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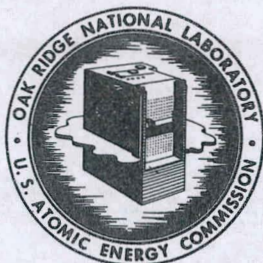
CF-56-6-56

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OAK RIDGE, TENNESSEE

ORNL
CENTRAL FILES NUMBER
56-6-56

DATE: June 8, 1956

SUBJECT: Composition of Solids from HRT Mockup Pressurizer.

TO: E. G. Bohlmann

FROM: D. M. Richardson

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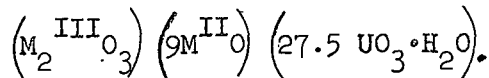
The black crystals found (March 1956) in the horizontal pipe which connects the steam pressurizer and the main loop of the HRT Mockup have been shown by chemical analysis to have the following composition:

Total U	68.8%	by weight
U ⁺⁴	2.42	" "
Cu	4.34	" "
Ni	1.53	" "
Mn	0.56	" "
Fe	0.51	" "
SO ₄	0.01	" "
Cr	0.06	" "
Co	0.02	" "
PO ₄ , S, Cl	Negligible.	

The weight loss on ignition was less than 0.1% at 250°C, 2.4% at 400°C, 6.0% at 600°C, 8.4% at 1000°C. Gamma spectrometer measurements by S. A. Reynolds showed the ratio of U²³⁵ to UX_I and UX_{II} to be that normal for the mockup feed material at radiative equilibrium. Optical spectrographic examination, after TBP extraction of U, showed no other significant constituents.

The x-ray spectrographs of this material did not match any available standard or ASTM data card. The spectrographs made at Y-12 by the X-Ray Section of the ORNL Spectroscopic Research Laboratory (Lab. No. XR 3393, XR3397, XR3400) were reported to be identical to spectrographs of material taken from the Mockup Let-Down Heat Exchanger in December, 1955 (Lab. No. XR3324, XR3325, XR3327). X-ray spectrographs were also made at X-10 by R. D. Ellison of the ORNL Chemistry Division and did not match any available standard.

If the following oxides are assumed, 97% by weight material balance (before ignition) is obtained: (Mn₂O₃, Fe₂O₃, Cr₂O₃), (CuO, NiO, CoO), (UO₃ · H₂O). The mole ratios of these oxides may be expressed within 3% of the analytical composition by the formula:



These black crystals were found lying loosely on the bottom of the 3-1/2" horizontal pipe in which water from the steam pressurizer at 340°C flows over and mixes with soup from the loop at 300°C. This mockup run was started on January 20, 1956 and ended March 11, 1956. The total operating time was 1122 hours. The approximate solution composition was 0.042M UO₂SO₄, 0.028 M H₂SO₄, .0064 M CuSO₄. The Ni level rose to .0043 M (250 ppm) during the course of the run.

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