JUN 30 1987

WM Record File | WM Project 91
Docket No.
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Mr. Steve Simpson
Chief Process Engineer
Associated Technologies Inc.
Suite 300, 212 South Tryon St.
Charlotte, North Carolina 28281

Dear Mr. Simpson:

We have reviewed your "Waste Form Qualification Testing Program for Bitumen NS-1 Decontamination Waste" and have provided comments on various sections of your plan. Specific comments are provided as an attachment to this letter. Our general comments are provided below. If our comments are addressed satisfactorily and the test results meet the recommendations of this letter and the Technical Position on Waste Form (TP), the test program should be acceptable for demonstrating compliance with the waste form stability requirements of 10 CFR Part 61 for the Dresden Unit I decontamination waste.

We are prepared to review your actual test results following the execution of your waste qualification test program.

General Comments

To assess the stability of a waste form proposed for shallow land burial, the NRC has recommended the tests and waste form criteria contained in the TP on Waste Form. The recommended tests are accelerated tests which are directly related to burial conditions and designed to measure the degradation of waste forms and container materials. For the results of these tests to be useful, and in order to obtain a quantitative measure of any degradation that may take place following the testing, suitable indicators of changes in material properties must be chosen. These indicators must be capable, in some cases, of detecting small changes in material properties so that results may be extrapolated to long time frames (300 years). Due to the lack of information on the behavior of waste solidified in bitumen, the TP on Waste Form did not contain suitable indicators of changes in material properties for this viscoelastic waste form. The specific comments contained in the attachment to this letter recommend testing that NRC believes will give an adequate indication of the degradation of a bitumen waste form following the accelerated tests recommended in the TP on Waste Form.

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These recommendations, like those in the TP on Waste Form are not requirements and ATI may propose alternative testing or test indicators to NRC for review and approval.

Sincerely,

Michael Tokar, Section Leader
Engineering Section
Technical Branch
Division of Low-Level Waste
and Decommissioning

Enclosure: As stated

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1.0 INTRODUCTION

No comment.

2.0 SPECIMEN PREPARATION

No comment.

3.0 COMPRESSIVE STRENGTH TESTING

NRC feels that testing is required to demonstrate the long-term stability characteristics of bitumen solidified waste. Of particular importance is the ability to determine that there will be no significant infiltration of bitumen into the pore voids of suitable backfill materials under the range of loads and conditions that are likely to exist at the burial site, to the extent practical. The tests should be conducted on test specimens that are representative of actual wastes.

Two types of tests are considered to be necessary and would include the establishment of the compressive strength of the solidified waste and a demonstration that the viscosity range of the proposed bitumen mixture would not result in filling of the pore voids of the backfill materials that are specified in Appendix A of SRP 4.3 (NRC NUREG 1200, "Standard Review Plan for the Review of a Licence Application for a Low-Level Radioactive Waste Disposal Facility").

Triaxial compression tests are recommended to measure the shear strength of the bituminized waste sample. This type of test is recommended in order to simulate the confining pressures which would exist in a backfilled waste disposal environment. The range of confining pressures to be used should cover the range of confining pressures that would reasonably be expected for near surface waste disposal. The effect of changes in bitumen viscosity and the compressive shear strength should be evaluated and an attempt made to determine what minimum compressive shear strength could be anticipated for the range in viscosity to be permitted by the manufacturer. Depending on the results and observed trends of the testing it may be possible to select a conservative "minimum acceptable" viscosity and to reduce or eliminate the need for compressive strength testing as the material property to detect waste form degradation. Test procedures to measure the extent of infiltration of the bitumen solidification agent into the potential backfill materials would need to be developed by the manufacturer. It is suggested that agreement with the NRC staff for these test procedures be reached before actual testing is undertaken.

4.0 LEACH TESTING/IMMERSION TESTING

Leach testing should include analysis of the leachate for the cumulative fractional release of any chelating agents contained in the NS-1 waste form.

This testing is necessary to assure that released chelates do not complex and mobilize radionuclides from waste placed in other areas of the trench.

Following the immersion test, the "minimum acceptable viscosity" should be determined (from the recommended testing in section 3.0), this viscosity should not have changed more than 20 percent of the pre-test value.

5.0 RADIATION TESTING

Will effects, such as swelling, due to gas generation be noticed when using an aluminum taped sample? How will ATI determine if there is significant degradation from gas generation?

Following this test, if the" minimum acceptable" viscosity is used (as determined from the recommended testing in section 3.0), then the viscosity should not have changed more than 20 percent of the pre-test value.

6.0 BIODEGRADATION TESTING

At the conclusion of the ASTM G21 and G22 test, if the samples are determined to have undergone significant biodegradation, then additional testing (such as the Barther Pramer test) should be instituted to determine the rate of biodegradation of the samples and whether this rate would cause stability problems (in a 300 year time frame). Following this test, if the minimum acceptable viscosity is used (as determined from the recommended testing in section 3.0), then the viscosity should not have changed more than 20 percent of the pre-test value.

7.0 THERMAL DEGRADATION TESTING

We do not recommend using an alcohol bath during thermal cycling due to the damage it may cause to the form. If a temperature of 40°C can not be reached without the aid of the alcohol bath, we will accept data at a temperature of 30°C if you increase the number of thermal cycles from 30 to 50. Following this testing specimens should be checked for free standing liquid as well as indications of physical deformation. If the minimum acceptable viscosity is used (as determined from the recommended testing in section 3.0) to quantify the amount of degradation which has occurred, then the viscosity should not have changed more than 20 percent of the pre-test value.

8.0 FREE STANDING LIQUIDS/HOMOGENEITY

ATI should note the physical appearance of the extracted (or cored specimens). In addition, a determination that the minimum acceptable viscosity has been maintained in the full size specimen will be sufficient to assure homogeneity.