Docket: 40-6940

From: "Schoenfelder, Robert P." <R.Schoenfelder@WestonSolutions.com>
To: "NRC-HQ, Elaine" <esb@nrc.gov>
Date: 11/3/03 11:10AM
Subject: revision of filtercake data review.

<<FLTRCKrfhQuarterly Average Concentrations2.doc>>

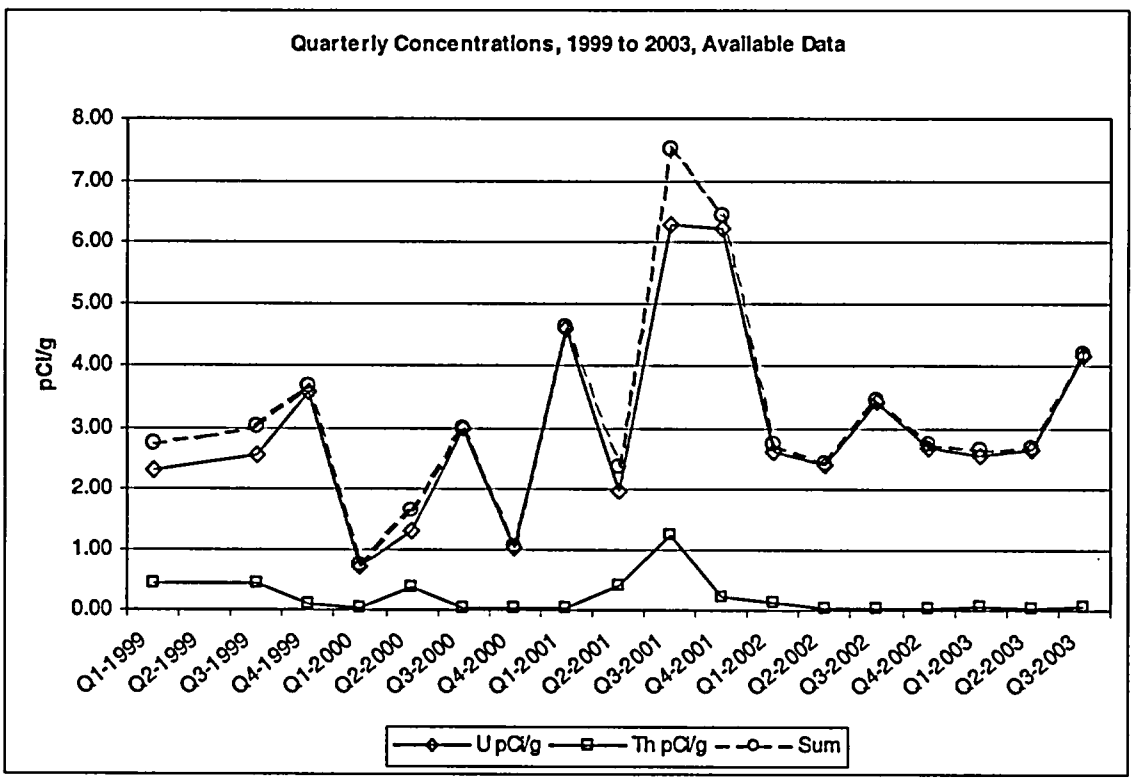
Elaine;
Revised evaluation of filtercake data is attached, See new quarters legend in figure 1, new intro paragraph, and new paragraph at end addressing moisture values.
-Bob

CC: "Schoenfelder, Robert P." <R.Schoenfelder@WestonSolutions.com>, "Tim Knapp" <Timothy_Knapp@cabot-corp.com>, "Rick Haaker, CHP, CIH" <Rick@Haaker.org>

Variability in CSM Filtercake Concentrations 24 October 2003

CSM has analyzed historical data from its wastewater treatment sludge (also known as filtercake) in order to support a proposed limit for releasing the material for disposal. Scenarios were established and doses were evaluated based upon the amount of material that would be released in one year. A sampling scheme has been established for ensuring that the annual average values in the filtercake do not exceed the proposed annual limit. Quarterly average concentrations are provided in Figure 1 for the filtercake. Prior to 2003, the data for most quarters was a composite of samples taken from about 3 bins of material. A bin has a volume of 13 cubic yards, which is equivalent to 18 metric tons of material, and the plant produces 4 to 5 bins of filtercake each day during the week for a total annual production of 20,000 metric tons per year. The 2003 quarterly data are averages of the monthly averages for three consecutive months. Figure 1 illustrates that there were no quarters in which the results exceeded 8 pCi/g total U+Th.

Figure 1. Available Quarterly Concentration Data from 1999 to Present.



During 2003 CSM performed a special study of the uranium and thorium concentrations in filtercake. Between January and October 2003, CSM analyzed approximately 750 samples from an equal number of bins of filtercake that had been generated. The monthly averages that are provided in Figure 2 are averages of all analyses that were performed in a month. The average values for all 750 samples are 3.1 pCi/g U and 0.05 pCi/g Th.

CSM performed dose assessments for recycling and disposal of filtercake and proposed limits for releasing the material for offsite disposal. NRC responded with the sum of ratios limit given in Equation 1.

