89000701

CHP/A4171 0C88



APR 4 1989

Dr. Charles G. Interrante, Program Manager
Metallurgy Division - Corrosion Section
National Institute for Standards and Technology
U.S. Department of Commerce
Gaithersburg, MD. 20899

Dear Dr. Interrante:

We have reviewed the October 1988 NIST Monthly Letter Report for FIN A-4171, "Evaluation and Compilation of DOE Waste Package Test Data." Comments on the MLR are presented below in Attachment 1.

Actions resulting from this letter are considered to be within the scope of FIN A-4171. No changes in costs or delivery of contracted products are authorized. Please notify me immediately if you feel this letter will result in additional costs or delay in delivery of contracted products.

Sincerely,

C. H. Peterson

Charles H. Peterson
Engineering Branch, DHLWM
Office of Nuclear Material Safety
and Safeguards

Enclosure: Att. 1

cc: w/Att. 1:

Dr. Neville Pugh, Director
Metallurgy Division, NIST

Dr. Richard E. Ricker, Group Leader
Metallurgy Division, NIST

DISTRIBUTION WITH ATT. 1

| | | | |
|---|---|---|---|
| Central File | NMSS/RF | HLEN/RF | |
| REBrowning, HLWM | BJYoungblood, HLWM | RLBallard, HLGP | JOBunting, HLEN |
| JJLinehan, HLPN | RAWeller, HLEN | CHPeterson, HLEN | KCChang, HLEN |
| DChery, HLGP | MSilberberg, RES | | |

CONCURRENCES

| OFC | :HLEN | :HLEN | :HLEN | : | : | : | : |
|---|---|---|---|---|---|---|---|
| NAME | :CHPeterson | :RAWeller | :JOBunting | : | : | : | : |
| DATE | :89/04/04 | :89/04/4 | :89/04/4 | : | : | : | : |

OFFICIAL RECORD COPY



NH17
A-4171
WM-11

ATTACHMENT 1

COMMENTS ON THE MONTHLY LETTER STATUS REPORT
OCTOBER 1988 (FIN A4171-9)

Task 3. Laboratory Testing

A. Crack Propagation Studies

1. As discussed recently, it is not too soon to begin preparation of reports on the laboratory studies. Please submit with the next monthly letter report (MLR) a diagram of the test specimens showing dimensions and details of the grooves.

2. It is reported that an undesired branch crack also formed in Specimen ST2v, and that this is attributed to the combination of small root diameter of the side grooves and the hardness of the specimen.

a. Must both conditions be present in order to generate branch cracks, or would one of these conditions be sufficient?

b. What was the reason for using a high hardness specimen in this test? What was the reason for using a small root diameter for the grooves?

c. Can "branch" cracks be generated independently of the desired precracks? It is understood that the objective of the work is to explore crack propagation not crack initiation. Nevertheless, since it is not expected that waste packages will be subjected to cyclic stresses after emplacement, some thought should be given to the question of whether residual stresses, as in welds, might lead to random "branch" cracks. The Brookhaven report (NUREG/CR-4619) it may be recalled did note the possiblity of pre-existing cracks.

B. Resistivity and Transport Studies

1. Preparation of narrow cut sand fractions seems to be a time consuming aspect of this work. Perhaps commercially available fractions might be sufficient for establishing an effect of mean particle size. If such an effect is demonstrated, then it would be appropriate to determine more precisely the actual distribution.

2. Was a standardized sieving procedure, such as an ASTM procedure using a Ro-Tap machine, used?

C. Pitting Corrosion of Steel

1. Please report some details of the valuable and interesting interactions experienced at the Electrochemical Society Meeting in Chicago. Section 5.3 of the SOW requires trip reports for all travel associated with FIN A4171.

2. The statement that the negative open circuit potential of A27 steel in water indicates that the metal is corroding does not appear accurate. Under open circuit conditions, no (corrosion) current can flow. What may be meant is that if the circuit were closed a corrosion current would flow and the metal would corrode.

3. Does the statement that a pitting potential was not established mean that up to the maximum impressed voltage no pitting was observed? What was this voltage?

4. Please report some numerical data, however, preliminary. What was the value of the "high current"? Also convert the $ma/cm^2$ to mm/y.

5. Localized corrosion in A27 is attributed to cementite and to "impurities of discontinuities". Is it possible to generalize the latter and conclude that localized corrosion (e.g., pitting) requires the presence of surface inhomgeneities?

D. Zircaloy Studies

1. We again ask for a specific test plan showing what tests are contemplated to determine the effects of the variable cited.

2. What tests are going to be done with the Zircaloy-2 specimens?

Document Reviews

A. Shaw: "Plan for Spent Fuel Waste Form Testing for NNWSI"

1. Are any of the reports listed under "Related HLW Reports" in the NIST/NRC database? Have any of them been reviewed by NIST? In particular, has the Waste Form Spent Fuel Scientific Investigation Plan been reviewed?

2. Reports 1 and 2 should be given fuller identification.

3. What electrochemical data should be obtained in the Smith proposed tests on Zircaloy?

B. Glass et al: "Corrosion Processes of Austenitic Stainless Steels and Copper-Base Materials in Gamma-Irradiated Aqueous Environments"

1. What was the effective concentration of hydrogen peroxide resulting from addition of one drop of 30% peroxide? It would seem that a better control over this concentration would be obtained by adding a larger quantity of a more dilute peroxide. Although this is only one instance, it raises questions about the technical QA.

2. Is there any even preliminary indication that the oxide coating formed on copper in an irradiated environment is adherent and thus protective?

3. If the potentials observed are mixed potentials, how can they be interpreted and what is their value in predicting long-term behavior?

4. The decline of corrosion potential to less positive values might also be attributed to exhaustion of the supply of peroxide or other species. Again it would be more communicative to include some numbers on the magnitudes of the currents observed, and to relate these to the amount of metal likely to be present in the actual waste package design.

C. General

1. Productivity of document reviews seems to have declined in recent months: 3 in July, 2 in August, 0 in September, and 2 in October. As discussed recently, we estimate that the target is about 5 per MLR on the average. This is again an illustration of the importance of focussing the available resources on extracting information on what each investigator found.

2. In deciding which reports to review, those presenting literature reviews or surveys of the art would appear to be useful, while those which appear to present little new data in a single field should probably not be reviewed in detail.