



Douglas A. Ducey  
Governor

# ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY



Misael Cabrera  
Director

*Sent via U.S. Certified Mail*

October 16, 2015  
VRP 16-117

Mr. Stuart Brown  
Senior Director, Remediation Projects  
Freeport Minerals Corporation  
333 North Central Avenue  
Phoenix, Arizona 85004

**RE: Review of Freeport Minerals Corporation Response to ADEQ and Public Comments Regarding the Draft Sampling and Analysis Plan and Draft Quality Assurance Project Plan**  
United Verde Soil Program  
Clarkdale, Arizona  
VRP Site Code: 512101-00

Dear Mr. Brown:

The Arizona Department of Environmental Quality Voluntary Remediation Program (VRP) has completed its review of the Freeport Minerals Corporation (FMC) letter titled *Response to Comments*, dated September 25, 2015 (the Letter). FMC prepared the Letter in response to comments received during a 30-day public comment period, held from July 17 through August 17, 2015, for FMC's Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) for the United Verde Soil Program, Clarkdale, Arizona. The Letter addresses comments received by FMC from the VRP in a letter dated August 28, 2015, and addresses public comments submitted to FMC from three interested parties (Town of Clarkdale [TOC]; Karen O'Regan and Philip Briggs [OB]; and Donna Whitmore [DW]). The VRP concurs with FMC's responses to all comments in the Letter, and provides below an illustration of how these comments should be implemented.

The VRP concurs with FMC's proposal to address the following comments in the SAP and QAPP:

Page 3, TOC.4	Page 4, TOC.59	Page 9, TOC.19	Page 19, TOC.27
Page 3, TOC.5	Page 4, TOC.Q1	Page 12, TOC.35	Page 24, TOC.Q11B
Page 4, TOC.34	Page 8, TOC.15	Page 13, TOC.36	Page 25, OB.2

In addition, the VRP recommends FMC include clarification in the SAP and QAPP for the following comments:

Page 2, TOC.3	Page 10, TOC.22	Page 10, TOC.23(b)	Page 16, TOC.49
Page 9, TOC.17	Page 10, TOC.23(a)	Page 14, TOC.41	



Finally, the VRP considers the following comments addressed by the Letter and has no additional requirements for them:

Page 1, TOC.1	Page 7, TOC.12F	Page 15, TOC.47	Page 21, TOC.57	Page 25, OB.3
Page 1, TOC.2	Page 7, TOC.12G	Page 15, TOC.48	Page 21, TOC.Q9	Page 26, OB.4
Page 1, TOC.6	Page 8, TOC.13	Page 16, TOC.50	Page 21, TOC.29	Page 26, OB.5
Page 2, TOC.10	Page 8, TOC.14	Page 16, TOC.52	Page 22, TOC.58	Page 26, OB.6
Page 2, TOC.Q5	Page 8, TOC.16	Page 16, TOC.53	Page 22, TOC.Q2	Page 27, OB.7
Page 3, TOC.8	Page 9, TOC.18	Page 16, TOC.54	Page 22, TOC.Q3	Page 27, OB.8
Page 4, TOC.9	Page 11, TOC.25	Page 17, TOC.55	Page 22, TOC.Q4	Page 27, DW.A
Page 4, TOC.45	Page 11, TOC.31	Page 17, TOC.60	Page 22, TOC.Q6	Page 28, DW.B
Page 5, TOC.7	Page 12, TOC.33	Page 17, TOC.61	Page 23, TOC.Q12	Page 28, DW.C
Page 5, TOC.11A	Page 13, TOC.37	Page 17, TOC.Q10	Page 23, TOC.30	Page 28, DW.D
Page 6, TOC.11B	Page 13, TOC.38	Page 18, TOC.20	Page 23, TOC.44	Page 28, DW.E
Page 6, TOC.12A	Page 13, TOC.39	Page 18, TOC.21	Page 23, TOC.51	Page 29, DW.F
Page 6, TOC.12B	Page 14, TOC.40	Page 19, TOC.28	Page 24, TOC.Q7	
Page 6, TOC.12C	Page 14, TOC.42	Page 19, TOC.32	Page 24, TOC.Q8	
Page 7, TOC.12D	Page 15, TOC.43	Page 20, TOC.26	Page 24, TOC.Q11A	
Page 7, TOC.12E	Page 15, TOC.46	Page 21, TOC.56	Page 25, OB.1	

**General Comments**

Although the VRP concurs with FMC’s responses to all comments, the VRP would like to provide some over-arching regulatory clarification on the following issues:

**1) The selection of cleanup levels associated with this Site.**

In accordance with Arizona Administrative Code (A.A.C.) R18-7-201 *et seq.*, soil contaminant concentrations remaining in soil shall be less than or equal to one of the following:

- a) predetermined remediation standards (Soil Remediation Levels; (SRLs));
- b) background remediation standards; or
- c) site-specific remediation standards.

FMC elected to conduct a risk assessment to establish site-specific cleanup levels (option c, above) for the residential scenario. These site-specific cleanup levels are documented in FMC’s *Human Health Risk Assessment to Support Site-Specific Soil Remediation Levels for Arsenic, Copper and Lead*, dated January 2015 (the Report). The Report was reviewed on ADEQ’s behalf by a third-party risk assessor (Kleinfelder). This review concluded that the methodology and development of the site-specific cleanup levels were acceptable and consistent with industry and regulatory standards associated with risk assessments.

The pre-determined SRL of 10 milligrams per kilogram (mg/kg) for arsenic (option a, above) was not developed based on risk evaluation, but rather based on background levels established for Arizona.



The site-specific cleanup level of 30 mg/kg for arsenic, employed at this site, was developed based on risk associated with a residential scenario.

It should also be noted that the non-residential SRLs for copper and lead are only being applied to properties with a known non-residential use. This is an acceptable and appropriate use of the non-residential SRLs.

**2) Allowable risk associated with cleanup levels.**

In accordance with A.A.C. R18-7-201 *et seq.*, contaminants remaining in soil after remediation must be between a  $1 \times 10^{-6}$  and a  $1 \times 10^{-4}$  cumulative excess lifetime cancer risk. The default value in the pre-determined SRLs is  $1 \times 10^{-5}$ . Only the contaminants cited in A.A.C. R18-7-205(D) shall be remediated to a  $1 \times 10^{-6}$  level. None of the contaminants requiring a  $1 \times 10^{-6}$  cleanup level are associated with smelter fallout. The cumulative excess lifetime cancer risk associated with this site and documented in the Report is  $1 \times 10^{-5}$ .

**Required Information**

The VRP requires FMC to include this correspondence and the Letter as an Appendix in the SAP and the QAPP. FMC should make the respective revisions to the SAP and QAPP and submit them to the VRP for final approval.

**How to Submit**

Documents sent in response to this letter should be submitted as two hard copies and one electronic copy (.pdf) addressed to:

John Patricki, Project Manager  
Arizona Department of Environmental Quality  
Remedial Projects Section, Voluntary Remediation Program  
1110 West Washington Street, Mailcode 4415B-1  
Phoenix, AZ 85007

**Additional Information**

The VRP site name and site code should be consistently used on all correspondence and reports relating to this site to ensure accuracy of file identification.

If you have any questions, regarding this correspondence please feel free to contact me via email at [jp10@azdeq.gov](mailto:jp10@azdeq.gov) or by telephone at (602) 771-4397.

