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MEMORANDUM FOR: Thomas M. Novak, Assistant Director for Licensing, DL

FROM: James P. Knight, Assistant Director for Components & Structures Engineering, DE

SUBJECT: INPUT FOR WATERFORD-3 SER SUPPLEMENT

In Section 3.9.3.1 of the Waterford-3 SER dated July 1981, we identified a confirmatory item regarding the piping preoperational testing program. The applicant has provided a summary of its testing program and we have completed our review of the submittal. Attached is our safety evaluation for input into the next SER supplement.

Original signed by
James P. Knight

James P. Knight, Assistant Director for
Components & Structures Engineering
Division of Engineering

Attachment: As stated

cc: R. Vollmer, DE
G. Knighton, DL
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3.9.2.1 Piping Preoperational and Start-up Testing Program

In Section 3.9.2.1 of the Waterford-3 SER dated July 1981, we identified a confirmatory item regarding the piping preoperational and start-up testing program. The purpose of these tests is to assure that the piping vibrations are within acceptable limits and to verify that the piping systems can expand thermally in a manner consistent with the design intent. In a letter from F. J. Drummond to G. W. Knighton dated June 8, 1983, the applicant has provided a summary of the thermal testing of piping systems based on the preoperational phase of the Waterford-3 start-up testing program. The results of the program indicated that the piping thermal expansions are acceptably within design limits except for two cases where the acceptance criteria for thermal expansion were exceeded. These deficiencies are documented in the Test Deficiency Record and corrective measures are being implemented and will be verified during post-core hot functional or power ascension testing to assure the adequacy of the corrective actions. In addition, piping vibration monitoring will be conducted during post-core hot functional and power ascension testing. The applicant has committed to provide the results of those testing phases after completion of the start-up testing program. Provided the stresses due to vibration in the piping systems are within the acceptance criteria discussed in Section 3.9.2.1 of the SER (July 1981) and the above corrective measures being implemented for the thermal expansion testing are found to be adequate, the staff considers the confirmatory item regarding the piping preoperational and start-up test program to be closed.

Attachment 2

OBSERVATIONS - WATERFORD UNIT 3 SITE

The following observations were made during a site visit to the Waterford facility on June 30, 1983.

In the auxiliary building at the top of the common basemat (El. -35 ft), moisture was noted to have been permeating up from the basemat at several locations, some of which had been noted in May 1983 by the licensee in the areas known as the waste gas compressor rooms, gas surge tank room, gas decay tank room, and others that were identified by the senior NRC resident inspector and the Inquiry Team formed for the resolution of this question.

Two temporary manholes (for construction during conduit and cable placement) were observed. One was located near column line 12A between H and J and the other near column line 1A between J and K. These appeared not to have steel liners and were examined to determine if a source of water had also found a path through to these areas of lesser basemat thickness. The openings (blockouts) were approximately 6 ft wide x 6 ft long x an estimated 7 ft deep and contained water to an unknown depth. No specific details related to cracking or water source could be obtained from the observation.

In an area located generally southwest from a floor drain (FD) sump, near column line 10A between K and L, a darkened zone approximately 5 ft long was observed with several specific wet spots along with a buildup of material. This area was

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identified earlier by the senior NRC resident inspector. The rough darkened area was examined with an 8X eyeglass but no distinct crack could be observed within the zone. However, moisture and discoloration established a definite linear zone, permitting distinctive visual recognition of a difference with the surrounding area. No flowing water was observed, but it appeared that moisture was present in the zone and seemed to be coming to the surface from within the basemat. This surface seemed to be the original finished concrete surface of the common basemat and did not appear to have a surface coating. The adjacent FD sump (#6) was examined and found to be steel lined (as is typical for FD sumps at El. -35 ft) and to contain water. The source of the water in this sump could not be determined from the observations made.

In another location where seepage had been identified by the senior NRC resident inspector, the common basemat surface was coated with what was described as an epoxy paint material. The moisture was located along a linear path (about 7 ft long) that appeared to be at the construction joint between block placement numbers 13B and 18. The moisture had broken through the epoxy paint and was present on top of the surface along with a buildup of grey deposits of material from 1/8" to 3/16-in. thick. The area of this observation was near column line 6A between J and K along the door and into the south motor-driven auxiliary feedwater pump room. Portions of the permeable zone extended westward outside the room.