Equation 1:

$$\frac{CTh}{3\ pCi/g} + \frac{CU}{10\ pCi/g} < 1$$

Figure 3 compares the monthly average sums of ratios with the limiting value provided in Equation 1. Figure 4 provides the concentrations of uranium and thorium for the 750 bins analyzed in the 2003 wastewater treatment sludge special study.

Figure 5 provides a plot of the sum of the ratios for each of the 750 samples analyzed in 2003. It shows that none of the bins would have exceeded the limit defined by Equation 1. Figure 6 is a plot of uranium + thorium for the 750 bins of landfill cake generated between January and October 2003. It shows that none of the bins had total concentrations that exceeded 10 pCi/g.

Figure 2. Monthly Average Concentrations in pCi/g, January – October 2003.

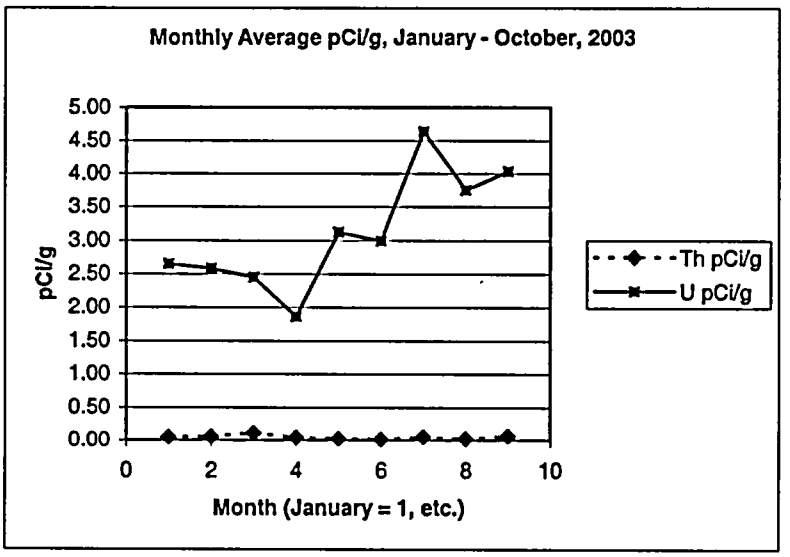


Figure 3. Comparison of the Monthly Average Sum of Ratios to the Proposed Limit, January-October 2003.

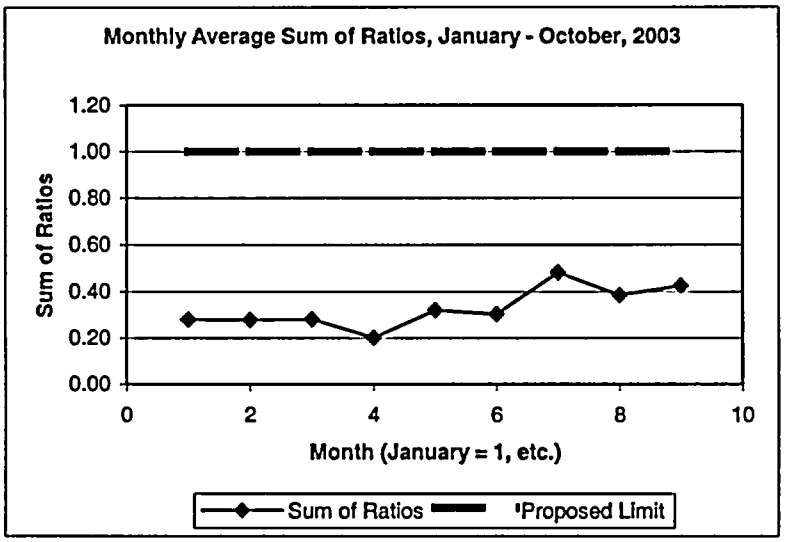


Figure 4. Concentrations of Uranium and Thorium in 750 Bins of Filtercake, January – October 2003.

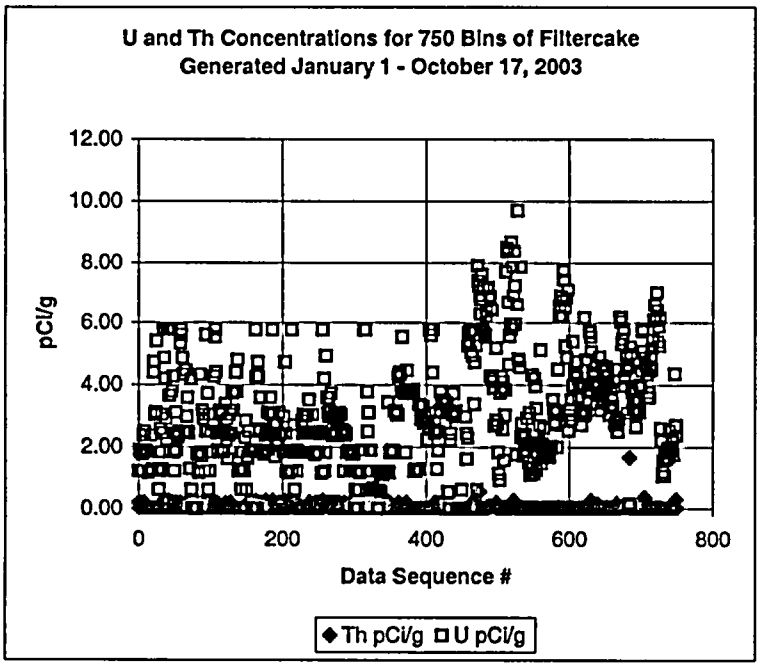


Figure 5. Sum of Ratios of 750 Samples from Bins of Filtercake Sorted by Rank, January – October 2003.

