample Soil Sample Score<sup>b</sup>**

Score	Lead (mg/kg)	Zinc (mg/kg)
1	>1000	>1000
2	>900	>900
3	>800	>800
4	>700	>700
5	>600	>600
6	>500	>500
7	>0	>0
NS	-	-

- Historic Rail Line
- River
- - - Intermittent Drainage
- ▭ Former Iron King Mine Property
- - - Former Humboldt Smelter Property
- ▭ Dewey-Humboldt Town Boundary



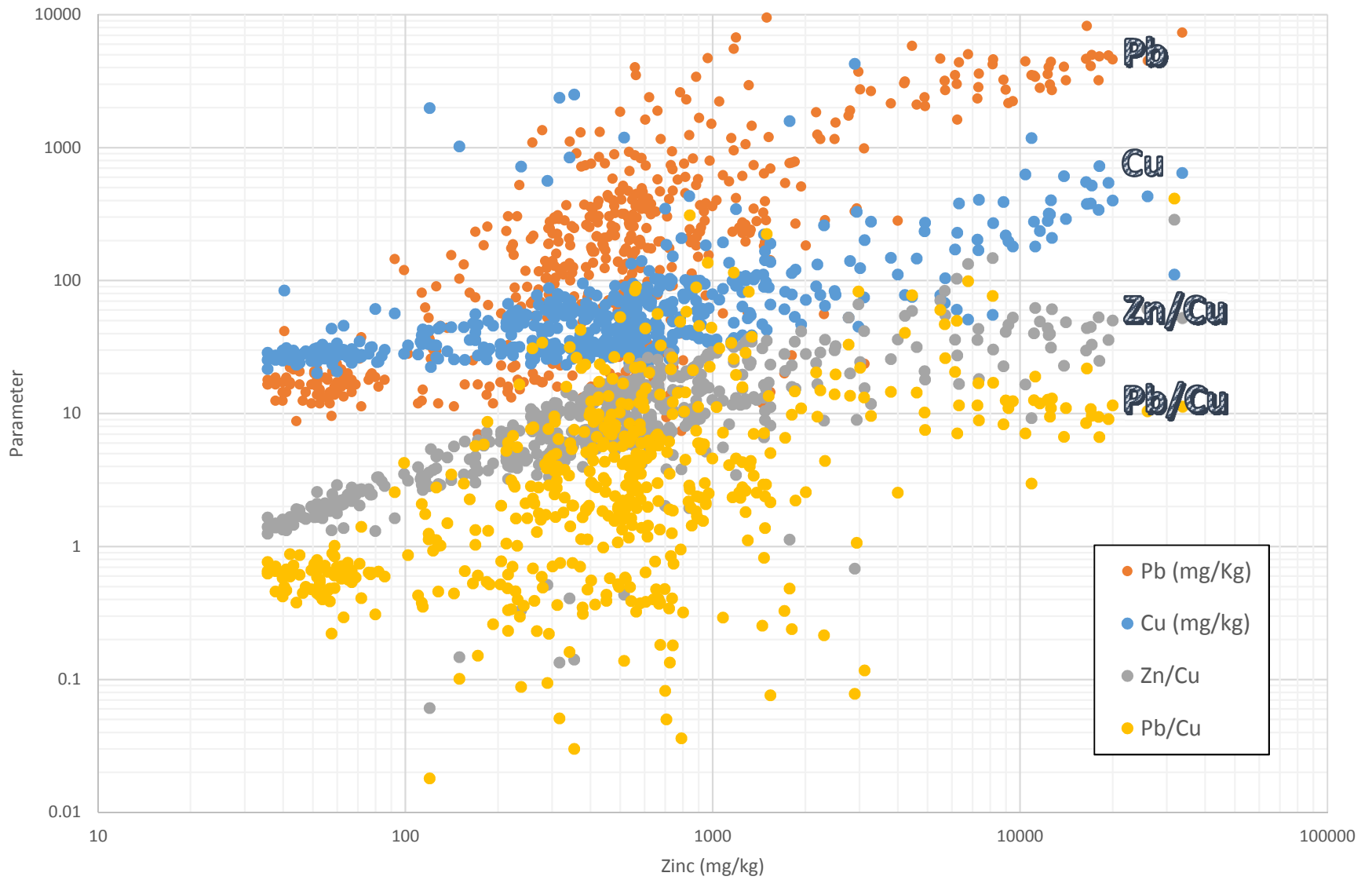
<sup>a</sup>Proportional symbols represent 1-foot sample intervals between 0 and 27 feet bgs. Each symbol represents a separate sample and is color coded according to the sample score.

<sup>b</sup>Samples characterized are assigned a score of 1 to 7 using the lead and zinc concentrations. NS indicates no score is assigned. Only those materials characterized as Hickey Ash/Cinder Material and with detections of zinc and lead are scored on this figure.

Notes:  
feet bgs = feet below ground surface  
Image Source: Google Earth™; Image date November 6, 2015. Accessed February 2, 2016.

**Figure I-6J**  
**Chaparral Gulch Materials and Signatures, Lead and Zinc Concentration Scores, Hickey Ash/Cinder**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

