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Activity: Baseline Preservice Inspection (PSI) Program

1.0 Purpose: This guideline provides a method to evaluate the PSI program that details ASME Section XI baseline examinations, inspections, and tests of nuclear power plant components and systems which are required to be completed prior to initial plant startup, and when a component is replaced, added, or modified during the service lifetime of a power station.

2.0 Scope: This guideline has been developed for use in the review and evaluation of preservice inspection programs for Classes A, B, C, and D pressure retaining components and their supports and preservice testing of pumps, valves, and component supports. It does not apply to inservice inspection (ISI) examinations, inspections, and tests.

3.0 References:

3.1 ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components"

3.2 Regulatory Guide 1.14 recommends requirements for testing and inspection of reactor

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coolant pump flywheel integrity.

3.3 Regulatory Guide 1.58 recommends requirements for personnel qualifications for inspecting, examining, and testing according to SNT-TC-1A for NDE and ANSI N45.2.6 for discipline-related inspections.

3.4 Regulatory Guide 1.83 recommends eddy current inspection requirements for steam generator tubing including selection of baseline data and sample selections.

3.5 Regulatory Guide 1.150 recommends ultrasonic testing techniques for examination of reactor vessel welds.

4.0 Guidelines:

4.1 In preparation for and during the conduct of this surveillance:

E Obtain and review implementing procedures, instructions and drawings governing this activity.

E Prepare a guide or checklist using the selected items from this guideline.

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- E Review past surveys, audits, surveillances and other evaluations/ assessments.

- E Ensure that checklists include, where applicable, actual observations of performance, general plant conditions, radiological work practices, housekeeping, work document controls and use, and safety practices.

NOTE: Refer to Guideline A.1, "General Quality Surveillance Guidance," for specific details on the attributes listed above.

4.2 A surveillance checklist, or "marked-up" copy of the plant's current procedures applicable for the activity, should be prepared. Emphasis should be placed on real-time observations of performance- based activities. Appropriate documentation should be reviewed during surveillance preparation and checklist preparation, including but not limited to, industry and regulatory reports which address specific concerns and problems, and previous plant-specific audit and surveillance reports.

4.3 The PSI program is a system of planned tests, inspections, and examinations conducted by qualified personnel using approved written procedures. The data from this first series of inspections, examinations, and tests form the baseline against which ISI results are compared.

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4.3.1 Examination applies to nondestructive examination (NDE) techniques according to ASME Section XI. The following methods are employed:

4.3.1.1 Visual testing methods VT-1, VT-2, VT-3, and VT-4.

4.3.1.2 Magnetic particle and liquid penetrant surface NDE techniques.

4.3.1.3 Radiographic, ultrasonic, and eddy current volumetric NDE techniques.

4.3.2 Test applies to all verifications of operational readiness by direct functional testing.

4.3.3 Inspection refers to the verification of the performance of examinations or tests by the Authorized Nuclear Inservice Inspector (ANII).

4.3.4 The surveyor should consider in the evaluation the following types of components or systems and ASME Section XI require

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ssure retaining bolting larger than two inches in diameter.

Surface, volumetric, visual VT-1 examinations of reactor

vessel closure head nuts, closure studs, threads in flange,

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closure washers, bushings, pressurizer, steam generator, heat exchanger, piping, pump, valve, bolts, studs, and bolting.

- G. Pressure retaining bolting two inches and smaller in diameter. Visual VT-1 examination of reactor vessel, pressurizer, steam generator, heat exchanger, piping, pump, valve bolts, studs, and nuts.
- H. Integral attachments for vessels. Volumetric or surface examinations in reactor vessel, pressurizer, steam generator, and heat exchanger integrally welded attachments.
- I. Pressure retaining welds in piping. Surface and volumetric examinations of circumferential and longitudinal welds on pipe four inches or greater in diameter, surface examinations of piping socket welds, and circumferential and longitudinal welds on pipe less than four inches in diameter.
- J. Integral attachments for piping, pumps, and valves. Volumetric or surface examinations of piping, pump, and valve integrally welded

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attachments.

- K. Pressure retaining welds in pump casings and valve bodies.
Volumetric examination of pump casing and valve body welds.
- L. Pump casings and valve bodies. Visual VT-3 examination of pump casing and valve bodies exceeding four inches in nominal pipe size.
- M. Interior of reactor vessel. Visual VT-3 examination of accessible vessel interior areas.
- N. Integrally welded core support structures and interior attachments to (BWR) reactor vessels. Visual VT-1 examination of accessible welds on interior attachments, and accessible surfaces on core support structure.
- O. Removable core support structures. Visual VT-3 examination of accessible surfaces and welds on core support structure.

