



# Town of Clarkdale

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August 11, 2015

Arizona Department of Environmental Quality  
Voluntary Remediation Program  
Attention: John Patricki  
1110 W. Washington Street  
Phoenix, AZ 85007

RE: United Verde Soil Program - Sampling and Analysis Plan (SAP) and a Quality Assurance Project Plan (QAPP) Comments

Dear Mr. Patricki:

The Town of Clarkdale appreciates the opportunity to review and comment on the SAP and the QAPP for Freeport Minerals Corporation's soil remediation project to be performed in Clarkdale.

Please note that we've received input from a Clarkdale citizen who points out the benefits of having a separate Community Involvement Plan that reflects the diversity and concerns of the community and helps focus and drive the community involvement activities. While our attached comments do not include a request for a separate Community Involvement Plan, the Town of Clarkdale would be supportive of one.

The Clarkdale Town Council reviewed and approved the attached comments relating to the SAP and QAPP at their Town Council meeting held August 11, 2015.

Thank you again for the opportunity to comment. Please do not hesitate to contact me if you have any questions.

Sincerely,

Gayle Mabery  
Town Manager



## Sampling and Analysis Plan Comments

### Section 1: Introduction

- 1) Differences between the “Study Area” and the “Initial Study Area” should be articulated. The Study Area could be a broader area that is not currently shown on the maps associated with this SAP.
- 2) Page 4; Paragraph 3: What are your technical reasons for saying “The Study Area includes properties *most likely* to have been affected by historical air emissions...”
- 3) Page 4; Paragraph 5: Definition of “Planned for Development” is too narrow and should be expanded to include any property zoned in a way that allows for future residential use.
- 4) Page 4; Paragraph 6: There are industrially zoned properties in Clarkdale that have been used primarily for residential or commercial purposes. As drafted, this paragraph would wholly exclude those properties from the testing program, when, in fact, there is good reason to include them.

We suggest the following amended provision: *“Properties that are, and generally were, used industrially, are not eligible for the soil program as they represent different exposure scenarios and human health risk considerations.”*

As written, the last sentence in this paragraph makes a broad assumption that seems inappropriate for inclusion in the SAP. We recommend that this sentence be stricken in its entirety, or amended as follows: *“In addition, industrial operations could represent sources of metals and other contaminants that have no relation to or would be indistinguishable from the historical smelter operations.”*

- 5) Page 6; last paragraph: Please provide the reference relating to emissions testing completed in 1935.
- 6) The title for Figure 1-1 should be amended to read “Initial Study Area” as it does not reflect the possible expanded areas that may result from adjustments made under Section 1.3
- 7) Section 1.2 – Target Constituent and Cleanup Levels, Table 1-1 raises question about the cleanup levels that were selected for this project. The residential cleanup levels shown in this table were developed through a site specific Human Health Risk Assessment (Damian, 2015). The non-residential cleanup levels for copper (Cu) and lead (Pb) were selected based on ADEQ’s pre-determined values, but the non-residential cleanup levels for arsenic (As) was selected to match the residential standard. It seems inconsistent to use three different methodologies to determine the cleanup levels for this project. Why were ADEQ’s pre-determined values only used for non-residential Cu and Pb, and not applied for non-residential As, and residential Cu, Pb, and As? What are ADEQ’s pre-determined values for residential cleanup?
- 8) The sampling plan provides very little rationale for the soil sampling chosen; only a brief discussion (Section 1.2, Page 7). This is the place for the sampling plan to describe the risk this potential soil contamination poses and to demonstrate that the sampling plan is



responsive to the risk assessment's basic premise. (It mentions children, and play areas but never says why this is of interest.) The short discussion is that the risk to be addressed arises from ingestion, inhalation, and dermal contact with surface soils. Notably, the plan lacks reference to remediation of household dust, which is referenced in the risk assessment and was noted as a cleanup factor by Freeport at the May 19<sup>th</sup> public meeting in Clarkdale. Once the SAP adequately describes the risks, then the authors can describe how the sampling plan is responsive to that risk.