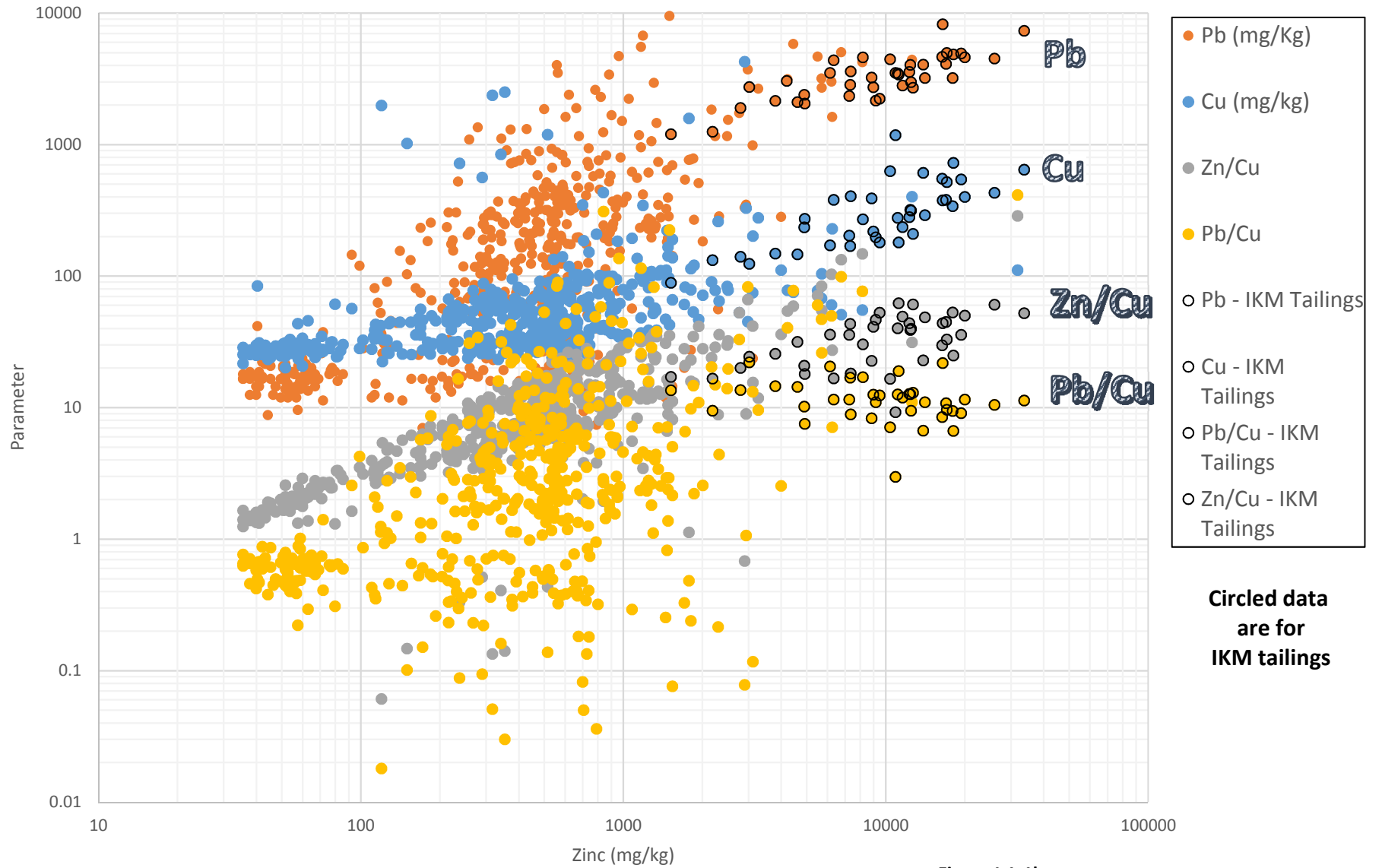
Attachment I-1  
Cross Plots



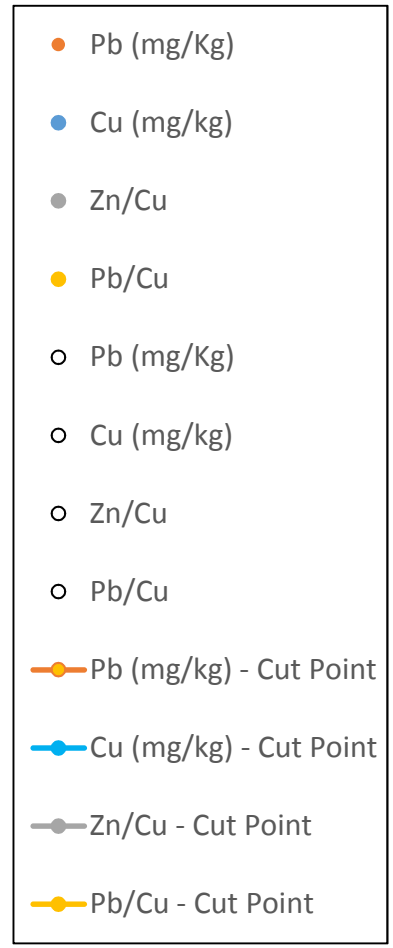
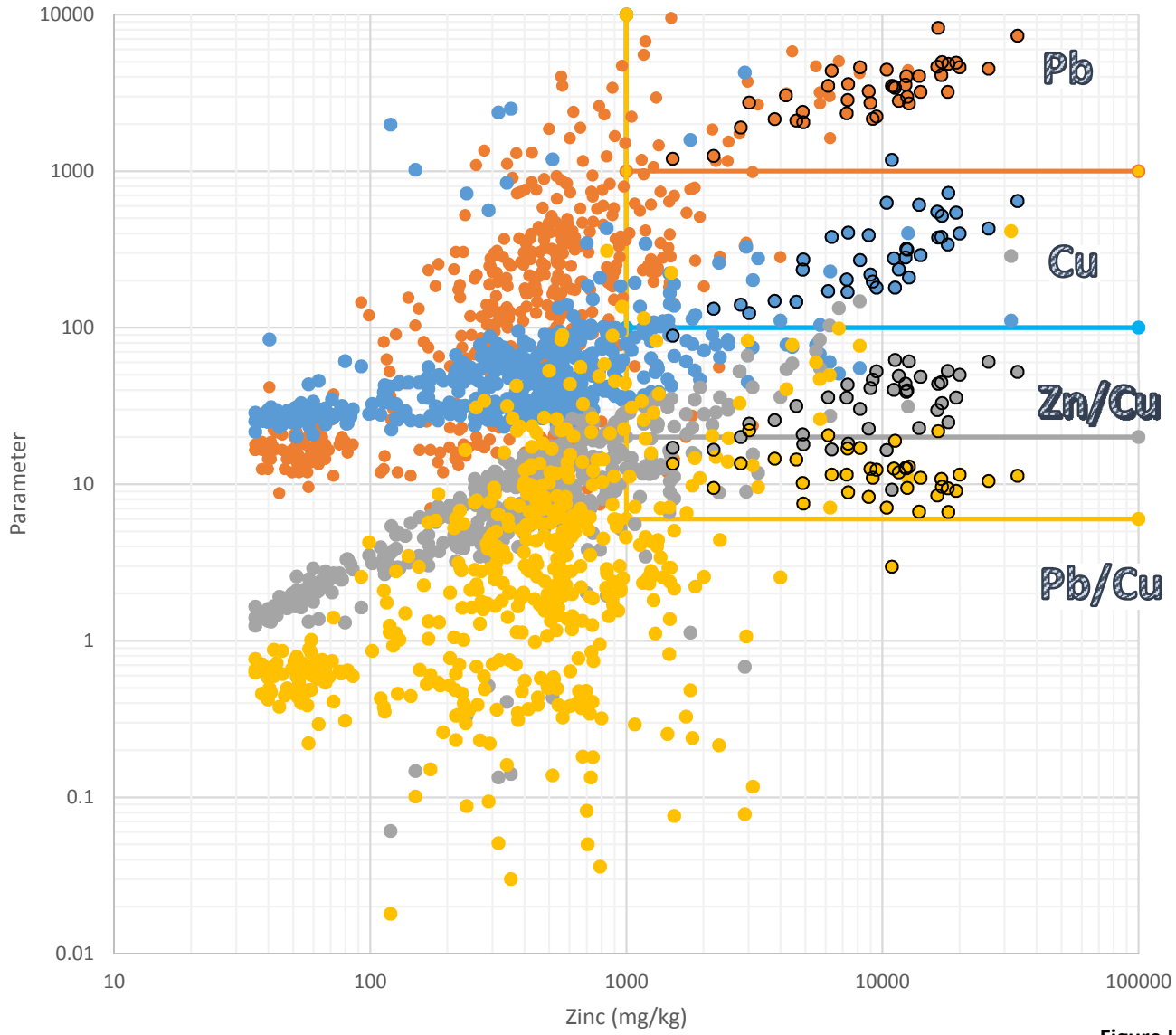
**Figure I-1-1a**

