

APPENDIX BRECORDS PARTIALLY WITHHELD

<u>NUMBER</u>	<u>DATE</u>	<u>DESCRIPTION & EXEMPTION</u>
1.	9/18/90	Memorandum for A. Bert Davis from H. J. Miller, Subject: Meeting with IDNS on ASME MOU Implementation. (4 pages, Portions Withheld Exemption 5) enclosure Withheld in its Entirety, Exemption 5, 3 pages)
2.	10/10/90	Letter to Roy Wight, Department of Nuclear Safety, State of Illinois from H. J. Miller (1 page, Release) attaching Meeting Minutes (Withheld in Entirety, Exemption 5) (3 pages)



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 25 1988

TO ALL LICENSEES OF OPERATING BOILING WATER REACTORS (BWRs), AND HOLDERS OF CONSTRUCTION PERMITS FOR BWRs

Gentlemen:

SUBJECT: NRC POSITION ON IGSCC IN BWR AUSTENITIC STAINLESS STEEL PIPING
(Generic Letter 88-01)

Intergranular stress corrosion cracking (IGSCC) near weldments in BWR piping has been occurring for almost 20 years. Early cases were in relatively small-diameter piping. In early 1982, cracking was identified in large-diameter piping in a recirculation system of an operating BWR plant in this country. Since then, extensive inspection programs have been conducted on BWR piping systems. These inspections have resulted in the detection of significant numbers of cracked weldments in almost all operating BWRs.

A number of domestic and foreign BWR owners have replaced or plan to replace piping systems that have experienced IGSCC with more resistant material. Other owners are implementing countermeasures such as Stress Improvement (SI) or Hydrogen Water Chemistry (HWC) to reduce the susceptibility of the piping to IGSCC. In many cases, cracked weldments have been repaired by reinforcing them with weld overlay.

Substantial efforts in research and development have been sponsored by the BWR Owners Group for IGSCC Research. The results of this program, along with other related work by vendors, consulting firms, and confirmatory research sponsored by the NRC, have permitted the development of revised Staff Positions regarding the IGSCC problems.

The technical bases for these positions are detailed in NUREG-0313, Rev. 2 "Technical Report on Material Selection and Process Guidelines for BWR Coolant Pressure Boundary Piping." This revision to NUREG-0313 was a major task in the staff long range plan to deal with BWR pipe cracking that was presented to the Commission in SECY 84-301. This revision includes the relevant recommendations of the Piping Review Committee Task Group on Pipe Cracking issued as NUREG-1061, Vol. 1, "Report of USNRC Piping Review Committee", and consideration of public comments on that document. NUREG-0313, Rev. 2 describes the technical bases for the staff positions on materials, processes, and primary coolant chemistry to minimize and control IGSCC problems. Inspection schedules and inspection sample sizes are based on the susceptibility of weldments to initiation and propagation of IGSCC. Inspection schedules are comparable to those specified in Section XI of the ASME Boiler and Pressure Vessel Code in cases where the piping material is IGSCC resistant. Varying amounts of augmented inspections are specified for piping with a greater susceptibility to cracking, where there is less certainty about the effectiveness of mitigation measures used, or in cases where repairs have been performed. When improved water chemistry control with hydrogen additions is implemented, less augmentation of inspection schedules is required.

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The purpose of this Generic Letter is to seek information regarding implementation of the new staff positions covering these technical areas. This Generic Letter supersedes Generic Letter 84-11, "Inspection of BWR Stainless Steel Piping."

This Generic Letter applies to all BWR piping made of austenitic stainless steel that is four inches or larger in nominal diameter and contains reactor coolant at a temperature above 200°F during power operation regardless of Code classification. It also applies to reactor vessel attachments and appurtenances such as jet pump instrumentation penetration assemblies and head spray and vent components.

This Generic Letter does not apply to piping made of carbon steel classified as P-1 by the ASME Boiler and Pressure Vessel Code.

Staff Positions have been developed covering the following subjects:

1. Staff Position on Materials
2. Staff Position on Processes
3. Staff Position on Water Chemistry
4. Staff Position on Weld Overlay Reinforcement
5. Staff Position on Partial Replacement
6. Staff Position on Stress Improvement of Cracked Weldments
7. Staff Position on Clamping Devices
8. Staff Position on Crack Characterization and Repair Criteria
9. Staff Position on Inspection Methods and Personnel
10. Staff Position on Inspection Schedules
11. Staff Position on Sample Expansion
12. Staff Position on Leak Detection
13. Staff Position on Reporting Requirements

These Staff Positions are fully delineated in Attachment A to this letter.

The staff continues to believe that replacing susceptible piping with IGSCC-resistant materials will provide the greatest degree of assurance against future cracking problems. Licensees may follow Generic Letter 84-07, "Procedural Guidance for Pipe Replacements at BWRs"; the staff encourages programs to replace degraded piping so as to reduce the potential for cracking and to minimize the need for augmented inspections. However, the staff recognizes that, if the staff positions of this Generic Letter are implemented, adequate levels of piping integrity and reliability can be achieved. The staff believes this Generic Letter, together with the revision to NUREG-0313, will be of use to licensees in making sound decisions regarding IGSCC. Each weldment can be evaluated considering its material, heat treatment history, stress level, chemical environment and surveillance program. This will provide a basis for a reasonable judgment regarding the long-term acceptability of that weldment. Considering that each piping system has many weldments and each plant has many piping systems, the entire problem must be evaluated in an integrated way.

The Commission has determined that, unless appropriate remedial actions are taken, BWR plants may not be in conformance with their current design and licensing bases, including 10 CFR 50, Appendix A, General Design Criteria 4, 14, and 31.

Accordingly, pursuant to 10 CFR 50.54(f), you, as a BWR operating reactor licensee or construction permit holder, are requested, to furnish, under oath or affirmation, your current plans relating to piping replacement, inspection, repair, and leakage detection. Your response should indicate whether you intend to follow the staff positions included in this letter, or propose alternative measures. This information is needed for the Commission to determine whether an operating license should be issued, or if you hold an operating license, whether it should be modified or revoked.

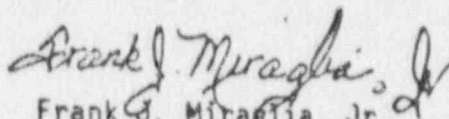
An acceptable response to this letter would include the following specific items:

1. Your current plans regarding pipe replacement and/or other measures taken or to be taken to mitigate IGSCC and provide assurance of continued long-term piping integrity and reliability.
2. An Inservice Inspection (ISI) Program to be implemented at the next refueling outage for austenitic stainless steel piping covered under the scope of this letter that conforms to the staff positions on inspection schedules, methods and personnel, and sample expansion included in this letter.
3. A change to the Technical Specifications to include a statement in the section on ISI that the Inservice Inspection Program for piping covered by the scope of this letter will be in conformance with the staff positions on schedule, methods and personnel, and sample expansion included in this letter (see enclosed model BWR Standard Technical Specification). It is recognized that the Inservice Inspection and Testing sections may be removed from the Technical Specifications in the future in line with the Technical Specifications Improvement programs. In this case, this requirement shall remain with the ISI section when it is included in an alternative document.
4. Confirmation of your plans to ensure that the Technical Specification related to leakage detection will be in conformance with the staff position on leak detection included in this letter.
5. In accordance with 10CFR50.55a(e), your plans to notify the NRC of any flaws identified that do not meet LBW-3500 criteria of Section XI of the Code for continued operation without evaluation, or a change found in the condition of the welds previously known to be cracked, and your evaluation of the flaws for continued operation and/or your repair plans.

Licensees and construction permit holders for BWR plants are requested to respond to this generic letter within 180 days of receipt of this letter. NRC review of your submittal of information in response to this letter is not subject to fees under the provisions of 10 CFR 170. However, should you, as part of your response or in a subsequent submittal, include an application for license amendment or other action requiring NRC approval, it is subject to the fee requirements of 10 CFR 170 with remittance of an application fee of \$150 per application (Sections 170.12(c) and 170.21) and subsequent semi-annual payments until the review is completed or the ceiling in Section 170.21 is reached.

This request for information was approved by the Office of Management and Budget under clearance number 3150-0011 which expires December 31, 1989. Comments on burden and duplication may be directed to the Office of Management and Budget, Reports Management Room 3208, New Executive Office Building, Washington, D.C. 20503.

Sincerely,



Frank G. Miraglia, Jr.
Associate Director for Projects
Office of Nuclear Reactor Regulation

Enclosures:

1. Staff Positions on IGSCC
In BWR Austenitic Stainless
Steel Piping
2. Model BWR Standard Technical
Specification for Item 3 of
this Generic Letter
3. NUREG-0313, Revision 2

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*For previous concurrences
see attached ORC

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*See attached background document for concurrence by DEST and ADT

(ATTACHMENT A)

STAFF POSITIONS ON IGSCC IN BWR AUSTENITIC STAINLESS STEEL PIPING

Scope

These Staff Positions apply to all BWR piping made of austenitic stainless steel that is four inches or larger in nominal diameter and contains reactor coolant at a temperature above 200°F during power operation regardless of Code classification. It also applies to reactor vessel attachments and appurtenances such as jet pump instrumentation penetration assemblies and head spray and vent components.

This Generic Letter does not apply to piping made of carbon steel classified as P-1 by the ASME Boiler and Pressure Vessel Code.

Staff Position on Materials

Materials considered to be resistant to sensitization and IGSCC in BWR piping systems are:

- (1) Low carbon wrought austenitic stainless steel, which includes types 304L, 304NG, 316NG and similar low carbon grades with a maximum carbon content of 0.035%. Type 347, as modified for nuclear use, will be resistant with somewhat higher carbon content, the usual maximum of 0.04% is adequate. These materials must be tested for resistance to sensitization in accordance with ASTM A262-A or -EI or equivalent standard.
- (2) Low carbon weld metal, including types 308L, 316L, 309L and similar grades, with a maximum carbon content of 0.035% and a minimum of 7.5% ferrite (or 7.5 FN) as deposited. Low carbon weld metal especially developed for joining modified type 347 is also resistant as deposited.

Welds joining resistant material that meet the ASME Boiler and Pressure Vessel Code requirement of 5% ferrite (or 5 FN) but are below 7.5% ferrite (or 7.5 FN) may be sufficiently resistant, depending on carbon content and other factors. These will be evaluated on an individual case basis.

- (3) Piping weldments are considered resistant to IGSCC if the weld heat affected zone on the inside of the pipe is protected by a cladding of resistant weld metal. This is often referred to as corrosion resistant cladding (CRC).
- (4) Cast austenitic stainless steel with a maximum of 0.035% carbon and a minimum of 7.5% ferrite (or 7.5 FN). Weld joints between resistant piping and cast valve or pump bodies that do not meet these requirements are considered to be special cases, and are covered in the Staff Position on Inspection Schedules below.
- (5) Austenitic stainless steel piping that does not meet the requirements of (1) above is considered to be resistant if it is given a solution heat treatment after welding.

- (6) Other austenitic materials, including nickel base alloys such as Inconel 600, will be evaluated on an individual case basis. Inconel 82 is the only commonly used nickel base weld metal considered to be resistant.

It is the staff position that no austenitic material is resistant to cracking in the presence of a crevice, such as formed by a partial penetration weld, where the crevice is exposed to reactor coolant.

Staff Position on Processes

The processes considered to provide resistance to IGSCC in BWR piping welds are:

- (1) Solution Heat Treatment (SHT)
- (2) Heat Sink Welding (HSW)

Either of these two processes will upgrade non-resistant material to IGSCC Category A (see Table 1)

- (3) Stress Improvement (SI)

Either of the following processes will upgrade non-resistant material to IGSCC Category B or C (See Table 1)

- a. Induction Heating Stress Improvement (IHSI)
- b. Mechanical Stress Improvement Process (MSIP)

Last pass heat sink welding (LFHSW) is not considered to be fully effective.

Staff Position on Water Chemistry

The use of hydrogen water chemistry, together with stringent controls on conductivity, will inhibit the initiation and growth of IGSCC. However, the responses of BWRs to hydrogen injection differs from plant to plant, and the development and verification of a generic HWC specification is not yet complete. For these reasons, reductions in piping inspection frequency based on the use of HWC will be considered on an individual case bases at the present time. Staff criteria for evaluating the effectiveness of water chemistry improvements are under development, and will be available prior to general use of the HWC option. If fully effective HWC is maintained, a factor of two in reduction of inspection frequency may be justified for IGSCC Categories B, C, D, and E weldments. (See Table 1)

Staff Position on Weld Overlay Reinforcement

Cracked weldments that are reinforced with weld overlay are acceptable for short-term operation, and may be considered for longer term operation provided:

- (1) The overlaid weldments are in conformance with the criteria of IWB 3600 of Section XI of the 1986 Edition of the ASME Boiler and Pressure Vessel Code, and

- (2) they are inspected in conformance with the Staff Position on Inspection Methods and Personnel, by UT examiners and procedures qualified to inspect overlaid welds.

Staff Position on Partial Replacement

If portions of cracked piping are replaced in the course of repair, the replaced portions will be subjected to inservice inspection requirements that will depend on the materials and processes used. All relevant staff positions of this Generic Letter will apply.