- 9) Page 7 should include a section that articulates methods that will be employed when archeological sites or objects are identified on a property that is being either sampled or remediated.
- 10) Section 1.4 should contain a more explicit method for determining whether an expansion of the Study Area is warranted. The expansion should not just rely on test results and patterns within the Initial Study Area, but should include some method for sampling outside the Initial Study Area as well. This could well be modeled after the methodology that is laid out in Section 3.5.5 for Large Residential and Non-Residential Areas, and its corresponding Figure 3-6. For example, if any TC exceeds its CL at any boundary, will you automatically step out and investigate those properties until the concentrations of TCs are below CLs? If so, what will the approach be? If not, why?

## **Section 2: Community Involvement, Outreach and Solicitation**

- 11) The following additional objective of the CIOP should be added:
  - Provide opportunities for those wishing to comment on program documents the ability to do so through a formal ADEQ process (similar to the process used for this SAP)
  - In addition to providing comment on other program documents, the Town of Clarkdale specifically requests the opportunity to review and provide comment on the property owner agreement and the Remedial Action Work Plan (RAWP) before they are approved for use on this project.
- 12) The following steps should be included as part of the CIOP:
  - All materials should be available in both English and Spanish, and a Spanish speaking representative should be available for discussions with those residents who require interpretation.
  - Consideration for occasional office hours for the Community Outreach Office during untraditional business hours (nights and weekends) to facilitate availability for working families.
  - Freeport and/or their project managers should develop a project website so that residents and interested parties have access to electronic information about the project.
  - The CIOP should detail how occupants of properties will be contacted and educated during different stages of the project (in addition to owners of properties).



- The Town of Clarkdale and Freeport will agree on a mutually acceptable schedule of periodic project briefings for the duration of the project.
- Freeport should provide mapping updates for testing and remediation phases (in an electronic format that is acceptable to the Town) for the Town's inclusion in the permanent property files, on a mutually acceptable schedule.
- The Initial Study Area is comprised of 4 distinct neighborhoods (Upper Clarkdale, Lower Clarkdale, Patio Park and the Yavapai-Apache Nation). A neighborhood Open House should be held for each of those 4 neighborhoods, and such neighborhood meetings should be held as warranted if and when the Study Area expands beyond the Initial Study Area.

### Section 3: Sampling Approach

- 13) Sampling Approach, Page 9, second paragraph, last sentence: This sentence should be modified to include areas that are prone to producing dust, not just direct contact.
- 14) Sampling Approach, Page 9, second paragraph, second bullet: This bullet should be modified to say "unless these slopes represent a dust source".
- 15) Sampling Approach, Page 9: "Functional part" is not clearly defined in reference to Use Areas, making interpretation of what is considered "eligible property" unclear.
- 16) Sampling Approach, Page 9: The Town of Clarkdale has prepared a map of all Town owned properties that we would like to have included as eligible properties, and can provide that map as an exhibit for the SAP if necessary.
- 17) Sampling Approach, Page 9: The description for "accessible areas" should be expanded as follows: those areas within a UA that represent a potential for direct contact with surface soil that is either bare or covered by grass, *landscaping*, *vegetation* or gravel.
- 18) Sampling Approach, Page 9: Who will make the determination if a particular UA has particular "unacceptable safety concerns if remediated"? We would like to see an appeal process for the property owner when such a decision is made.
- 19) Section 3.1, Page 9: The SAP states that sampling will likely not extend below 24 inches due to the low probability of potential human health-related exposure at lower depth intervals. Is there an objective measurement that determines the need to go deeper that can be included in the SAP? Also, if at any location the 24 inches depth interval indicates that any TC exceeds its CL, will you continue to investigate deeper until the concentrations of TC are less than their CL?
- 20) This SAP is based on EPA, 2003, and generally says that use of the foregoing guidance ensures that the sampling approach meets regulatory guidelines, is technically defensible, and will achieve the sampling objectives. EPA, 2003, says "The overall goals of the sampling effort are to estimate an average soil lead concentration for risk assessment purposes and to provide information to determine the scope of any required clean-up actions." Further, EPA, 2003, goes on to recommend that a representative number of sample pairs be collected from 0 to 1 inch, and 1 to 6 inches and statistically compare those results to determine the most representative and appropriate first sample interval to collect and analyze. Why is this not



included in this SAP? Additionally, EPA, 2003, says that “Composite samples should be collected at 6 inch depth intervals, i.e., 0-6 inches, 6-12 inches, 12-18 inches, and 18-24 inches.” In Table 3-1, the first sample interval specified for collection is “0 to 3”, then “6 to 12”. Why is the interval “3 to 6” being skipped before generating site-specific data? The “3 to 6” inches interval could contain a predominance of TCs. Does Freeport have a technical justification why this potentially important interval is skipped? Given that the risk to be addressed in this project arises from ingestion, inhalation, and dermal contact with surface soils, we believe the 3-6” interval should be included.

