

From: "Schoenfelder, Robert P." <R.Schoenfelder@WestonSolutions.com>  
To: "Tim Knapp" <Timothy\_Knapp@cabot-corp.com>, "NRC-HQ, Elaine" <esb@nrc.gov>, "Cabot - Jacqui Stewart" <jacqui\_stewart@cabot-corp.com>, "Rick Haaker, CHP, CIH" <radpro@aqsaafety.com>  
Date: 7/21/04 7:14PM  
Subject: To All; Docket: 40-6940

To All;

Attached is a revised draft of the request for the pilot study. The table of Th and U values now show the corrected headings and the table of background ranges of radionuclides in US soils is included.

Robert Schoenfelder

Weston Solutions, Inc.  
Albuquerque, NM  
(505) 837-6556

CC: "Schoenfelder, Robert P." <R.Schoenfelder@WestonSolutions.com>

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Created By: R.Schoenfelder@WestonSolutions.com

Recipients

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twf4\_po.TWFN\_DO  
ESB (Elaine Brummett)

aqsafety.com  
radpro (Rick Haaker, CHP, CIH)

cabot-corp.com  
jacqui\_stewart (Cabot - Jacqui Stewart)  
Timothy\_Knapp (Tim Knapp)

Post Office twf4\_po.TWFN\_DO  
Route nrc.gov  
aqsafety.com  
cabot-corp.com

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**DRAFT – 7/21/04**

Ms. Elaine Brummett  
U.S. Nuclear Regulatory Commission  
Fuel Cycle Facilities Branch  
Division of Fuel Cycle Safety and Safeguards  
Office of Nuclear Material Safety and Safeguards

July 19, 2004

Re: Request to Conduct Plant Trial Using Filtercake as Cement Kiln Feed Material - Cabot Super Metals, Inc. Boyertown Facility, License SMB-920. Docket No. 40-6940

Dear Ms. Brummett

As you know, Cabot Super Metals, Inc. (CSM) operates a plant in Boyertown, PA that includes an on-site wastewater treatment plant that produces filtercake containing trace levels of radionuclides. We now have an opportunity to pursue a disposal option that will permit beneficial reuse of the filtercake as cement kiln feedstock in a manner that would involve minimal exposure risk to workers and the general public. We are requesting permission to proceed with a limited Plant Trial operation to test the feasibility of this disposal option based on the following facts:

- 1) This option has been tentatively determined by the EPA Region III Waste Minimization Program Leader, Tad Razinsky, to be a good candidate for implementation.
- 2) Local, and state regulators have been consulted and have expressed support for this disposal option.
- 3) The filtercake contains very low concentrations of uranium and thorium that do not exceed 10 pCi/g, and are required by NRC license to result in doses that do not exceed a few mrem for off-site disposal at local sanitary landfill sites.
- 4) The potential doses to workers and the public will be minimal because the concentrations of U and Th in the filtercake are low, the concentrations will be diluted by a factor of 100:1 when mixed with other conventional feed materials in the proposed process, and the Plant Trial will involve a short duration of only one month and a quantity of only about 1,500 tons.
- 5) It is reasonable and necessary to conduct the limited Plant Trial to ensure that this recycle option is feasible before spending significant time, money and regulatory resources on an application for license revision to allow this disposal process on a full-time basis.

The data that can be collected from this trial study will determine if the process is feasible, and will provide information to support the dose assessment modeling that is required for the license amendment request. This option could become the best alternative for disposal of the filtercake because beneficial re-use of a waste is preferable to increasing the volumes of material sent to Pennsylvania landfills, and because it is the most economically advantageous disposal option for this material. This economic advantage helps ensure that our operations remain competitive and that we continue to operate as a major employer in the Boyertown area.

## I. The Proposed Process

Based on preliminary analyses of CSM's filtercake, Lehigh Cement Company (LCC) in Blandon, PA has tentatively agreed that it can be used as an alternative raw material feed source for their cement kiln. Calcium is the primary component in their feed sources and the filtercake is primarily calcium fluoride and calcium sulfate (>70%). LCC has determined that the high calcium content of the filtercake meets their criteria for feed material, and there were no obvious characteristics that would cause adverse impacts to the quality of their cement. The filtercake would be added at a 1% (by weight) feed ratio to the kiln resulting in a 100:1 dilution of our filtercake. The total raw material feed rate to the kiln is approximately 1.8 - 2.0 million tons per year, so the quantity of filtercake that CSM could supply to LCC in any year would be 20,000 tons.

The next step is to conduct a full-scale Plant Trial over a period of about one month. Lehigh would process the filtercake through their kiln during a standard product run while collecting specific process data to confirm that it is a good raw material feed source for them. Those data, along with other analytical data, will be used to evaluate the process and demonstrate to the PADEP that the filtercake can be used as a raw material without harm to human health and the environment, and to confirm that it does not affect the quality of the cement produced. If all of the process data look good, and the regulatory agencies approve, LCC will accept the material at their site for processing on a continual basis.

The proposed Plant Trial involves approximately 1500 tons of filtercake, which is the quantity produced during four weeks of normal operation at the Boyertown plant. The material would be transported from the Boyertown Plant to the LCC plant, a distance of approximately 17 miles, using covered or contained vehicles identical to those identified in the prior dose assessments for landfill disposal and roadbase recycling. Approximately 62 truckloads carrying 20 cubic yards of material (assuming 90 lbs/cubic foot filtercake density) would be shipped during the month. The process for transporting and handling the filtercake minimizes the possibility of releasing material or exposing individuals. The filtercake is a fairly dense solid with a moisture content of about 40% when it is accumulated at the Boyertown plant. The physical nature of the material further minimizes the possibility of generating airborne particulates during handling and transportation.