Staff Position on Stress Improvement SI of Cracked Weldments

Stress Improvement is also considered to be an effective mitigation process when applied to weldments with short or shallow cracks. Specifically, welds with cracks that are no longer than 10% of the circumference, and are no deeper than 30% of the wall thickness will be considered to be mitigated by SI.

SI is only considered to be effective if it is followed by a qualified UT examination, and if cracks are found, they must be sized both in depth and length, by procedures and personnel qualified to perform sizing evaluations:

Staff Position on Clamping Devices

Clamping devices may be used for temporary reinforcement of cracked weldments. Each case must be reviewed and approved on an individual basis.

Staff Position on Crack Evaluation and Repair Criteria

Methods and criteria for crack evaluation and repair should be in conformance with IWB-3600 of Section XI of the 1986 Edition of ASME Boiler and Pressure Vessel Code.

Evaluation of cracks for continued operation without repair requires that crack growth calculation be performed. As some details are not yet provided in the Code, the following will be acceptable to the staff.

The crack growth rate (da/dt) selected for use by the staff is expressed as:

$$da/dt = 3.590 \times 10^{-8} \times K_I^{2.161} \text{ inches per hour}$$

where

K_I is the applied stress intensity factor (Ksi $\cdot\sqrt{\text{in}}$).

Linear elastic solutions for K_I are required for crack growth calculations.

Any standard method is acceptable, for example, those described in the ASME Boiler and Pressure Vessel Code, Section XI, Appendix A. The axial residual stress distribution considered acceptable by the staff for large diameter pipes (12 inches and larger) is described by the following nondimensional expression.

$$\sigma/\sigma_1 = \sum_{j=0}^4 \sigma_j \xi^j$$

where

$$\begin{aligned} \sigma_0 &= 1.0 \\ \sigma_1 &= -6.910 \\ \sigma_2 &= -8.687 \\ \sigma_3 &= -0.480 \\ \sigma_4 &= -2.027 \\ \xi &= x/t \\ \sigma_1 &= \text{stress magnitude at } \xi = 0 \text{ (inner surface)} \end{aligned}$$

The above formula permits calculation of the residual stress value at any point (x) through the vessel wall thickness (t) as a function of the peak residual stress value at the inside diameter (ID), σ_1 .

Technical basis and additional discussion related to evaluation and repair are given in NUREG 0313 Revision 2.

Staff Position on Inspection Methods and Personnel

Examinations performed under the Scope of this letter should comply with the applicable Edition and Addenda of the ASME Code, Section XI, as specified in paragraph (g), "Inservice Inspection Requirements" of 10CFR50.55a, Codes and Standards, or as otherwise approved by the NRC.

In addition, the detailed procedure, equipment and examination personnel shall be qualified by a formal program approved by the NRC such as that being conducted in accordance with the NDE Coordination Plan agreed upon by NRC, EPRI, and the Boiling Water Reactor Owners Group for IGSCC Research, being implemented at the EPRI NDE Center in Charlotte, North Carolina.

Staff Position on Inspection Schedules

A summary of the Staff Position on Inspection Schedules is given in Table 1. Additional details and definitions are provided below. NUREG-0313, Rev. 2, Section 5 provides background information and technical bases.

- (1) Welds of resistant material, IGSCC Category A, shall as a minimum be examined according to an extent and frequency comparable to that specified in applicable provisions of Section XI of the ASME Boiler and Pressure Vessel Code, as reflected in Table 1, attached. The selection of specific welds to be included in this sample is the responsibility of the Licensee, and should include considerations of stress levels, piping configurations, weld details, etc, and should represent his best judgement regarding selection of a representative and meaningful sample.

The provisions of 10CFR50.55a, (b),(2),(ii) may be invoked if it is determined necessary to use the 1974 edition of the Code to permit a meaningful sample selection.

- (2) Although castings with higher carbon content than 0.035% are not considered to be resistant to sensitization, welds joining such castings (in the form of pump and valve bodies) to piping have been relatively free of IGSCC. This may be attributed to a favorable residual stress distribution, as calculations have indicated. For this reason, welds joining resistant material to pumps and valves will be considered to be resistant welds, and included in IGSCC Category A. If extensive weld repairs were performed the residual stress may be unfavorable, in which case such welds should be included in Category D.
- (3) Welds that have been treated by SI or reinforced by weld overlay that are classified as IGSCC Category F because they do not meet the applicable staff positions may be upgraded to Category E if no adverse change in crack condition is found after 4 successive examinations.

Staff Position on Sample Expansion

If one or more cracked welds in IGSCC Categories A, B, or C, are found by a sample inspection during the 10 year interval, an additional sample of the welds in that category shall be inspected, approximately equal in number to the original sample. This additional sample should be similar in distribution (according to pipe size, system, and location) to the original sample, unless it is determined that there is a technical reason to select a different distribution. If any cracked welds are found in this sample, all of the welds in that IGSCC Category should be inspected.

If significant crack growth or additional cracks are found during the inspection of an IGSCC Category E weld, all other Category E welds should be examined.

- a) Significant crack growth for overlaid welds is defined as crack extension to deeper than 75% of the original wall thickness, or for cracks originally deeper than 75% of the pipe wall, evidence of crack growth into the effective weld overlay.
- b) Significant crack growth for SI mitigated Category E welds is defined as growth to a length or depth exceeding the criteria for SI mitigation (either 10% of circumference in length or 30% of the wall in depth).

Staff Position on Leak Detection

Leakage detection systems should be in conformance with Position C of Regulatory Guide 1.45 "Reactor Coolant Pressure Boundary Leakage Detection Systems," or as otherwise previously approved by the NRC.

1. Plant shutdown should be initiated for inspection and corrective action when, within any period of 24 hours or less, any leakage detection system indicates an increase in rate of unidentified leakage in excess of 2 gpm or its equivalent, or when the total unidentified leakage attains a rate of 5 gpm or equivalent, whichever occurs first. For sump level monitoring systems with fixed-measurement-interval methods, the level should be monitored at approximately 4-hour intervals or less.

- ii. Unidentified leakage should include all leakage other than:
- (a) leakage into closed systems, such as pump seal or valve packing leaks that are captured, flow metered, and conducted to a sump or collection tank, or
 - (b) leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operations of unidentified leakage monitoring systems or not to be from a throughwall crack in the piping within the reactor coolant pressure boundary.
3. For plants operating with any IGSCC Category D, E, F, or G welds, at least one of the leakage measurement instruments associated with each sump shall be operable, and the outage time for inoperable instruments shall be limited to 24 hours, or immediately initiate an orderly shutdown.

Staff Position on Reporting Requirements

If any cracks are identified that do not meet the criteria for continued operation without evaluation given in Section XI of the Code, NRC approval of flaw evaluations and/or repairs in accordance with IWB 3640 and IWA 4130 is required before resumption of operation.

TABLE 1

SUMMARY OF INSPECTION SCHEDULES FOR BWR PIPING WELDMENTS

DESCRIPTION OF WELDMENTS	NOTES	IGSCC CATEGORY	INSPECTION EXTENT & SCHEDULE
Resistant Materials		A	25% every 10 years (at least 12% in 6 years)
Non-resistant Matls SI within 2 yrs of operation (1)	(1)	B	50% every 10 years (at least 25% in 6 years)
Non-resistant Matls SI after 2 yrs of operation	(1)	C	All within the next 2 refueling cycles, then all every 10 years (at least 50% in 6 years)
Non-resistant Matls No SI	(1)	D	All every 2 refueling cycles
Cracked Reinforced by weld overlay or mitigated by SI	(1)(2)	E	50% next refueling outage, then all every 2 refueling cycles
Cracked Inadequate or no repair	(2)	F	All every refueling outage
Non-Resistant Not Inspected	(3)	G	All next refueling outage

Notes:

- (1) All welds in non-resistant material should be inspected after a stress improvement process as part of the process. Schedules shown should be followed after this initial inspection.
- (2) See recommendations for acceptable weld overlay reinforcements and stress improvement mitigation.
- (3) Welds that are not UT inspectable should be replaced, "sleeved", or local leak detection applied. RT examination or visual inspection for leakage may also be considered.

APPLICABILITY

SURVEILLANCE REQUIREMENTS

4.0.1 Surveillance Requirements shall be met during the OPERATIONAL CONDITIONS or other conditions specified for individual Limiting Conditions for Operation unless otherwise stated in an individual Surveillance Requirement.

4.0.2 Each Surveillance Requirement shall be performed within the specified time interval with:

- a. A maximum allowable extension not to exceed 25% of the surveillance interval, but
- b. The combined time interval for any 3 consecutive surveillance intervals shall not exceed 3.25 times the specified surveillance interval.

4.0.3 Failure to perform a Surveillance Requirement within the specified time interval shall constitute a failure to meet the OPERABILITY requirements for a Limiting Condition for Operation. Exceptions to these requirements are stated in the individual Specifications. Surveillance requirements do not have to be performed on inoperable equipment.

4.0.4 Entry into an OPERATIONAL CONDITION or other specified applicable condition shall not be made unless the Surveillance Requirement(s) associated with the Limiting Condition for Operation have been performed within the applicable surveillance interval or as otherwise specified.

4.0.5 Surveillance Requirements for inservice inspection and testing of ASME Code Class 1, 2, & 3 components shall be applicable as follows:

- a. Inservice inspection of ASME Code Class 1, 2, and 3 components and inservice testing of ASME Code Class 1, 2, and 3 pumps and valves shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50, Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50, Section 50.55a(g) (6) (i).
- b. Surveillance intervals specified in Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda for the inservice inspection and testing activities required by the ASME Boiler and Pressure Vessel Code and applicable Addenda shall be applicable as follows in these Technical Specifications:

<u>ASME Boiler and Pressure Vessel Code and applicable Addenda terminology for inservice inspection and testing activities</u>	<u>Required frequencies for performing inservice inspection and testing activities</u>
Weekly	At least once per 7 days
Monthly	At least once per 31 days
Quarterly or every 3 months	At least once per 92 days
Semiannually or every 6 months	At least once per 184 days
Every 9 months	At least once per 276 days
Yearly or annually	At least once per 366 days

APPLICABILITY

SURVEILLANCE REQUIREMENTS (Continued)

- c. The provisions of Specification 4.0.2 are applicable to the above required frequencies for performing inservice inspection and testing activities.
- d. Performance of the above inservice inspection and testing activities shall be in addition to other specified Surveillance Requirements.
- e. Nothing in the ASME Boiler and Pressure Vessel Code shall be construed to supersede the requirements of any Technical Specification.
- f. The Inservice Inspection Program for piping identified in NRC Generic Letter 88-01 shall be performed in accordance with the staff positions on schedule, methods, and personnel and sample expansion included in this generic letter.

LIST OF RECENTLY ISSUED GENERIC LETTERS

Generic Letter No.	Subject	Date of Issuance	Issued To
GL 88-01	"NRC POSITION ON IGSCC IN BWR AUSTENITIC STAINLESS STEEL PIPING"	/ /	ALL LICENSEES OF OPERATING BOILING WATER REACTORS AND HOLDERS OF CONSTRUCTION PERMITS FOR BWRs
GL 87-16	NUREG-1262, "ANSWERS TO QUESTIONS AT PUBLIC MEETINGS RE IMPLEMENTATION OF 10 CFR 55 ON OPERATORS LICENSES"	11/12/87	ALL POWER AND NONPOWER REACTOR LICENSEES AND APPLICANTS FOR LICENSES
GL 87-15	POLICY STATEMENT ON DEFERRED PLANTS	11/04/87	ALL HOLDERS OF CONSTRUCTION PERMITS FOR A NUCLEAR POWER PLANT
GL 87-14	REQUEST FOR OPERATOR LICENSE SCHEDULES	08/04/87	ALL POWER REACTOR LICENSEES
GL 87-13	INTEGRITY OF REQUALIFICATION EXAMINATIONS AT NON-POWER REACTORS	07/10/87	ALL NON-POWER REACTOR LICENSEES
GL 87-12	50.54(f) LETTER RE. LOSS OF RESIDUAL HEAT REMOVAL (RHR) DURING MID-LOOP OPERATION	07/09/87	ALL LICENSEES OF OPERATING PWRs AND HOLDERS OF CONSTRUCTION PERMITS FOR PWRs
GL 87-11	RELAXATION IN ARBITRARY INTERMEDIATE PIPE RUPTURE REQUIREMENTS	06/23/87	ALL OPERATING LICENSEES, CONSTRUCTION PERMIT HOLDERS, AND APPLICANTS FOR CONSTRUCTION PERMITS
GL 87-10	IMPLEMENTATION OF 10 CFR 73.57, REQUIREMENTS FOR FBI CRIMINAL HISTORY CHECKS	06/12/87	ALL POWER REACTOR LICENSEES
GL 87-09	SECTIONS 3.0 AND 4.0 OF THE STANDARD TECHNICAL SPECIFICATIONS ON THE APPLICABILITY OF LCD AND SURVEILLANCE REQUIREMENTS	06/04/87	ALL LIGHT WATER REACTOR LICENSEES AND APPLICANTS

NUCLEAR SAFETY PREPAREDNESS ACT

AN ACT in relation to nuclear safety preparedness, amending certain Acts in connection therewith. P.A. 81-577, approved and effective Sept. 14, 1979.