**All Data**

*Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona*

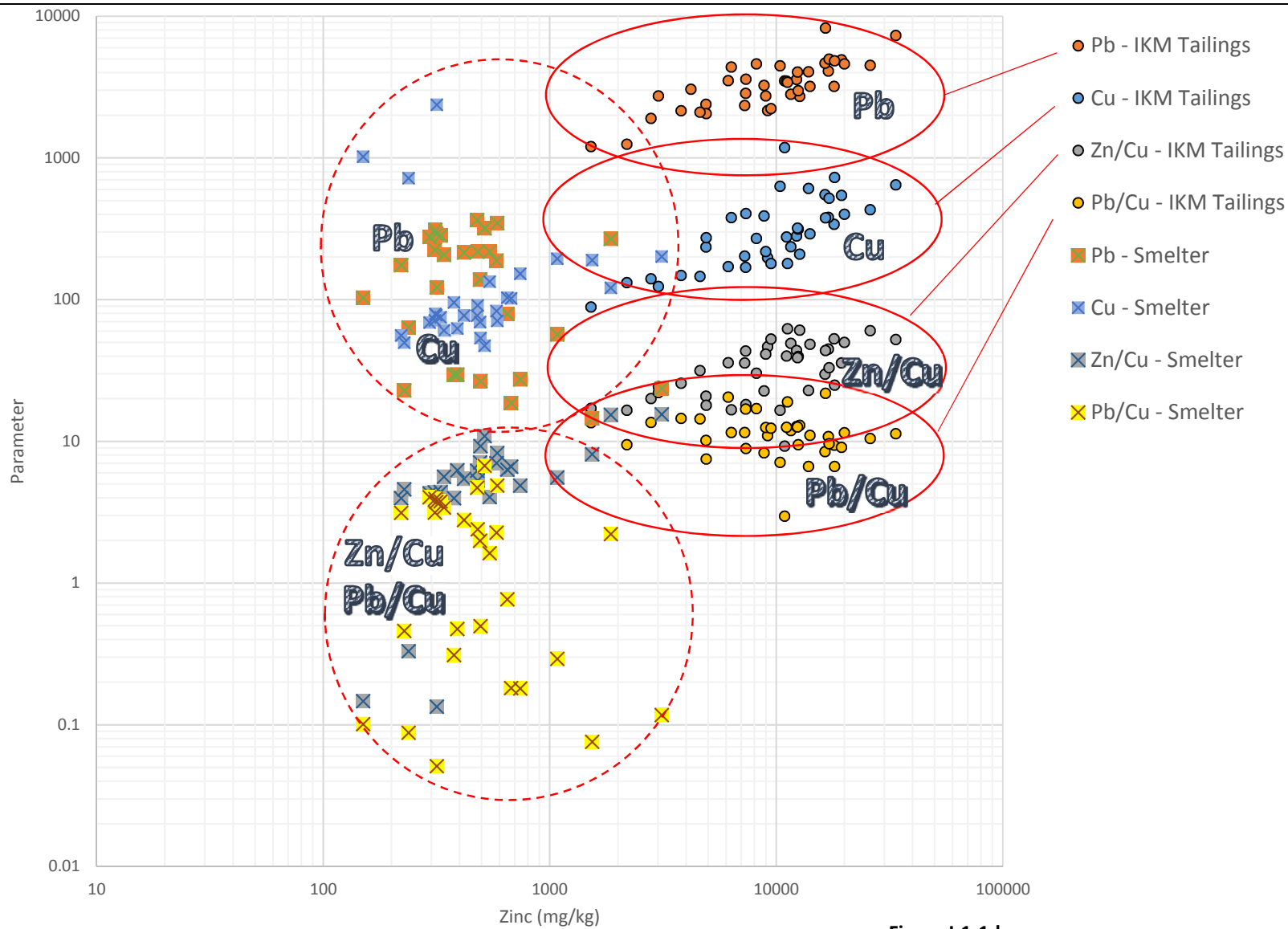


**Figure I-1-1b**  
**All Data, Iron King Mine Tailings Data Circled**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

