INTRA-LABORATORY CORRESPONDENCE
OAK RIDGE NATIONAL LABORATORY

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MSR-69-24

To: P. N. Haubenreich
From: C. H. Gabberd

Subject: Proposal to Measure the Short-Lived Fission Products
On MSRE Graphite

The data on fission product deposition on graphite in the MSRE thus far has been limited to nuclides with relatively long half-lives. This has been caused by the inherent delay times in retrieving the core specimens for the reactor vessel, delivering the specimens to the Lab, and preparing the specimens for analysis. The analyses have generally been for specific nuclides by radio-chemical technique. A gamma scan was to be made for short-lived fission products on the graphite surveillance specimens following the Run-14 shutdown, but there was a cooling time of at least 3 weeks and none of the short-lived materials were detected.

A proposal was outlined in MSR-69-23 to measure the short-lived activities deposited in the heat exchanger and in the main salt piping using a high-resolution detector and a multichannel analyzer. This same equipment could be adapted to scan specimens of graphite within the sampler-enricher so that all but the very short half-life materials could be detected if they were present. Graphite, and also INOR specimens, could be exposed to the fuel salt in the pump tank for a sufficient time to saturate the nuclides of interest. The specimens could then be withdrawn and placed in the 3-A area of the sampler for counting through the removal valve assembly. This procedure would permit counting to start within about 1 to 2 hours after the specimens were exposed to the salt. At this short decay time, almost every fission product decay chain present would be detectable. On the other hand, to remove the surveillance specimens from the core and deliver them to the hot cell required 12 days during the shutdown following Run 14. At that time, only the materials with relatively long half-lives remained.
The deposition on graphite in the pump tank would probably be different from that on the core graphite, but since the short-lived materials are potentially greater heat sources, an experiment to detect these materials would be worthwhile.

In addition to the detector and analyzing equipment outlined in MSR-69-23, a special collimator would be required that would fit into the sampler-enricher removal valve and seal, and a special capsule for exposing the specimens in the pump tank would be required. Some type of fixture to hold the specimen under the collimator in the 3-A area of the sampler would also be required.

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