In May 1983, the licensee noted that three of the next four areas or rooms where seepage was observed were areas of concrete cracks as evidenced by water percolation to the surface of the common basemat. These areas are generally adjacent to one another and are located in the northwest corner of the auxiliary building. In the gas surge tank room area there is a zone of seepage approximately 10 ft long running parallel to the L column line and passing beneath a 2 ft 6 in. wall near the entry point to the room. In waste gas compressor room "B", the licensee had chipped an area about 1/2 to 3/4 in. below the epoxy-coated surface. This area approximately 12 in. x 15 in. provided a relatively "clean" but rough surface to view the zone of moisture. When viewed with an 8X magnifying lens, no specific crack could be observed. The approximately 6 ft zone tracked diagonally from the room's corner area to the concrete mounting base of the compressor. There was also evidence of patching at three locations on the side opposite the moisture zone. Repaired areas had approximate dimensions of 24 in. x 24 in., 12 in. x 12 in. and 12 in. x 8 in. The NRC resident inspector had no information readily available related to these patch areas and there was insufficient time to discuss them with the licensee.

In waste gas compressor room "A" another seepage zone was approximately 5 ft long. The zone was oriented diagonally from a room corner to the base of the compressor. Specific observations with an 8X magnifying lens were made. The moisture sources seemed to well up out of the concrete in distinct locations, upture the epoxy coating, and then build a small cone-shaped deposit of aterial assumed to be material that was dissolved in the water to form a olution and was left as a result of the evaporation of the water. One of the all areas was examined. A 3/8-in.-diameter and 1/2-in.-deep hole was easily de around one of the seepage areas. This small "crater" was cleaned and dried with paper towels and observed by three other NRC personnel. Approximately one hour later, the same NRC engineers viewed this area and could detect no discernible change in the moisture levels. In the doorway of gas decay tank room "C", another seepage zone 4 ft long was observed. A new zone was found at the base of the "C" gas decay tank along the northeast side. There was considerable surface moisture in this area, but it could not be determined whether all the observed water was from the seepage zone or from another source, such as that associated with ongoing flushing and testing of systems or from rainwater.

Areas adjacent to the shield building and the containment at El. -35 ft were visually observed over about 300° of the circumference. Along the northwest quadrant of the base ring block of concrete (10 ft thick x 16 ft-10 in. high), which was placed as the base ring of the shield building, there were indications of water leakage in the past on the vertical faces (as evidenced by deposits of probably calcium carbonates). At the junction with the common basemat at El. -35 ft. there was evidence of the seepage zones as well as areas that appeared to have previously been seepage zones but were now dry. Areas in this quadrant had surface water and the source of the water could not be ascertained. An area perpendicular to the wall between column lines 1A and 1M, which serves as the wall of wet cooling tower A, showed evidence of seepage over a distance of approximately 4 ft to 5 ft.

In the southwest quadrant between columns 4A-N and 5A-M, there was an area adjacent to the shield building near an electrical panel that seemed to have water actively seeping out from under the shield building. There also appeared to be a buildup of material that had leaked out or had been deposited out of solution as the water evaporated. This area may also represent a location where there was a 1 ft-9 in. deep sump during construction.

In the southeast quadrant near column 9A-M, there appeared to be another area of active water seepage from beneath the shield building. Also in this area, there was an old zone of seepage with deposits present on the concrete common basemat surface. No seepage was evident on the day of the inspection.

Observations were made in the annular space between the containment and the shield building on the lowest level (-1.5 ft) to check for water and moisture along the top of the knuckle region of the steel containment. One area of wetness was observed along the southern portion beginning about 6 ft west of penetrations #66 and #71 and continuing for 12 to 15 ft westerly along the arc. The water was in the pocket of ethafoam cushion/flexible material, but it was not possible to determine whether the water was coming from the fill concrete below or whether the water had come from above and collected in this region.

In all instances where water or moisture was observed that was clearly identifiable with seepage from the surface of the common basemat, no flow or excessive buildup of water was noted.