Section 4301. Short title

§ 1. This Act shall be known and may be cited as the "Illinois Nuclear Safety Preparedness Act".

Section 4302. Legislative declaration and findings

§ 2. It is declared to be the policy of the General Assembly to protect the people of the State of Illinois against adverse health effects resulting from radiological accidents by establishing a mechanism for emergency preparedness to mitigate the effects of such accidents. The General Assembly finds that it is appropriate that the nuclear industry in Illinois bear costs associated with preparing and implementing plans to deal with the effects of nuclear accidents. The fees assessed by this Act are intended to cover the costs of the Nuclear Safety Preparedness Program authorized by this Act.

Section 4303. Definitions

§ 3. Unless the context otherwise clearly requires, as used in this Act:

(1) "Department" means the Department of Nuclear Safety of the State of Illinois.

(2) "Director" means the Director of the Department of Nuclear Safety.

(3) "Person" means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, political subdivision of this State, any other state or political subdivision or agency thereof, and any legal successor, representative, agent, or agency of the foregoing.

(4) "NRC" means the United States Nuclear Regulatory Commission or any agency which succeeds to its functions in the licensing of nuclear power reactors or facilities for storing spent nuclear fuel.

(5) "High-level radioactive waste" means (1) the highly radioactive material resulting from the reprocessing of spent nuclear fuel including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (2) the highly radioactive material that the NRC has determined to be high-level radioactive waste requiring permanent isolation.

(6) "Nuclear facilities" means nuclear power plants, facilities housing nuclear test and research reactors, facilities for the chemical conversion of uranium, and facilities for the storage of spent nuclear fuel or high-level radioactive waste.

(7) "Spent nuclear fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

Section 4304. Plans and programs--Fees--Reimbursement of expenses

§ 4. Persons engaged within this State in the production of electricity utilizing nuclear energy, the operation of nuclear test and research reactors, the chemical conversion of uranium, or the transportation, storage or possession of spent nuclear fuel or high-level radioactive waste shall pay fees to cover the cost of establishing plans and programs to deal with the possibility of nuclear accidents. Except as provided below, the fees shall be used exclusively to fund those Departmental and local government activities defined as necessary by the Director to implement and maintain the plans and programs authorized by this Act. Local governments incurring expenses attributable to implementation and maintenance of the plans and programs authorized by this Act may apply to the Department for compensation for those expenses, and upon approval by the Director of claims submitted by local governments, the Department shall compensate local governments from fees collected pursuant to this Section, except that such compensation, in the aggregate, shall not exceed \$250,000 in any year. The Department shall, by rule, determine the method for compensating local governments under this Section. In addition, a portion of the fees collected may be appropriated to the Illinois Emergency Services and Disaster Agency for activities associated with preparing and implementing plans to deal with the effects of nuclear accidents. Such appropriation shall not exceed \$500,000 in any year. Such fees shall consist of the following:

(1) A one-time charge of \$590,000 per nuclear power station in this State to be paid by the owners of such stations.

(2) An additional charge of \$240,000 per nuclear power station for which a fee under subparagraph (1) was paid before June 30, 1982.

(3) Through June 30, 1982, an annual fee of \$75,000 per year for each nuclear power reactor for which an operating license has been issued by the NRC, and after June 30, 1982, and through June 30, 1984 an annual fee of \$180,000 per year for each nuclear power reactor for which an operating license has been issued by the NRC, and after June 30, 1984, an annual fee of \$400,000 for each nuclear power reactor for which an operating license has been issued by the NRC, to be paid by the owners of nuclear power reactors operating in this State.

(4) A capital expenditure surcharge of \$1,400,000 per nuclear power station in this State, whether operating or under construction, shall be paid by the owners of such station.

(5) An annual fee of \$25,000 per year for each site for which a valid operating license has been issued by NRC for the operation of an away-from-reactor spent nuclear fuel or high-level radioactive waste storage facility, to be paid by the owners of facilities for the storage of spent nuclear fuel or high-level radioactive waste for others in this State.

(6) A one-time charge of \$280,000 for each facility in this State housing a nuclear test and research reactor, to be paid by the operator of the facility. However, such charge shall not be required to be paid by any tax-supported institution.

(7) A one-time charge of \$50,000 for each facility in this State for the chemical conversion of uranium, to be paid by the owner of the facility.

(8) An annual fee of \$150,000 per year for each facility in this State housing a nuclear test and research reactor, to be paid by the operator of the facility. However, such annual fee shall not be required to be paid by any tax-supported institution.

(9) An annual fee of \$15,000 per year for each facility in this State for the chemical conversion of uranium, to be paid by the owner of the facility.

(10) A fee assessed at the rate of \$1,000 per cask for truck shipments and \$2,000 per cask for rail shipments of spent nuclear fuel or high-level radioactive waste received at or departing from any nuclear power station or away-from-reactor spent nuclear fuel or high-level radioactive waste storage facility in this State to be paid by the owners of such facilities.

(11) A fee assessed at the rate of \$1,000 per cask for truck shipments and \$2,000 per cask for rail shipments of spent nuclear fuel or high-level radioactive waste traversing the State to be paid by the owner of such shipments.

(12) In each of the State fiscal years 1988 through 1992, in addition to the annual fee provided for in subparagraph (3), a fee of \$400,000 for each nuclear power reactor for which an operating license has been issued by the NRC, to be paid by the owners of nuclear power reactors operating in this State. Within 120 days after the end of the State fiscal years ending June 30, 1988, June 30, 1989, June 30, 1990, June 30, 1991 and June 30, 1992, the Department shall determine the expenses of the Illinois Nuclear Safety Preparedness Program paid from funds appropriated for those fiscal years. When the aggregate of all fees, charges and surcharges collected under this Section during any fiscal year exceeds the total expenditures under this Act from appropriations for that fiscal year, such excess shall be credited to the owners of nuclear power reactors who are assessed fees under this subparagraph, and such credits shall be applied against the fees to be collected under this subparagraph for the subsequent fiscal year. Any such excess produced in fiscal year 1992 shall be applied against the fees next due under subparagraph (3). Each owner shall receive as a credit that amount of the excess which corresponds proportionately to the amount the owner contributed to all fees collected under this subparagraph in the fiscal year that produced the excess.

Section 4305. Time--Payment of fees

§ 5. Except as otherwise provided in this Section, within 30 days after the beginning of each State fiscal year, each person who possessed a valid operating license issued by the NRC for a nuclear power reactor or a spent fuel storage facility during any portion of the previous fiscal year shall pay to the Department the fees imposed by Section 4 of this Act. The one-time facility charge assessed pursuant to subparagraph (1) of Section 4 shall be

paid to the Department not less than 2 years prior to scheduled commencement of commercial operation. The additional facility charge assessed pursuant to subparagraph (2) of Section 4 shall be paid to the Department within 90 days of June 30, 1982. Fees assessed pursuant to subparagraph (4) of Section 4 shall be paid in six payments, the first, in the amount of \$400,000, shall be due and payable 30 days after the effective date of this Amendatory Act of 1984. Subsequent payments shall be in the amount of \$200,000 each, and shall be due and payable annually on August 1, 1985 through August 1, 1989, inclusive. Fees assessed under the provisions of subparagraphs (6) and (7) of Section 4 of this Act shall be paid on or before January 1, 1990. Fees assessed under the provisions of subparagraphs (8) and (9) of Section 4 of this Act shall be paid on or before January 1st of each year, beginning January 1, 1990. Fees assessed under the provisions of subparagraphs (10) and (11) of Section 4 of this Act shall be paid to the Department prior to the movement of such shipments within this State. Fees assessed pursuant to subparagraph (12) of Section 4 shall be paid to the Department by each person who possessed a valid operating license issued by the NRC for a nuclear power reactor during any portion of the previous State fiscal year as follows: the fee due in fiscal year 1988 shall be paid on January 15, 1988, the fee due in fiscal year 1989 shall be paid on December 1, 1988, and subsequent fees shall be paid annually on December 1, 1989 through December 1, 1991.

Section 4306. Budget

§ 6. The Department shall prepare a budget showing the cost (including capital expenditures) to be incurred in administering this Act during the fiscal year in question. Such budget shall be prepared only after consultation with those liable for the fees imposed by this Act as to the costs necessary to enable the Department to perform its responsibilities under this Act.

Section 4307. Nuclear Safety Emergency Preparedness Fund--Deposits

§ 7. All monies received by the Department under this Act shall be deposited in the State Treasury and shall be set apart in a special fund to be known as the "Nuclear Safety Emergency Preparedness Fund". All monies within the Nuclear Safety Emergency Preparedness Fund shall be invested by the State Treasurer in accordance with established investment practices. Interest earned by such investment shall be returned to the Nuclear Safety Emergency Preparedness Fund. Monies deposited in this fund shall be expended by the Director only to support the activities of the Illinois Nuclear Safety Preparedness Program, including grants and scholarships under the Nuclear Safety Education Assistance Act.

Section 4308. Program--Nuclear power reactors--System status signals

§ 8. (a) The Illinois Nuclear Safety Preparedness Program shall consist of an assessment of the potential nuclear accidents, their radiological consequences, and the necessary protective actions required to mitigate the effects of such accidents. It shall include, but not necessarily be limited to:

(1) Development of a remote effluent monitoring system capable of reliably detecting and quantifying accidental radioactive releases from nuclear power plants to the environment;

(2) Development of an environmental monitoring program for nuclear facilities other than nuclear power plants;

(3) Development of procedures for radiological assessment and radiation exposure control for areas surrounding each nuclear facility in Illinois;

(4) Radiological training of state and local emergency response personnel in accordance with the Department's responsibilities under the program;

(5) Participation in the development of accident scenarios and in the exercising of fixed facility nuclear emergency response plans;

(6) Development of mitigative emergency planning standards including, but not limited to, standards pertaining to evacuations, re-entry into evacuated areas, contaminated foodstuffs and contaminated water supplies;

(7) Provision of specialized response equipment necessary to accomplish this task;

~~(8) Implementation of the Boilers and Pressure Vessel Safety program at nuclear steam-generating facilities as mandated by subsection C of Section 71 of The Civil Administrative Code of Illinois;~~

(9) Development and implementation of a plan for inspecting and escorting all shipments of spent nuclear fuel and high-level radioactive waste in Illinois; and

(10) Implementation of the program under the Illinois Nuclear Facility Safety Act.

(b) The Department may incorporate data collected by the operator of a nuclear facility into the Department's remote monitoring system.

(c) The owners of each nuclear power reactor in Illinois shall provide the Department all system status signals which initiate Emergency Action Level Declarations, actuate accident mitigation and provide mitigation verification as directed by the Department. The Department shall designate by rule those system status signals that must be provided. Signals providing indication of operating power level shall also be provided. The owners of the nuclear power reactors shall, at their expense, ensure that valid signals will be provided continuously, 24 hours a day.

All such signals shall be provided in a manner and at a frequency specified by the Department for incorporation into and augmentation of the remote effluent monitoring system specified in subsection (a)(1) of this Section. Provision shall be made for assuring that such system status and power level signals shall be available to the Department during reactor operation as well as throughout accidents and subsequent recovery operations.

For nuclear reactors with operating licenses issued by the Nuclear Regulatory Commission prior to the effective date of this amendatory Act, such system status and power level signals shall be provided to the Department by March 1, 1985. For reactors without such a license on the effective date of this amendatory Act, such signals shall be provided to the Department prior to commencing initial fuel load for such reactor. Nuclear reactors receiving their operating license after the effective date of this amendatory Act, but before July 1, 1985, shall provide such system status and power level signals to the Department by September 1, 1985.

Section 4309. Equipment--Installation

§ 9. Any equipment purchased by the Department to be installed on the premises of a nuclear facility pursuant to the provisions of subsections (1), (2) and (7) of Section 8 of this Act shall be installed by the owner of such nuclear facility in accordance with criteria and standards established by the Director of the Department, including criteria for location, supporting utilities, and methods of installation. Such installation shall be at no cost to the Department. The owner of the nuclear facility shall also, at its expense, pay for modifications of its facility as requested by the Department to accommodate the Department's equipment including updated equipment, and to accommodate changes in the Department's criteria and standards.

