

From: John A. Grobe (JAG), RTI
To: JEH *Holtz, RTI*
Date: Wednesday, November 30, 1994 10:44 am
Subject: AMS/NEORS Cobalt Solubility

Folks,

This is the essence of the cobalt solubility question regarding the effluents from AMS:

1. The licensee submitted a position in 1987 that the cobalt discharged from their facility would be cobalt oxide that is not soluble in normal water and is dispersible in water due to common industry standards regarding the particle size of cobalt oxides.
2. The licensee stopped discharging cobalt into the sewers from its processing operations approximately 1/2 decade ago. Prior to this stoppage, the licensee discharged cobalt-60 into the sewers contaminating them. Contamination is easily detectable today with hand held survey instruments and is removable (measurements in 1994 range from not detectable up to $1 \text{ E}+5$ dpm on a smear).
3. Slawinski's last report indicates from a thorough assessment of water usage records that the licensee has been using 3700 gallons to 6900 gallons of water per day between July 1992 and July 1994. This would be the minimum water passing through the sewers and does not include storm water which would also discharge through the same contaminated pathway.
4. The result is that there has been a very significant period of flushing of the sewers with significant quantities of waste water. This causes me to pause and question whether any cobalt carried by the waste water today is soluble or dispersible.
5. The reported value of cobalt in the wastewater is exceedingly low and some wastewater samples showed no cobalt-60. Six of twelve samples showed no detectable cobalt-60 and the other six ranged from 13 pCi/l to 306 pCi/l. For conservative purposes, I will use the highest value. The specific activity of cobalt-60 is reported in the Radiological Health Handbook as $1.13\text{E}+3$ Ci/g. Also assume that the density of the waste water is 1.0 g/ml.

$$\begin{aligned} & (3.06\text{E}+2 \text{ pCi Co-60/l H}_2\text{O}) (1/1000\text{ml}) (\text{ml H}_2\text{O}/1.0 \text{ g H}_2\text{O}) \\ & (\text{Ci}/1\text{E}+12 \text{ pCi}) (\text{g Co-60}/1.13\text{E}+3 \text{ Ci Co-60}) = \\ & 2.71\text{E}-16 \text{ g Co-60/g H}_2\text{O or } 2.71\text{E}-7 \text{ ppb Co-60} \end{aligned}$$

6. Since the basis for a violation would be that the licensee is discharging non-soluble material, we need to be comfortable with the physical form of cobalt in the waste water. We have not retained any of the samples, but sent them to NEORS.

If the technical staff can conclude based on the chemical form that the material is not soluble down to the E-7 ppb range with out analytical testing, great! I'm not a good enough chemist to be able to say that. If we cannot draw this conclusion without further analytical testing, what testing would be appropriate? Filtering with a couple micron filter?

Please give me your thoughts so we can issue the Kurth report on AMS.

Thanks.

Jack

CC: FCC, JXD1, CG1, BAB1, MFK, WLA, CJP1, WJS2