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MEMORANDUM: To Files

FROM: Dennis G. Reid
Quality Assurance Section
Source Containment and Devices Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: IMPACT LIMITER STATIC LOAD CERTIFICATION TESTING FOR
TRANSNUCLEAR, INC.- FORT ST. VRAIN TRANSPORTATION CASK.

Stephen O'Connor and myself observed of certification testing of the Transnuclear, Inc.- Fort St. Vrain (TN-FSV) transportation cask impact limiter. The tests were conducted at Professional Service Industries, Inc., in Pittsburgh, Pennsylvania, on December 15-16, 1993. The Transnuclear contact was Mr. Glenn Guerra, TN-FSV Project Manager, telephone number (914) 347-2345.

Observers from Public Service Company of Colorado, who are the potential users of the TN-FSV transportation casks, were also present. Our observations extended to a review of the test apparatus against the test procedure, verification of calibrations and procedure approvals, provisions for data acquisition and recording, test personnel's familiarity with procedure requirements and use of appropriate equipment.

This segment of the certification testing was comprised of two static load tests on a half scale model of an impact limiter consisting of wood segments (redwood and balsa) contained within a stainless steel shell. The tests were designed to verify the adequacy of the impact limiter attachment and to determine the energy absorption capability of the impact limiter. Each test was performed independently as different loading orientations were required. The first test, the prototype attachment test, required that the prototype impact limiter be oriented vertically, enabling the load to be applied perpendicular to the attachment bolts. The second test, the energy absorption test, required the impact limiter to be positioned horizontally at a ten degree angle with the load plane. The tests were planned and implemented using test procedure PSI/TN-001, revision 4, which was approved by Transnuclear, Inc.

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The tests were executed acceptably in general, however, some specific observations were noted by the NRC observers.

- 1) In the first test (attachment integrity test), the prototype impact limiter was secured to the fixture using six bolts. The Transnuclear representative stated that a minimum torque of 10 lb-ft was required, however, that requirement was not specified in the procedure. In addition, an inappropriate torque wrench (0-200 lb-ft) was used to tighten the bolts. Using a torque wrench within the lower and upper 10% of its range, violates good industry practice. In addition, no torque sequence was specified for the bolts.
- 2) During the attachment integrity test, the Transnuclear representative stated that one bolt was allowed to break; however, that criteria was not stated in the procedure. A visual inspection performed at the end of the attachment test, revealed that five of the six bolts were broken. It could not be determined at what point the bolts broke during the loading phase. It should be noted that the prototype impact limiter was subjected to a load that exceeded the predetermined value.
- 3) Due to large deformations in the impact limiter bolt hole pattern which occurred during the attachment integrity test, the prototype could not be secured using the six bolts as required by the procedure for the energy absorption phase of the test. Only one of the six bolt holes could be engaged. Instead, brackets were used to temporarily secure the lower end of the impact limiter to prevent it from rotating off the fixture when the load was applied.
- 4) An uncalibrated digital multimeter was used for verification measurements during testing, but it should be noted that these measurements were not part of the acceptance data.
- 5) The test apparatus utilized a Linear Voltage Differential Transformer (LVDT) and an X-Y Plotter which were calibrated together, prior to the test, however, calibration stickers were not applied to each unit at that time. Instead, calibration stickers were applied after the first test had been completed; and only after the testing staff was requested to do so by Transnuclear's quality representative via telephone instructions.
- 6) The LVDT was not oriented in accordance with the test procedure, but the change was noted in the procedure and was approved by Transnuclear.

The two static load tests were determined, by Transnuclear, to be successful. Numerous data points were verified using the X-Y plotter, LVDT and mathematical reductions of selected data points, during each test phase.

Our observation indicated that both tests were reasonably performed, good levels of control were exercised, test personnel demonstrated a high degree of skill and a thorough knowledge of the test procedure.

Original Signed by

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