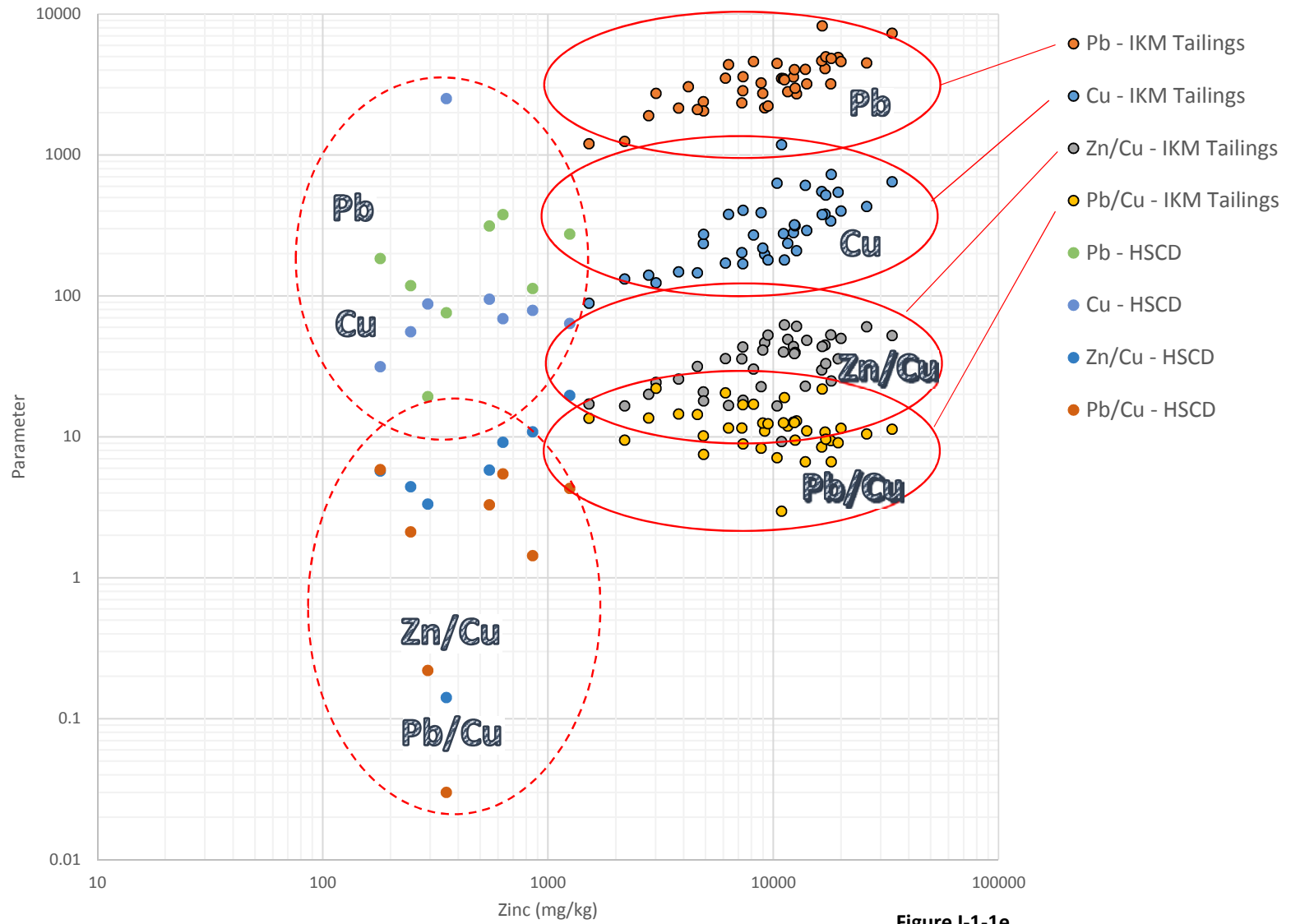


**Circled data are circled  
for IKM tailings**

**Figure I-1-1c**  
**Cut Points for Tailings Mixing Evaluation**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

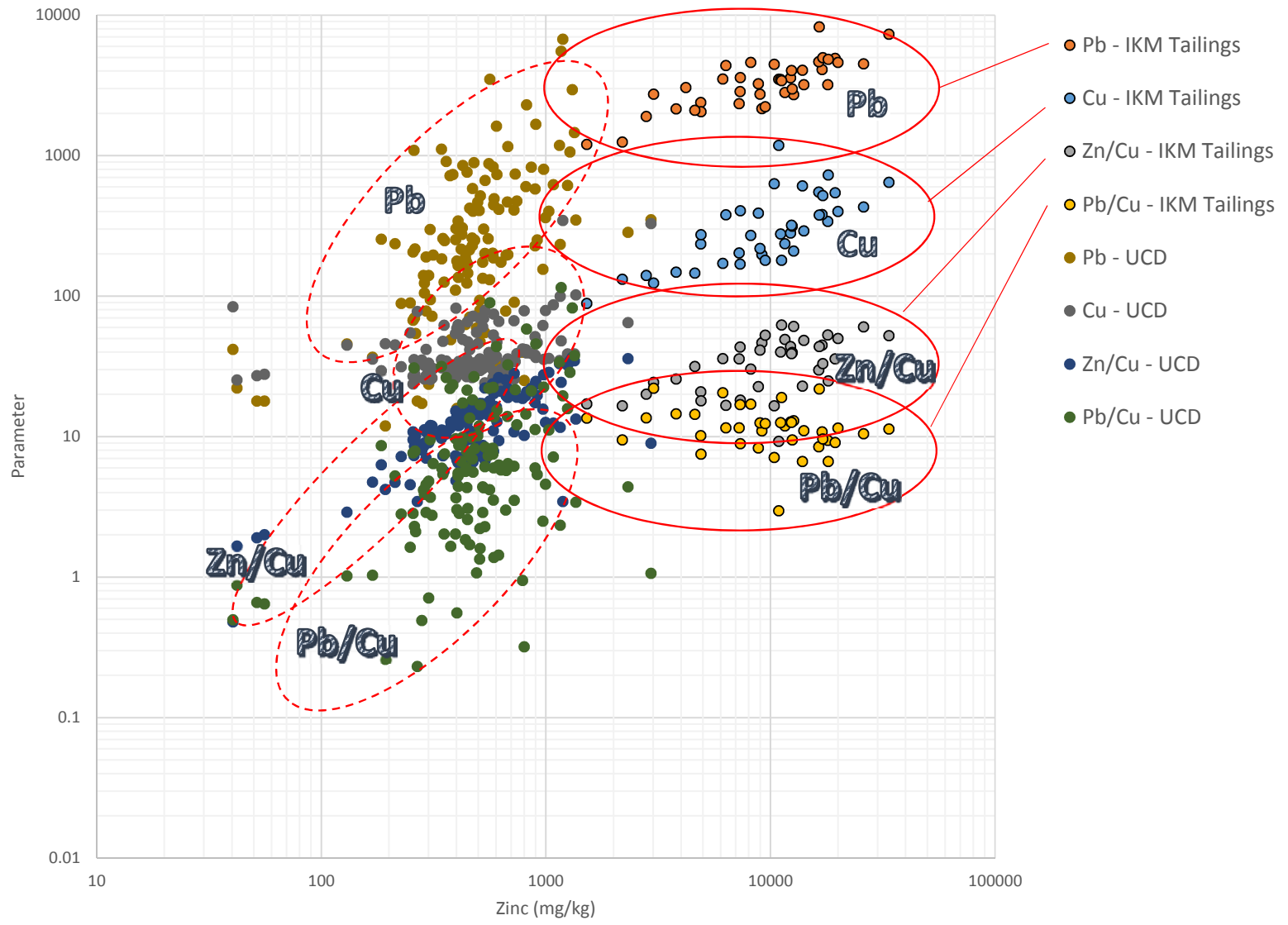