- 21) Table 3-1: Without site-specific data indicating if TC concentrations generally increase or decrease with depth, the decision to only submit samples from the C and D depth intervals only if the sample from the “6- to 12-inch interval exceed a CL” may be technically flawed. It is recommended that the sample depth intervals include soil from 3 to 6 inches, and that the C interval be analyzed if either intervals A or B samples exceed a CL. This recommendation better accounts for unknown site-specific transport, adsorption and absorption properties, soil types, and historically if and what fill soil may have been placed at depth(s).
- 22) Section 3.2 and Section 5 of GHD’s Field Training Manual (Appendix A): It is unclear how samples will be collected from each depth interval. Considering that Section 5 says that surficial soil is defined to be 0 to 6 inches deep, and that deeper soil may require a borehole, how will each sample be collected from “surficial soil” and deeper intervals? Further, it is unclear if each sample will be collected equally from the entire depth interval, from the top of an interval, from the bottom of an interval, or at the whim of each field technician. Please clarify this most important procedure in the SAP and Appendix A.
- 23) Section 3.2 and Section 5 of GHD’s Field Training Manual (Appendix A): EPA, 2003, recommends that samples collected from all depth intervals be sieved using a No. 60 sieve. The reason is that smaller particles are preferentially brought into the home, and that fraction is most likely ingested by children. Later in the SAP it does indicate that samples will be sieved; however, do you plan to sieve each composite sample? If not, do you plan to complete a sieving study where a correlation between sieved and unsieved sample analyses are evaluated to determine if the correlation can be used to predict sieved results from unsieved samples?
- 24) Section 3.2: This section says “Each composite sample will consist of one aliquot for each 400 square feet (sq ft) of UA, with a minimum of five aliquots per composite sample.” What is the maximum number of samples that will be collected from a UA? Later in this document it indicates that spacing will be “even”; please clarify how will each sample location be spaced (evenly spaced along a grid, generally along the midpoint of each UA, generally along the perimeter of each UA, nearest to each residence)?
- 25) Section 3.2 and Section 5 of GHD’s Field Training Manual (Appendix A): Please define what a “separate, clean container” means. For example, if a separate clean container is a 4 ounce jar, then it might be difficult to adequately homogenize each composite sample or contain at least five representative aliquots from each UA. What is currently planned to be used to composite each sample aliquot?



- 26) Section 3.3: How does the QAPP deal with each confirmation sample as they pertain to data validation, and how does this treatment differ from a “duplicate sample”?
- 27) Section 3.4: If the composite sample for the UA that contains the discrete sample location also exceeds the CLs, vertical delineation at the discrete sample location may not be required, why and how will this area be remediated? Further, please clarify throughout that the intent is to further delineate if **any** CL is exceeded, not “the CLs” (meaning all three CLs).
- 28) Section 3.4: “The discrete sample location with a CL exceedance is considered horizontally delineated when it is surrounded by discrete sample locations without a CL exceedance and/or structural boundaries defined above.” How many “**discrete sample locations**” ‘step outs’ with concentrations less than a CL will be considered before determining that horizontal delineation is complete?
- 29) Project Verification and Split Sampling Section should be added on Page 10 as follows:  
“Permission will be granted to the Town of Clarkdale, ADEQ and their authorized agents and contractors to enter upon properties being tested at reasonable times to verify that the work is being performed in accordance with the work plan, is approved pursuant to A.R.S. 49-177, or has been performed in accordance with the report submitted pursuant to A.R.S. 49-181. Town of Clarkdale and ADEQ’s review may include field inspection and reasonable sampling. Freeport must include language to this effect on any Property Owner Consent agreements, in order to secure such right of entry.”
- 30) Section 3.5, Page 11: Final individual sampling plans should be subject to modification and input from the property owner in order to develop UAs that, if requiring remediation, will result in the most aesthetic remediation pattern possible for the property.
- 31) Section 3.5.1, Page 11: This entire section provides details on how sample locations will be developed in order to avoid testing areas that may have been impacted from lead from other sources (lead-based paints, lead-contaminated vehicle fluids, prior emissions from leaded gasoline). The protocols as designed result in a lack of testing for other important TCs (arsenic and copper) in the use areas. In addition, the blanket provision to stay at least 5 feet from any building presumes that the building was impacted by lead based paint, when, in fact, many structures may have been built well after the date that lead based paint would have been used.

