

**4445**

**SAMPLING AND RADIOLOGICAL ANALYSES OF  
SEDIMENT FROM PADDY'S RUN AND THE  
STORM SEWER OUTFALL DITCH (USED AS A  
REFERENCE IN THE OU4 RI REPORT)**

**09/07/89**

**IT/ASI  
3  
MEMORANDUM  
OU4**



# Memorandum

To: R. Galbraith, Fernald

Date: September 7, 1989

From: *John B. Frazier*  
J. Frazier, Knoxville

Subject: **SAMPLING AND RADIOLOGICAL ANALYSES OF SEDIMENT FROM PADDY'S RUN AND THE STORM SEWER OUTFALL DITCH**

On July 18, 1989, at the Technical Information Exchange meeting at the FMPC, I presented a summary of results and conclusions for sampling and radiological analyses of sediment from Paddy's Run and the Storm Sewer Outfall Ditch (SSOD). The data presented at that meeting were taken from the 1987 and 1988 sediment sampling results obtained by the FMPC Environmental Monitoring Program. Other data were reviewed (including the 1986 litigation sampling data and sediment sampling from earlier sampling programs) but were found to be much less comprehensive than the 1987 and 1988 data. Also, sediment sampling and analysis as part of the RI/FS, have not been completed. Therefore, data for the 309 sediment samples collected in 1987 and 1988 were chosen for presentation as the most complete description of the radiological conditions in the sediment along these two stream beds.

As I discussed in the July 18 meeting, laboratory analyses was performed for each sediment sample for the following radionuclides:

U-234	Ra-224	Tc-99	Th-228
U-235/236	Ra-226	Pu-238	Th-230
U-238	Ra-228	Pu-239/240	Th-232

These data are enclosed as Attachment A. Data are also listed in Attachment B for each radionuclide and arranged in order of concentration.

The conclusions that I presented in the July 18, 1989 meeting were:

1. There were 309 sediment samples analyzed for 14 radionuclides as part of the 1987 and 1988 Environmental Monitoring Programs at the FMPC.
2. No concentrations of Tc-99 were found to exceed the analytical detection limits for sediment samples.
3. No concentrations of the following radionuclides were found to exceed natural background concentrations for sediment:

Ra-224	Th-228	Pu-238
Ra-226	Th-230	Pu-239,240
Ra-228	Th-232	

4. Concentrations of uranium in sediment samples exceeded natural background concentrations at some location along Paddy's Run and the Storm Sewer Outfall Ditch (see April 12, 1989 letter to USEPA from USDOE).

R. Galbraith  
September 7, 1989  
Page 2

Since the July 18, 1989 meeting, we have further reviewed and validated the 1987 and 1988 data. We have prepared histograms showing the percentage of samples for each concentration range. These are enclosed as Attachment C.

There were 48 samples (15.5% of 309) with a total uranium concentration exceeding the upper range of natural background concentrations for the area (4.4 pCi/g). Of these, there were 2 samples (0.6 % of 309) with total uranium concentration greater than 35 pCi/g.

After reviewing and validating the data for the remaining radionuclides, we have confirmed the conclusions presented on July 18, 1989, with the following exception. After a detailed analysis of the concentrations of Ra-226 and Th-230 in the sediment samples, we have concluded that there are concentrations of these two radionuclides in some sediment samples collected onsite which exceed natural background concentrations.

In order to better understand the nature and locations of the above-background concentrations of U-234, U-235, U-238, Ra-226, and Th-230, we have prepared figures showing the measured concentrations of these radionuclides for 1987 and 1988 according to sampling locations in the SSOD and Paddy's Run. These figures are enclosed as Attachment D. The "Distance (meters)" axis of the figures corresponds to the distance along the stream bed from the confluence of the SSOD and Paddy's Run, with 0 meters being the location of the confluence. Negative distances are upstream from the confluence and positive distances are downstream. It is important to note that concentrations shown on the figures as 0 pCi/g are, in fact, concentrations below the analytical detection limit.

Several conclusions can be drawn from these figures. A partial list of conclusions is as follows:

1. With two exceptions, concentrations of total uranium are less than 35 pCi/g for sediment samples from the SSOD and Paddy's Run.
2. Uranium concentrations are higher in sediment from the SSOD than from Paddy's Run.
3. Uranium concentrations in sediment from Paddy's Run are lower in 1988 than in 1987.
4. Uranium concentrations in sediment from Paddy's Run are higher below the confluence of the SSOD than above the confluence.
5. In general, uranium concentrations from sediment from the SSOD and Paddy's Run are higher on the east and west banks than from the center stream bed.
6. In general, the highest uranium concentrations in sediment from these stream beds are found in the SSOD from 500 m to 700 m upstream from the confluence with Paddy's Run.
7. In general, Ra-226 concentrations in sediment from the SSOD were at natural background levels.
8. There was one sediment sample from the SSOD and Paddy's Run with a concentration of Ra-226 greater than 5 pCi/g. This sample had a measured concentration of Ra-226 of 13.7

R. Galbraith  
September 7, 1989  
Page 3

pCi/g, and was collected from the east bank of Paddy's Run a distance of 1600 m upstream of the confluence with the SSOD. The approximate state plane coordinates for this location are N480200 and E1378075.

- 9. Measured concentrations of Ra-226 in Paddy's Run indicate that there are above-background levels immediately to the west of the K-65 Silos and at the confluence with the SSOD.
- 10. There were no concentrations of Th-230 in sediment samples which exceeded 5 pCi/g.
- 11. Above-background concentrations of Th-230 in sediment collected in 1987 were not as prevalent as in sediment collected in 1988.
- 12. There are no clear indications of specific locations continuing to have above-background concentrations of Th-230.

To summarize this recent evaluation of sediment data, there is an indication that Ra-226 may be present in the sediment of Paddy's Run from historical activities at the FMPC or from a minor transport pathway from the K-65 Silos. Concentrations in sediment do not indicate a major environmental concern and do not present a hazard to onsite or offsite personnel. The presence of above-background concentrations of Ra-226 in this area is an indicator of potential transport pathways from the K-65 Silos, which are being evaluated further as part of additional sampling and analysis of surface water and soil in the area between the K-65 Silos and Paddy's Run.

- cc: J. Allingham  
G. Gaillot  
D. Harmer  
R. Lenyk  
J. Yeasted