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November 7, 1986

Mr. K. C. Chang
Mail Stop 623-SS
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Chang:

COMMENTS ON BWI-TI-287

Attached are the subject comments. If you have any questions,
please call me at 703-759-3646.

Very truly yours,

Gary

Gerald H. Fuller
10024 Colvin Run Rd.
Great Falls, VA 22066

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Comments on BWIP Supporting Document BWI-TI-287,
"Waste Package Preliminary Reliability Analysis Report"
by Yung and Terry, Dated 11/85.

This report, marked "Preliminary-Unpublished", is a draft of an attempt to describe the containment and release characteristics of the presently envisioned BWIP HLW repository configuration. The report is intended to be broadly based and all-inclusive in addressing currently identified physical/chemical/regulatory issues. It touches on all aspects of the problem: thermal, chemical, hydraulic, structural, radiolytic, etc. It is successful in this attempt at an exhaustive survey in that all the major issues, and subissues, which are expected to influence repository performance are recognized (ie, mentioned). This draft will be useful, therefore, as a framework for building more detailed future discussions.

The writers follow well-established precedent by taking conservative approaches, where possible, in dealing with specifics. They are explicit about these approaches, and they are equally explicit about uncertainty in their results which follows from any uncertainty in their assumptions or data. They recognize the presence of over-simplification in some areas (eg, the corrosion modelling approach in section 4.3.3). Occasionally they state assumptions with no attempt at justification and no estimate of conservatism (section 4.3.3, again).

The transport and process models which are used in the sample analyses presented in the report are based on some

standard assumptions: no advection transport; no crevice/fracture transport; no surface diffusion is explicitly discussed; nuclide release from the surface of the canister is saturation-limited. In this area, nothing new is offered.

The writers introduce reliability concepts as bases for formulating probabilistic statements about container failure. This approach may be useful. However, care must be taken to be sure that all pertinent conditions that relate to component or system "failure" are taken into account. Their Failure Modes and Effects Analysis is merely a cursory nod in that direction. Their functional and failure definitions are not consistent with standard FMEA practice. For example, it is inappropriate to describe a failure event as "normal". A component failure is, by definition, the occurrence of an out-of-spec. condition for that component. The claim is made on page 74 that "the [performance of the] components of the waste package have very limited effects on [the performance of] each other." An appropriate counter-example is the effect of "packing failure to retard resaturation with ground water" on "container containment capability" in the face of corrosion. It is hoped that the next generation of FMEAs will be more thorough and better thought out.

Conclusions (pages 202, 205) are stated in reliability (really, probabilistic) terms. Some of the pertinent probability density functions are derived using well-established stress/strength (in a general sense) relations such as for steel structural properties. Other pdf's are merely guessed at, such as for basalt porosity in section 4.4.2.3. This guesswork is currently necessary in the absence of any firm data, and the

instances where such uncertainty exists are generally flagged by the writers. However, as in the basalt porosity case above, some data uncertainties are not directly reflected in the performance (response) calculations.

Treated as a whole, the document is useful. It is likely that further editions will be more comprehensive and will reflect advances in knowledge. The writers establish this objective from the beginning. The results that are generated are currently as good as the assumptions, ie, accurately formulated based on general models, somewhat conservative, but also incomplete since many effects/processes are ignored or simplified.