July 17, 2002

Mr. Steve Redeker
Manager, Plant Closure and Decommissioning
Sacramento Municipal Utility District
6201 5th Street
P.O. Box 15830
Sacramento, CA 95852-1830

SUBJECT: ACCEPTANCE OF ASME CODE EXCEPTION REQUEST FOR THE RANCHO SECO INDEPENDENT SPENT FUEL STORAGE INSTALLATION, DOCKET 72-11 (TAC NO. L23464)

Dear Mr. Redeker:

By letter dated May 8, 2002, the Sacramento Municipal Utility District (SMUD) submitted a request to the Nuclear Regulatory Commission (NRC), in accordance with Technical Specification 4.3.4 of Materials License No. SNM-2510 for the Rancho Seco Independent Spent Fuel Storage Installation (ISFSI), for approval of an exception to the requirements of the American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code, Section III, Subsection NB, paragraph NB-4121.3. The proposed exception would allow the use of a NUHOMS® failed fuel dry shielded canister (FF-DSC) that did not receive a liquid dye penetrant examination of the bottom forging following machining. The exception, if approved, would apply only to the single FF-DSC (serial no. FF13P-R21) fabricated for use at the Rancho Seco ISFSI.

The ASME Code requires a surface examination after removal of more than 1/8 inch of material. During the assembly of the FF-DSC, the canister fabricator failed to perform a dye penetrant examination (PT) of the bottom forging surfaces following final machining. The forging was welded to the canister shell and the basket and bottom shield plug were welded in place. As a result, the inside forging surfaces are no longer accessible because the bottom forging has already been installed. Although the post-machining PT exam was not performed on the interior surfaces of the forging, other examinations of the forging were done. These include ultrasonic (UT) and PT tests of the forging before machining, and a PT test of the external surface of the forging after assembly of the FF-DSC.

SMUD provided a Transnuclear, Inc. (TN) nonconformance report (NCR), dated May, 3, 2002, which included a detailed evaluation in support of the request. The weld joints between the bottom end forging and the DSC shell and the bottom inner cover plate, and the forging surfaces adjacent to these weld joints, passed dye penetrant (within 0.5 in. of the joints), visual (within 0.5 in.) and radiographic (within 2 in.) examinations after machining. The welded forging forms part of the canister shell, which was successfully pressure tested and helium leak tested. The bottom end forging joints to the shell and bottom inner cover plate were visually examined again after pressure and leak testing.

Transnuclear's NCR also included an evaluation of the bottom forging for potential defects. The maximum stress in the forging occurs in the cylindrical portion, and so a flaw was postulated at this location. The flaw could either be oriented in the axial direction (parallel to the length of the cylinder), or in the circumferential direction. The geometry of the forging makes circumferential flaw size more critical because the length of the forging limits an axial flaw in the cylinder. Also, an axial flaw in the cylinder eventually becomes intercepted by the "web" of the forging, which is the portion of the forging welded to the bottom of the canister. There is no growth mechanism that would drive a flaw beyond the forging boundary. As such, a circumferential flaw in the cylindrical portion of the forging is evaluated as the bounding flaw.

The UT requirements for the as-machined forging are specified in paragraph NB-2542 of Section III of the ASME Boiler and Pressure Vessel Code. The supporting calibration standards of ASME Section V allow that the maximum acceptable flaw consists of a flat bottom hole which is 3/32-inch diameter (15% of nominal thickness) and 1-1/2-inches long (less than one percent of total circumference of canister). This flaw is identified as the largest subsurface or surface flaw that can exist in the forging as the component is put into service.

The maximum credible defect in the forging is relatively small compared with ASME Code Section XI allowable flaw size. There are no potential flaw growth mechanisms identified which will propagate this defect to encroach upon the ASME Code Section XI allowables.

The NRC staff agrees with SMUD and TN that although a final surface examination of the bottom forging was not performed after machining, the structural margins of the cask will not be compromised. The reasons for this conclusion are:

(1) The performance of other required non-destructive examinations (NDE) prior to machining, including PT and UT, and the performance of PT on the external surfaces after assembly of the canister, revealed no significant defects; and

(2) The high toughness of the SA-182, Type 304 stainless steel material ensures that even if a significant defect were missed, the resulting structure is highly flaw tolerant. In addition, the impact toughness characteristics of the material demonstrate that brittle failure of the forging would be precluded under operating conditions.

Consequently, the staff finds that performance of the required surface examination for the bottom forging of the failed fuel dry shielded canister to be used at Rancho Seco would not provide a significant increase in safety or quality commensurate with the hardship and risks involved in requiring the test to be performed on the canister as fabricated. The staff finds that your proposed exception to the requirements of the ASME B&PV Code, Section III, Subsection NB, paragraph NB-4121.3, is acceptable only for the single FF-DSC intended for use at the Rancho Seco ISFSI. If you have any questions, please contact James R. Hall of my staff at (301) 415-1336.

Sincerely,

/s/ /RA/

E. William Brach, Director
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Dockets 72-11 (50-312)

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Consequently, the staff finds that performance of the required surface examination for the bottom forging of the failed fuel dry shielded canister to be used at Rancho Seco would not provide a significant increase in safety or quality commensurate with the hardship and risks involved in requiring the test to be performed on the canister as fabricated. The staff finds that your proposed exception to the requirements of the ASME B&PV Code, Section III, Subsection NB, paragraph NB-4121.3, is acceptable only for the single FF-DSC intended for use at the Rancho Seco ISFSI. If you have any questions, please contact James R. Hall of my staff at (301) 415-1336.

Sincerely,

/s/ /RA/

E. William Brach, Director
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

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Rancho Seco Nuclear Generating Station
Docket Nos. 72-11 (50-312)

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