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by authority of *see attached file record card*
C. J. Benick, AED (Authority for change in classification)

3/24/89

(Signatures of persons making change and verifying the information)

- 1 - G. D. Graves (Airmail) 3-162
- 2 - G. D. Graves, Wilmington
- 3 - W. O. Simon - 700 Area File
- 4 - W. O. Simon - 300 Area File
- 5 - S. J. Bugbee - B. H. Mackey
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Date OCTOBER 11, 1944

EXPLOSIVES - TNT
TECHNICAL DIVISION, HANFORD
WEEKLY REPORT FOR PERIOD ENDING OCTOBER 10, 1944

Hood Worthington

We have attended meetings in which the disposition of slugs and the program for alternative canning processes were discussed. The fraction of canned slugs in the 111 grade is now high enough for serious consideration of sending all others to eventual reclaim. Operations has a backlog of 211 and 112 slugs for disposal. The probable fate of the former is not clearly defined, but the latter may be put in the outskirts of pile B.

The recent discovery of xenon poisoning makes us wish to keep within reach as much k as possible. Should the pile power be so low that slug temperature and heat transfer were of no consequence, the process for unbonded slugs might well permit increasing k and thus increasing the limit of power while still leaving the unbonded assembly well within its limits of safe performance. The zinc process, on the other hand, though it probably uses up 0.1 to 0.2% of k because of the higher absorptive qualities of Zn in comparison with Al-Si, provides another kind of insurance, as an alternative that may be tight under conditions such that the present slugs leak and fail. Our point of view was therefore that no new information had been uncovered that would affect adversely the decision to install equipment for both alternative canning processes.

The new HF reclaim process causes so small (0.03%) a loss in k that it appears to us to be reasonable to plan to use slugs reclaimed by this process in the center of D and to use in the outer portions the stock of slugs made until the HF process is installed.

Attention this week has centered on increasing our understanding of xenon poisoning, on ways of increasing k, increasing control, and improving the accuracy of power measurement from the pile. The last point, which previously was of little moment, became of greater importance as we sought to interpret the data on xenon poisoning, though here the important datum is the ratio of power output under different conditions. At first glance it appears that this ratio should be available from various ion chamber readings, but in practice these proved to be variously affected by the continuously shifting positions of the rods. We then urged the use of temperature rises determined by a proper

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Reviewed by *C. J. Benick* 3/24/89
Official *C. J. Benick, AED Class Officer*

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integration of the scanner temperatures taken over a number of diameters. There are still uncertainties in these results, perhaps because of stray e.m.f's, and so it became necessary to fall back on a precise direct measurement of the temperature rise through the unit. This may well not be the final method, however, since a measurement of water activity at a point away from the pile, and so unaffected by shadowing, may be a better routine method.

Fermi has discussed with us his most recent estimate of the long term changes in k due to boron destruction, formation of samarium, and increase in product. The properties of the product are now better known than at the time of Wheeler's estimate. The effect in a 1500-tube pile at 100 megawatts may be a loss in k of about 0.4% in k in 150-200 days followed by a slow rise to the initial value in 500 days. The uncertainties are large: Fermi states that the loss may be 0.0 or 0.8. This points up the desirability of determining the rate of loss at as early a date as is consistent with a reasonable certainty in interpreting the results; i.e., early in the operation of the 1500-tube pile. The unknown effect of C^{14} is not included. The original objective of Clinton's problem assignment 105X24P on the absorption cross section of C^{14} is therefore quite urgent. We have asked Clinton when we shall have the figure.

John A. Wheeler

Replacement of 5.5 mils thickness of Al-Si bond by an equal thickness of Zn is estimated to lower k by $1/4$ per cent.

Calculations on the control power of the 9 rod shim and regulating rod system give the following tentative results:

Tubes in loading	Available k in %	Held by rods	Margin of safety
2004	1.14	0.77	- 0.37
1500	0.84	0.87	+ 0.03
1300	0.65	0.94	+ 0.29
1000	0.23	1.06	+ 0.83

Dale F. Babcock

During the unscheduled shutdown of 105-B unit on October 9 the poison in the pile (as measured by change of activity during startup) increased by 12 ih, whereas the predicted value was but 3 ih.