Respectfully,



John Patricki, Project Manager  
Voluntary Remediation Program

Enclosure: FMC Response to Comment Letter dated September 25, 2015

cc: Town of Clarkdale  
Ms. Donna Whitmore, via email  
Ms. Karen O'Regan and Mr. Philip Briggs, 558 Rancho Villa LN, Clarkdale Arizona 86324





Freeport Minerals Corporation  
333 North Central Avenue  
Phoenix, AZ 85004

**Alicia C. Voss**  
Manager, Remediation Projects  
Telephone: (602) 366-8049  
e-mail: Alicia\_Voss@fmi.com

September 25, 2015

John Patricki, Voluntary Remediation Program  
ADEQ  
1110 West Washington Street  
Phoenix, AZ 85007

Re: Response to Comments  
VRP Site code: 512101-00  
United Verde Soil Program  
Draft Sampling and Analysis Plan and  
Draft Quality Assurance Project Plan



Dear Mr. Patricki:

Freeport Minerals Corporation (Freeport) is responding to comments from the Arizona Department of Environmental Quality (ADEQ), the Town of Clarkdale (TOC), and several Clarkdale residents on the July 6, 2015 draft Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) proposed for the United Verde Soil Program (UVSP), which is being conducted under the Voluntary Remediation Program. DEQ transmitted the comments to Freeport in a letter dated August 28, 2015.

The draft SAP and QAPP describe methods for soil sample collection and analysis for the UVSP. The intent of the UVSP is to evaluate soil on residential and commercial properties for elevated metals that may be the result of historical air emissions from a nearby copper smelter, which operated from about 1915 to 1953.

Freeport's responses to ADEQ's comments are provided below. Responses to TOC and Clarkdale residents' comments are also attached. The comments from TOC and Clarkdale residents were grouped according to similar topics rather than in the order in which the comments were received.

#### **ADEQ Comments and Freeport Responses**

**Comment - ADEQ.1a)** The VRP has concerns related to the methodology for establishing the Study Area boundaries. The SAP indicates the Study Area was developed based on properties most likely to have been affected by historical smelter air emissions. Please provide supporting information for selecting the current Study Area boundaries, in addition to an explanation for why certain adjacent properties in the TOC were not included.

**Response** - The purpose of the USVP is to address possible impacts from smelter emissions to soil on residential and commercial properties proximal to the smelter. As stated in the SAP, the primary pathway for target constituents (TC) to have impacted soil within the Study Area is via airborne deposition of particulate from historical emissions from the former United Verde Smelter. Residential and commercial properties closest to the former smelter are likely to have the highest amount of historical deposition. Accordingly, Freeport designated the Study Area based upon the location of the former smelter, the location of nearby commercial and residential properties, the development history of those properties, and the prevailing wind direction.

Regarding the three parcels immediately adjacent to the existing Study Area, further review of property information identified current industrial and commercial property uses. These three properties will be included in the UVSP for further investigation. Figures showing the Study Area boundary will be updated in the SAP.

**Comment** - ADEQ.1b) Although not referenced in the SAP, FMC indicated in a meeting held with ADEQ on August 14, 2015, that soil sampling will be conducted within the partially developed tract of land located just south of the southern boundary of the Study Area. As such, FMC should include this area in the Study Area boundary and revise Figure 1-1 accordingly.

**Response** - Freeport offered random discrete sampling at the Mountain View subdivision at the request of the TOC. The proposed sampling is being offered separately from the work outlined in the SAP.

**Comment** - ADEQ.2. The SAP briefly refers to the type of ore processed when the mine was in operation, citing the presence of copper, zinc, lead, iron sulfide minerals, along with trace elements such as gold, silver and other minor metals. In addition, the SAP states that emission testing data from the time the smelter was in operation indicated detectable concentrations of copper, iron, zinc, lead, arsenic and iron. FMC should provide the emission data and clarification on how Target Constituents (TC) were selected.

**Response** - Freeport will provide the emissions data and add to Section 1.1 more details on how the ore and emissions data support the selection of the TCs. Freeport will add zinc as a TC based on further review of the emissions data. Freeport also will analyze soil samples for tin to help evaluate whether the detected metals are from the former smelter because there are very few other sources of tin in the area, as compared to lead and arsenic, which can be derived from multiple residential sources (e.g., lead-based paints, leaded gasoline, pesticides, herbicides, treated wood).

**Comment** - ADEQ.3. FMC should clarify that the site-specific soil remediation levels (SS-SRLs) developed for the TCs for residential use will be utilized wherever residential use is encountered. Those properties with non-residential use will be remediated to the non-residential SRLs for lead and copper, as cited in Arizona Administrative Code R18-7-201 et. seq., and the SS-SRL for arsenic.

**Response** - The HHRA for the UVSP evaluated exposures to the TCs at residential properties following ADEQ and EPA risk assessment guidelines. Accordingly, the site-specific soil remediation levels recommended in the HHRA are protective of residential exposures.

Non-residential properties are much more varied (shopping centers, office buildings, warehouses, hotels, hospitals, etc). To develop site-specific non-residential cleanup levels for all non-residential properties, the different exposures at each type of non-residential property would need to be considered, which might result in wide range of cleanup levels, depending on the site-specific exposure. Rather than develop another HHRA that evaluated these different types of exposures, Freeport choose to use ADEQ's pre-determined non-residential soil remediation standards, as provided in Appendix A, Arizona Administrative Code Title 18, Chapter 7.

For arsenic, Table 1-1 uses the site-specific cleanup levels developed in the HHRA for both residential and non-residential properties. This is consistent with how ADEQ developed its pre-determined non-residential soil remediation level for arsenic. It also is very protective because it requires arsenic in soil at non-residential properties to be cleaned to a residential-exposure based standard.

The clarifications requested by ADEQ will be added to Table 1-1.

**Comment** - ADEQ.4. Determining whether or not to expand the Study Area will be based on the representative data collected through the sampling activities. FMC should submit these data and subsequent recommendations based on the data to the VRP for review and, if appropriate, approval.

**Response** - Sampling data will be provided to ADEQ and any recommendation to expand the Study Area will be discussed with ADEQ at the appropriate time.

**Comment** - ADEQ.5. FMC should include a figure of the sampling grid based on the protocol for horizontally delineating the discrete sample areas.

**Response** - A sampling grid figure will be added to the SAP.

**Comment** - ADEQ.QAPP: The VRP requests adjusting the text to state that laboratory certification is conducted through the Arizona Department of Health Services (ADHS). The text should also indicate the ADHS certification number for Microbac Laboratories, Inc.

**Response** - Text will be modified in the QAPP. A laboratory has not been selected yet; however, an ADHS certification number will be provided to ADEQ prior to conducting sampling activities.

**Conclusion**

Freeport appreciates the opportunity to provide further information on the UVSP draft SAP and QAPP. If you would like to discuss these responses further, please do not hesitate to contact me at your earliest convenience. Otherwise, if the responses are acceptable to ADEQ, please respond accordingly and Freeport will submit the final SAP and QAPP to ADEQ for your records.

Sincerely,

A handwritten signature in black ink, appearing to read "Alicia C. Voss". The signature is fluid and cursive, with a long horizontal stroke at the end.

Alicia C. Voss  
Manager, Remediation Projects  
Freeport Minerals Corporation

Attachment

cc: David Wallis, Gallagher & Kennedy  
Stuart Brown, Freeport Minerals Corporation

**Responses to Comments - Attachment**  
**DRAFT Sampling Analysis Plan (SAP) and Quality Assurance Program Plan (QAPP)**  
**United Verde Soil Program**  
**Clarkdale, Arizona**  
**September 2015**

*Note: Comments from the Town of Clarkdale (TOC) have been re-organized by topic.*

**COMMENTS RELATED TO STUDY AREA**

**Comment #TOC.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.*

**UVSP Response**

Pursuant to A.R.S. 49-173.A.3, an applicant is required to describe the "boundaries of the site or portion of the site" that the applicant determines to include in the VRP application. Freeport described in its UVSP VRP Application the area that Freeport wanted covered under the VRP. Freeport termed this area the "Study Area." Figure 1-1 of the Sampling and Analysis Plan (SAP) shows the Study Area. To avoid confusion concerning what is covered by Freeport's VRP Application, the term "Study Area" will be used, instead of the term "Initial Study Area," throughout the SAP and QAPP.