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- P. Pressure retaining welds in control rod housings (CRD).
Volumetric or surface examination of welds in CRD housing.
- Q. All pressure retaining components. Visual VT-2 examination of system leakage and hydrostatic test of reactor vessel, pressurizer, steam generator, heat exchanger, piping, pump, and valve pressure retaining boundary.
- R. Steam generator tubing. Volumetric examination of steam generator tubing in straight tube and U-tube type designs.

4.3.4.2 Class B components and required examinations and tests.

- A. Pressure retaining welds in pressure vessels. Volumetric examination of shell and head circumferential welds and tubesheet-to-shell weld.
- B. Pressure retaining nozzle welds in vessels. Surface examination of vessel nozzles, surface and volumetric examination of nozzle-to-shell (or head) weld, and volumetric examination of nozzle

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inside radius section.

- C. Integral attachments for vessels, piping, pumps, and valves.
Surface examination of pressure vessel, piping, pump, and valve integrally welded attachments.
- D. Pressure retaining bolting exceeding two inches in diameter.
Volumetric examination of pressure vessel, piping, pump, and valve bolts and studs.
- E. Pressure retaining welds in piping. Surface examination of circumferential and longitudinal weld in pipe welds with nominal thickness less than or equal to one-half inch and pipe branch weld connections, pump valve casing welds, surface and volumetric examination of circumferential and longitudinal weld in pipe welds with nominal thickness greater than one-half inch.
- F. All pressure retaining components. Visual VT-2 examination of pressure vessel, piping, pump, and valve system leakage test of pressure retaining component.

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4.3.4.3 Class C and D components and required examinations and tests.

- A. Systems in support of reactor shutdown function. Visual VT-2 examination of pressure retaining components. Visual VT-3 examination of component support and restraints, mechanical and hydraulic snubber, spring type and constant load type supports, and shock absorber integral attachments.
- B. Systems in support of emergency core cooling, containment heat removal, atmosphere cleanup, and reactor residual heat removal. Visual VT-2 examinations of system pressure test of pressure retaining components and visual VT-3 examinations of component support and restraint, mechanical and hydraulic snubber, spring and constant load type supports, and shock absorber integral attachment.
- C. Systems in support of residual heat removal from spent fuel storage pool. Visual VT-2 examinations of leakage tests of pressure retaining components. Visual VT-3 examinations of component supports and restraints, mechanical and hydraulic

snubber, spring and constant load type supports, and shock absorber integral attachment.

4.3.4.4 Classes A, B, C, and D component supports. Visual VT-3 examination of component support mechanical attachments including bolting, welded attachments, component displacement, settings of guides and stops, alignment, and assembly. Visual VT-4 examinations of spring and constant load type supports, shock absorbers, and hydraulic and mechanical type snubbers.

4.3.4.5 Classes A, B, C, and D centrifugal and displacement type pumps. Visual VT-4 examinations and functional test to measure pump speed, inlet pressure, differential pressure, flow rate, vibration amplitude, bearing temperature, and observation of lubricant level or pressure.

4.3.4.6 Classes A, B, C, and D valves and their actuating and position indicating systems. Visual VT-4 examinations and operation readiness testing to assess valve function, leak rate measurement, and exercising stroke tests.

4.4 Confirm by review that an ISI program has been developed for the specific plant in

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accordance with Title 10CFR50.55g that identifies the specific year and addenda of ASME Section XI in effect at the nuclear plant based upon the construction permit issuance date.

NOTE: PSI consists of a 100 percent coverage of all items in the ISI program. Shop and field examinations may serve in lieu of the onsite PSI examinations provided, in the case of vessels only, the examination is performed after the hydrostatic test required by ASME Section III has been completed. Such examinations are conducted under conditions and with equipment and techniques equivalent to those that are expected to be employed for subsequent inservice examinations. The shop and field examination records are, or can be, documented and identified in a form consistent with those required in ASME Section XI, IWA-6000, as defined by established station PSI/ISI program procedures.

4.5 Confirm that PSI instructions titled "Preservice Inspection Programs" have been prepared by the ISI Group. The guidance of paragraphs 4.4.1 and 4.4.4 should be used for the selection of activities to be verified. The instructions should contain as a minimum:

4.5.1 The ASME Code of Record for PSI.

4.5.2 The components and component supports subject to examination and test.

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4.5.3 The NDE method for each component.

4.5.4 The examination is consistent with approved procedural requirements:

4.13.1 Examination by the continuous method (current on while particles are being applied) with adequate mate

5.0 Other Guidelines for Consideration:

5.1 A.1, "General Quality Surveillance Guidance")