Section 4310. Loans, grants or other funds or gifts

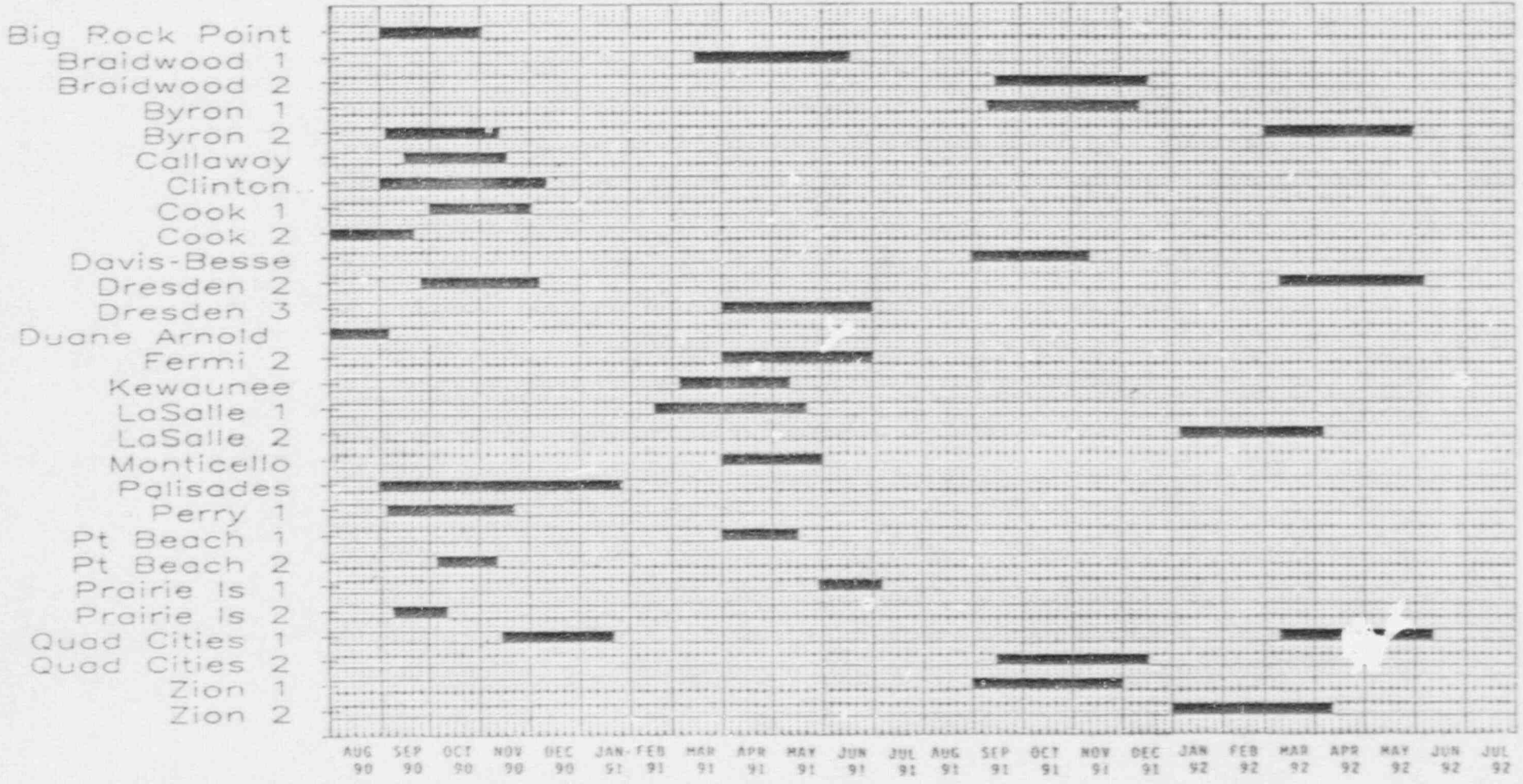
§ 10. The Department may accept and administer according to law, loans, grants, or other funds or gifts from the Federal Government and from other sources, public and private, for carrying out its functions under this Act.

Section 4311. Fees and Expenses - Federal Activities

§ 11. Fees and expenses related to federal activities and facilities. If any activity or facility for which a fee is imposed or an expense is incurred under this Act is an activity or facility of the federal government, the fee shall be paid or the expense shall be borne by the prime contractor under contract with the federal government to perform the activity or operate the facility. If the federal government performs the activity or operates the facility directly, the fee shall be paid or the expense incurred only as provided by federal law.

43

REGION III
 REACTOR OUTAGE SCHEDULE
 AUGUST 10, 1990
 (Dates Subject to Change)



Vertical Grid Lines - 5 days

ASME

AGENDA

NRC Region III ASME Inspector Visit

- 151

- Other

- Hub Miller
- Duane Danielson
- Mark Ring
- John Jacobson
- Kavin Ward

September 7, 1990

- 10:00 a.m. - Overview of Office of Nuclear Facility Safety (Organization, Mission, Plans, REAC)
- Roy Wight, Manager
- 10:30 a.m. - Role & Responsibilities of Reactor Analyst
- Mike Parker, Chief, Division of Engineering
- 11:00 a.m. - Role & Responsibilities of the Environmental Analyst
- Jim Blackburn, Chief Fiscal Manager
- 11:30 a.m. - Role & Responsibilities of the REAC Commander
- Roy Wight, Manager
- 12:00 p.m. - LUNCH in REAC/NRC Overview of ASME
- 1:00 p.m. - Overview of ASME Code Compliance Program
- Neill Howey, Assistant Office Manager
- Larry Sage, Code Compliance Section Head
- 2:00 p.m. - Open discussion.

REVISION 1

Nuc Fac
Safety
- Wight

Env.
Safety
- LLW

Licensing
- materials
- agreements
- etc.

Prevention Mitigation

A-4

AGENDA

NRC Region III ASME Inspector Visit

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Duane Danielson
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John Jacobson
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REVISION 1

IDNS/NRC @ Springfield

Mission: Same as RTHC - for Illinois (includes GE Morris/Dresden 3
Allied processing plant, etc)

IDNS - Roy Wight - formed in 1980

3 Offices - Rx (Nuclear) Safety

Environmental Safety - includes transport / low level waste sites

Radiation Safety - Agreement state (also mutual licenses)

Event response - Command trailer + fixed facilities

- Gamma det + stack monitor + Gamma det in cooling water disch.

(will have at all plants shortly)

- Rx Data Link - Computer hook ups

Preventive Safety - want to embark on cooperative efforts w/ NRC

Rx Analyst - M. Parker - Remote Monitoring

Working on portable gamma det / radio link up to truck, etc

See agenda

ASME - Neill

Preventive Res. Engr, ASME Compliance, Rx Safety Analysis,
license Amendment Reviews, LERs, Safety Issues (IPE, Cont. Vets.
SIBC, PRA, DeCommission)

Formal dialogue / documentation w/ Commission

Informal / behind scenes w/ licensees (CER, IP)

AS

M. Parker



ASME ~ State Comparison - B31V laws / Sect III & XI

I.

State Fire Marshall - outside Nuclear

IDWS - Nuclear

Constructed, Operated, Maintained - w/ Code

Ageing & Life Extension - make Code Compliance more important



MOU - 6/90

Joint Insp. of NRC, ASME related insp.

Considerable discussion on MOU, Important to Safety, Safety Related
Illinois IDWS authority,

Frank Misidick - Amendment review - Payton/Belnd - venting - ECCS lines
"potential 2 sterammers" RHR

ASME → 2 people - 1 ↓ turned down

- FY 92 + 2 Anticipate 4-5

State Data Bank

→ Sets - Nuclear Side - Boilers & PV + ISI

- Non Sect XI - ANI reports

Fire Marshall - has/is continuing to issue insp. cert. for all
i.e. ^{Miss. Non NRC} ^{alarm} ^{safe}

Oct. Immediate plans for Quad Insp. (who, how many?) (Contacts Belnd in Mar.)

1. Plans for ASME insp. section? - Just 2 people forever? - No - 4 or 5

2. Plans as far as Pumps & Valves, Sect. 8,

3. End goal? (Ideal situation 5-10 yr. from now)

4.

→ To get beyond Boilers & Press. Vess. takes legislative action

"no pipes, no pumps & valves?"

larry Seeger



UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
Washington, D.C. 20555

INSPECTION AND ENFORCEMENT MANUAL

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INSPECTION PROCEDURE 73051

INSERVICE INSPECTION - REVIEW OF PROGRAM

PROGRAM APPLICABILITY: 2512, 2515 (BASIC)

R

73051-01 INSPECTION OBJECTIVE

Ascertain whether the licensee's program pertaining to the Preservice Inspection (PSI) and Inservice Inspection (ISI) is complete and in conformance with regulatory requirements and the licensee's commitments.

73051-02 INSPECTION REQUIREMENTS

02.01 Program Approval. Ascertain that the following requirements are met:

- a. ISI program, including examinations and tests, is in conformance with relevant ASME Code Section XI editions and addenda, and Code cases proposed for use as part of the plan. Verify that any relief from Code requirements has been approved by NRR. R
R
R
R
- b. The services of an Authorized Nuclear Inservice Inspector (ANII) have been procured and the ISI plan has been reviewed by the ANII in accordance with Article IWA-2120 of the ASME Code. R
R
R
R
- c. The ISI plan has been reviewed by the licensee's site nuclear safety review committee, or equivalent licensee review and approval has been documented. R
R
R

02.02 Program Organization. Ascertain whether the following items are included in the ISI program: R
R

- a. Identification of all licensee commitments and regulatory requirements pertinent to ISI testing and monitoring. R
R
- b. Means of preparing plans and schedules and filing them with enforcement and regulatory authorities having jurisdiction at the facility. R
R
R
- c. Sufficient organizational staff, both in number and training, to ensure that acceptable ISI work is performed. R
R

Issue Date:

ALG

- d. Site administrative procedures are in place to define the authority and responsibilities of the persons or organizations involved with the final evaluation and acceptance of ISI results for the licensee. R
R
R
R
- 02.03 Quality Assurance Program. Review the licensee's and ISI contractor's quality assurance programs to verify the following items are included: R
R
R
- a. Procedures for the maintenance of required ISI records. R
- b. QA review includes assurance that plans and procedures have been reviewed by appropriate personnel and meet regulatory requirements.
- c. Procedures are established for the corrective action of conditions adverse to quality as detected during examination, including provisions to preclude repetition of such adverse conditions.
- d. Audits or surveillances of ISI activities are conducted by qualified QA personnel to verify compliance with the ISI program.
- e. Procedures are established to effectively oversee contractor activities concerned with ISI/PSI. R
R
- 02.04 Repair Program. Review the licensee's administrative and maintenance procedures to verify that the requirements of Article IWA-4000 of the ASME Code, and NRC supplementary requirements, are included or referenced. R
R
R
R
- 02.05 Replacement Program. Review the licensee's administrative and maintenance procedures to verify that requirements of Article IWA-7000 of the ASME Code, and NRC supplementary requirements, are included or referenced. R
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- 02.06 Records. Ascertain that provisions for the maintenance and retention of records, including inspection, examination, test reports, repair and replacement, QA, and NDE records have been established in the ISI program.
- 02.07 Qualification of Personnel. Ascertain whether the program specifies personnel qualification requirements consistent with the ASME Code, plant Technical Specifications (TS), and other applicable documents.
- 02.08 Reporting Requirements. Verify that the licensee's program includes the ASME Code and plant TS requirements for submittal of written reports of ISI results, repairs, and replacements. R
R
R
- 02.09 Relief Requests. Verify that the licensee's program contains guidance regarding the identification and processing of requests for relief from ASME Code requirements. Conduct a walkdown R
R
R

inspection or an ISI data review, as appropriate, to verify that the bases for the relief requested are valid and accurate. R
R

73051-03 INSPECTION GUIDANCE

03.01 General Guidance. The review of the licensee's program is to be conducted for the PSI of each unit and for the first ISI of each unit. Subsequent reviews shall be conducted every other outage and should key only on program changes. The inspection frequency should be increased if the licensee receives a Category 3 SALP rating in the "outage" functional area. Additionally, a review of the licensee's program shall be conducted upon submittal of the program document to the NRC at the prescribed 10-year interval. R
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R

This procedure covers ASME Section XI with the exception of those items in the PSI program that are covered in the Preoperational Test Program, Chapter 7000 of the IE Manual. R
R
R

For the purpose of this inspection procedure, the term, "ISI program," includes the ISI plan and the administrative, technical, and quality assurance programs required to implement the plan. R
R
R
R

03.02 Specific Guidance.

a. Inspection-Requirement 02.01. Pursuant to 10 CFR 50.55a (g), the licensee periodically submits an updated ISI program to the NRC for review and approval. Requirements delineated in this program are regulatory requirements as are the TS. In the event of conflict between the TS and 10 CFR 50.55a(g), the regulatory position is that of the more stringent requirement. Exceptions to or deviations from testing requirements shall be consistent with those permitted by the ISI program approved by the NRC. R
R
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R

b. Inspection Requirement 02.02. The PSI/ISI program requirements differ for each facility. Each facility will have submitted an ISI plan to the NRC and often have been granted relief from certain requirements. The inspector should contact the licensing project manager for the site to determine the status of any relief requests for TS changes involving PSI/ISI activities. The inspector should develop a list of requirements and commitments involving ISI and determine if the licensee's program provides a means of tracking requirements and commitments. ANSI N45.2.6, "Qualification of Inspection, Examination, and Testing Personnel" and RG 1.58, "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel" provide guidance to ensure that commitments to qualifications of organizational staff are met. R
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The inspector should also be aware of NRC/industry initiatives in the area of qualification of procedures and personnel for ISI. R
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R

- c. Inspection Requirement 02.03. PSI and ISI activities are subject to QA audit, monitor, surveillance, and QC inspection. The licensee's QA Manual and (if applicable) contractor's QA Manual should cover all PSI and ISI activities.

The QA program must be documented in accordance with 10 CFR 50 or ANSI/ASME NQA-1-1979, "Quality Assurance Program Requirements for Nuclear Facilities, Parts II and III."