**Figure I-1-1d**  
**Iron King Mine Tailings and Smelter Material**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

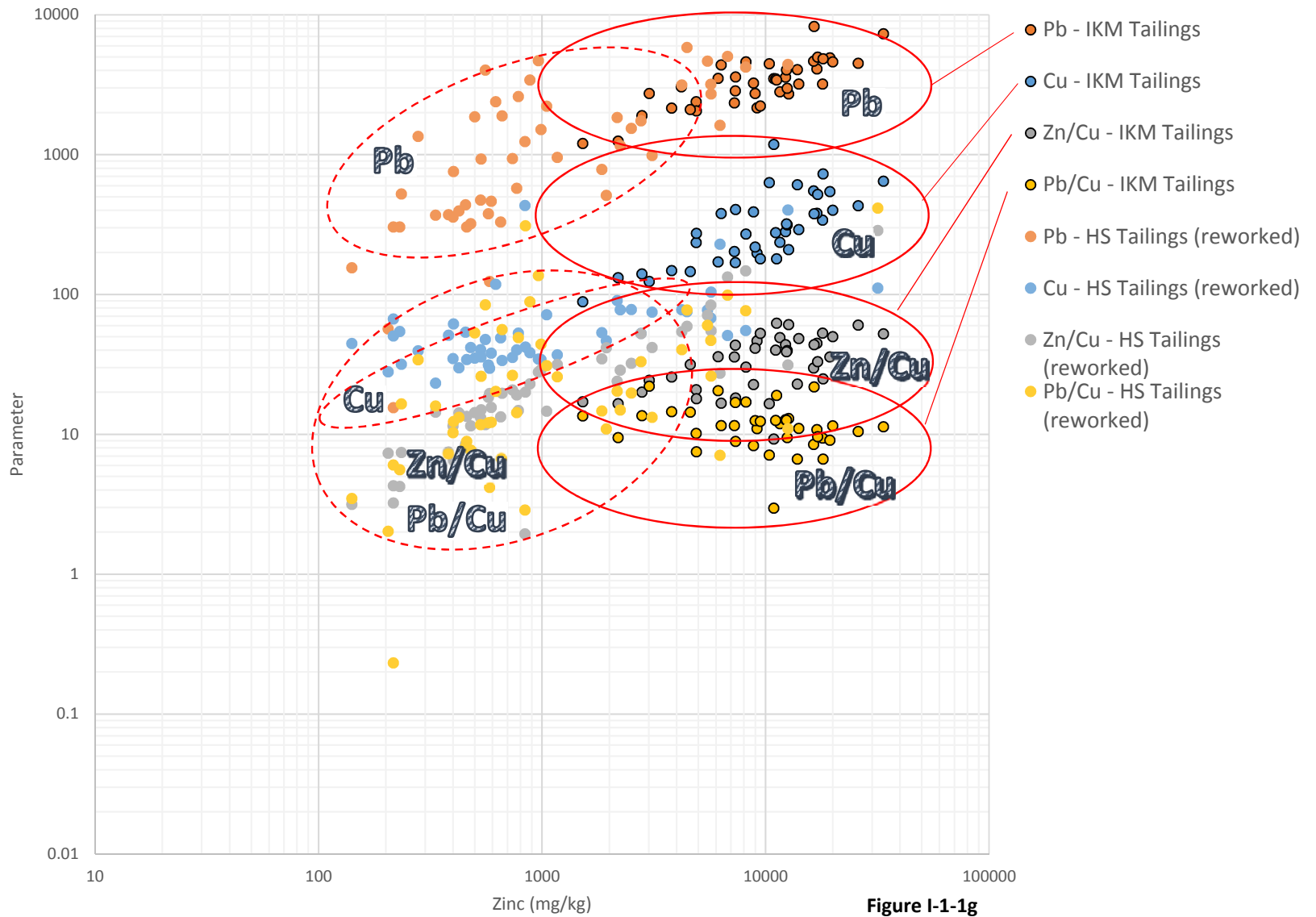


**Figure I-1-1e**  
**Iron King Mine Tailings and Humboldt Smelter**  
**Channel Deposit (HSCD)**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*