The SAP describes the criteria that Freeport will use to evaluate whether to include additional properties within the Study Area. (See response to Comment #TOC.10). If Freeport determines that additional properties should be included in the Study Area, Freeport will update the Study Area figure in the SAP and the VRP Application.

**Comment #TOC.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..."*

**UVSP Response**

The purpose of the UVSP is to address possible impacts from smelter emissions to soil on residential and commercial properties proximal to the smelter. As stated in the SAP, the primary pathway for target constituents (TC) to have impacted soil within the Study Area is via airborne deposition of historical emissions from the former United Verde Smelter. Residential and commercial properties closest to the former smelter are likely to have the highest amount of historical deposition. Accordingly, Freeport designated the Study Area based upon the location of the former smelter, location of nearby commercial and residential properties, development history of those properties, and prevailing wind direction.

**Comment #TOC.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*

#### UVSP Response

Please see the response to Comment #TOC.1.

#### Comment #TOC.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?***

#### UVSP Response

After soil sampling data are collected within the Study Area, Freeport will evaluate whether the Study Area should be expanded. Freeport will examine two primary lines of evidence in evaluating whether elevated TCs at the Study Area boundary are due to smelter emissions. This examination may include evaluating the spatial distribution of metals in surficial soil and whether it is indicative of a smelter emission plume, and if the mixture or ratio of metals is consistent with the smelter emission signature. Any decision to expand the Study Area will be submitted to the ADEQ for review. After soil sampling data are obtained for any expanded portion of the Study Area, this process will be repeated to determine whether to propose additional properties to be included in the Study Area.

#### Comment #TOC.Q5

***Section 2.3, second bullet point should reference the "Initial Study Area" as well as any Expanded Study Area.***

#### UVSP Response

Please see response to Comment #TOC.1. Section 2.3 references use areas at eligible properties within the Study Area, as well as any properties which might be included if the Study Area is expanded.

### COMMENTS RELATED TO PARCEL ELIGIBILITY

#### Comment #TOC.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.***

#### UVSP Response

Zoning designations will be considered when determining whether a property is eligible for testing and restoration. Freeport also will consider the actual current use of the property and future development plans for the property.

**Comment #TOC.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."*

**UVSP Response**

Change is acceptable and a revision will be made to the SAP.

**COMMENTS RELATED TO TEXT**

**Comment #TOC.5**

*Page 6; last paragraph: Please provide the reference relating to emissions testing completed in 1935.*

**UVSP Response**

The reference will be incorporated in the SAP.

**Comment #TOC.8**

*The sampling plan provides very little rationale (sic) 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 19th 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.*

**UVSP Response**

The Human Health Risk Assessment (HHRA) approved for the UVSP addressed the potential risks associated with human exposure to metals in soil. The HHRA addressed the potential for human exposure

to soil through the pathways of ingestion, inhalation and dermal contact. The SAP describes how soil samples will be collected and analyzed in use areas where there is a potential for human exposure to determine if metals concentrations exceed CLs. A separate work plan will be developed for sampling and cleaning of household (interior) dust.

**Comment #TOC.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.***

**UVSP Response**

If archeological or other protected historic objects are encountered during sampling activities, the sampling work will cease and the property owner will be notified. The property owner will determine whether to proceed with any required assessment of the identified object(s) and whether to continue with sampling. Discovery of archeological or historical objects is more likely during soil remediation. Protocols for identification and notification will be included in the Remedial Action Work Plan (RAWP).

**Comment #TOC.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."***

**UVSP Response**

"Parks" will be added in Section 3.5.2 of the SAP.

**Comment #TOC.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.***

**UVSP Response**

The VRP requires that these items be covered in a QAPP. The SAP references the QAPP for this information. A revision to the text of the SAP is not needed.

**Comment #TOC.59**

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

**UVSP Response**

Appropriate revisions will be incorporated in the final version of the SAP.

**Comment #TOC.Q1**

***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.***

## UVSP Response

Where similar language is used in both the SAP and QAPP, revisions to that language will be made in both documents as appropriate.

### **COMMENTS RELATED TO RISK ASSESSMENT**

#### **Comment #TOC.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?***

#### **UVSP Response**

The HHRA for the UVSP evaluated exposures to the TCs at residential properties following ADEQ and EPA risk assessment guidelines. Accordingly, the site-specific soil remediation levels recommended in the HHRA are protective of residential exposures.

Non-residential properties are much more varied (shopping centers, office buildings, warehouses, hotels, hospitals, etc.). To develop site-specific non-residential cleanup levels for all non-residential properties, the different exposures at each type of non-residential property would need to be considered, which might result in a wide range of cleanup levels, depending on the site-specific exposure. Rather than develop another HHRA that evaluated these different types of exposures, Freeport choose to use ADEQ’s pre-determined non-residential soil remediation standards, as provided in Appendix A, Arizona Administrative Code Title 18, Chapter 7.

For arsenic, Table 1-1 uses the site-specific cleanup levels developed in the HHRA for both residential and non-residential properties. This is consistent with how ADEQ developed its pre-determined non-residential soil remediation level for arsenic. It also is very conservative (i.e., protective) because it requires arsenic in soil at non-residential properties to be cleaned to a residential-exposure based standard.

### **COMMENTS RELATED TO OUTREACH**

#### **Comment #TOC.11A**

***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).***

#### **UVSP Response**

Freeport anticipates submitting to ADEQ a RAWP for the soil restoration phase of the UVSP. Freeport anticipates that this work plan will be subject to public notice and comment. Freeport does not anticipate any other program documents that will be submitted to ADEQ for review and approval, until completion of the project.

#### **Comment #TOC.11B**

***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.***

#### **UVSP Response**

As stated above, ADEQ and public will have the opportunity to review and comment on the RAWP in a similar fashion as the SAP/QAPP. ADEQ does not review or comment on property access agreements between Freeport and property owners. Property owners will have the opportunity to review the soil sampling access agreement for their property (or properties), and if eligible (due to an exceedance of one or more soil cleanup levels), a soil remediation access agreement for their property (or properties). The Town of Clarkdale will be provided these same opportunities for eligible Town of Clarkdale properties.

#### **Comment #TOC.12A**

***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.***

#### **UVSP Response**

All published Outreach materials will be made available in English. Spanish-language materials can be provided upon request from a property owner. It is expected that a Freeport representative would be made available for translation needs and discussion purposes, if necessary.

#### **Comment #TOC.12B**

***Consideration for occasional office hours for the Community Outreach Office during untraditional business hours (nights and weekends) to facilitate availability for working families.***

#### **UVSP Response**

The Community Outreach Office schedule will be established in advance of soil sampling activities and is expected to be open during traditional business hours. The Community Outreach Office will accept sampling access agreements or questions related to the Program via phone, regular mail or e-mail. Community Outreach staff will be available to meet by appointment after hours, on an as-needed basis.

#### **Comment #TOC.12C**

***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.***

#### **UVSP Response**

Development of a project website will not be conducted; however, a repository of Program documents will be placed in the local library and made available to the Town. The Community Outreach Office will be open and will provide published information (such as Fact Sheets and Frequently Asked Questions). Additionally, requests from interested parties can be submitted and addressed via email if necessary. Property-specific information will only be provided to the individual owner(s) of the property.