- d. Inspection Requirement 02.04. Detailed requirements for repair programs are specified in Article IWA-4000 of the ASME Code. Repairs should be performed in accordance with the licensee's design specifications and the Construction Code of the component or systems to be repaired. Later editions of the Construction Code or Section III may be used. If repair welding cannot be performed in accordance with these requirements, the following may be used: R
R
R
R
R
R
R

- (1) IWB - 4000 for class 1 components R
- (2) IWC - 4000 for class 2 components R
- (3) IWD - 4000 for class 3 components R
- (4) IWE - 4000 for class MC components R

Proper justification is essential for deviations from, or exceptions to, codes and standards.

Individual repair projects differ widely, so the licensee's pre-established program must recognize this. The program should address the various aspects of repair work and require that explicit procedures be developed, reviewed, approved, and implemented to accomplish the specific project.

- e. Inspection Requirement 02.06. As required by Section XI, the licensee prepares records of inservice inspection. The standard FSAR and standard TS specify record retention periods, and ANSI N45.2.9 provides specific guidance on retention periods and design features for a permanent record storage facility. It is not necessary that all PSI and ISI records be stored onsite. Special concern should be given to the acquisition and proper storage of PSI records for the PSI performed by the manufacturer. The licensee's program for the evaluation of indications found during ISI should include the requirement that the inspection results be compared to the last ISI or the PSI results. R
R
R
R

- f. Inspection Requirement 02.09. Requests for relief based on component inaccessibility should be verified by performing a walkdown inspection of the item for which relief was requested. For requests based on other limitations to inspection, a review of existing NDE data should be performed. Also, during PSI program reviews, the inspector should verify that the relief requests do not involve matters that are rejectable under the original system building code (i.e., ASME Code Section III). R
R
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R

73051-04 REFERENCES

ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."

ANSI N45.2.6, "Qualification of Inspection, Examination, and Test Personnel."

Society for Nondestructive Testing, "Recommended Practice No. SNT-TC-1A."

ANSI N45.2.9., "Requirements for Collection, Storage, and Maintenance of QA Records."

Regulatory Guide 1.58, "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel."

ANSI NQA-1-1979, "Quality Assurance Program Requirements for Nuclear Facilities, Parts II and III."

Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability - ASME Section XI Division 1."

END



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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INSPECTION AND ENFORCEMENT MANUAL

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INSPECTION PROCEDURE 73052

INSERVICE INSPECTION - REVIEW OF PROCEDURES

PROGRAM APPLICABILITY: 2512, 2515 (BASIC)

R

73052-01 INSPECTION OBJECTIVE

- ✓ Ascertain whether the licensee's procedures pertaining to the Preservice Inspection (PSI) and/or Inservice Inspection (ISI) adequately cover all required aspects of the approved ISI program.

R
R

73052-02 INSPECTION REQUIREMENTS

02.01 Program Requirements. Review the licensee's commitments in the SAR, Technical Specifications (TS), and approved ISI program. Ascertain that ISI procedures adequately cover all areas specified in the licensee's commitments for ISI and PSI requirements, where applicable.

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R
R
R

02.02 Procedure Approval. Ascertain whether the ISI procedures have been approved by authorized licensee personnel and by the Authorized Nuclear Inservice Inspector (ANII).

R
R

02.03 Non-Destructive Examination (NDE) Procedure Review. The inspector should choose a sampling of procedures from each type of NDE, as appropriate, and review them for the following:

R
R

a. Scope.

1. Requirements are specified and agree with licensee's commitments in 02.01 above, including specified or referenced acceptance levels.
2. Qualifications of NDE personnel are specified and in accordance with the licensee's approved ISI program.
3. Methods of recording, evaluating, and dispositioning findings are established and reporting requirements are in compliance with applicable Code requirements. Records identified for retention should include:

- (a) Examination results and data sheets R
 - (b) Film and tape records, as applicable R
 - (c) Examination equipment data, including records of consumable materials such as penetrant materials, ultrasonic test (UT) couplants, etc. R
 - (d) Calibration data sheets R
 - (e) Calibration blocks, sheets, and tubes R
4. If the licensee is using contractor personnel for all or part of the ISI effort, the procedures delineate the scope of work and division of responsibilities between the licensee and the contractor. R
R
R
R
- b. Technical Content.
- 1. Method of examination, extent, and technique is adequately described and in conformance with the requirements and guidance of ASME Code Section V. R
R
R
 - 2. Procedures include any special requirements imposed by joint NRC or industry initiatives, if applicable. R
R
 - 3. Methods to record and evaluate test results are specified. R
- 02.04 Code Repair or Replacement Procedure Review. The inspector should choose one Code repair and one Code replacement procedure and review them to ensure that the elements of the procedures are consistent with the applicable requirements of the ASME Code and the approved ISI program. R
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R
R
R
- a. Code Repair Procedure. Elements of a complete repair cycle that the licensee's procedure should include are: R
R
- 1. Identification of the NDE method that revealed the flaw and the description of the flaw. R
R
 - 2. Description of the flaw removal method. R
 - 3. Procedure for weld and postweld heat treatment, if applicable, including review of procedures for welding prior to authorization of the repair and review of qualifications of welders performing the repair. R
R
R
R
 - 4. Provisions for using the services of an Authorized Inspection Agency when making a weld repair, as well as for having the ANI review and approve the repair procedure before its performance. R
R
R
 - 5. Description of the NDE program to be used after the repair is completed. R
R
 - 6. Delineation of the scope of work and division of responsibilities between the licensee and contractor, if a contractor is used. R
R
R

- b. Code Replacement Procedure. Elements of a replacement program that the licensee's procedure should include are:
1. Provisions to verify that the replacements met the requirements of the edition of the Construction Code to which the original component/part was constructed, the provisions of later editions of that same Code, or Section III of the ASME Code.
 2. Provisions to ensure that the replacements ordered as spares met the requirements of the appropriate Construction Code used for the part/component it was intended to replace, the provisions of later editions of that Code, or Section III of the ASME Code.
 3. Justification, consistent with NRC guidelines, for not requiring a Code stamp.
 4. Evaluation of the suitability of the replacement prior to authorizing its installation.
 5. Retention of reports and records as required by the Construction Code and ASME Code Section XI.
 6. Performance of a PSI prior to the return to service of the replacement component or part in accordance with the applicable Code.

73052-03 INSPECTION GUIDANCE

03.01 General Guidance. Review of the licensee's procedures is to be conducted for the PSI of each unit and for the first ISI of each unit. Subsequent reviews shall be conducted each outage and should key only on revisions and newly implemented procedures.

This procedure covers ASME Section XI with the exception of those items in the PSI program that are covered in the Preoperational Test Program, Chapter 7000 of the IE Manual.

ASME Section V, "Nondestructive Examination, Subsection A - Nondestructive Methods of Examination," should be used as supplemental guidance during the conduct of this inspection procedure. However, the field of NDE is developing rapidly, causing NRC requirements, tailored to individual plants, to differ significantly from Section V of the ASME Code. In such cases, NRC requirements govern.

03.02 Specific Guidance.

- a. Inspection Requirement 02.01. The ISI program and program requirements differ for each facility. Each facility will have submitted an ISI plan to the NRC for review against the requirements of 10 CFR 50.55a(g). Often, relief will have been granted from certain requirements. Therefore, the ISI program requirements must be inspected against the TS and commitments made by the specific facility in its NRC-reviewed ISI program.

- b. Inspection Requirement 02.02. According to ASME Code Section XI, it is the duty of the ANII to verify that the NDE are performed in accordance with written approved procedures by qualified personnel. This includes verifying the technical content and requirements of examination procedures and the procedures used to qualify NDE personnel. R
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- c. Inspection Requirement 02.03. At least one procedure from each type of NDE should be examined for technical adequacy. The inspector should be aware of NRC initiatives in the areas of procedure and personnel certification such as the NRC/EPRI/BWK Owners Group qualification requirements for intergranular stress corrosion cracking UT inspections. The following should be used for the review of each NDE procedure selected: R
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1. Visual Examination. Use procedure review requirements from inspection procedure (IP) 57050 as a checklist for this review. R
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 2. Liquid Penetrant Examination. Use procedure review requirements from IP 57060 as a checklist for this review. R
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 3. Magnetic Particle Examination. Use procedure review requirements from IP 57070 as a checklist for this review. R
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 4. Ultrasonic Examination. Use procedure review requirements from IP 57080 as a checklist for this review, supplemented by any special requirements imposed by NRC/industry initiatives (i.e., Regulatory Guide (RG) 1.150). R
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 5. Radiographic Examination. Use procedure review requirements from IP 57090 as a checklist for this review. R
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 6. Eddy Current Examination. Review the licensee's procedure to ensure that the: R
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 - (a) Multi-channel examination unit is specified. R
 - (b) Method of examination is described. R
 - (c) Method of calibration and sequence of calibration is described. R
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 - (d) Requirements of TS or ASME Code Section XI (whichever is applicable) have been addressed. R
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 - (e) Procedures meet the requirements and intent of RG 1.83. R
 - (f) Licensee has written approval for use of Code cases such as "N-401". R
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Because the specific NDE technical requirements vary among Code editions and addenda, the inspector should ensure, when using the 57050 series IPs as technical requirements checklists, that the requirements reflect those specified in the Code of record committed to by the licensee being inspected. R
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- d. Inspection Requirement 02.04. If the inspector finds it necessary to conduct a more detailed inspection of the technical aspects of the process procedures used in the repair activity (i.e., welding, NDE), the 55050 and 57050 series IPs should be used. The inspector, however, should ensure that only the welding and NDE requirements of the Code section used in the repair (normally Section XI with referenced portions of Section III) are applied to the inspection of the process procedures. Additionally, the inspector should ensure that the licensee has evaluated all repair and replacement actions in accordance with 10 CFR 50.59 to ensure that there are no unresolved safety questions. R
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73052-04 REFERENCES

ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."

ASME Code Section V, "Nondestructive Examination."

ANSI N45.2.6, "Qualification of Inspection, Examination, and Testing Personnel."

Society for Nondestructive Testing, "Recommended Practice No. SNT-TC-1A."

Regulatory Guide 1.58, "Qualifications of Nuclear Power Plant Inspection, Examination, and Testing Personnel."

Regulatory Guide 1.150, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations."

Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes."

Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability - ASME Section XI Division 1."

END



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NRC INSPECTION MANUAL

EMCB

INSPECTION PROCEDURE 73753

INSERVICE INSPECTION - OBSERVATION OF WORK AND WORK ACTIVITIES

PROGRAM APPLICABILITY: 2515

73753-01 INSPECTION OBJECTIVE

Ascertain whether the inservice inspection (ISI), repair, and replacement of Class 1, 2, and 3 pressure retaining components are performed in accordance with Technical Specifications (TS), the applicable ASME Code, correspondence between NRR and the licensee concerning relief requests, and requirements imposed by NRC/industry initiatives, including the augmented licensee inspection requirements identified in Generic Letter 88-01.

73753-02 INSPECTION REQUIREMENTS

02.01 Review the licensee's ISI plans and schedules for the current inspection period of the inspection interval. Determine if changes to the inspection plan concerning component selection, etc. have been properly documented and approved.

02.02 Review the qualifications and certifications of the inspection personnel (Levels I and II) observed during observation of work identified in section 02.03, below. Review the qualifications and certifications of all licensee and contractor Level III examiners involved with the ISI. Ascertain whether the qualification and certification records properly reflect the following:

- a. Employer's name.
- b. Person certified.
- c. Activity qualified to perform.
- d. Level of certification.
- e. Effective period of certification.
- f. Signature of individual certifying title and level.
- g. Basis used for certification, such as the required number of training hours, etc. for the examination method specified.
- h. Annual visual acuity, color vision examination, and periodic recertification.

02.03 Observe three different methods of examination of components from the following:

- a. Volumetric examination of welds using manual (A-scan) ultrasonic technique.
- b. Volumetric examination of welds using automatic or programmable ultrasonic technique.
- c. Volumetric examination of nozzle-to-vessel radiused section using ultrasonic technique.
- d. Volumetric examination of welds using radiographic technique.
- e. Volumetric examination of components (control rod drive housings, bolts, studs, bolt hole ligaments, integrally welded supports).
- f. Volumetric examination of steam generator tubes using eddy current technique.
- g. Surface examination of welds, bolts, nuts, or studs using liquid penetrant (PT) or magnetic particle (MT) technique.
- h. Visual examination of core support structures, support components (mechanical or hydraulic), or other components listed in ASME Code Section XI.
- i. Visual examination during system leakage or hydrostatic test.

02.04 For each selected method of examination from paragraph 02.03, above, verify that the following requirements are met:

- a. Approved procedures are available, are being followed, and specified nondestructive examination (NDE) equipment is being used.
- b. Examination personnel are knowledgeable of examination method and operation of test equipment.
- c. Examination personnel with proper level of qualification and certification are performing the various examination activities, including designation of examination method/technique to be used, equipment calibration, examination, and interpretation/evaluation/acceptance of test results.
- d. Examination results, evaluation of results, and any corrective actions/repairs/replacements are being recorded as specified in the ISI program and NDE procedures. If applicable, review the comparison of inservice findings (adverse) with previous examination findings to determine any change in flaw size.