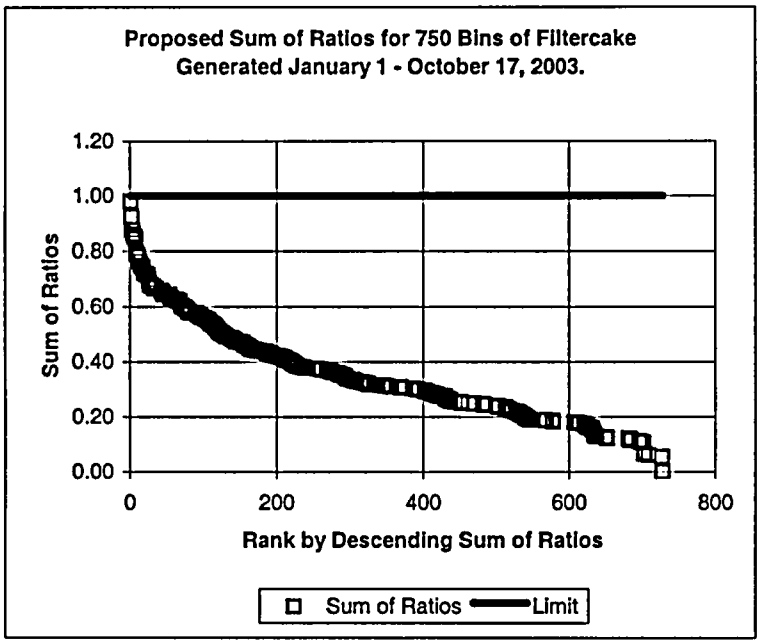
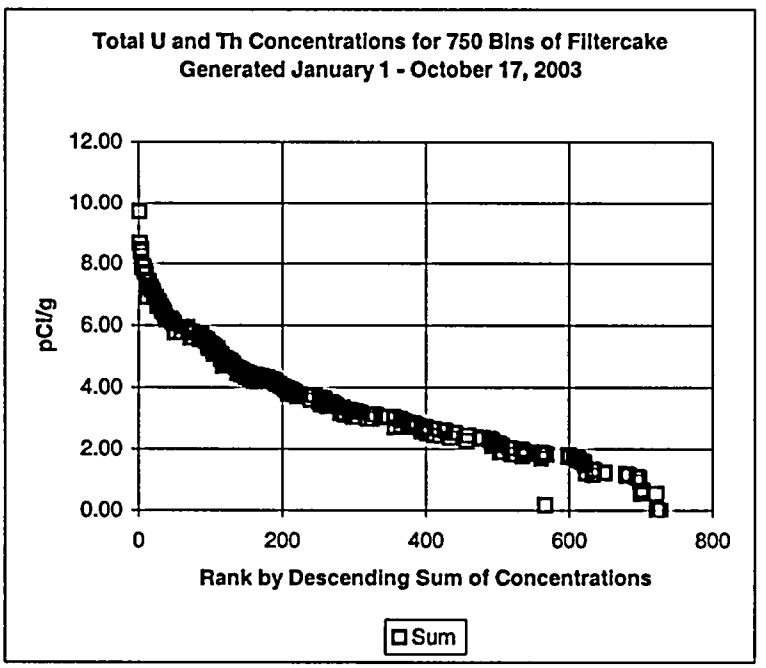


Figure 6. Total Uranium and Thorium Concentrations for 750 Samples from Bins of Filtercake, January-October 2003.



Moisture Content Measured in CSM Filtercake

CSM analyzed the moisture content in 26 samples of filtercake collected over the 36 months from March 1999 thru February 2002. Those data indicate that the filtercake consistently contains about 50% water by weight. The moisture values in those 26 samples ranged from 43.2% to 57.4% and averaged 50.9%, with a standard deviation of 3.6%.

The filtercake is very wet when produced and maintains a high moisture content between the time it is removed from the filter presses and transported off-site because there is minimal surface area exposed to the ambient air when the material is on the pad, there is minimal mixing or spreading of the material, and the average relative humidity in the Boyertown area is high (when compared to the arid conditions in the western U.S. where many uranium operations exist). It is important to note that the dose assessments developed for various filtercake disposal scenarios did not take credit for this high moisture content. This was done in order to introduce a factor of conservatism into the assessments that could easily be factored into the final doses by taking the actual moisture content into account. The final doses in those assessments would be reduced by a factor of 2 if the 50% moisture content were accounted for.