#### **Comment #TOC.12D**

***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).***

#### **UVSP Response**

Freeport will communicate with tenants at the request of a property owner. For example, a property owner may wish to designate a local representative (e.g.; property manager or tenant) to allow access to the property for sampling. The contact information for an owner's representative may be provided either in the designated section of the soil sampling access agreement or by contacting the Community Outreach Office.

When the property is scheduled to be sampled, the property owner will be contacted and UVSP will verify the designated representative. Soil sampling results will be communicated to the current owner(s) of record for the property.

#### **Comment #TOC.12E**

***The Town of Clarkdale and Freeport will agree on a mutually acceptable schedule of periodic project briefings for the duration of the project.***

#### **UVSP Response**

Agreed

#### **Comment #TOC.12F**

***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.***

#### **UVSP Response**

The Town of Clarkdale will receive results in the form of a soil sampling report for only Town of Clarkdale owned properties. General study area maps depicting soil sampling progress (and if warranted, remediation progress) will be included in periodic project briefings with the Town.

#### **Comment #TOC.12G**

***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.***

## **UVSP Response**

Freeport anticipates there will be an open house for property owners within the entire Study Area as well as a separate open house for the Yavapai-Apache Nation. In addition, general information (such as Fact Sheets and Frequently Asked Questions) related to the UVSP activities will be available to the general public. UVSP property-specific information will be available to the corresponding property owners by contacting the local Community Outreach Office.

## **COMMENTS RELATED TO SAMPLING APPROACH**

### **Comment #TOC.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.***

### **UVSP Response**

A revision to the text is not warranted. Sampling is intended to address current exposure. As such, the UA will address any dust deposition and the complete exposure pathway. The RAWP will address dust control measures that will be used during soil restoration.

### **Comment #TOC.14**

***Sampling Approach, Page 9, second paragraph, second bullet: This bullet should be modified to say "unless these slopes represent a dust source".***

### **UVSP Response**

For safety reasons, Freeport will avoid work on steep slopes. Accordingly, a revision to the text is not necessary.

### **Comment #TOC.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.***

### **UVSP Response**

The text will be revised to provide clarification that if a use area encroaches into a right-of-way, that portion of the right-of-way will be included as part of the use area.

### **Comment #TOC.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.***

### UVSP Response

Freeport has received the map from the Town and will request the Town to provide access to its eligible properties within the Study Area for sampling. Maps of individual properties, including the Town map, will not be included as exhibits to the SAP.

### Comment #TOC.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.***

### UVSP Response

An accessible area is an area that is accessible for sampling teams to safely collect soil samples, while meeting the requirements of the SAP. Examples of areas that may not be accessible include steep slopes, areas with potential fall hazards, areas with dense and/or thorny vegetation, and areas with excessive debris that is not removed by the property owner.

### Comment #TOC.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.***

### UVSP Response

A top priority for Freeport is the safety of UVSP workers. During the course of the site soil sampling and any future site visits (e.g., if a property is eligible for soil remediation), the UVSP team may identify potential safety concerns. If identified, these concerns will be discussed with the property owner to determine if the property owner will make the area safe to allow access for UVSP activities. If the property owner is unable to make the area safe, it will be excluded from sampling. Freeport will not allow property owners to appeal its safety decisions.

### Comment #TOC.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?***

### UVSP Response

Sampling is typically continued in six-inch depth intervals until analysis results in a non-exceedance of CLs for a depth interval or if refusal is encountered. Refusal is defined as conditions where greater than 50 percent of the aliquots required for a particular use area cannot be collected due to bedrock, subsurface structures, or other impediments. The text of the SAP will be revised to provide this additional description.

**Comment #TOC.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.***

**UVSP Response**

Soil samples are typically collected using a clean trowel or hand auger (2 inch or 2-3/4 inch diameter) depending upon the soil type. Soil is collected from the entire depth interval at each aliquot location and then homogenized. A sample is then taken from the homogenized soil for laboratory analysis.

**Comment #TOC.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?***

**UVSP Response**

During field sample collection, each composite sample is sieved with a No. 10 sieve to exclude larger particles (i.e. small roots and gravel). The laboratory then sieves each sample with a No. 60 sieve prior to performing the analysis. A No. 60 sieve is used per EPA's Superfund Lead-Contaminated Residential Sites Handbook (August 2003).

**Comment #TOC.23**

***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)?***

**UVSP Response**

Composite soil samples are collected from between five and nine aliquot locations within each residential use area. The exact number of aliquots in each use area is based upon surface area that is available for sampling. The table below describes the relationship of the size of each residential use area to the number of aliquot locations to be sampled in each use area.

Residential Use Area Size	Number of Aliquot Locations
< 2,000 sq. ft.	5
2,001 to 2,400 sq. ft.	6
2,401 to 2,800 sq. ft.	7
2,801 to 3,200 sq. ft.	8
3,201 to 3,600 sq. ft.	9

Alternatively, the maximum non-residential use area size is 5,000 sq. ft. Soil samples from five aliquot locations will be collected for a non-residential use area.

Aliquot sample locations within each use area are typically evenly spaced using a 'W' pattern with consideration given to general sample location requirements identified in Section 3.5.1 of the SAP.

**Comment #TOC.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?***

**UVSP Response**

A "separate, clean container" is typically a 1-gallon zip top plastic bag or a clean mixing bowl. Manual homogenization of the aliquots is performed in one of these containers prior to filling a laboratory certified clean 4-ounce jar. Nitrile gloves will be worn by the person mixing the composite sample, and those gloves will be discarded between each composite sample.

**Comment #TOC.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?***

#### **UVSP Response**

Sampling next to structures is avoided in an effort to minimize impacts from non-smelter related sources of metals associated with structures or the drip zone (e.g., lead based paint, pesticides, herbicides, treated wood). If a CL from any TC is exceeded in a depth interval, the entire use area at that property is eligible for cleanup to the exceeded depth interval. During remediation planning, the full extent of the use area is planned for excavation to the target depth, which includes soil within 5-feet of the residence or structure. The exact limits of soil remediation near a structure depend upon the presence of vegetation, underground or overhead utilities, other structures and property owner considerations. Additional details regarding soil excavation will be provided in a RAWP and will be discussed with the property owner during the pre-remediation planning phase. Use areas that meet the criteria in Section 3 of the SAP will be eligible for soil sampling.

#### **Comment #TOC.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.***

#### **UVSP Response**

During soil sampling at a property, the field team leader will communicate with the property owner if sampling in a use area or a portion thereof cannot occur because the area is obstructed or has other sources of potential soil contamination. Typically, a sufficient number of aliquots can be collected within a use area while observing the setback guidelines for the smaller items described above. This procedure has not been an issue with property owners at other soil programs administered by Freeport. No appeal process is necessary.

#### **Comment #TOC.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.***

#### UVSP Response

If the adjacent property is being used or is likely to be used for residential or commercial purposes, it will be sampled with the permission of the property owner. The SAP will be revised to reflect this criterion. No appeal process is necessary.

#### Comment #TOC.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).*

#### UVSP Response

This clarification will be made in the SAP.

#### Comment #TOC.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.*

#### UVSP Response

The use area dimensions for an individual property are based upon the size and layout of that property. The size or layout of adjacent parcels is not considered during sampling. Any individual use area which exceeds 3,600 square feet but is less than one acre will be subdivided into use areas approximately equal in size such that no individual use area exceeds 3,600 square feet.

#### Comment #TOC.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?*

#### UVSP Response

Please refer to the response provided in Comment #24.