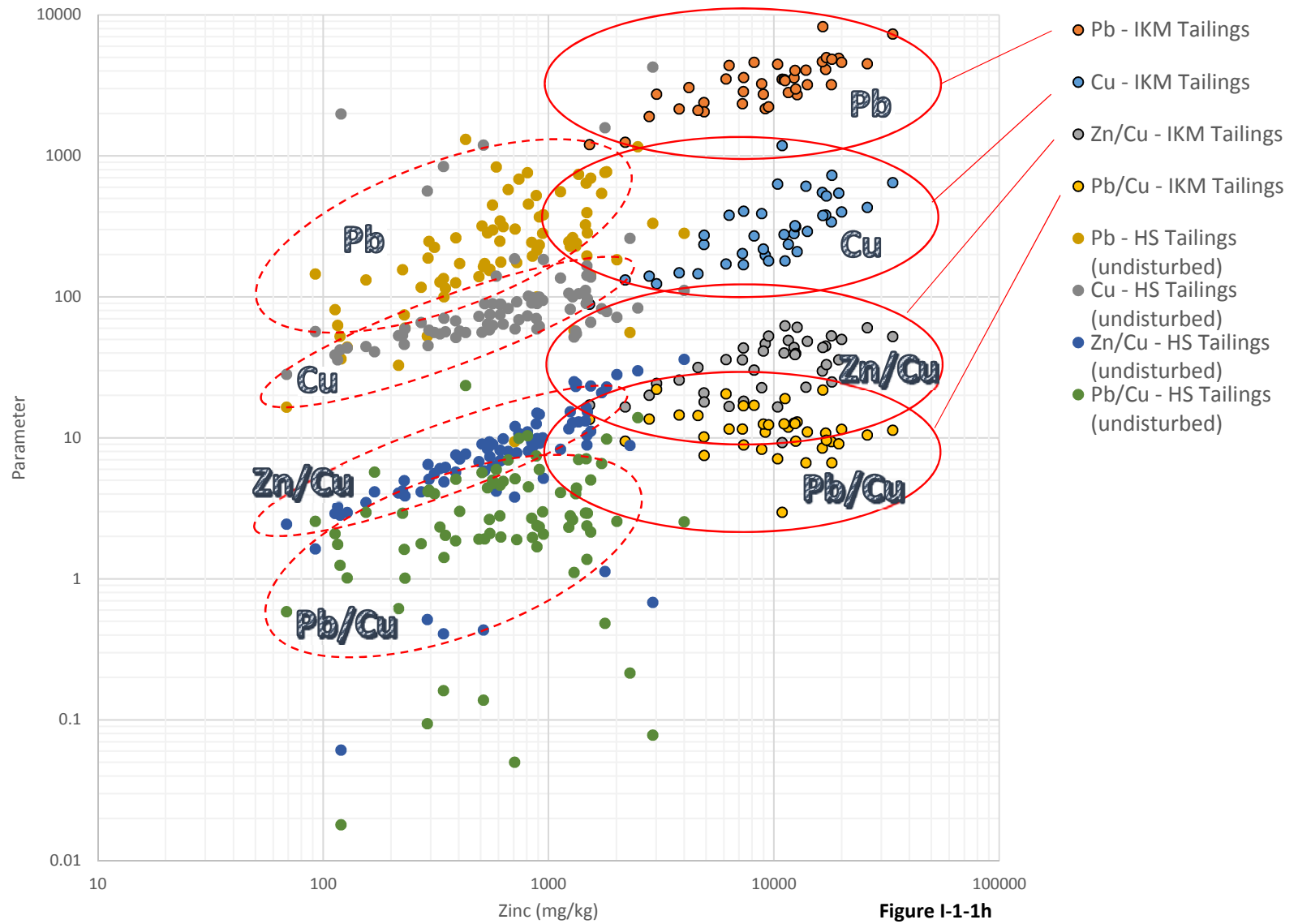


**Figure I-1-1f**  
**Iron King Mine Tailings and Upper Channel Deposit (UCD)**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona

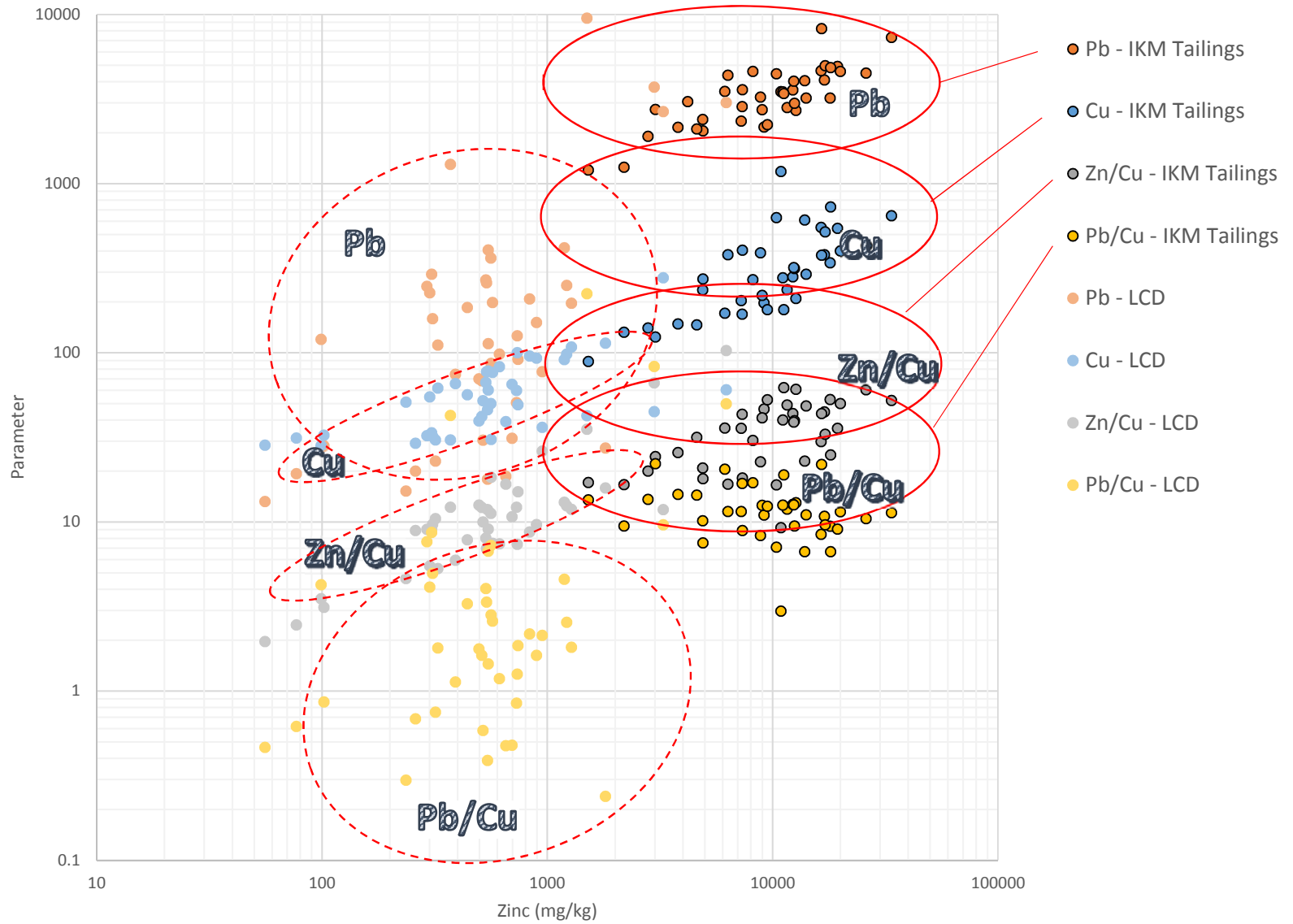


**Figure I-1-1g**  
**Iron King Mine Tailings and Humboldt Smelter Tailings (Reworked)**

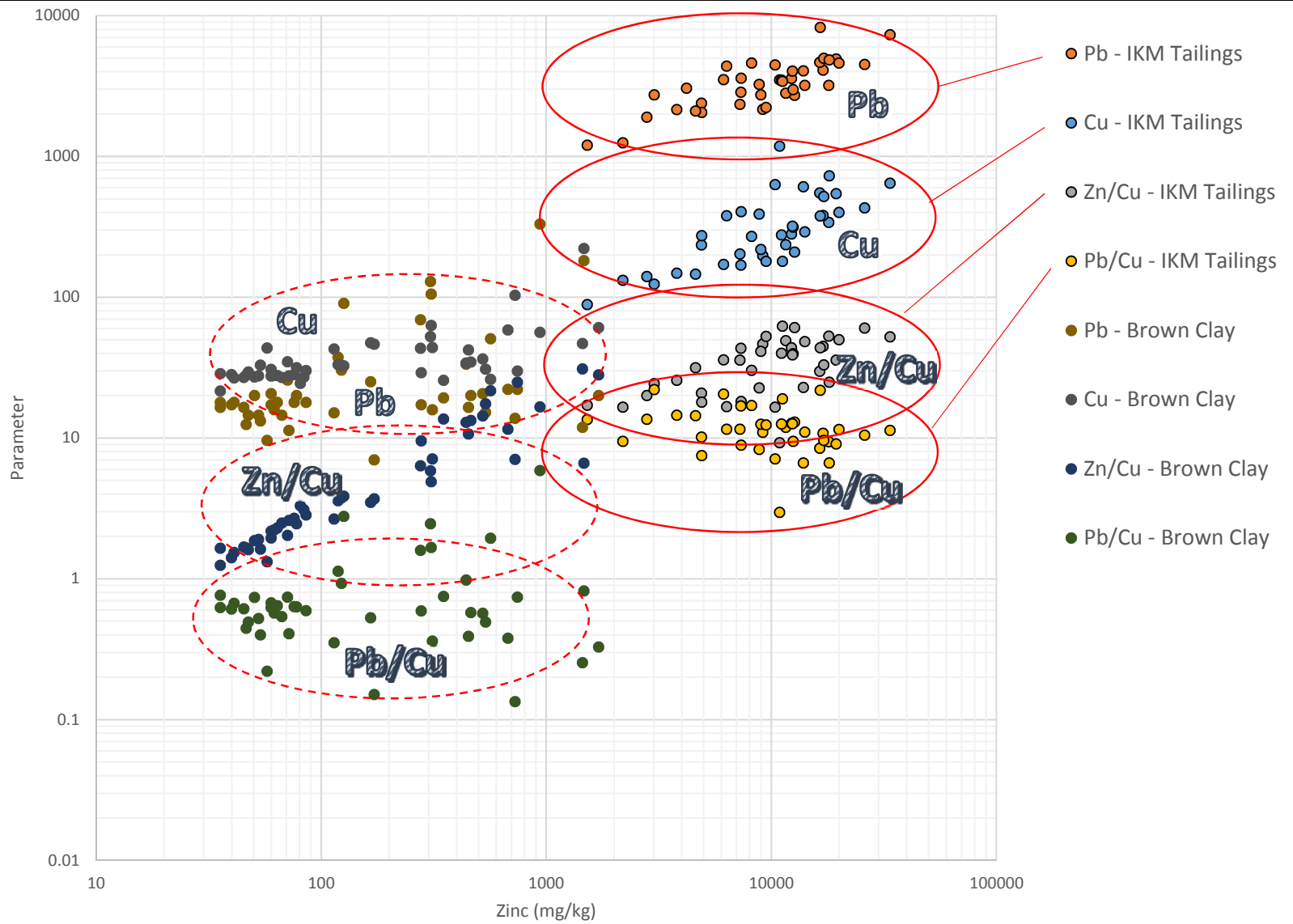
*Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona*



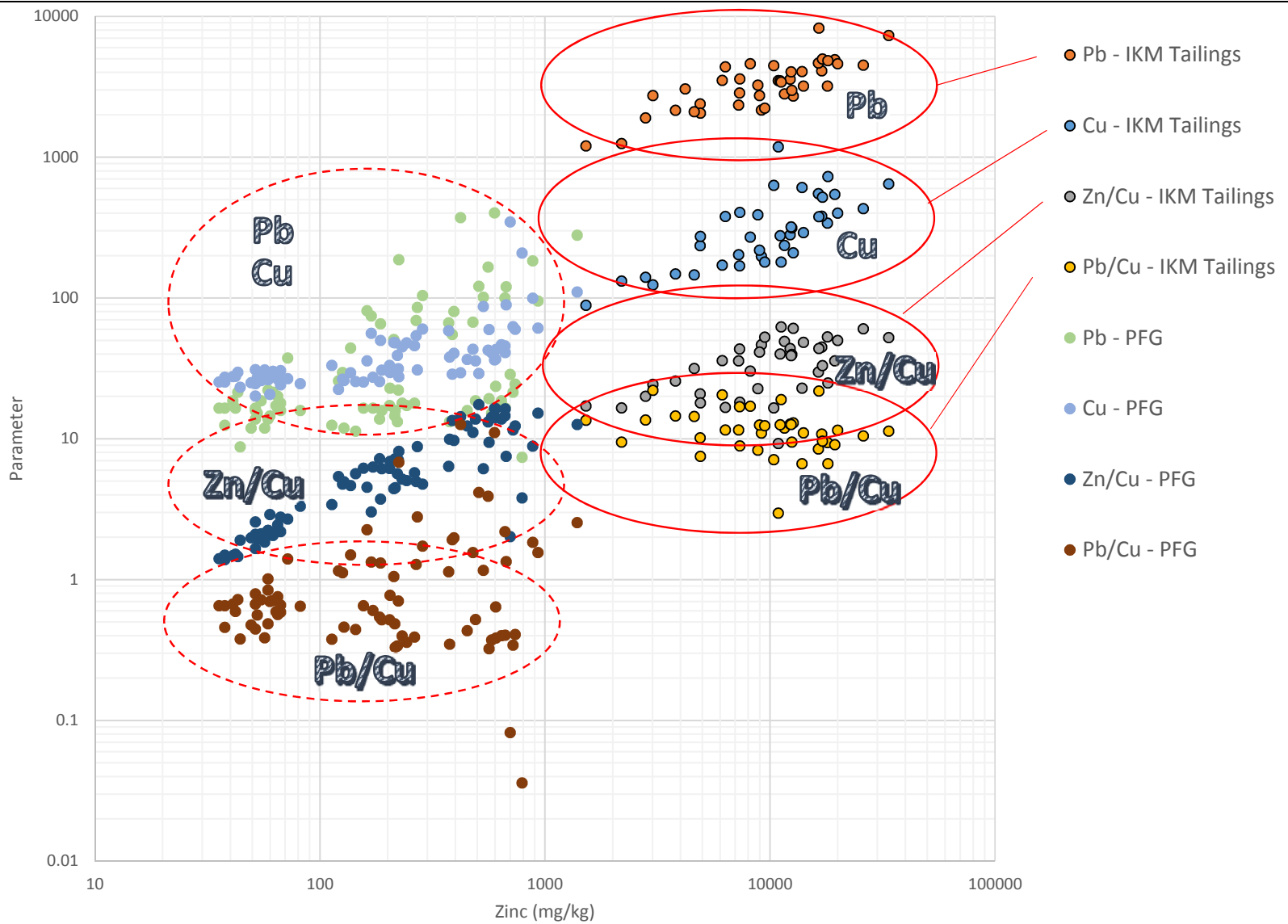
**Figure I-1-1h**  
**Iron King Mine Tailings and Humboldt Smelter Tailings**  
**(Undisturbed)**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*