02.05 Observe two Code repairs and two Code replacement activities and verify that:

- a. An approved procedure for each activity is in use.
- b. Personnel responsible for the performance of each activity are knowledgeable of procedural requirements.

- c. The ANI or ANII is involved to the extent required by the licensee's ISI plan.

73753-03 - INSPECTION GUIDANCE

03.01 General Guidance. Other than for the Preservice Inspection (PSI), it is intended that this inspection procedure be accomplished during a refueling outage. In general, most inservice inspections are performed during refueling outages with a few inspections being performed during plant operation and during plant shutdowns for maintenance or forced outages. R

The inservice inspections of interest in this procedure are those non-destructive examinations of Class 1, 2, and 3 components and system leakage and hydrostatic tests performed to meet the requirements of the TS and the ISI program accepted by the NRC. Inservice testing of pumps and valves as described in subsections IWP and IWV of Section XI is not included within the scope of this procedure. The inspector should refer to inspection procedure 61725, "Surveillance Testing and Calibration Control Program," for inservice testing of pumps and valves.

The inspector should perform his inspection during peak periods of inservice inspection activity at the licensee's facility. Under the requirements of Section XI, the licensee files plans and schedules for inservice inspection with the NRC; therefore, the inspector should obtain a copy of these plans and schedules in order to accomplish and schedule his inspection.

The inspector shall be thoroughly familiar with NDE methods and techniques, their applications, limitations, and the recording and analysis of examination results. He shall be able to evaluate findings or indications and determine if these are acceptable within code limits. Should the inspector find that justification for an approved examination, exception, or exemption is not valid, this finding should be documented in the inspection report and immediately brought to the attention of regional management for resolution.

03.02 Specific Guidance.

- a. Inspection Requirement 02.01. Pursuant to 10 CFR 50.55a(g) the licensee periodically submits an updated ISI program to the NRC for review and approval. Requirements delineated in this program are regulatory requirements, as are the TS. In the event of conflict between the TS and 10 CFR 50.55a(g), the regulatory position is that of the more stringent requirement. Under the provisions of Section

XI, the licensee establishes an inservice inspection program for each inspection interval (generally ten years). This interval is usually divided into three inspection periods for accomplishing specified percentages of those component examinations and tests which are to be performed during the inspection interval. In some instances, inspection requirements in addition to those of Section XI are imposed by the NRC for the licensee to comply with 10 CFR 50.55a(g), and these should be documented in the TS and/or the licensee's ISI program. As the licensee gains experience, or corrective actions are taken, the augmented ISI may change. The licensee must document any changes made.

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- b. Inspection Requirement 02.02. Personnel involved in the performance, evaluation, or supervision of nondestructive examination of safety-related items should meet the qualification and certification requirements in the applicable supplement of SNT-TC-1A and ASME Section XI. Qualification certificates, the last annual visual acuity, and color vision test should be made part of the NDE records. For augmented ISI's required by GL 88-01, special qualifications are required.

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The inspector should verify that NDE activities are performed according to these levels. No one shall perform NDE activities at a level higher than that for which he is qualified (examination evaluation, etc.). The three levels of examiners are:

- Level I - Authorized to perform specific set-ups, calibrations, and tests under the guidance of a Level II or III individual.
- Level II - Authorized to set-up, calibrate, examine and record data, evaluate and report examination results.
- Level III - Authorized to develop and approve inspection and examination procedures, as well as administer training, examinations, and certifications, if specified.

- c. Inspection Requirement 02.03. The inspector is provided sufficient flexibility to ascertain whether the examinations are being conducted properly. It is expected that when different methods of examinations are in progress simultaneously, the inspector will select methods of examination of higher regulatory interest; i.e., volumetric examination of reactor pressure vessel pressure retaining welds or nozzle radiused sections, volumetric examination of Class 1 component pressure retaining welds inside containment, volumetric examination of steam generator tubes. Additionally, a history of problems with a particular technique also should form a basis for the selection of a given technique to inspect.

In view of radiation exposure limitations, and in the interest of efficient use of resources, it is not required for the inspector to observe the complete examination of a component or weld. Rather, the inspector should observe a method of examination until he is confident in his determination of the certification of the examiners, compliance with NDE procedure requirements during examination, and

the evaluation and recording of examination results. For example, when observing volumetric examination of welds using the manual (A-scan) ultrasonic technique, it is expected that the inspector can obtain valid findings by observing the equipment calibration and complete examination of one weld using a straight or one angle beam sca in one direction; i.e., it is not necessary to observe all straight and angle beam examinations in the several directions in the testing of the weld.

At times the inspector may want additional assurance that the ISI examinations are being conducted properly. Options that are available include the following:

- ° Requesting that the licensee repeat certain examinations using different examiners.
- ° Having regional NDE specialists repeat certain examinations.
- ° Having NRC contractors review ISI data (for automatic UT or eddy current examinations).

The following should serve as guidance to determine the acceptability of the activity being observed and should be consistent with the approved procedure, Section XI, and Section V, where applicable:

1. Volumetric Examination Using Ultrasonic Technique. Use work observation requirements from IP 57080 as a checklist for this review, supplemented by any special requirements imposed by NRC or industry initiatives (i.e., Regulatory Guide (RG) 1.150).
2. Volumetric Examination Using Radiographic Technique. Use work procedure requirements from IP 57090 as a checklist for this review.
3. Volumetric Examination Using Eddy Current Technique. Verify by work observation that the licensee follows the approved procedures.
4. Surface Examination Using Liquid Penetrant Technique. Use work observation requirements from IP 57060 as a checklist for this review.
5. Surface Examination Using Magnetic Particle Technique. Use work observation requirements from IP 57070 as a checklist for this review.
6. Visual Examination. Use work observation requirements from IP 57050 as a checklist for this review.
7. System Pressure Tests.
 - (a) Test conditions of pressure and temperature are as specified.
 - (b) Test condition holding time is as specified.

- (c) Rate of temperature and pressure increase is recorded and is as specified.
- (d) Pressure and/or temperature measuring instrumentation is calibrated and has a range as specified by procedure.
- (e) Sources of detected leakage are located, evaluated, and corrective measures are taken.
- (f) Gauges are calibrated prior to test.

Because the specific NDE technical requirements vary among Code editions and addenda, the inspector should ensure that, when using the 57050 series IPs as technical requirements checklists, the requirements reflect those specified in the Code of record committed to by the licensee being inspected.

- d. Inspection Requirements 02.04b and 02.05b. If some or all of these individuals are contractor personnel, interview several individuals to verify that:
 1. They are familiar with the scope of work and division of responsibilities between the contractor and the licensee.
 2. They are knowledgeable of the requirements of the approved, licensee procedures which they are using, as well as the licensee's overall ISI or repair/replacement program.

73753-04 REFERENCE

Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Steel Piping." (microfiche 69196/290)

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END



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INSPECTION AND ENFORCEMENT MANUAL

01

INSPECTION PROCEDURE 73755

INSERVICE INSPECTION DATA REVIEW AND EVALUATION

PROGRAM APPLICABILITY: 2515 (BASIC)

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73755-01 INSPECTION OBJECTIVES

01.01 Ascertain whether the reported data covers the scope of examination required during the current inspection period of the inspection interval as described in the applicable ASME Code, the Technical Specifications (TS), and Inservice Inspection (ISI) program accepted by the NRC.

01.02 Ascertain whether the ISI data files are complete and the data are within the previously established acceptance criteria.

01.03 Ascertain whether the licensee's disposition of adverse findings and subsequent re-examination is consistent with regulatory requirements.

01.04 Ascertain whether the licensee is utilizing the services of a third party inspection agency, as required.

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73755-02 INSPECTION REQUIREMENTS

02.01 Review site nondestructive examination (NDE) inspection records for the current inspection period of the inspection interval and ascertain whether the reported extent and frequency of examinations for those Class 1, 2, and 3 components and areas subject to examination are consistent with the TS and ISI program accepted by the NRC, meet the minimum examination requirements specified in the applicable addenda of the ASME Code Section XI, and have been reviewed by the Authorized Nuclear Inservice Inspector (ANII).

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02.02 Obtain NDE records of the most recent ISI examinations of one of each of the following:

a. One pressure retaining pipe weld in each of three piping systems (above 2 in. diam.), of which at least two systems should be within the reactor coolant pressure boundary.

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b. One pressure test with visual examination.

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c. Visual examination of one bolted connection.

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Ascertain whether the selected records contain or provide reference to the following documents:

- a. Examination results and data sheets.
- b. Examination equipment data.
- c. Calibration data sheets.
- d. Examination evaluation data.
- e. Records on extent of examination.
- f. Records on deviation from program and procedures including justification for deviation, if applicable.
- g. Records on disposition of findings.
- h. Re-examination data after repairwork, if applicable.
- i. Identification of NDE material such as penetrant, penetrant cleaner, couplant, films, tapes, etc.

02.03 Obtain NDE records for the most recent ISI examination of one pressure retaining weld of the reactor pressure vessel (length of examination not less than five feet) or one nozzle examination. If such records are unavailable due to these examinations being performed at the full ten-year interval, expand the sample of NDE records examined in paragraph 02.02 to include two more pressure retaining piping welds or two pressure retaining component welds. Ascertain that the following requirements are met:

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- a. The method, extent, and technique of examination comply with the licensee's ISI program and applicable NDE procedure.
- b. The examination data are within the acceptance criteria as outlined in the applicable NDE procedure and applicable Code requirements.
- c. The recording, evaluating, and dispositioning of findings are in compliance with the applicable NDE procedure and applicable Code requirements.
- d. Inservice NDE results are compared with the recorded results of prior Section XI examinations.
- e. The method used for NDE was sufficient to determine the full extent of indication or acceptance.

02.04 Obtain the records for the two most recent Code repair and replacement activities. Verify that the following requirements are met:

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- a. The method, extent, and technique of examination comply with the licensee's Code repair/replacement procedures.
- b. The examination data are within the acceptance criteria as outlined in the applicable Code repair/replacement procedures and applicable Code requirements.
- c. The recording, evaluating, and dispositioning of findings are in compliance with the applicable Code repair/replacement procedures and applicable Code requirements.
- d. The method used for NDE was sufficient to determine the full extent of indication or acceptance.

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03.01 General Guidance. This procedure should be run for the first ISI of each unit. Subsequent reviews shall be conducted twice within a three-outage cycle. One of these inspections shall be an in-office review of the Owner's ISI Report, while the other shall be an onsite data review. The inspection frequency at the site should be increased if the licensee receives a Category 3 SALP rating in the "outage" functional area. In-office review of the Owner's ISI Report should be charged to this inspection procedure on NRC form 766, rather than to inspection procedure 90713. MC 25:5 applicability requirements for inspection items delineated in section 73755-02 are 100% for each additional unit at duplicate facility sites and at other multifacility sites. R
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The ISIs of interest in this procedure are those nondestructive examinations of Class 1, 2, and 3 components and system leakage and hydrostatic tests performed to meet the requirements of the TS and the ISI program accepted by the NRC. Inservice testing of pumps and valves as described in ASME Code Section XI is not included within the scope of this procedure.

Examination data, test results, and other NDE data and records are essential for comparison with future examinations to establish a history of findings and indications. Evaluation of the previous growth rate of flaws and other indications permits a realistic prediction of expected further growth based on valid examination data. Therefore, it is essential to have complete, reliable, and clear NDE data, records, and files for each examination.

It is the intent of this inspection procedure to review examination findings to assure that corrective measures are taken on adverse findings, and to ensure that the licensee has used the services of the Authorized Nuclear Inspector (ANI) and ANII, as required. If the situation arises wherein the authorized inspector appears to have neglected to perform his assigned activities, the matter should be referred to IE Headquarters.

Additionally, since Section XI requires that the Owner's ISI Report be filed with the NRC (in practice, the Regional Office), completion of this review by the inspector at the frequency stated above will ensure systematic and programmatic handling of these reports and documentation of the inspector's review.

03.02 Specific Guidance.

- a. Inspection Requirement 02.01. Pursuant to 10 CFR 50.55a(g), the licensee periodically submits an updated ISI program to the NRC for review and approval. Requirements delineated in this program are regulatory requirements as are the TS. In the event of conflict between the TS and 10 CFR 50.55a(g), the regulatory position is that of the more stringent requirement. As required by Section XI, the licensee prepares records of inservice inspections. With the advent of inspection of Class 2 components and Class 3 systems, inservice inspections may occur at different times during the calendar year. Therefore, to determine the licensee's compliance with the extent and frequency of required examinations and pressure tests, the inspector performs a review of the collective records for the current

inspection period. Exceptions to or exemptions from testing requirements shall be consistent with those permitted by the ISI program approved by the NRC.

b. Inspection Requirement 02.02. The inspector should use the listing of required documents as a "checklist" during the review of the three selected sets of NDE records for completeness and technical adequacy. In addition, the inspector should ensure that the following requirements were met for the test records reviewed:

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1. The examination unit calibration data sheets show no major deviations between initial and final calibrations.
2. Collected examination data and any recordable indications are properly recorded to permit accurate evaluation and documentation.
3. Evaluation of examination data is performed by a Level II or Level III examiner.
4. Evaluation of examination complies with the procedure.
5. Evaluation of indicators complies with the criteria of the NDE procedure and ASME Code Section XI, if applicable.
6. Incomplete examinations and results were repeated to permit full evaluation, if applicable.

c. Inspection Requirement 02.03. The NRC inspector shall evaluate the data and references of these selected sets of inspection records and verify that the licensee's inspection program and procedures have been followed for the requirements listed in 73755-02 of this procedure. For the review of evaluations of examinations, the inspector should ascertain whether the inspection procedure criteria have been followed and whether the limitations for acceptability exceed the limits set forth in ASME Code Section XI and the TS.