#### Comment #TOC.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.*

**UVSP Response**

Please refer to the table in the response provided for Comment # 24. To summarize, depending on the size of the residential use area, the number of aliquots collected will be between five and nine. The maximum size of a residential use area will be 3,600 sf. As the exposure frequency and duration of non-residential parcels is less than a residential parcel, the number of aliquots collected for a non-residential use area will be five and the maximum size will be 5,000 sf.

**Comment #TOC.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.*

**UVSP Response**

Please refer to the table in the response provided for Comment #24.

**Comment #TOC.41**

*Section 3.5.4, Page 16: Explicitly list that Town of Clarkdale alleys will be sampled on a Block Basis. Define "functional part".*

**UVSP Response**

According to information provided by the Town of Clarkdale, municipal utilities enter private properties from alley locations. It is Freeport's experience that the presence of utilities in narrow alleys significantly limits the accessibility of the areas to sampling. Therefore, the UVSP is not anticipating the sampling of alleys at this time. "Functional part" is defined as portions of the alley that are accessible and either traverse developed use areas or connect developed use areas. Undeveloped rights-of-way located away from developed use areas will typically not be sampled.

**Comment #TOC.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'.*

**UVSP Response**

Section 4.2.2 of EPA's Superfund Lead-Contaminated Residential Sites Handbook (August 2003) states: "It is recommended that when sampling residential lots with a total surface area (emphasis added) less than 5,000 square feet (a typical urban lot size), five-point composite samples should, at a minimum, be collected from each of the following locations: the front yard, the back yard and the side yard (if the size of the latter is substantial)". The UVSP SAP follows the guidelines set forth in the EPA Handbook for dividing a property into use areas: a residential lot less than 5,000 square feet is divided into Use Areas (front yard, back yard, side yard) with a minimum of five aliquots collected from each Use Area.

**Comment #TOC.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.***

**UVSP Response**

The example in Figure 3-6 identifies 18 grids that will be sampled. Depending on the results, additional grids may be sampled. Nine aliquots will be collected from each grid for a residential property and five aliquots will be collected from each grid for a non-residential property. Composite samples from all 18 grids would be submitted to the laboratory for analysis. The number of samples and types of samples include the following:

- 18 grids x 4 depth intervals = 72 composite samples (assumes refusal is not encountered)
- Field duplicates: minimum of 1 out of 10 samples (10%) = 8 samples
- Matrix Spike and Matrix Spike Duplicate: minimum of 1 out of 20 samples (5%) = 4 samples
- Equipment Rinsate: minimum of 1 out of 20 samples (5%) = 4 samples
- Shifted Grid or Confirmation Samples: 1 out of 20 samples (5%) = 4 samples
- Total samples collected = 92

**Comment #TOC.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.***

**UVSP Response**

Hand trowels or augers may be used for the 0-3 inch interval. The sample tool will be selected based on the soil conditions at the individual property.

**Comment #TOC.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?***

**UVSP Response**

Yes. Please refer to the response provided for Comment #TOC.23.

**Comment #TOC.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?***

#### **UVSP Response**

Using the example provided in this question, the soil representing 0 to 3 inches will be collected from each aliquot location for use as the composite sample representing that use area. The soil will be homogenized and a composite will be extracted. The sample will not be biased towards the upper or lower extend of the depth interval.

#### **Comment #TOC.49**

***Section 5.4: Where will each 55 gallon drum be located during working and non-working hours?***

#### **UVSP Response**

Investigation-derived waste (IDW) is transferred from smaller container(s) (e.g., a five-gallon bucket with a securable lid) to a 55-gallon drum at the end of each work day. The drums are typically stored within secondary containment and in a secure location controlled by UVSP staff. The secure location is anticipated to be the UVSP Program Office.

#### **Comment #TOC.50**

***Section 5.7, Page 21: Should a time and date stamp be included for each site photo?***

#### **UVSP Response**

Each photo is digital and has an electronic record of the date and time the photo was captured.

#### **Comment #TOC.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?***

#### **UVSP Response**

Sample bottle labels are pre-printed prior to the mobilization of UVSP staff to the property.

#### **Comment #TOC.53**

***Section 7.2.1, Table 7-1: Is "Left Yard" and "Right Yard" relative to facing each house?***

#### **UVSP Response**

Correct.

#### **Comment #TOC.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?***

#### UVSP Response

This system has been used successfully by the UVSP staff at other similar soil programs administered by Freeport. Sample identification is pre-planned and generated using a Project Database. Prior to sample collection, the UVSP staff cross reference the individual property sampling plan with the pre-printed sample labels.

#### Comment #TOC.55

***Section 7.3: The SAP does not specify the field QA/QC sample types or frequencies. See comment 45, above.***

#### UVSP Response

Quality control samples as outlined in Section 4.8.2 of the QAPP are generated during the planning phase in the Project Database to ensure the correct numbers of quality control samples are collected. The minimum frequency of collecting field quality control samples is as follows:

- Field duplicates: 1 out of 10 samples (10%)
- Matrix Spike and Matrix Spike Duplicate: 1 out of 20 samples (5%)
- Equipment Rinsate: 1 out of 20 samples (5%)
- Shifted Grid or Confirmation Samples: 1 out of 20 samples (5%)

#### Comment #TOC.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.***

#### UVSP Response

Please refer to the response for Comment #TOC.46

#### Comment #TOC.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?***

#### UVSP Response

Yes

#### Comment #TOC.Q10

***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?***

## UVSP Response

Field split and field duplicate samples may be collected in the same manner. Field duplicate samples will be collected and sent to the laboratory contracted by UVSP to perform laboratory analyses. Field split samples will be collected by UVSP or ADEQ staff and ADEQ will make arrangements to have the sample analyzed by a separate laboratory contracted directly with ADEQ.

## COMMENTS RELATED TO DEPTH INTERVAL

### Comment #TOC.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.*

### UVSP Response

The 0-3 inch interval is used to best represent the surface soil that may have been impacted by air deposition from the former smelter. Furthermore, the 3-6 inch interval is not likely to have more air deposition impact than the 0-3 inch interval. As will be explained in the RAWP, if the 0-3 inch interval exceeds any TC, the 0-6 inch interval will be removed as a practical excavation technique and, therefore, is addressed.

### Comment #TOC.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).*

## UVSP Response

The speculation that a deeper depth interval could have a higher TC concentration than a shallower interval is inconsistent with the air deposition pathway for soil. Freeport has collected similar soil samples associated with air deposition from smelter emissions at other sites and has found a decreasing trend associated with depth of soil.

## Comment #TOC.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).***

## UVSP Response

Additional clarification will be provided in the SAP.

## Comment #TOC.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?***

## UVSP Response

A discrete sample location can be considered **horizontally** delineated if the composite sample for the use area where the discrete sample was taken indicates an exceedance. The use area would be addressed as outlined in the response to Comment #TOC.27.

Horizontal delineation of a discrete sample collected within a use area that indicates an exceedance (and the composite sample in the same use area does not indicate an exceedance) will be delineated as follows:

- One discrete sample will be collected no more than 20-feet in each of the cardinal directions of the original discrete sample location.
- If one or more of the discrete step-out locations indicate an exceedance, the step-out delineation as outlined above will continue until the discrete locations with an exceedance are surrounded by step-out locations which do not exceed any of the CLs, or structural boundaries (such as foundations, walls or other structures), or laboratory analytical results in an adjacent use area indicates none of the TC exceed the CL.

## Comment #TOC.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)

#### **UVSP Response**

The above-referenced report states that lead concentrations in soil decreased at each downward depth interval. However, the report does not conclude that the lead concentrations in the 0-8 inch interval were greater than the 0-2 inch interval. In fact, Table 5-1 from the report states that the mean lead concentrations in the 0-2 inch interval was 280 ppm, while the mean lead concentrations in the 0-8 inch interval was 223 ppm. Also, the majority of 0-2 inch interval had higher concentrations than the 0-8 inch interval.

