October 28, 1994

Cyprus Amax Minerals
ATTN: Mr. Patrick Lee
Manager, Environmental Engineering
Representing Cyprus Foote Mineral
9100 East Mineral Circle
Englewood, CO 80155

SUBJECT: NRC COMMENTS ON PHASE I WORK PLAN FOR A SCOPING SURVEY OF VICINITY PROPERTIES CAMBRIDGE, OHIO

Dear Mr. Lee:

This letter transmits the Nuclear Regulatory Commission (NRC) comments on the report entitled *Phase I Work Plan for a Scoping Summary of Vicinity Properties in the area of Cambridge, Ohio* (Enclosure 1). This report was prepared by Woodward-Clyde Consultants on behalf of Cyprus Foote Mineral Company (CFMC). Also enclosed is an addendum to the NRC Inspection Report No. 999-90003/94044 (DRSS) (Enclosure 2), which presents radon test results for two residences.

After review of your plan, the NRC staff identified a number of concerns that need to be considered in implementing this work plan. Therefore, we request that CFMC revise the plan to address the NRC comments, and that CFMC submit to our office within 30 days of receipt of this letter copies of those portions of the plan that have been revised.

During an October 18, 1994, conference call with Messrs. Rudy Torrini and Patrick Kelly, we communicated the specific comments relating to your approach for conducting radiological surveys and dose assessments. These comments addressed the following areas: the use of discrete versus composite samples; the establishment of a system for identifying sampling locations; and input parameters and radionuclides of interest for the dose assessment. During an October 19, 1994, follow-up call, Mr. Torrini informed NRC staff that the sampling concerns would be incorporated in the implementation of the sampling phase of the work plan. Based on this agreement, we authorized CFMC to proceed with these surveys.

If you have any questions regarding this letter, please contact me at (708) 829-9876 or Ray Glinski of my staff at (708) 829-9813.

Sincerely,

Original Signed By

Gary L. Shear, Chief
Fuel Cycle and Decommissioning Branch

Enclosures: As stated

cc w/encl: R. Torrini, Woodward-Clyde Consultants
R. Owen, ODH
B. Blair, OEPA
J. Wendel, USEPA, Region V
The Honorable H. Metzenbaum, U.S. Senate
The Honorable J. Glenn, U. S. Senate
The Honorable, G. DiDinato, Ohio House Response
S. Bauman, Save the Wills Creek Water Resources Committee
D. Patterson, Jr., Beveridge and Diamond, P.C.
S. Eves, SMC

This document has been coordinated with Office of General Counsel.

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OFFICE	RIII	E	RIII	C	RIII	N	NMSS	
NAME	Glinski RG		McCann MMM		Shear GCS		Weber (Phone)	
DATE	10/27/94		10/27/94		10/28/94		10/28/94	

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Enclosure 1

NRC Comments on Cyprus Foote Mineral Company's
Phase I Plan for a Scoping Survey of Vicinity Properties
in the Area of Cambridge, Ohio

1. Section 1.1 - Definition of Source Material, pg. 1

The work plan text states that "source material" is material containing greater than 0.05 percent weight (% wt) combined uranium and thorium. This definition is not consistent with the definition of source material in 10 CFR 40.4. Under the first part of the definition of source material, NRC regulations state that source material means "uranium or thorium, or any combination thereof, in any physical or chemical form..." Therefore, as defined, source material under the first part of the definition has no lower weight concentration threshold (e.g., 0.05 % wt). This threshold only applies in the definition to "ores" containing uranium, thorium, or any combination. Consequently, materials other than "ores" are considered source material if they contain any uranium, thorium, or any combination thereof.

NRC requirements in §40.13(a) establish the threshold of 0.05 % wt for "unimportant quantities" of source material. Source material in any chemical mixture, compound, solution, or alloy in which the source material is less than 0.05 % wt is exempt from the requirements in 10 CFR Part 40 and from the requirements for a license under section 62 of the Atomic Energy Act. Consequently, unimportant quantities of source material are often referred to as "not licensable" under the Act. Nevertheless, these materials are source material and subject to NRC jurisdiction.