Data will be taken during the next scheduled shutdown (October 12) which will determine whether this effect was real or just an instrument error.

No new measurements were made on the energy released on heating graphite that was previously exposed in the pile. This work will be resumed when more samples are available (now expected on October 12).

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T. B. Drew

A thermocouple system was devised for precisely measuring the temperature rise of the water passing through the pile and the specifications were transmitted to the Technical Department. Such precise data are especially needed in studying the currently discovered xenon poisoning and in estimating the effect thereof on the behavior of the fully loaded pile.

Experiments were observed on a model of the high velocity thermohm which we had recommended for installation on the 200 Area meteorological mast to measure air temperatures. Performance was satisfactory at the designed flow of 10-12 CFM (which corresponds to an air velocity past the thermohm of 16-19 ft./sec.) when infra-red lamps were throwing radiation upon the shielding system with an intensity four times that of summer sunlight at high noon. The shield consists of a pair of concentric aluminum tubes.

W. K. Woods

Developments at 100-B have been followed and daily oral reports submitted. Particular attention has been paid to measurements of pile output from measurements of water temperatures and flow rates.

During a recent shutdown, flow rates in two selected tubes were calibrated in terms of the observed pressure drop across the orifice. These tubes had normal panellit readings during pile operation. The calibration indicated that the flow rate in the tubes was 20.4 g.p.m. at a time when the average flow rate for the tubes on the chilled water headers was 19.4 g.p.m., as obtained by taking the gross flow rate and dividing by the number of tubes. This discrepancy has not been explained. The gross flow rate was checked satisfactorily with meter readings in 190 Bldg. Additional tubes are to be calibrated this week. Tubes in the flow laboratory were found to be non-representative because of the presence of constrictions at the points where the pigtails were fastened to the headers; these constrictions have been removed, improving the apparent orifice coefficients, but coefficients for the flow laboratory tubes still are significantly lower than those for the two tubes in the pile.

It was demonstrated that readings taken from the temperature scanner, using the jack board, were affected by the heat of a hand on a jack. Attempts have been made to improve the accuracy of the exit water temperature indicated by the tube scanner, but there is indication that observed temperatures may still be uncertain by as much as 2°C. Attempts have been made to integrate scanner readings to yield a value for the average exit temperature from the active tubes in the pile. During the coming week thermocouples will be used to get a temperature differential from the valve pit to the process water sewer; this measurement (coupled with observation of total water rate through the unit) should be the most reliable absolute measure of power generation yet attempted.

Water has been collected from the dryers in 115 Bldg. at a rate of about 2 gal./hr. Despite the large area of aluminum tubing involved, this rate of leakage is too great to be accounted for by inter-molecular diffusion through the tubes. It is not known whether this water comes from small leaks in a few of the aluminum tubes, or from normal drying of the graphite

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and Masonite in the structure. The rate was decreasing slowly up to the time measurements were suspended because of the high activity of the gas. |||

C. W. J. Wende

An inquiry into the reasons for the low currents registered by the ion chambers in the pedestal of the 105-B unit revealed that the stainless steel risers were plugged top and bottom with 3/4" stainless steel plates. These plates reduce the number of neutrons reaching the chambers by a factor of 10 to 20. The risers in the D and F units are capped by 1/8" plates. On the basis of present data, the chambers under these units should register at least 10^{-7} amperes (100 cm galvanometer deflection) when the piles are loaded to 2000 tubes and operated at 250 MW. The chambers under 105-F may be made more sensitive by decreasing the thickness of the lead plugs in the thermal shield. For example, if the plug thickness is decreased to 4", the chamber current will be increased fivefold with relatively little increase in gamma background. The sensitivity of the D and F installations is probably adequate for monitoring the pile during operation at high power. For startup, however, an auxiliary chamber in one of the test holes will continue to be desirable.

P. F. Gast

Absent on account of illness.

TECHNICAL DIVISION
HOOD WORTHINGTON

Hood Worthington

mvl

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3-862

DATE 10-11-44

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SUBJECT Explosives - TNX Tebb. Division, Hanford Weekly Report for Period Ending 10-10-44

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