END



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INSPECTION AND ENFORCEMENT MANUAL

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INSPECTION PROCEDURE 57050

NONDESTRUCTIVE EXAMINATION PROCEDURE
 VISUAL EXAMINATION PROCEDURE
 REVIEW/WORK OBSERVATION/RECORD REVIEW

PROGRAM APPLICABILITY: 2512, 2515, 2730

57050-01 INSPECTION OBJECTIVES

- 011 To determine whether the visual examination procedures used by the licensee/contractor meet applicable AWS/ASME Code, regulatory, specification and contract requirements.
- 012 To determine through direct observation whether the visual examination is being conducted by properly qualified personnel, in accordance with procedures and the licensee's/contractor's approved QA program.
- 013 To review a sample of records to determine whether they are prepared, evaluated and maintained in accordance with applicable commitments and/or requirements.

Recommended Inspection Schedule

<u>Inspection</u>	<u>May Be Started</u>	<u>Must Be Started</u>	<u>Must Be Completed</u>
1st inspection	After work is 10% complete	-----	Before work is 25% complete
2nd inspection	After work is 75% complete	Before work is 90% complete	Before startup of the plant

The schedule listed above applies to inspection of nuclear construction site and other long-term inspection efforts. For short-duration projects and vendor inspections a different schedule may be more practical.

57050-02 INSPECTION REQUIREMENTS

021 Procedure Review

- a. Review the active visual examination procedure(s) and ascertain whether it has (they have) been issued and qualified in accordance with the licensee's/contractor's QA program.
- b. For each visual examination procedure determine whether the procedure contains information or references a general inspection procedure or supplementary instruction, sufficient to assure that the following parameters are specified and controlled within the limits permitted by the applicable code, standard and other additional specification requirement.
 1. Method - direct visual, remote visual or translucent visual
 2. Application - hydrostatic testing, fabrication procedure, visual examination of welds, leak testing etc.
 3. How visual examination is to be performed
 4. Type of surface condition available
 5. Method or tool for surface preparation, if any
 6. Whether direct or remote viewing is used
 7. Special illumination, instruments, or equipment to be used, if any
 8. Sequence of performing examination, when applicable
 9. Data to be tabulated, if any
 10. Acceptance criteria are specified consistent with the applicable Code section and specific contract requirements. The procedure shall contain or reference a report of what was used to demonstrate that the examination procedure was adequate. In general, a fine line 1/32 in. (0.8 mm) or less in width, or some other artificial flaw located on the surface or a similar surface to that to be examined, may be considered a test method for this demonstration. The line or artificial flaw should be in the least discernible location on the area examined, to prove the procedure.

11. Report form or general statement to be completed.

022 Work Observation

- a. Observe the performance of the visual examination for the selected application and conduct the following reviews:
 1. Determine whether the applicable drawing, instructions or travelers clearly specify the test procedure to be used and that a copy of the procedure is available in the area where the work is being performed.
 2. Identify for subsequent record review the personnel performing the examination and ascertain whether they are qualified to perform the assigned task.
 3. Determine whether the required tools and examination aids (as specified in the examination procedure) are available at the work location.
 4. Determine whether the specific areas, locations and extent of examination are clearly defined.
 5. Determine whether the test attributes are as specified in the applicable test procedure and consistent with the limits or ranges given in paragraph 021b above.
 6. Ascertain whether the defects are evaluated in accordance with the procedure requirements, correct acceptance criteria are used and the inspection results are reported in a prescribed manner.

023 Record Review

- a. For each inspected work activity, review an adequate number of visual inspection personnel qualification records and ascertain whether these qualification records properly reflect the following:
 1. Employer's name
 2. Person certified
 3. Activity qualified to perform
 4. Effective period of certification
 5. Signature of employer's designated representative
 6. Basis used for certification

7. Annual visual acuity, color vision examination and periodic recertification
- b. Select records for 10 to 30 visual inspections and review them for compliance with procedure record requirements.
- c. Select 3 to 5 completed inspection records and independently verify the visual inspection results using the licensee's/contractor's procedure for conducting the inspection.

57050-03 INSPECTION GUIDANCE
031 General Guidance

- a. Applicable portions of the SAR should be reviewed to determine licensee commitments relative to nondestructive examination of components and equipment. The applicable Code editions and special requirements will generally be indicated in specification, drawings and/or construction QA manuals. The inspector is responsible for determining the acceptance criteria for each individual application.
- b. Inspection of visual examination as outlined in this procedure can be described as a three-phase, progressive review: First, a general audit is made of the applicable visual examination procedure to verify that it is properly prepared, approved and qualified in accordance with the applicable Code and contract requirements. Secondly, the use of the procedure is observed to verify that the work is planned, scheduled, and accomplished in accordance with the licensee's/contractor's QA program and that personnel performing the examination are properly qualified. Finally, records are reviewed to verify that they are complete, accurate, and retrievable. It is preferable to complete all phases of the inspection during a single inspection. However, this may not always be possible since there may be no visual examination in progress during a particular inspection. Under such circumstances, completion of a specific phase of the procedure may be deferred and resumed during a subsequent inspection.

The first inspection should concentrate on reviewing the licensee's program and procedures with enough work observation and record review to determine that the visual inspection personnel know and understand the program. The second inspection should only include changes to previously reviewed program and procedures and concentrate heavily on work observation, record review, and independent verification.

- c. The type of visual examination to be inspected should be selected by the inspector. The selected application scheduled for observation should be adequate to permit an effective evaluation of the inspected visual examination activities.
- d. The visual examination method described in Section III or V of the ASME Code is applicable to most conditions encountered during fabrication. However, the Code recognizes that special conditions may be encountered which require modification of these techniques. If modified procedures are used, they must be equivalent or superior to the Code techniques. Such special procedures must also be proven by demonstration to be capable of detecting discontinuities to at least the same extent as the applicable Code technique under normal conditions. This applies to all nondestructive examination procedures used to meet Code acceptance criteria.
- e. Qualification of NDE personnel involved in the performance, evaluation or supervision of nondestructive examination should meet the qualification requirements set forth in the applicable codes and standards referenced in the licensee SAR.

Qualification certificates, visual acuity, color vision examination, and periodic recertification should be included in the licensee's or contractor's procedures.

- f. Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution or being in violation and requiring correction. When significant inadequacies are identified indicating possible generic deficiencies, the issue should be addressed at the appropriate level of licensee management

032 References

1. 10 CFR 50, Appendix B, Criterion Ix
2. ASME Boiler and Pressure Vessel Code Section III and V
3. Society for Nondestructive Testing - Recommended Practice No. SNT-TC-1A and Supplements
4. Regulatory Guide 1.88 - Collection, Storage and Maintenance of Nuclear Power Plant QA Records
5. Regulatory Guide 1.58 - Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel

6. ANSI N45.2.9 - Requirements for Collection, Storage and Maintenance of QA Records for Nuclear Power Plants
7. ANSI N45.2.6 - Qualification of Inspection, Examination and Testing personnel.
8. AWS D1.1 - Structural Welding Code.

END



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INSPECTION AND ENFORCEMENT MANUAL

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INSPECTION PROCEDURE 57060

NONDESTRUCTIVE EXAMINATION PROCEDURE
 LIQUID PENETRANT EXAMINATION
 PROCEDURE REVIEW/WORK OBSERVATION/RECORD REVIEW

PROGRAM APPLICABILITY: 2512, 2515, 2730

57060-01 INSPECTION OBJECTIVES

- 011 To determine whether liquid penetrant examination procedures used by the licensee/contractor meet the applicable AWS/ASME Code, regulatory, specification, and contract requirements.
- 012 To determine through direct observation whether liquid penetrant examination is being conducted by properly qualified personnel, in accordance with qualified procedures and the licensee's/contractor's approved QA program.
- 013 To review a sample of records to determine they are prepared, evaluated and maintained in accordance with applicable commitments and/or requirements.

Recommended Inspection Schedule

<u>Inspection</u>	<u>May Be Started</u>	<u>Must Be Started</u>	<u>Must Be Completed</u>
1st inspection	After work is 10% complete.	-----	Before work is 25% completed.
2nd inspection	After work is 75% complete.	Before work is 90% complete	Before startup of the plant.

The schedule listed above applies to inspection of nuclear construction site and other long-term inspection efforts. For short-duration projects and vendor inspections a different schedule may be more practical.

57060-02

57060-02 INSPECTION REQUIREMENTS

021 Procedure Review

- a. Review the active liquid penetrant examination procedure(s) and ascertain whether it has (they have) been issued and qualified in accordance with the licensee's/contractor's QA program.
- b. Review each special test procedure which deviate from the ASME Code prescribed technique to determine that they have been qualified in accordance with applicable code requirements, and have been approved by the licensee's authorized inspection agency.
- c. For each liquid penetrant examination procedure ascertain whether essential examination variables are defined and whether these variables are controlled within the limits specified by the applicable Code and other specification/contract requirements. To accomplish this, determine whether the liquid penetrant procedure contains information or references a general inspection procedure or supplementary instruction sufficient to assure that the following parameters are specified and controlled within the limits permitted by the applicable Code and other additional specification requirements.
 1. The specified test method is consistent with applicable Code requirements.
 2. The brand names and specific types (number or letter designation if available) of penetrant, penetrant remover, emulsifier and developer are specified.
 3. The penetrant materials used for nickel base alloys are required by procedure to be analyzed for sulfur using the method prescribed by the applicable Code.
 4. The penetrant materials used for the examination of austenitic stainless steel are required by procedure to be analyzed for total halogens using the method prescribed in the applicable Code.
 5. The methods for acceptable pre-examination of surface preparation are specified and consistent with the applicable Code. The area to be cleaned is consistent with applicable Code requirements. The cleanliness acceptance requirements are consistent with applicable Code requirements. The surface area to be examined is consistent with applicable Code requirements.

6. The procedure establishes a minimum drying time following surface cleaning.
7. The method of penetrant application and the penetration (dwell) time are specified and that the penetration time is consistent with the penetrant manufacturer's recommendation.
8. The examination surface temperature is specified and is consistent with the applicable Code.
9. The procedures (when applicable) specify acceptable methods for removing water-washable penetrant consistent with the applicable Code.
10. The method of applying emulsifier (when applicable) and the maximum emulsification time is specified and consistent with the applicable Code.
11. The methods for removal of solvent removable penetrant (when applicable) are specified.
12. The method and time of surface drying prior to developing is specified.
13. The type of developer to be used, method of developer application and the time interval between penetrant removal and developer application is specified.
14. The examination technique is specified and the permitted time interval during which the "final interpretation" is performed within the range of 7-30 minutes after developer application.
15. Minimum light intensity at the inspection site is prescribed.
16. The technique for evaluation of indications is specified, acceptance standards are included and these are consistent with applicable Code and specific contract requirements.
17. Reporting requirements are specified.
18. The procedure requires requalification when changes are encountered in any of the following parameters:
 - a. Surface treatments which may alter the condition of surface openings (blast cleaning, acid etching).

- b. Change in precleaning materials or methods.
- c. Change in the type of penetrant materials (including developer, etc.) or in processing technique.
- d. Change in surface examination temperature limits.

022 Work Observation

Observe the performance of liquid penetrant examination(s) for randomly selected weld samples of at least three but not more than ten welds and conduct the following reviews:

- a. Determine whether the applicable drawings, instructions or travelers clearly specify the test procedure to be used and whether a copy of that procedure is available in the areas where the work is being performed.
- b. Determine whether the sequencing and timing of the examination relative to other operations such as grinding, welding or heat treating, etc., are specified and are in accordance with applicable Code and contract requirements.
- c. Identify for subsequent record review the personnel performing the examination and ascertain whether they are qualified to perform the assigned task.
- d. Determine whether the required equipment and materials are at the work station. Identify material serial number(s) for subsequent record review and ascertain whether the certifications are available which demonstrate conformance with the applicable sulfur and halogen limitations.
- e. Determine whether the specific areas, locations, and extent of examination are clearly defined.
- f. Determine whether the following test attributes are as specified in the applicable procedure being used and consistent with the applicable Code and contract requirements:
 - 1. Surface preparation/cleaning method, type, time, etc.
 - 2. Penetrant type (intermixing of materials from various manufacturers is not recommended)
 - 3. Penetrant application method
 - 4. Penetration time (dwell time)
 - 5. Temperature of surface

6. Penetrant removal
 7. Drying
 8. Developer, application, type
 9. Developing time
- g. Determine whether the indications are evaluated at the proper time in accordance with the procedure requirements, correct acceptance criteria are used and the results are reported in a prescribed manner.
8. Determine whether examined surfaces are cleaned at the conclusion of the examination.