Also, it is unclear in the SAP if a CL from any TC is exceeded, and that UA is selected for remediation, will soil from within 5 feet of each residence also be remediated? If soil from within 5 feet of each residence is not intended for remediation, Clarkdale disagrees with this approach and recommends, at a minimum, that a pre-study be completed by collecting several discrete samples from several different properties within 5 feet of each residence, and analyze each sample for the TCs. The residences should be selected based on their age and divided into pre- and post-lead-based paint eras. If CLs for any TC are exceeded, the data from the residences grouped into pre- and post-lead-based paint eras should be statistically compared to determine differences, primarily that of lead. If the concentrations of arsenic or copper tend to exceed its CL, then the investigation approach should be changed and at least



one of the composite sample aliquots should be collected from within 5 feet of each residence and included in each composite sample for that UA. An alternative approach could be collecting 4 sample aliquots from each side of each residence within 5 feet of that residence, composite and analyze that sample. If the analytical results for copper or arsenic exceed either CL, then soil from within 5 feet of that residence should be remediated. If a situation occurs where a residence is within 5 feet of say a road or parking lot, will samples be collected, and analyzed for CLs, and the results of copper and arsenic at least be considered?

32) In order to better understand the possible fate and transport of site-specific metals in Clarkdale soil, a Remedial Investigation (RI)<sup>1</sup> relating to the Omaha Lead Site in Omaha, Nebraska was reviewed. This RI, as well as previous investigations conducted at this Omaha site, has investigated potential migration of lead contamination from surface to subsurface soils. Investigations of soil chemistry and lead concentrations in subsurface soils at this site have indicated that the lead contamination at the site is concentrated in the top 2 to 12 inches of soil. Also, the number of samples in which lead was detected decreased at each downward depth interval. Alternatively, both lead and arsenic were determined present in numerous soil samples collected from 0 to 2 inches deep, and 0 to 8 inches deep. Numerous analytical results indicated that metals concentrations in the 0 to 8 inches interval were equal to or greater than the metals concentrations in the 0 to 2 inches interval. This can be interpreted to indicate that the predominance of metals may reside in a deeper interval, say, 3 to 6 inches, and that that interval apparently is not being investigated in Clarkdale (See Comments 20 and 21). If the Omaha site data are used as a predictor of fate and transport associated with Clarkdale soil, and if the 3 to 6 inches interval is not sampled, then it is possible that soil cleanup might be biased to only removing soil down to 3 inches, where in fact soil down to at least 6 inches should be removed.

In addition, the “drip zone” established for this RI extended only 3 feet from each residential foundation rather than 5 feet as described in the Clarkdale SAP (see comment 31) meaning that more soil would likely be cleaned up if the Omaha sampling plan approach were considered. To further highlight the Omaha RI’s attention to the drip zone, discrete samples were also collected from the drip zone to better understand if lead-based paint in soil might bias analytical results, and to determine if other toxic, metals not related to lead-based paint were present in near-surface soil. Again, either a “drip-zone” study, or discrete samples should be collected from the drip zone to determine if arsenic or copper CLs are exceeded. If exceeded, soil cleanup should occur.

<sup>1</sup> [http://www.epa.gov/region7/cleanup/superfund/sites/omaha\\_ne\\_lead\\_RI.pdf](http://www.epa.gov/region7/cleanup/superfund/sites/omaha_ne_lead_RI.pdf)

33) Section 3.5.1, Page 11: Who will make the determination that a vehicle is “in a state of disrepair”, or that a property contains a “junked item”? We would like to see an appeal process for the property owner when such a decision is made.



