UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 18, 1995

MEMORANDUM TO: Sher Bahadur, Chief
Waste Management Branch
Division of Regulatory Applications
Office of Research

FROM: Michael J. Bell, Chief
Engineering and Goesciences Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

SUBJECT: REVIEW OF SOW FOR CONTINUATION OF INTEGRATED WASTE PACKAGE RESEARCH AT THE CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

It has been our hope that the continuation of the IWPE would take up as many of the topics from our user needs as would be possible, given the limited funds for EBS research. With this in mind, we have reviewed your SOW, and we find selected topics, as enumerated below, that have not received attention in this SOW:

Research on cracking of closure weldments and repair welding procedures, of A516 steel and Alloy 825 should be initiated early in the program. Thermal aging, effects of weld repair and heat-treatment, and neutron flux should be considered for the 825 weldment. If not this year, weldment behavior must be factored into the program at the earliest time possible.

Recent concerns about criticality indicate that DOE's proposed basket material, borated 304, should be included in the test program for austenitic materials, and that tests should begin early in the project. This steel should be fully tested comparably with the A516 and the Alloy 825 materials, as the behavior of this steel is as important to waste-package performance as are the containers themselves. Therefore, we suggest it at the highest priority for slow-strain-rate tests, fracture tests, corrosion tests, etc., as appropriate.

We feel that now (this comming fiscal year) is the time to complete the slow-strain-rate tests for all candidate alloys of interest in environments regarded to be likely for the proposed repository. These tests may be useful in disclosing unexpected environmental interactions

Fracture toughness (in air) tests should be conducted now as benchmarks for understanding the magnitudes of effects of any environmental

conditions of interest. Include all materials (and their weldments) that we regard to be important candidates for the waste package. These tests would be followed by similar tests under the environmental conditions of interest.

Some time ago, at our last research coordination meeting held for the EBS, we were led to believe that Dr. Sagar agreed with the position taken by Dr. Ahn on the importance of glass in our program. Ahn indicated that solubility data indicate to him that the leachate concentrations of plutonium and americium at 90 C imply that: (1) releases of these radionuclides could be more than 20 percent of the total release of these radionuclides; and (2) we should continue glass testing. Why is there no testing of glass in the SOW? We feel that our expertise in this area may not be adequate unless we have some ongoing effort in glass.

Zircaloy has not been included for study. Some effort should be expended so long as DOE appears to be "taking credit" for the Zircaloy.

Effects of metal corrosion products, including Zircaloy's, and their interactions with the environment of the waste package should be factored into our studies of waste-form dissolution. We do not believe that this has been taken into account in the SOW.

Work on our user-need R203 on capillary behavior, should be folded into studies of the environmental effects. R102, Cracking of the Waste Form, should be included as part of the spent-fuel studies.

For spent-fuel studies, three principal questions arise for the period after containers begin to fail:

(1) What releases from spent fuel can be expected, and what can be done about them?
(2) In what ways can we simulate spent-fuel behavior with testing behavior with testing that is less costly than normal for tests of "hot" spent fuel?
(3) What are the kinetics of the alteration behavior of spent fuel, and how does oxidation state affect dissolution in the environments of interest?

We have thought of doing cooperative research to minimize costs associated with answering these and other questions on spent-fuel issues. It appears that work with the Canadians will have to be minimal. We wonder whether we will be able to do something with the Germans who have suggested that we cooperate with one another. Perhaps workers in some other country may be able to help our program through some exchange mechanism (for staff or information), if nothing else. One question that we would like to have answered is a topic broached by a member of your staff: Must spent fuel, such as that from Turkey Point, be tested to understand the behavior of this class of waste form or will some simulated material be adequate in this regard? Perhaps our TA work related to this topic will clarify this question for us during the current fiscal year, and this will clear the way for tests to be conducted with confidence on their usefulness.

In general, we ask that you be a bit more specific in describing each task, with an explanation of exactly what work will be done, what objectives will be met and the methodology and rationale associated with each set of tests. It is particularly apparent to us that this was not done for the spent fuel studies, but other studies may be lacking in this regard as well.

Ticket: D-157
DISTRIBUTION:
Central File DWM r/f JGreeves MFederline JSurmeier MMcNeil
NMSS r/f ENGB r/f PUBLIC DWM t/f

DOCUMENT NAME: S:\DWM\ENGB\CGI\EBSAPR.SOW

OFC	ENGB		ENGB		ENGB			
NAME	CInterrante/eb		RWeller for RHW		MBell			
DATE	4/14/95		4/18/95		4/18/95			

OFFICIAL RECORD COPY

ACNW: YES ✓ NO ___
IG : YES ___ NO ✓
LSS : YES ___ NO ✓

Delete file after distribution: Yes ___ No ✓