LCC will receive the waste filtercake in bulk and store it on a concrete pad. The pad is covered on 3 sides to protect it from the elements. To add the filtercake to the kiln feed, an operator will transport the material by front-end loader from the storage pad to the kiln feed chute. The material is dumped directly into the feed chute. There is no further worker interaction with the filtercake from that point as the material handling equipment (conveyors, scrapers, etc.) moves the filtercake material through the system to the blending and pre-heat areas, and to the kiln. After the blending stage, the radionuclide concentrations in the filtercake have effectively been reduced by a factor of 100 due to dilution with other feed materials. In other words, if the filtercake contained less than 10 pCi/g of uranium and thorium, the blended material would now contain less than 0.1 pCi/g of those nuclides.

There is no further operator interface with the material until after it has been blended and processed and the cement klinker product exits the kiln. The cement klinker product is a large particle (pea-gravel size) solid material that presents very limited potential for airborne resuspension.

**II. Comparison of U and Th Concentrations in Filtercake, LCC Feed Material, and Background Soils**

The actual concentrations of U and Th in the filtercake are typically far below the release limit of 10 pCi/g of U and Th that were calculated to maintain doses below a few mrem. The following table presents the first half of 2004 results of monthly monitoring of the U and Th concentrations in the filtercake.

**U and Th Concentrations in CSM Filtercake**

Month - 2004	Th (pCi/g)	U (pCi/g)
January	0.03	2.07
February	0.03	2.69
March	0.04	3.29
April	0.05	3.46
May	0.03	3.59
June	0.05	4.11

<b>Range US Soil (pCi/gram)</b>	
U-238	0.11 to 3.81
Th-230	0.11 to 3.81
Ra-226	0.11 to 3.81
Pb-210	0.11 to 3.81
Po-210	0.11 to 3.81
Th-232	0.11 to 3.54

<<Include U/Th concentration data from LCC's current feed materials and quote applicable data for concentrations of U/Th in Portland cement >>

**III. Evaluation of End Uses for LCC Product Material**

The klinkers that emerge from the kiln are ground into fine particles and this cement is packaged in individual bags for wholesale distribution and eventual mixing with aggregate and water to form concrete. It is expected that the klinkers and the cement will demonstrate gamma radiation levels that are indistinguishable from background using portable survey instruments.

End uses of concrete include a wide range of scenarios including roads, commercial and residential structures, barriers, etc. The final concrete matrix is a non-distributable solid form that will not present an intake or uptake hazard and is expected to demonstrate

external dose rates that are not different than for concrete that is formed without the use of filtercake.

#### IV. Regulatory Agency Coordination

LCC and CSM are working with the Pennsylvania Department of Environmental Protection (PADEP) Office of Solid Waste and the Bureau of Radiation Protection. The planned process will comply with what the agency calls a "co-product" determination of this material. The Co-Product Regulations contained in 25 PA Code 287.1 were established to reduce the amount of waste going to landfills by finding ways to beneficially reuse residual wastes such as this filtercake. If this Plant Trial proves the process to be viable, the Office of Solid Waste has concurred that it would be a very positive approach from a solid waste regulation standpoint. CSM has requested a letter from PADEP documenting their support for this process under the Co-Product Regulations.

CSM also completed a conference call on July 8, 2004 with the EPA Region III Team Leader for the Waste Minimization Program, Tad Razinsky, and EPA's consultant, David Freedman. They verbally expressed support for our plan at this point, and are developing a letter documenting their initial determination that this process is a good candidate for implementation under their program.

CSM will also review LCC's permits to ensure that there are no restrictions against the receipt or incorporation of this material into their process.

#### V. Factors Expected to Minimize Doses

CSM routinely analyzes the concentrations of U and Th in its filtercake. In addition, LCC has provided data that characterize its recent feedstock. Factors that support an assumption that dose assessment results will be minimal for this Plant Trial are described below.

1. The concentrations of uranium and thorium in CSM's filtercake have remained consistent for a long period of time and the material has been released to local landfills in compliance with an NRC license condition that requires the total uranium and thorium levels in the material not to exceed 10 pCi/g. CSM's process has not significantly changed in the recent past and there are no plans to implement any significant change in the foreseeable future. CSM will continue to monitor the U/Th content of its filtercake during the Plant Trial in accordance with commitments in its current NRC license
2. CSM has performed gamma surveys of trucks carrying the filtercake to landfills and found levels that are indistinguishable from background. The distance to LCC from the Boyertown site is only 17 miles and each trip is expected to take approximately 30 minutes. There will be a total of about 62 truckloads resulting in a total exposure period for the truck drivers of only 31 hours. The low dose rates and limited exposure period minimizes the doses to truck drivers and to individuals along the route.

3. The route from CSM to LCC does not pass through any major metropolitan areas, and will not include any interstates or highways with speed limits above 55 miles per hour. These factors minimize the chance for a major transportation accident.
4. The dilution factor for this process is 100:1, and the U and Th content in the filtercake is typically less than 5 pCi/g making the maximum expected contribution from the filtercake after dilution only 0.05 pCi/g. The current feedstock contains U and Th concentrations similar to background soils so the relative concentrations of the radionuclides in the feed material and the end product material should be in the range of natural background.
5. The process of mixing and handling the cement kiln feed material is automated, requires little direct worker interaction or close contact, and will occur for a short period of time.

Based on this information, CSM requests approval from the NRC to process 4 weeks of filtercake material through the LCC kiln for the Plant Trial. We need quick approval on this and anticipate it will occur within a month of approval.

Thank you for your timely consideration of this request.

Sincerely,  
Tim Knapp – RSO, Cabot Super Metals, Inc.

Cc: