From: Terence Chan
To: Harold Chernoff
Date: Fri, May 28, 2004 9:30 AM
Subject: Info regarding the basis for the Order

I think I forgot to send this to you last night.

CC: Jay Collins

B-32

Issue 1: Provide technical justification why the NRC has not required Point Beach Nuclear Plant (PBNP) to "PT" (liquid dye penetrant test) a reasonable sample of the other high stress penetration's "J" groove welds (outer periphery penetrations, and the mechanically straightened penetrations during manufacture of the subject head)

Issue 1.a: The NRC staff did not require PBNP to "PT" a reasonable sample of the other high stress penetration's "J" groove welds.

Answer 1.b: There is no requirement in the regulations or First Revised NRC Order EA-03-009 (Order) for the licensee to expand the sample scope of surface examination to other reactor pressure vessel (RPV) head penetration nozzle J-groove welds due to the indications identified by the licensee in penetration nozzle 26.

The licensee decided on its own to perform the surface examination of penetration nozzle 26's J-groove weld. Because inservice inspections performed in accordance with the American Society of Mechanical Engineer's (ASME) Code are completed on a sampling basis, the ASME Code has a provision for scope expansion when flaws greater than ASME Code acceptance criteria are identified. Since this inspection was not required by the ASME Code, the ASME scope expansion provision is not applicable.

The First Revised NRC Order EA-03-009 (Order) inspection requirements for high susceptibility plants is to perform an effective examination in accordance with Section IV.C(1) of the Order. If the licensee chooses to perform a volumetric examination in accordance with Section IV.C(5)(b)(i) of the Order, and address any flaws attributed to primary water stress corrosion cracking (PWSCC) consistent with Footnote 1 of Section IV.B of the Order, then the NRC staff has determined that no further examinations are required to demonstrate reasonable assurance of adequate protection of public health and safety.

Issue 1.b: The First Revised NRC Order EA-03-009 (Order) does not require licensees to "PT" penetration J-groove welds if a volumetric examination is performed.

Answer 1.b: The Order does not require examination of the J-groove weld surface if the licensee chooses to inspect its RPV head penetration nozzle with a volumetric examination, in accordance with Section IV.C(5)(b)(i). During the formulation of the Order, the NRC staff determined that requiring a surface examination of the J-groove weld in conjunction with a volumetric examination of the nozzle is not necessary for reasonable assurance of public health and safety in that the potential radiological exposure required to perform the examination constituted a hardship without a compensating increase in the level and quality of safety. In making that determination, the NRC staff recognized and accepted the possible existence of flaws in the j-groove weld despite an acceptable volumetric examination of the penetration.

The volumetric examination of a RPV head penetration nozzle provides several means to detect or infer the existence of flaws in the J-groove weld. The volumetric examination from the inside diameter surface of the nozzle at the J-groove weld level allows some signal penetration of the J-groove weld. Inspection experience has demonstrated that these examinations are capable of identifying large defects at or near the penetration wall/weld interface, as well as

any flaw that breaks through the "triple point" or nozzle material. The triple point is a point where the weld material intersects the nozzle material and the heat treated butter layer of the RPV head. The volumetric examination is also capable of indicating the presence of leakage in the annulus area between the penetration and the RPV head above the j-groove weld, this inferring the existence of a potential leakage path through the j-groove weld.

Performance of a surface examination of each J-groove weld in every pressurized water reactor could result in significant radiological dose exposure. Because the ASME Code did not require periodic inservice inspection of these welds, many of the weld surfaces were not finished with surface conditions conducive to surface examinations. In order to perform the examinations, it is expected that many weld surfaces will require preparation in a high radiation field. If a PT is performed, the examination itself may result in significant personnel exposure. Radiological dose estimates for a complete PT surface inspection of all RPV head penetration J-groove welds at only one facility could range as high as 700 person-rem.

Furthermore, crack growth rates through Alloy 182/82 material, the material used in RPV head penetration J-groove welds for Alloy 600 nozzles, are significantly higher than those for Alloy 600 nozzle materials. The NRC staff gives no credit for this material when analyses are performed to determine the adequacy of inspection coverage of the nozzle beneath the toe of the J-groove weld.

For the reasons stated above, the NRC staff found that requiring a surface examination of the J-groove weld in conjunction with a volumetric examination of the nozzle performed in accordance with Section IV.C(5)(b)(i) of the Order is not necessary for reasonable assurance of public health and safety, and would result in hardship without a compensatory increase in the level of quality and safety.