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VICE PRESIDENT AND GROUP EXECUTIVE
NUCLEAR OPERATIONS

July 2, 1981

Mr. Harold R. Denton
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Preservice Inspection Program
SER Open Item 1.6.6

Dear Mr. Denton:

A meeting was held with the NRC on June 2, 1981, at the Virgil C. Summer Nuclear Station to discuss SER Open Item 1.6.6 regarding preservice inspection activities. At the end of that meeting SCE&G was requested to provide supplemental information in three areas. Explanations presented for clarification are given in three basic categories, as follows:

1) Method of conducting the ultrasonic examination of piping system welds since Section V, Article V, is not appropriate.

2) Limitations of the ultrasonic examination methods available for piping system welds.

3) Improvement of ultrasonic examination for austenetic piping system welds.

1) Section XI, 1974 Edition, requires that ultrasonic examinations be conducted in accordance with the provisions of Appendix I. Where Appendix I (I-1200) is not applicable, the provisions of Article 5, Section V, shall apply. There is no methodology in Article 5, Section V, that is clearly and specifically applicable to ultrasonic (ISI) examination of piping system welds and particularly to the detection of service induced failures, which are expected to occur at either the ID or OD surfaces.

Article T-523 references Article 23 for the ultrasonic examination of pipe and SE-273 is the only standard in Article 23 that pertains to welds in piping. The calibration reflector specified in SE-273 is a "longitudinal reference notch ..... on the outer and inner surfaces of the standard," however, no notch depth is specified.

Article T-510 requires the use of Article 1 when the "use of Article 5 is required by a referencing code section."

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In essence, T-110(c) describes the general applicability of methods described in Section V and requires that when they are not applicable, "the manufacturer (owner or user) shall develop special procedures..."

Appendix III of the Winter 1976 Addenda of Section XI is the only available code reference source that is specifically applicable for use in developing the procedures that are required by T-510 and T-110(c). Therefore, its use as a guideline for preparing the required special procedures was deemed appropriate - if not essential.

The resulting procedures, ISI-205, was used for ultrasonic examination of piping system welds and is consistent with the ISI requirements of the Summer '78 Addenda which has been recognized and accepted by the NRC.

2) Some ultrasonic examination of piping welds are limited or not practical because of component or fitting geometry and/or other physical obstructions. Generally, these limitations exist at pipe-to-elbow, pipe-to-flange, pipe-to-valve, valve-to-elbow and in areas where integrally welded supports, lugs or hangers, etc. preclude examination to some part of the examination area.

Examinations were conducted to review as much of the examination zone as was practical within these geometric, metallurgical and physical limitations. When the required ultrasonic examination volume or area could not be examined 100%, as required by Section V, Article V, the examination was considered to be partial (PAR) and so noted on the report. Hence, the required volume on the component or fitting side cannot be quantified. In any case, 100% of the 1 "T" volume cannot assured. Thus, a PAR is required as a disclaimer to having satisfied the requirements of Section V, Article V.

These limitations also exist to a lesser degree when the construction code requirements prevent grinding the piping weld flush with the adjacent pipe outside surface.

Coupling of the transducer to the examined area was maintained throughout the examination except for some momentary interruptions. This type of interruption generally occurred in an area of weld metal to base metal transition and may have occured in other areas of the base metal or weld metal where surface irregularities were present.

Where geometric configurations limited the ultrasonic beam metal path, the area could not be qualified nor quantified. This occurred at those points where a change in diameter and thickness (pipe-to-flange, pipe-to-valve) and a change in direction (pipe-to-elbow) exist. Also, this occurred where a change in diameter, thickness and direction existed simultaneously for a weld (pipe-to-flange, pipe-to-valve, pipe-to-elbow, valve-to-elbow).

In some instances, other types of physical restrictions (such as welded lugs, hangers, supports, etc.) encroached upon the periphery of the base metal area to be examined. Therefore, the base metal area examined could not be accurately quantified.

The non-destructive examination operator, being knowledgeable of these existing physical limitations and the ultrasonic beam direction-reflection characteristics, could not credit the weld, including the 1 "T" area and volume, as being 100% examined.

Since the 1 "T" area is an arbitrary code specified dimension and taking into consideration the aforementioned limitations, an ample amount of weld and base metal has been examined to gain a level of confidence and quality consistent with a later Code edition and addenda (1977 Edition, Summer 1978 Addenda) which has been recognized and accepted by the NRC Staff.

A summary of piping system welds by number identification, the limiting direction(s) and the limitation will be prepared and forwarded in order to recognize that these limitations do exist.

3) To improve ultrasonic examination of austenetic piping system welds, the weld crowns were dressed flush to the exterior adjacent piping surface when permitted by the construction code requirements.

Specific methodology does not clearly and definitely exist for ultrasonic examination of austenetic piping welds in either Section V or Section XI of the ASME Code through the 1980 edition. Therefore, when the weld crown has been dressed flush with the adjacent external piping material, scanning across the weld allows the observance of the half-node examination of anomalous austenetic material.

For the reactor coolant loops, a double DAC curve was constructed using a 1/4 T - 80% and 3/4 T - 80% with a 1 megacycle 41° refracted longitudinal beam in order to achieve better penetration through the austenetic material.

In addition to the above, the Reactor Pressure Vessel safe-ends welds received an inside diameter ultrasonic examination with the remote tooling machine.

Successful calibration using the standard fabricated calibration blocks demonstrates the maximum effectiveness and usefulness of the intended ultrasonic application for these anomalous austenetic materials. The calibration was accepted by the Authorized Inspection Agency's Inspection Specialist on June 12, 1981.

Hence, these ultrasonic examination methods used to control the beam direction, penetration and reflection characteristics for the described austenetic materials exceeds the requirements of the Code.

If you have any questions, please let us know.

Very truly yours,

for T. C. Nichols, Jr.

RBC:TCN:lkb

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