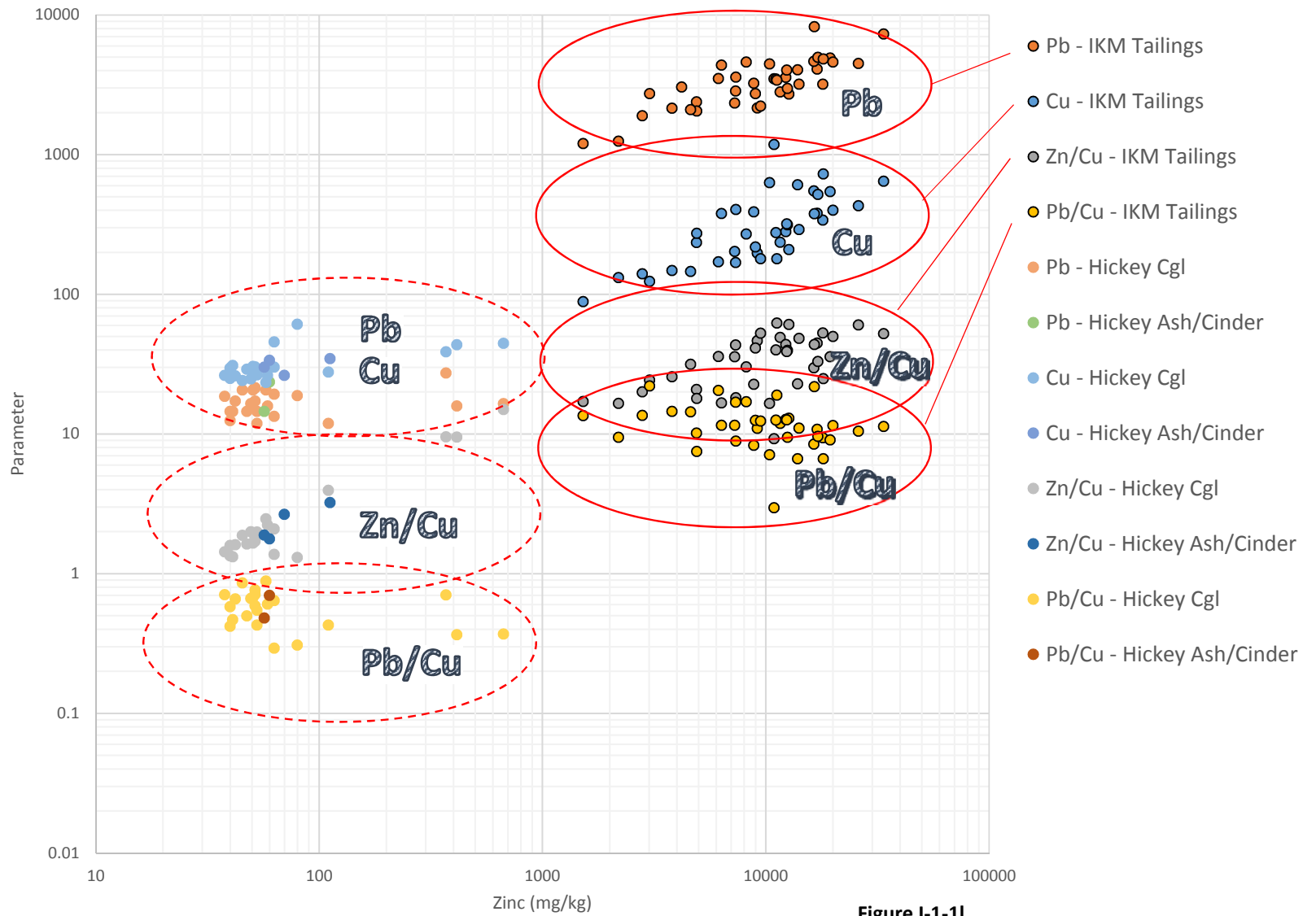
**Figure I-1-1i**  
**Iron King Mine Tailings and Lower Channel Deposit (LCD)**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



**Figure I-1-1j**  
**Iron King Mine Tailings and Brown Clay (BC)**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



**Figure I-1-1k**  
**Iron King Mine Tailings and Principal Fluvial Gravel (PFG)**  
 Iron King Mine – Humboldt Smelter Superfund Site  
 Dewey-Humboldt, Yavapai County, Arizona



**Figure I-1-11**  
**Iron King Mine Tailings, Hickey Cgl, and**  
**Hickey Ash/Cinder**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*