See also response to Comment #TOC.31 regarding drip zones.

#### **COMMENTS RELATED TO QUALITY CONTROL**

##### **Comment #TOC.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"?**

#### **UVSP Response**

Pertaining to data validation, the shifted grid/confirmation samples are treated similarly to the regular composite samples. As such, no comparison is made between the shifted grid/confirmation sample and its associated regular composite sample. Field duplicates are assessed like the other samples but

additionally, they are also compared with the "parent sample" and the relative percent difference (RPD) as discussed in Section 3.1 of the QAPP.

**Comment #TOC.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?***

**UVSP Response**

A Project Chemist will validate the data following the US EPA Functional Guidelines.

**Comment #TOC.57**

***Section 7.5.2, Page 28: Who will the analytical laboratory make the data available to?***

**UVSP Response**

The analytical laboratory will provide data electronically to Freeport and its consultant for upload and use in the Project Database.

**Comment #TOC.Q9**

***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.***

**UVSP Response**

The collection frequency and laboratory analysis of field quality control samples is discussed in Section 4.8.2 of the QAPP.

**COMMENTS RELATED TO TOWN AUTHORITY**

**Comment #TOC.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."***

#### **UVSP Response**

ADEQ is providing project oversight under the VRP. The statutory citations in the foregoing question only provide ADEQ with oversight authority, not municipalities. Accordingly, ADEQ will oversee the work, including field inspections, review of laboratory analytical data, soil sampling and soil remediation work plans, soil sampling results letters and soil remediation completion results letters. The parties to the Property Access agreement will be Freeport, its contractors, and the property owner.

We appreciate the TOC's interest in this project and as stated in response to Comment #TOC.12E, Freeport will meet with TOC representatives on a regular basis to keep them informed, but ADEQ, not the TOC, will be providing regulatory oversight under the VRP.

#### **Comment #TOC.58**

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

#### **UVSP Response**

Property owners will have the opportunity to review the soil sampling results for their properties. The TOC will be provided the same opportunity for eligible Town properties. To respect privacy interests, Freeport will not provide private property information (e.g., sample results) to other parties.

#### **Comment #TOC.Q2**

***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.***

#### **UVSP Response**

See responses to Comments #TOC.29 and #TOC.58.

#### **Comment #TOC.Q3**

***Add a new Section 2.1.4 for "Local Government" or "Town of Clarkdale".***

#### **UVSP Response**

See responses to Comments #TOC.29 and #TOC.58.

#### **Comment #TOC.Q4**

***Add the Local Government Jurisdiction (Town of Clarkdale) to the Project Organizational Chart in Figure 2-1.***

#### **UVSP Response**

See responses to Comments #TOC.29 and #TOC.58.

#### **Comment #TOC.Q6**

***Section 3.3 add the Town of Clarkdale as a recipient of sampling and analytical data.***

**UVSP Response**

See responses to Comments #TOC.29 and #TOC.58.

**Comment #TOC.Q12**

***Section 5.5 add information about deliverables to Town of Clarkdale.***

**UVSP Response**

See responses to Comments #TOC.29 and #TOC.58.

*QUESTIONS RELATED TO APPEAL PROCESS*

**Comment #TOC.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.***

**UVSP Response**

UVSP will coordinate with property owners to obtain access to properties and determine which areas will be sampled. While UVSP encourages property owners to allow sampling of all eligible UAs at the property, property owners may decline sampling or exclude certain areas from sampling at their discretion. If one or more UAs within a parcel are eligible for soil remediation, UVSP reviews the soil remediation cleanup work plan and obtains input from the property owner at that time.

**Comment #TOC.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.***

**UVSP Response**

Property owners are informed of their property sampling results prior to Freeport and ADEQ discussions. Freeport will discuss the results with the property owner as Freeport develops its remediation cleanup work plan for the property. The property owner also may discuss the results with ADEQ.

**Comment #TOC.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.***

**UVSP Response**

See responses to Comments #TOC.30.

## **COMMENTS RELATED TO LABORATORY APPROACH**

### **Comment #TOC.Q7**

*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?*

### **UVSP Response**

Method 3051 is an EPA-accepted method. A revision to the text is not necessary.

### **Comment #TOC.Q8**

*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?*

### **UVSP Response**

The laboratory will complete project-specific QC. Samples from other clients and locations will not be included.

### **Comment #TOC.Q11A**

*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.*

### **UVSP Response**

All data packages will be Level IV packages. Ten percent of the data packages will be validated at EPA Level IV by a Project Chemist.

### **Comment #TOC.Q11B**

*Section 5.1 add a bullet point for "Required Local Government Permits"*

### **UVSP Response**

Text will be added to the SAP that all applicable local government permits will be obtained.

## **RESPONSES TO KAREN O'REGAN AND PHILIP BRIGGS' (OB) COMMENTS**

### **Comment #OB.1**

***Study Area: The claim that the "Study Area includes properties most likely to be affected by historical air emissions...due to the properties proximity to historic smelter operations" needs much more explanation, justification and research. Historic photos have shown a "bathtub" ring of dead vegetation in the hills above the smelter. In fact, farmers throughout the Verde Valley sued the smelter owners (and won) because of the serious damage to their crops caused by the toxic smelter smoke. Historic photos should be researched to determine the most likely impacted properties as the chemical-laden smelter smoke surely did not likely follow the neat lines of the study area delineated by Freeport.***

### **UVSP Response**

See response to Comment #TOC.2. Additionally, there is a difference between the fate and transport of particulate matter emissions from the former smelter compared to gas emissions. Metals were part of the particulate matter emissions, which were much heavier and did not travel as far as gas emissions. The gas emissions (e.g., smoke) traveled further and contained sulfur dioxide. The sulfur dioxide was found in prior law suits to have impacted vegetation, including crops.

### **Comment #OB.2**

***The last paragraph of the Introduction includes a sweeping generalization about industrial operations that is not always true and should be deleted. In addition, if a person has a residence in an industrial zoned property, the portion of that property that is subject to residential use should be included in the sampling program.***

### **UVSP Response**

See response to Comment #TOC.4 and the proposed changes to the SAP.

### **Comment #OB.3**

***It appears from Table 1-1 that Freeport used three different methods to choose soil cleanup standards. This gives the impression that Freeport was allowed to "pick and choose" standards that would allow for the least costly remediation.***

***Unfortunately, as previously mentioned, the public did not have the opportunity to comment on the soil cleanup standards approved by ADEQ in the Human Health Risk Assessment and listed in the Table 1-1. ADEQ approved Freeport to use less stringent cleanup standards developed by Freeport instead of the more conservative soil remediation levels (SRLs) established by ADEQ in rule. Freeport's cleanup levels use an allowable risk of one excess death in 100,000 people versus the state approved SRLs which use a risk of one excess death in 1,000,000 people. In addition, the Verde Independent reported that a soil cleanup in Hayden used the more stringent SRLs.***

***Please explain why Clarkdale properties are being cleaned up to a less stringent standard than Hayden and why the state adopted SRLs are not being implemented in Clarkdale. Please also explain why the public was not invited to comment on these most important decisions and why three different methods were used to determine the standards used for this cleanup.***

#### **UVSP Response**

See response to Comment #TOC.7. Furthermore, the cleanup in Hayden did not use ADEQ's SRLs. Other residential soil cleanup programs conducted in the state under the VRP have used much higher site-specific cleanup levels. For example, in Superior, Arizona, the site-specific residential soil remediation level used to cleanup residential properties was 90 ppm arsenic.