As applied by the NRC staff, materials containing uranium and thorium (or any combination) with concentrations less than 0.05 % wt (other than special nuclear material) are not licensed by NRC and are not required to be disposed of in a licensed low-level radioactive waste disposal facility, provided they have not been generated as a result of handling or processing licensable quantities of source material (i.e., source material with uranium and thorium concentrations in excess of 0.05 % wt). If sites have become contaminated with uranium or thorium in excess of background radiation (see 10 CFR 20.1003) as a result of processing or possession of licensable source material, then the contamination must be reduced to levels allowing release for unrestricted use of the site in accordance with NRC decommissioning requirements in §40.42. The Commission stated these unrestricted use criteria in the *Action Plan to Ensure Timely Cleanup of Site Decommissioning Management Plan Sites*, April 16, 1992 [57 FR 13389]. The criteria are applied on a site-specific basis with emphasis on maintaining residual contamination levels as low as is reasonably achievable. For source material contamination dispersed in soils and similar materials, the applicable criteria are described in Options 1 and 2 of the Branch Technical Position entitled *Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations* (46 FR 52061; October 23, 1981).

Based on this explanation, and the limited availability and review of historical production information to date, it is premature to draw conclusions about whether the contamination found offsite in the vicinity of Cambridge, Ohio, is licensable or resulted from processing or possession of licensable quantities of source material. Such determinations must await further review of available records and analysis of the characteristics and origins of the offsite contamination.

2. Section 1.1 - References, pg. 2

The work plan contains numerous conclusions and observations that are apparently based on Cyprus Foote Mineral Company's (CFMC) review of available records. However, the text does not provide or cite the references on which these statements are based. These references should be included to ensure that the basis for the statements may be independently confirmed, based on review and analysis of the referenced information.

3. Section 1.2 - Source Material at Offsite Locations, pg. 3

The bullet at the bottom of this page states that none of the 54 properties surveyed by NRC contain slag that is source material. As described in Comment #1, it is premature to draw such conclusions. The statement is also probably incorrect as currently written because: 1) each sample contained some concentration of uranium and thorium, although the concentrations may be at or close to background concentrations in some cases; 2) some of the slag buttons at property #10 probably exceeded the threshold of 0.05 % wt for thorium and uranium, or any combination thereof, and would therefore be considered licensable source material; and 3) the statement does not consider the NRC criteria for the unrestricted release of sites.

4. Section 1.2 - Radon Levels, pg. 4

From the preliminary work to date, it cannot be determined whether the elevated radon levels are a result of the presence of Foote Mineral slag [See the Addendum to the NRC Inspection Report 999-90003/94044 (DRSS)].

5. Section 1.3 - Acceptable Dose Levels, pg. 4

The 100 mrem/yr in 10 CFR 20.1301(a)(1) applies to licensed operations, and does not constitute an appropriate guideline value for unrestricted release of contaminated properties for long-term use. As indicated in the 1981 Branch Technical Position, unrestricted release means that no member of the public is expected to receive an unacceptable dose from any foreseeable use of the property. The plan states that 100 mrem/yr above background exposure rates will be used as the threshold for determining if a significant and imminent risk is posed by the slag. The NRC uses the 100 mrem/yr as a threshold to determine when an immediate health and safety risk exists, meaning that immediate action must be taken to reduce the risk. Therefore, 100 mrem/yr should not be

used as an acceptable dose level for the unrestricted release of properties with residual contamination. In NRC's view, an acceptable dose level for unrestricted release of a site would likely be in the range of 10-15 mrem/yr.

6. Section 1.3 - Exposure from External Sources, pg. 5

10 CFR 20 1302(b)(2)(ii) states that the dose resulting from exposure to external sources of radiation must not exceed 50 mrem in a year. This could occur to an individual that is continuously present in an unrestricted area that is six microRoentgens per hour above ambient background. The NRC would take into account institutional control and occupancy factors in determining acceptable external exposure rates in unrestricted areas.

