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December 14, 1951

Mr. John R. Parks
Oak Ridge National Laboratory
9204-1, Y-12
Post Office Box "P"
Oak Ridge, Tennessee

MOUND DECLASSIFICATION REVIEW	
1ST REVIEW DATE: <u>11/12/57</u>	DETERMINATION (CIRCLE NUMBER(S))
AUTHORITY: <input type="checkbox"/> AOC <input checked="" type="checkbox"/> AADC <input type="checkbox"/> ADD	1. CLASSIFICATION RETAINED
NAME: <u>J. M. Flanagan</u>	2. CLASSIFICATION CHANGED TO _____
2ND REVIEW DATE: <u>11/12/97</u>	3. CONTAINS NO DOE CLASSIFIED INFO
AUTHORITY: <u>AS</u>	4. COORDINATE WITH _____
NAME: <u>R. R. Rater</u>	5. CLASSIFICATION CANCELLED
	6. CLASSIFIED INFO BRACKETED
	7. _____

Dear John:

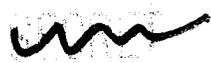
This letter is a partial reply to your letter of November 2 to Don Timma. As you probably know, I was at Hanford November 19 and 20 to discuss data that we got on the two channels that we calorimetered. They were very happy to get the information and everything considered, the trip was very successful.

The calorimetric method of the determination of the polonium-210 activity of the slugs from two channels of the Hanford D pile (reports number 51-9-85 and 51-10-113) was discussed. It was pointed out that the calorimeter values agreed with the value of the activity determined by the Operations Division but did not agree with the value assigned by Hanford. Also, the measured distribution of the activity as a function of slug position in the channel was discussed. Dr. Edward Montgomery, of Hanford, believes that the pronounced assymetry along channel 1168 (near the center of the pile) and the slight assymetry along channel 1186 (near a side) are due to a change in the neutron scattering in the cooling water around the slugs as a function of the temperature of the water. The average temperature rise along a channel varies between 40 and 60°C. depending on the position of the channel in the pile.

During the conferences on November 20, we learned that the polonium activity was determined from the rate of flow and the temperature rise of the water in the four channels adjacent to the bismuth channel, the nominal power level of the pile over the period of time of irradiation, and a set of correlating curves which had been calculated by Leona Marshall for a power level of about 300 megawatts. Since the power level and the

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declassification

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rate of flow of the cooling water had been increased during the last two years, the accuracy of their assigned activity was not too well known. It is hoped that the calorimetric data together with the operating data of the D pile during the time the slugs were activated will facilitate a more exact calculation of polonium activity.

In the past, the bismuth channels had been spaced more or less uniformly throughout the pile but they now are irradiating bismuth in groups of four channels with the expectation that more channels of bismuth (or other material) may be loaded in the pile without impairing the power level. By placing these groups of four bismuth channels in the high neutron flux region some "flattening" will result from the bismuth, permitting a more efficient use of the pile. To assist in the evaluation of the efficacy of this idea, we agreed to calorimeter one group of four channels making a total of 228 slugs.

Because of the precision of calorimetric measurements and its adaptability to the study of pile characteristics and the activity of certain isotopes, an interest was expressed in a calorimetry installation at Hanford.

The group of four channels arrived December 3 and we started making measurements on December 4. A new slug calorimeter is under construction and is expected to be in operation by the end of December. This calorimeter has sand as the gradient medium and is expected to have a "speed" of about one hour.

The 208-half life measurement is to be written up for a quarterly and I will try to send you a copy of our report if you want it. The two major factors in the lack of accuracy in our value were: (a) not knowing the isotopic constitution and (b) the readings were limited to a short period of time. We would be very happy to get a sample that we could take readings on over a period of about a half life. The sample that we did have had an initial activity of 0.427 curies and was of minimum size. Thus, if we could get a sample of about 0.7 curies or slightly larger we would be able to take readings over about a 1,000 day period with our present facilities. The calorimeter that we used was number 44 which has a "speed" of two hours and a sensitivity of 11 microvolts per millicurie.

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The spectroscopy group here has developed a emission spectro-graphic method for estimating the isotopic assay of 208-209 mixtures. These data have been communicated to Dr. Livingston. It offers, in conjunction with calorimetry, a method of analyzing the polonium.

Sincerely,

G. R. Grove

GRG:pm

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- Copy 3. - Dr. G. R. Grove
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