#### **Comment #OB.4**

*It is likely that sediments that have been impacted by the smelter chemicals have been eroded over time and transported and deposited into local surface water bodies (like Pecks Lake); however, there are no provisions for sampling these media in potentially affected areas. Given the fact that public access to the Verde River has dramatically increased, sampling should include surface water and sediments in the smelter smoke plume area. If these areas are found to be impacted that an appropriate risk analysis should be performed.*

#### **UVSP Response**

The only media that is being addressed under the UVSP is soil. While it is not anticipated that other media (e.g., sediments) have been impacted by the former smelter, any such impacts would be addressed under a different remedial program.

#### **Comment #OB.5**

*Adjustment to the study area: Please see comment number one about the selected study area. Again, it is highly unlikely that the smelter smoke plume followed the neat study area lines drawn by Freeport. In addition, the study area adjustment process is unclear. Given the lack of community involvement in the past it is likely to be based upon Freeport's sole discretion. The process needs to be clearly and objectively spelled out and include a community involvement and appeal process.*

#### **UVSP Response**

See response to Comment #TOC. 5.

#### **Comment #OB.6**

*Community Involvement: A separate Community Involvement plan should be developed. The brief outline in the sampling plan is inadequate. Freeport should develop a separate plan that would identify and interview stakeholders including community leaders and groups and then develop a specific community action plan based upon the interviews. The plan should include objectives, specific activities and opportunities to comment, including timeframes. It needs to identify the needs of the community and address the specific needs of the Yavapai Apache tribe as well as any translation needs. It should also describe the function and hours of the Community Outreach office.*

*The public should be invited to comment on major decisions especially the level of cleanup on their property. There should be a clear appeal process should property holders not agree with decisions make about their property.*

**All information developed by Freeport should be available online in a project website. It is ridiculous in this day and age not to have an online repository.**

#### **UVSP Response**

See responses to Comments #TOC.11B and #TOC.12C. The community involvement requirements of the VRP are contained in A.R.S. 49-176. These requirements have been or will be met by the SAP. The VRP does not require a separate Community Involvement Plan. Property owners will have the opportunity to comment on and approve plans for remediation of their properties.

#### **Comment #OB.7**

**Sampling intervals: Table 3-1 indicates that samples will not be obtained from 3 to 6 inches. Please explain why this important interval is being skipped as it seems like an oversight to not include it in the sampling effort. The Town has gone into extensive detail about this omission and in fact, not sampling this interval is inconsistent with the human health risk assessment as described in the following.**

#### **UVSP Response**

See responses to Comments #TOC.20 and #TOC.32.

#### **Comment #OB.8**

**Describing the risk: The sampling plan provides very little rationale for the soil sampling depths chosen; only a brief mention of the previously completed risk assessment (Section 1.2, Page 7). This Section is the place for the sampling plan to describe the risk the potential soil contamination poses and to demonstrate that the sampling plan is responsive to the risk assessment's basic premise.**

**As you know, the risk arises from ingestion, inhalation, and dermal contact with surface soils. The authors should describe how the proposed sampling will develop data that is responsive to that risk scenario. With this key foundation laid, the community reviewer will understand the process and can better participate in the study.**

**For example, this discussion would allow a reviewer to evaluate the importance of that missing sampling interval the Town discusses in their comments.**

**Our review finds that describing that risk justifies adding the 3 - 6 inch sampling depth. If that interval was inadvertently left out, it needs to be put in. If that interval was left out on purpose, then the proposed sampling plan is not responsive to the risk scenario and needs to be included in the revised sampling plan.**

#### **UVSP Response**

See response to Comments #TOC.8 and #OB.7.

### **RESPONSES TO DONNA WHITMORE'S (DW) COMMENTS**

#### **Comment #DW.A.**

**The "why" of this program is, in my opinion, unanswered by Freeport, ADEQ, the Arizona Department of Health Services and the Town of Clarkdale. The Town is apparently going to receive a monetary donation from Freeport in connection with the project; what is Freeport receiving and from whom? Is Freeport receiving Superfund remuneration via CERCLA?**

#### **UVSP Response**

Freeport has not agreed to nor stated that it will make a monetary donation to the Town in connection with this project. Freeport is not receiving any money from the federal Superfund or any other third parties for the project. Freeport is voluntarily conducting the UVSP to address potential impacts to soil on properties near the former smelter site in the VRP.

#### **Comment #DW.B**

*How is it possible for Freeport to have determined that only three metal-bearing particles need to be remediated in Clarkdale prior to having tested the soil, which is exactly what Freeport stated in the May 19, 2015 meeting.*

#### **UVSP Response**

Section 1.1 of the SAP describes how the TCs were developed.

#### **Comment #DW.C**

*There are many unanswered questions in the plan for remediation of the soil that need to be addressed. "Patch quilt" soil replacement is unacceptable as it replacement of expensive, alternate landscaping materials with plain old gravel. All replacements should be "in kind." That is only one example of the many problems in the plan, most of which the Town has addressed in its Staff Report of August 11, 2015.*

#### **UVSP Response**

The details of how soil will be remediated will be covered in the RAWP. The SAP only covers community outreach, sampling and analysis.

#### **Comment #DW.D**

*What is the name of the testing lab to be used for soil tests?*

#### **UVSP Response**

A testing lab has not been selected at this time; however, the selected laboratory will be certified with the Arizona Department of Health Services.

#### **Comment #DW.E.**

*Who is the "third party" that will review the Risk Assessment?*

#### **UVSP Response**

Scott Dwyer at Kleinfelder

**Comment #DW.F**

***Does the testing lab in 'D' or the third-party in 'E' have any prior, on-going or loose relationship of any kind with Freeport?***

**UVSP Response**

No.

COPY

Fume in Smelter Exit Gases

7/3/35

Mr. W. W. Dredger,  
Works Manager

From C. W. Eichrodt  
G. Bobadilla

On June 24th to 27th, 1935, incl. an 88-hr. continuous test was run on the Smelter Exit Gases.

The fume was collected in a Draco bag unit located by the Smelter office, and the gas passing thru the unit was drawn from the Smelter flue at a point located between the return flue from the bag house and the inlet to the stack. All the smelter exit gas was included but none of the exit gas from the Anode Flue.

It was extremely difficult to obtain gas velocity measurements at this point but a study of the flue system will reveal the fact that there is no good location for velocity measurements that can be closely related to fume samples of significant magnitude. The preliminary flue surveys were made with extreme care in order to minimize the errors that might be introduced. In fact, more time was spent on preliminary surveys and measurements than on the actual test run. It is doubtful if more accurate results could be obtained without considerably more equipment and expense than would be justified in making determinations applicable only to present existing conditions.

Gas velocities were measured by pitot tubes of home made variety. Velocity readings were made on the main Smelter flue, the Bag House return flue, and the 15" pipe from the main flue to the Sample bag unit.

Temperatures were taken at all points where velocity measurements were taken, by pyrometers and recording thermometers. The instruments were all checked in the laboratory so that all readings would be properly corrected.

Temperature and velocity readings were taken at 15-minute intervals during the entire run.

It was impossible at all times to maintain the velocity of gas in the pipe to the bag unit as high as the velocity in the main flue. This may tend to give low results as regards quantity of fume, and to give a fume sample somewhat high in the lighter constituents, probably high in zinc.

It was impossible to thoroughly clean out the copper and pipe to the bag unit at the end of each day without unduly interrupting the run. Hence to avoid any misleading interpretations, the entire run has been considered as one period, and not split into separate days. It was intended to run for four complete days or 96 hours. However, a breakdown in the Smelter caused the termination of the run at 11 P.M. on June 27th.