7. Section 1.4 - Radionuclide Concentrations. pg. 5

The NRC release criteria are based on known concentrations of radionuclides in discrete areas, and not on average concentrations over a given area. Therefore, CFMC should collect several discrete samples from each residence and report the results accordingly. Guidance is provided in NUREG/CR-5849.

8. Section 1.4 - Distribution Coefficients, pg. 5

Please elaborate on the distribution coefficients being determined and how they will be determined.

9. Section 1.4 - Inhalation Exposure Pathway, pg. 6

Rather than use <10 micron as particle size for inhalation, an appropriate Activity Medium Aerodynamic Diameter (AMAD) and resuspension factor should be determined for the slag.

10. Section 2.1 - Lack of a Plan for Canvassing Local Residents, pg. 7

Contrary to NRC's previous requests, the proposed scope of work does not include specific efforts to canvass local residents in the vicinity of Cambridge and Byesville to identify additional, potentially contaminated sites. Although it may be appropriate to defer such efforts until subsequent phases, it is important for CFMC to conduct an effort to solicit information about the location of other potentially contaminated properties because the information NRC used to identify potentially contaminated sites was based on a limited survey of the public (e.g., through press releases and a public meeting). NRC believes that the Phase I Work Plan (and certainly the Phase II Work Plan) should present additional information on key components of the subsequent phases of the investigation (i.e. identification of other places of slag use, contacting contractors, public notices, etc.).

11. Section 2.1 - Determining Distribution Coefficients, pg. 7

The proposed scope of work includes collection of slag samples to determine distribution coefficients. Although such coefficients should be helpful in characterizing the leaching behavior of the contaminated slags and soils, they will not be sufficient to characterize the mobility and transport of radiological contaminants that may be released from the slag in unsaturated and saturated media. Consequently, CFMC may need to collect additional samples of soils and geologic media located downgradient of contaminated areas to support groundwater transport assessments, if preliminary tests show that leaching may be significant.

12. Section 2.2 - Radionuclides of Interest, Inclusion of Uranium-234 and Uranium-235, pg. 8

In addition to the radionuclides of interest listed in section 2.2, uranium-234 and uranium-235 should be included in the analyses and dose assessments as part of the uranium decay series. Inclusion of ^{234}U and ^{235}U is especially significant because of the detection of elevated levels of unsupported uranium and actinium series decay products in the offsite contamination, as well as the detection of elevated natural uranium levels at Location #47. Analysis for the concentrations of these radionuclides in samples of the contamination may help in assessing the origin and lineage of the offsite contamination.

13. Section 2.4 - Literature Review of Hydrologic Data, pg. 9

As part of the literature review of hydrologic data, CFMC should review available hydrologic and hydrogeologic data that have been assembled for the site currently owned by Shieldalloy Metallurgical Corporation.

14. Section 2.5 - Field Investigation, pg. 9

CFMC should use some type of grid system to enable CFMC or another party to identify sample locations for future reference.

15. Section 2.5.3 - Biased Sampling of Slag Material, pp. 9-10

CFMC should ensure that the biased samples are representative of the materials being sampled. For example, sampling methods should consider physical variations in grain size, color, shape, and appearance in determining whether biased samples are representative of the contamination. Also, some slag may be distinguished by the appearance of tiny vesicles from the smelting process. In addition, more than one sample per site will be necessary to assess the variability of radionuclide concentrations in offsite areas. As noted in #7 above, NRC believes that several discrete samples should be collected at each property. NRC is interested in the range of concentrations and heterogeneity of discrete samples rather than average concentrations over a large area. NRC does not support the use of composite samples. Composite samples will not provide sufficient information to assess spatial variability of the characteristics and composition of the

contamination. The information from discreet samples may be useful in assessing potential doses to humans, environmental mobility of the contaminants, and origin of the material.

16. Section 2.5.4 - Composite Sampling of Slag Fill Material, pg 10

NRC believes that this section should be deleted form the work plan for the reasons stated in #7 and #15.