- 34) Section 3.5.2, Page 12: "Parks" should be explicitly added to the last bullet point, as follows:  
"Public recreational facilities, including ball fields, parks, playgrounds, etc."
- 35) Who determines which additional property (which is located adjacent to a property that has been selected for sampling) may be considered for sampling? We would like to see an appeal process for the property owner when such a decision is made.
- 36) Clarify that the 1-acre residential property threshold is determined based on the total acreage of use areas to be sampled (for instance, if a property were larger than one acre, but the total size of the UAs to be sampled was less than one acre, the 3,600 square foot aliquot size would apply).
- 37) Section 3.5.2: Why are the front yard and side yard width distinctions different? It is likely that many side yards will be less than 15 feet wide. What if a side yard is less than 15 feet and the neighboring yard is less than 15 feet wide, but together equal a distance greater than 15 feet, say 20 feet? This distinction seems to set up situations where several portions of a parcel are lumped into a not to exceed 3,600 sq ft UA.
- 38) Section 3.5.2: Regarding a not to exceed 3,600 sq ft UA... EPA, 2003, the document used to ensure that this SAP is technically defensible, gives examples of "recommended minimum soil sampling in yards less than or equal to 5,000 square feet..." In two examples, figures 4-1a and 4-1b, those yards were divided into two or three 'UAs' which presumably would equal approximately 1,700 to 2,500 sq ft each. Collecting a minimum of five composite sample aliquots from a smaller UA is going to be much more representative of that area than collecting a minimum of five composite samples within a 3,600 sq ft UA. Going back to comment 36, if a UA is 3,600 sq ft, and consists of (say) a front yard and two side yards, what would be the minimum and maximum number of composite sample aliquots that would be collected?
- 39) Section 3.5.3: Going back to comments 36 and 37, if a UA is 5,000 sq ft, and composite aliquots are collected based on an evenly spaced grid pattern where each grid node represents 400 sq ft, what would be the maximum number of composite sample aliquots that would be collected? In other words, collecting only five composite sample aliquots from a UA equal to 5,000 sq ft will not be representative of that relatively large area and more composite sample aliquots should be collected.
- 40) Section 3.5.4: It is recommended that more than five composite sample aliquots be collected, say every 400 sq ft, for UAs equaling 3,600 or 5,000 sq ft each.
- 41) Section 3.5.4, Page 16: Explicitly list that Town of Clarkdale alleys will be sampled on a Block Basis. Define "functional part".
- 42) Section 3.5.5: Please describe the statistical approach and methods used to determine that 3,600 and 5,000 sq ft UAs are statistically valid sizes given that EPA, 2003, divides a property equally to or less than 5,000 sq ft into two to three 'UAs'.
- 43) Section 3.5.5: Please clarify how many grids would be sampled, composite sample aliquots would be collected from each grid, and how many composite samples would be submitted for analysis for the example represented by Figure 3-6. How many and what types of quality



control and confirmation samples would also be collected by the example represented by Figure 3-6.

- 44) Section 3.5.5, Page 17: Allow property owners to be involved in the discussion of results with ADEQ and Freeport that is outlined in the last paragraph of this section.

#### **Section 4: Analytical Methods and Field Quality Control Sampling**

- 45) It is appropriate to describe, at a minimum, analytical methods and field quality control sample types and sample frequencies in a SAP for the following reasons: 1) completeness, 2) convenience, 3) less confusion for the sampling teams, 4) efficiency (a person doesn't have to search through hundreds of pages in a QAPP). At a minimum, please include section references to the QAPP that make this Section 4 more complete and useful.

#### **Section 5: Field Sampling**

- 46) Section 5.2, Number 4: It is still unclear if a hand trowel will be used to collect the 0-3 inches aliquot, and an auger or core will be used to collect deeper samples. Please clarify.
- 47) Section 5.2, Number 7: This section confirms that soil will be sieved using a No. 60 sieve. Will all composite and discrete samples be sieved?
- 48) It is still unclear which portion(s) of each interval will be collected as the composite sample aliquot. For example, will all of the soil representing 0 to 3 inches be included in the sample, or will the sample be biased toward either 0 or 3 inch portion of that interval?
- 49) Section 5.4: Where will each 55 gallon drum be located during working and non-working hours?
- 50) Section 5.7, Page 21: Should a time and date stamp be included for each site photo?