UVC009546

7/2/35

2.

Mr. W. W. Dredger,  
Works Manager

From C. W. Eichrodt  
G. Bobadilla

In drawing conclusions from the data obtained, it must be remembered that the results apply only to conditions existing during the duration of the test, and that variations in Smelter operations, materials treated, and condition of the flues, will affect the amount and content of the fumes.

A record was kept of the material treated in the Sinter Machine and Blast Furnace during the test. Analyses of these materials and their amounts will be included in this report.

The Smelter flues were thoroughly cleaned in April. However, Mr. Higgins, Smelter Superintendent, estimates that there was approximately 400 tons of dust in the flues at the time of the test. There was considerable leakage of air into the Smelter flues. Temperature and draft measurements show the influence of this condition. On the whole, the present condition of the Smelter flues should tend to give somewhat less than the normal amount of fume to be expected from the material treated, and a fume higher than normal in the lighter constituents.

The test was made just before a Smelter shut-down and hence with the bags in the Bag House in rather less than average condition.

Very truly yours,

(signed) C.W.Eichrodt

UVC009547

7/3/35

Mr. W. W. Dredger,  
Works Manager

G. W. Eichrodt  
G. Bobadilla

Average Smelter Fume per 24 hrs. during test

Composite of daily samples

	<u>% or oz/ton</u>	<u>Lbs. or Ozs.</u>
Total	---	15,064.00 lbs.
Copper	1.72	259.101 "
Zinc	32.29	4,864.166 "
Lead	14.35	2,159.671 "
Tin	1.33	200.351 "
Iron	2.41	363.042
Silica	.61	91.890
Arsenic	1.51	227.466
Antimony	.304	45.795
Silver	3.60 oz/ton	37.115 oz.
Gold	.025 "	.188 oz.

Analyses of daily fume samples

	<u>June 24</u>	<u>June 25</u>	<u>June 26</u>	<u>June 27</u>
Cu	1.50%	1.90	1.90	1.60
Ag	3.60 oz/ton	4.35 oz/ton	4.00 oz/ton	3.00
Au	.0275 "	.03 "	.025 "	.02
Zn	35.57	34.95	31.68	28.11
Pb	13.95	14.18	14.63	13.67
Sn	1.69	1.38	1.43	1.07
Fe	2.59	1.70	2.45	2.63

Mr. W. W. Brodger,  
Works Manager

G. W. Eichrodt  
G. Bobadilla

7/3/35

DATA

Time, Start of Test	7 A.M. June 24 - 1935
Time, End of Test	11 P.M. June 27 - 1935
Duration of Test	88 Hours
Amount Fume collected in bag unit	370 lbs.
Average fume collected per hour	4.2 lbs.
Av. Temp. Gas to Bag Unit	16.98 Ft. Sec.
Area Pipe to Bag Unit	1.2274 sq.Ft.
Exit Gas to Bag Unit at Temp.	1250.72 Cu.Ft./Min.
Exit Gas to Bag Unit at 60° F.	956.67 Cu.Ft./Min.
Fume in Exit Gas at 60° F.	73.17 lbs. per Million Cu.Ft.
Av. draft in Smelter exit flue	.43 in. of water
Av. temp. " " " gas	223.64° F.
Av. vel. in Smelter Flue	25.54 ft./sec.
Net area Smelter Flue	123,667 sq.ft.
Amt. Smelter Exit Gas & temp.	123,055 cu.ft./min.
" " " " at 60° F.	142,974 " " "
Avg. Amt. fume in Sm.Exit) gas per 24 hrs.	15,064
Avg. Temp. Gas in Bag House Ret. Flue	175° F.
" Velocity of Gas " " " "	19.22 Ft./Sec.
Net area bag house return flue	59.38 sq.ft.
Amt. gas thru bag house return flue at temp.	68,491 cu.ft./min.
" " " " " " " " 60° F.	56,068 " " /min.
(amt. gas from Blast Fec. Sinter Flue) leaks, etc. at 60° F.	88,906 cu.ft./min.
(Amt. gas from blast fec. Sinter Flue) leaks, etc. at 220° F.	113,698 " " "

W. W. Dredger,  
Works Manager

C. W. Eichrodt  
G. Bobadilla

Content of material treated in Sinter Plant and Blast Furnace During period. Due to the fact that lot analyses only were available, the silver and gold figures may not be truly representative of the material treated during the period.

	<u>Sinter Plant</u>	<u>Blast Fee.</u>	<u>Total</u>
Lbs. Copper	142,506.00	505,800.00	648,306.00
Ozs. Silver	2,622.24	3,132.225	5,754.465
" Gold	89.748	100.512	190.260

Tabulation of the operations carried out at Sintering Machine and Blast Furnace during the test period:

Sinter Charges -- Lbs. Dry Wt.

Ores	246,600
Brass Ashes	149,400
Sulphide Concen.	50,400
S. Amer. Concntr.	174,800
B.F. Reverts	<u>122,400</u>
	743,400

Analyses of Sinter Materials

	<u>% Cu</u>	<u>% Pb</u>	<u>% Zn</u>	<u>% Sn</u>	<u>% As</u>	<u>% Sb</u>	<u>% Cl</u>	<u>Oz/ T. Ag</u>	<u>Oz/ T. Au</u>
Ores	8.00	.60	0	0	.70	.30	0	15.0	.30
Brass Ashes	25.00	.0	10.0	.50	0	0	0	0	0
Sulphide Concen.	22.00	.20	0	0	.03	.03	.05	1.20	.04
S. Amer. "	20.00	1.00	0	0	.40	.15	.20	5.0	.10
B.F. Reverts	20.00	.80	5.75	.50	.50	.10	0	5.00	.30

Blast Furnace Charges - Lbs. Dry Wt.

Ores	198,000
Brass	266,200
Black Copper	127,800
Slag & Refuse	266,400
Converters Mat.	385,200
Blast Fee. Reverts	57,600
Sulphide Concentrates	525,800
So. Amer.	<u>138,600</u>
Total	1,963,600

Blast Fee. Blower Av. Oz. Air Press.	10.5
" " " Min. " " "	9.0
" " " Max. " " "	12.0

Mr. W. W. Dredger,  
Works Manager

C. W. Eichrodt  
R. Bobadilla

7/3/35

	<u>% Cu</u>	<u>% Pb</u>	<u>% Zn</u>	<u>% Sn</u>	<u>% As</u>	<u>% Sb</u>	<u>% Cl</u>	<u>Oz./T. Ag</u>	<u>Oz./T. Au</u>
Ores	8.00	.80	0	0	.70	.30	.0	32.0	.68
Brass	35.00	.0	10.0	.50	0	0	0	1.75	.05
Black Copper	75.00	7.11	0	0	.07	2.20	0	.60	.01
Anode Slag&Refuse	35.00	5.10	0	.10	.25	.30	0	3.0	.10
Conv.Slag&Floor	12.00	5.00	5.00	2.00	.50	.30	0	.80	.02
B.V. Reverts	20.00	.80	3.75	.50	.50	.10	0	5.00	.30
Sulphide Concen.	22.00	.20	0	0	.05	.03	.05	1.20	.04
So.Amer. "	20.00	1.00	0	0	.40	.15	.20	3.0	.10

- - - - -

Blister Production - Tons - 372  
(Including brass added directly to converters)

	<u>Total for 88 Hrs.</u>	<u>Cu</u>	<u>Ag</u>	<u>Au</u>
Contents of Blister	744,000	713,025.00	8,594.00	372.27
" Fume	55,236	950.09	99.428	.690