17. Sections 2.5.6 and 2.6 - Determination of Distribution Coefficients, pp. 11 and 12

The text states that ASTM methods will be used to determine distribution coefficients for the slag (and for radionuclides of concern). However, it does not state how many samples will be analyzed using these methods or which methods will be used to estimate distribution coefficients. This information should be provided to ensure that the results of the testing will be sufficient to assess the leaching potential of the slag and other contaminated materials.

18. Section 2.5.8 - Investigation Waste Disposal, pg. 11

The text states that "investigation wastes" will be containerized and disposed of in "an appropriate manner." However, the plan does not elaborate on what manner is appropriate for different types of waste (radioactive vs. non-radioactive) or on the procedures that will be used to screen the waste to determine what methods of disposal are appropriate. Specifically, the plan should describe in detail the methods and procedures that will be used to distinguish low-level radioactive waste (LLW) containing source material from other types of waste. If LLW is generated during the project, the waste will need to be stored until disposal capacity for such waste becomes available in the State of Ohio or be transferred to operating, licensed disposal facilities. The plan should include procedures and plans for extended waste storage or for transfer to offsite, licensed disposal facilities.

19. Section 2.8 - RESRAD Evaluation of Radionuclide Dose Factors, pg. 13

The plan's description of procedures to develop dose factors based on "realistic input parameters appropriate for the slag and conditions in the Cambridge area" is very vague. Although such an effort may provide valuable insights into the environmental transport of radionuclides near Cambridge, the dose modeling should conform to existing and accepted exposure scenarios, such as those described in NRC Policy and Guidance Directive 8-08 or NUREG/CR-5512 (both of which have been previously provided to CFMC). In addition, this modeling should consider uncertainties in the long-term behavior and conditions at the contaminated sites, such as the durability of existing cover materials. Policy and Guidance Directive 8-08 provides extensive guidance on the conduct of such exposure assessments. As described in the directive, departures from these standard exposure scenarios may be justifiable. CFMC should justify any departures from the standard exposure scenarios and selection of each input parameter value used in the modeling.

Enclosure 2

ADDENDUM TO: NRC Inspection Report 999-90003/94044(DRSS)

Report No. 999-90003/94044(DRSS)

Docket No. 040-7397 (Expired)

License No. SMB-1507 (Expired)

SUBJECT: Radon Concentration Data from Locations #19 and #33

Location #19: Slag collected from around the foundation of the house at Location 19 contained nearly 4900 pCi/g of thorium-230. Since the levels of radium-226 (30.2 pCi/g) were also significantly elevated, the NRC believed that a radon determination was warranted. NRC Region III sent four Environmental Protection Agency (EPA) certified radon testing kits to the resident. The EPA limit for radon is 4 picocuries per liter (pCi/l). The results are presented as ranges because the resident did not mark the time of day when the collection period ended.

The radon test results are as follows:

Basement:		
1)	near the location of the slag;	6.1 - 9.1 pCi/l
2)	middle;	4.9 - 7.3 pCi/l
Upstairs living quarters:		
1)	bedroom;	2.5 - 3.1 pCi/l
2)	living room;	1.7 - 2.5 pCi/l

Location #33: The radon test conducted by the Oak Ridge Institute for Science and Education at Location #33 showed 4.1 ± 0.6 (pCi/l). Therefore, the NRC also decided to conduct confirmatory radon analysis at this residence. NRC Region III sent four EPA certified radon testing kits to the resident.

The results of the radon are as follows:

Basement:		
1)	bedroom;	7.7 pCi/l
2)	TV room;	6.9 pCi/l
Upstairs living quarters:		
1)	bedroom;	1.3 pCi/l
2)	office;	1.2 pCi/l

Although the levels of radon detected in these basements is above the EPA limit of 4.0 pCi/l, the NRC does not believe that there is an immediate health and safety risk. From all the data available at this time, it cannot be determined whether the elevated radon is due to the CFM slag. Therefore, further evaluation is warranted.

Enclosure 1

NRC Comments on Cyprus Foote Mineral Company's
Phase I Plan for a Scoping Survey of Vicinity Properties
in the Area of Cambridge, Ohio

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Enclosure 2

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Docket No. 040-7397 (Expired)

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