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TO: FILE

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ANALYSIS OF 221-F  
IODINE REACTOR BERL SADDLES

Process Background

Six Berl saddles were collected from an iodine reactor cartridge which had been stored in the 221-F canyon since it was taken out of service on March 21, 1969. The cartridge was placed in service in 6.2R position from March 29, 1968, until January 14, 1969 when it was changed to the 7.1R position (6.4 dissolver system) where it remained until removed from service two months later. When the  $\text{AgNO}_3$  coated porcelain Berl saddles were emptied from the cartridge recently to permit recharging, Health Physics obtained six (6) of the saddles from the bottom portion of the cartridge (inlet end) for analyses for radionuclides and silver. The cartridge contained about 1620 lbs. ( $7.3 \times 10^5$  gms.) of saddles.

Radionuclide Analyses

A. Gibbs of 772-F Laboratories performed gamma, alpha, and strontium analyses with the following results:

<u>Radionuclide</u>	<u>d/m/gm</u>	<u>% of Total Activity</u>	<u>Est. Ci/Cartridge</u>
$^{95}\text{ZrNb}$	$3.93 \times 10^6$	55	
$^{103,106}\text{Ru}$	$2.02 \times 10^6$	28	
$^{144}\text{Ce}$	$1.02 \times 10^6$	14	
$^{60}\text{Co}$	$2.26 \times 10^5$	3	
TOTALS	$7.2 \times 10^6$	100	2.4
$^{239}\text{Pu}$	$1.5 \times 10^4$	-	.005
$^{89,90}\text{Sr}$	$7.8 \times 10^4$	-	.026

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A typical Berl saddle weighs about 2 grams. All 6 saddles contained the same radioisotopes. Analysis shown represents the maximum radioactivity on any one saddle. Portable survey instrument measurements indicated 50 to 300 mrad/hr beta-gamma at 3" and < 1000 d/m alpha from individual saddles.

#### Silver Analyses

Two saddles were analyzed for silver by A. R. McJunkin of 772-F Laboratories. Analytical results were as follows:

##### Saddle No. 1 (Brown stain over 50% of surface)

- o Weight of solids removed by successive attacks by  $H_2O$ ,  $NH_4OH$  and  $HNO_3$  = 0.0566 grams.
- o  $AgCl$  precipitate from above combined solutions = 0.0491 grams.

##### Saddle No. 2 (Surface totally covered with brown stain)

- o Weight of solids removed by successive attacks by  $H_2O$ ,  $NH_4OH$ , and  $HNO_3$  = 0.1458 grams.
- o  $AgCl$  precipitated from  $H_2O$  solution = 0.0209 grams  
 $AgCl$  precipitated from  $NH_4OH$  solution = 0.0806 grams  
 $AgCl$  precipitated from  $HNO_3$  solution = 0.0211 grams
- o The  $H_2O$  soluble silver could be  $AgNO_3$  (the cartridge had not been flushed with water).  
The  $NH_4OH$  soluble silver could be  $Ag_2O$ .  
The  $HNO_3$  soluble silver could be  $Ag$  metal.

Using the average  $AgCl$  precipitate from the two saddles or .08 grams/saddle and  $3.7 \times 10^5$  saddles per cartridge, there appears to be about 65 lbs. of silver chloride or 50 lbs. of silver metal in each iodine reactor charge.

DJR:sf