#### **Section 7: Data Management**

- 51) Section 7.1, Page 22: This section should explicitly list the involvement of the property owner in the sample planning for a given property.
- 52) Section 7.2: Will sample bottle labels be preprinted each day in order to minimize human error transcribing and translating the sample identifications onto each sample?
- 53) Section 7.2.1, Table 7-1: Is "Left Yard" and "Right Yard" relative to facing each house?
- 54) Section 7.2.5: This is a complicated and tricky sample identification system and will be prone to errors. Has this system been successfully used in the past? Will this sampling team have experience using this system? Other than comparison to each Sample Field Log, what other procedures will be used to ensure that each sample ID is correct?
- 55) Section 7.3: The SAP does not specify the field QA/QC sample types or frequencies. See comment 45, above.
- 56) Section 7.5.2, and Section 7.6: It may be described in the QAPP, regardless, will data be validated following the NCP National Functional Guidelines? Will validation be completed 'the old fashioned way' by a person; or, will data be validated electronically using custom software?
- 57) Section 7.5.2, Page 28: Who will the analytical laboratory make the data available to?



**Section 8: Reporting**

58) Add the Town of Clarkdale in the reporting sections in paragraph 2 and 3.

**Appendix A**

59) CRA no longer exists. Please change all reference in all SOPs to GHD.

60) Comment 23, above, points out that the SAP or the SOP does not specifically describe what tools will be used to collect soil samples from each interval. The SOP does consider soil from 0 to 6 inches deep to be “surficial soil” indicating that a trowel would be the likely tool to collect surficial soil samples. The specific tools should be described in the SAP given the SOP is general and somewhat subjective.

61) Appendix A, Section 3, Front Page: Will each field team member be required to adhere to the quality system training requirements described on that page?



### **Quality Assurance Project Plan (QAPP) Comments:**

- 1) This document contains introductory sections that are at least similar to those sections in the SAP. For any revision made to the SAP, make those same revisions in the QAPP.
- 2) Add the Town of Clarkdale as an entity to be communicated with by the point of contact in sections 2.1.2, 2.1.3.1, 2.1.3.3 and 2.1.3.5.
- 3) Add a new Section 2.1.4 for “Local Government” or “Town of Clarkdale”.
- 4) Add the Local Government Jurisdiction (Town of Clarkdale) to the Project Organizational Chart in Figure 2-1.
- 5) Section 2.3, second bullet point should reference the “Initial Study Area as well as any Expanded Study Area.
- 6) Section 3.3 add the Town of Clarkdale as a recipient of sampling and analytical data.
- 7) Section 4.7: Why is extraction method 3051 being used and not method 3050 considering method 3051 may not reflect the total content in a sample, meaning the sample concentration may be under reported?
- 8) Table 4-2: Will the laboratory be instructed to only ‘batch’ samples related to this “Soil Program” and complete laboratory QC on samples related to this program? Further, will only samples from this Soil Program be grouped into batches containing 20 samples, and not include samples from other clients and locations? In other words, are you going to request that the laboratory complete project-specific QC?
- 9) Section 4.8.2: What will be the frequency of collecting and analyzing the field quality control samples? The QAPP and SAP may or may not include frequencies for all sample types. A summary table in each document would be very convenient and helpful and minimize confusion and errors.
- 10) It is unclear if “Field Splits” will be completed because the text also seems to refer to these samples as “duplicates”. If so, which laboratory will be used to complete those analyses?
- 11) The QAPP says that “approximately 10 percent of the data packages containing compliance and closure samples will be validated at EPA Level IV by a third-party reviewer.” Further, “the third-party reviewer can be part of the DLVM’s organization provided that individual is not involved in routine Soil Program activities.” It is unclear which data deliverable package will be required; if not a Level IV package, please clarify. Are the investigation samples described in the SAP considered “compliance” or “closure” samples? Please clarify in the QAPP and SAP the data package “Level” and frequency associated with each sample type so that each document is consistent. For example, the SAP seems to indicate that all data deliverable packages for all samples will be Level IV meaning that many third-party validations will be completed. Please clearly describe in both the SAP and QAPP who will be completing third-party data validation. A table would be a wonderful thing to minimize mistakes and confusion. Section 5.1 add a bullet point for “Required Local Government Permits”
- 12) Section 5.5 add information about deliverables to Town of Clarkdale.