023 Record Review

- a. Review qualification records for an adequate number of LP inspection personnel and ascertain whether the qualification records properly reflect the following:
 1. Employer's name
 2. Person certified
 3. Activity qualified to perform
 4. Level of qualification
 5. Effective period of certification
 6. Signature of employer's designated representative
 7. Basis used for certification
 8. Annual visual acuity, color vision examination and periodic recertification.
- b. Review the "certification of contaminant content" for all materials identified in paragraph 022a4 and ascertain whether the halogen and sulfur analysis is consistent with the procedure requirements of 021c3 and 021c4.
- c. Review the records of at least ten liquid penetrant inspections for compliance with the procedure requirements for examination records. Record the names of the examiners for review of qualification records.

57060-03 INSPECTION GUIDANCE

031 General Guidance

- a. Applicable portions of the SAR should be reviewed to determine licensee commitments relative to non-destructive examination of components and equipment. The applicable Code editions and special requirements will generally be indicated in specifications, drawings and/or construction QA manuals. The inspector is responsible for determining the acceptance criteria for each individual application.

- b. Inspection of liquid penetrant examination as outlined in this procedure can be described as a three-phase, progressive review: First, a general audit is made of the applicable LP procedure to verify that it is properly prepared, approved and qualified in accordance with the applicable Code and contract requirements. Secondly, the use of the procedure is observed to verify that the work is planned, scheduled and accomplished in accordance with the licensee's/contractor's QA program and that personnel performing the examination are properly qualified.

Finally records are reviewed to verify that they are complete, accurate and retrievable. It is preferable to complete all phases of the procedure during a single inspection. However, this may not always be possible since there may be no liquid penetrant examination in progress during a particular inspection. Under such circumstances, completion of a specific phase of the procedure may be deferred and resumed during a subsequent inspection.

- c. Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution or being in violation and requiring correction. When significant inadequacies are identified indicating possible generic deficiencies, the issue should be addressed at the appropriate level of licensee management.

032 Specific Guidance

The guidance below refers to specific subsections of 02, above.

- 021 The liquid penetrant examination method described in Section III or V of the ASME Code is applicable to most conditions encountered during fabrication. However, the Code recognizes that special conditions may be encountered which require modification of these techniques. If modified procedures are used, they must be equivalent or

superior to the Code techniques. Such special procedures must also be proven by demonstration to be capable of detecting discontinuities to at least the same extent as the applicable Code technique under normal conditions. This applies to all nondestructive examination procedures used to meet Code acceptance criteria.

- 022 The actual number and location of welds to be inspected should be selected by the inspector. The selected number of welds scheduled for observation should be adequate to permit an effective evaluation of the inspected liquid penetrant examination activities.

In addition, the sample selection should include considerations such as number of NDE technicians or contractors performing the work at the manufacturing facility or plant site (construction or modification), combination of systems, weld configurations and difficulties to perform the required NDE.

Qualification of NDE personnel involved in the performance, evaluation or supervision of nondestructive examination should meet the qualification requirements set forth in the applicable codes and standards referenced in the licensee SAR. Qualification certificates, visual acuity, color vision examination and periodic recertification should be included in the licensee or contractor's procedures.

033 References

1. 10 CFR 50, Appendix B, Criterion IX.
2. ASME Boiler and Pressure Vessel Code Sections III and V
3. Society for Nondestructive Testing - Recommended Practice No. SNT-TC-1A and Supplements
4. Regulatory Guide 1.88 - Collection, Storage and Maintenance of Nuclear Power Plant QA Records
5. Regulatory Guide 1.19 - Nondestructive Examination of Primary Containment Liner Welds
6. Regulatory Guide 1.58 - Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel
7. ANSI N45.2.9 - Requirements for Collection, Storage and Maintenance of QA Records for Nuclear Power Plants

8. ANSI N45.2.6 - Qualification of Inspection, Examination and Testing personnel.

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IE INSPECTION PROCEDURE 57070

NONDESTRUCTIVE EXAMINATION PROCEDURE
 MAGNETIC PARTICLE EXAMINATION PROCEDURE
 REVIEW/WORK OBSERVATION/RECORD REVIEW

PROGRAM APPLICABILITY: 2512, 2515, 2730

57070-01 INSPECTION OBJECTIVES

- 011 To determine whether the magnetic particle examination procedures used by the licensee/contractor meet applicable AWS/ASME Code, regulatory, specification, and contract requirements.
- 012 To determine through direct observation whether the magnetic particle examination is being conducted by properly qualified personnel, in accordance with procedures and the licensee's/contractor's approved QA program.
- 013 To review a sample of records to determine whether they are prepared, evaluated and maintained in accordance with applicable commitments and/or requirements.

Recommended Inspection Schedule

<u>Inspection</u>	<u>May Be Started</u>	<u>Must Be Started</u>	<u>Must Be Completed</u>
1st inspection	After work is 10% complete	-----	Before work is 25% completed
2nd inspection	After work is 75% complete	Before work is 90% complete	Before startup of the plant

The schedule listed above applies to inspection of nuclear construction site and other long-term inspection effort. For short-duration projects and vendor inspections a different schedule may be more practical.

57070-02 INSPECTION REQUIREMENTS

021 Procedure Review

- a. Review the active magnetic particle examination procedure(s) and ascertain whether it has (they have) been issued and qualified in accordance with the licensee's/contractor's QA program.
- b. Review each special test procedure that deviates from the ASME Code prescribed technique or exceed the range of examination parameters specified by the ASME Code to determine that they have been qualified in accordance with the Code requirements and have been approved by the manufacturer's Authorized Inspection Agency.
- c. For each magnetic particle examination procedure ascertain whether essential examination variables are defined and whether these variables are controlled within the limits specified by the applicable Code and other specification/contract requirements. To accomplish this, determine whether the magnetic particle examination procedure contains information or references a general inspection procedure or supplementary instruction sufficient to assure that the following parameters specified are controlled within the limits permitted by the applicable Code and other additional specification requirements.
 1. Method - Continuous
 2. Surface Preparation
 3. Particle Contrast
 4. Surface Temperature
 5. Light Intensity
 6. Coverage
 7. Prod Spacing
 8. Magnetizing Current
 9. Yoke Pole Spacing
 10. Acceptance criteria are specified consistent with the applicable ASME Code Section and specific contract requirements.

022 Work Observation

Observe the performance of a magnetic particle examination for a randomly selected weld sample of at least three but not more than ten welds and conduct the following reviews:

- a. Determine whether the applicable drawing, instructions, or travelers clearly specify the test procedure to be used and that a copy of the procedure is available in the area where the work is being performed.
- b. Identify for subsequent record review the personnel performing the examination and ascertain whether they are qualified to perform the assigned task.
- c. Determine whether the required equipment and materials (as specified in the examination procedure) are available at the work station. Identify materials/equipment serial number(s) for subsequent review of calibration records and certifications as required.
- d. Determine whether the specific areas, locations, and extent of examination are clearly defined.
- e. Determine whether the following test attributes are as specified in the applicable test procedure and, consistent with the limits or ranges given in paragraph 021c above.
 - Type and color of ferromagnetic particles
 - Material surface preparation/cleanliness
 - Material surface temperature
 - Examination technique/coverage
 - Prod condition/usage
 - Magnetizing current
 - Prod or pole spacing
 - Yoke lifting power
 - Demagnetization
- f. Ascertain whether the indications are evaluated in accordance with the procedure requirements, correct acceptance criteria are used, and the inspection results are reported in a prescribed manner.

023 Record Review

- a. Review qualification records for an adequate number of MT inspection personnel and ascertain whether the qualification records properly reflect the following:
 1. Employer's name
 2. Person certified
 3. Activity qualified to perform
 4. Level of qualification
 5. Effective period of certification
 6. Signature of employer's designated representative
 7. Basis used for certification
 8. Annual visual acuity, color vision examination and periodic recertification.
- b. Review the calibration records and material certification records for the equipment and materials recorded during the inspection in paragraph 022a3.
- c. Select from 10 to 30 records of MT examination and review for compliance with procedure requirements. Examination personnel involved should be recorded for review of qualification records.

57070-03 INSPECTION GUIDANCE

031 General Guidance

- a. Applicable portions of the SAR should be reviewed to determine licensee commitments relative to non-destructive examination of components and equipment. The applicable Code editions and special requirements will generally be indicated in specification, drawings and/or construction QA manuals. The inspector is responsible for determining the acceptance criteria for each individual application.

- b. Inspection of magnetic particle examination as outlined in this procedure can be described as a three-phase, progressive review: First, a general audit is made of the applicable MT procedure to verify that it is properly prepared, approved, and qualified in accordance with the applicable Code and contract requirements. Secondly, the use of the procedure is observed to verify that the work is planned, scheduled and accomplished in accordance with the licensee's/contractor's QA program and that personnel performing the examination are properly qualified. Finally, records are reviewed to verify that they are complete, accurate, and retrievable. It is preferable to complete all phases of this procedure during a single inspection. However, this may not always be possible since there may be no magnetic particle examination in progress during a particular inspection. Under such circumstances, completion of a specific phase of the procedure may be deferred and resumed during a subsequent inspection.
- c. Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified indicating possible generic deficiency, the issue should be addressed at the appropriate level of licensee management.

032 Specific Guidance

The guidance below refers to specific subsection of 02, above.

- 021 The magnetic particle examination method described in Section III or V of the ASME Code is applicable to most conditions encountered during fabrication. However, the Code recognizes that special conditions may be encountered which require modification of these techniques. If modified procedures are used, they must be equivalent or superior to the Code techniques. Such special procedures must also be proven by demonstration to be capable of detecting discontinuities to at least the same extent as the applicable code technique under normal conditions. This applies to all nondestructive examination procedures used to meet Code acceptance criteria.
- 022 The actual number and location of welds to be inspected should be selected by the inspector. The selected number of welds scheduled for observation should be adequate to permit an effective evaluation of the inspected magnetic particle examination activities.

In addition the sample selection should include considerations such as number of NDE technicians or contractors

performing the work at the manufacturing facility or plant site (construction or modification), combination of systems, weld configurations, and how difficult it is to perform the required NDE.

Qualification of NDE personnel involved in the performance, evaluation or supervision of nondestructive examination should meet the qualification requirements set forth in the applicable codes and standards referenced in the licensee SAR. Qualification certificates, visual acuity, color vision examination and periodic recertification should be included in the licensee or contractor's procedures.

033 References

1. 10 CFR 50, Appendix B, Criterion 1X.
2. ASME Boiler and Pressure Vessel Code Sections III and V
3. Society for Nondestructive Testing - Recommended Practice No. SNT-TC-1A and Supplements
4. Regulatory Guide 1.88 - Collection, Storage and Maintenance of Nuclear Power Plant QA Records
5. Regulatory Guide 1.19 - Nondestructive Examination of Primary Containment Liner Welds
6. Regulatory Guide 1.58 - Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel
7. ANSI N45 2.9 - Requirements for Collection, Storage and Maintenance of QA Records for Nuclear Power Plants
8. ANSI N45.2.6 - Qualification of Inspection, Examination and Testing Personnel

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IE INSPECTION PROCEDURE 57080

NONDESTRUCTIVE EXAMINATION PROCEDURE
 ULTRASONIC EXAMINATION PROCEDURE
 REVIEW/WORK OBSERVATION/RECORD REVIEW

PROGRAM APPLICABILITY: 2512, 2515, 2730

57080-01 INSPECTION OBJECTIVES

- 011 To determine whether the ultrasonic examination procedures used by the licensee/contractor meet applicable AWS/ASME Code, regulatory, specification, and contract requirements.
- 012 To determine through direct observation whether the ultrasonic examination is being conducted by properly qualified personnel, in accordance with procedures and the licensee's/contractor's approved QA program.
- 013 To review a sample of records to determine whether they are prepared, evaluated and maintained in accordance with applicable commitments and/or requirements.

Recommended Inspection Schedule

<u>Inspection</u>	<u>May Be Started</u>	<u>Must Be Started</u>	<u>Must Be Completed</u>
1st inspection	After work is 10% complete	-----	Before work is 25% complete
2nd inspection	After work is 75% complete	Before work is 90% complete	Before startup

The schedule listed above applies to inspection of nuclear construction site and other long-term inspection effort. For short-duration projects and vendor inspections a different schedule may be more practical.

57080-02 INSPECTION REQUIREMENTS

021 Procedure Review

- a. Review the active ultrasonic examination procedure(s) and ascertain whether it has (they have) been issued and qualified in accordance with the licensee's/contractor's QA program.
- b. Review each special test procedure which deviates from the ASME Code prescribed technique or exceed the range of examination parameters specified by the ASME Code to determine that they have been qualified in accordance with the Code requirements and have been approved by the manufacturer's Authorized Inspection Agency.
- c. Determine whether the ultrasonic examination procedure contains information or references a general inspection procedure or supplementary instructions sufficient to assure that all parameters are specified and controlled within the limits permitted by the applicable Code and other additional specification requirements. For each ultrasonic examination procedure ascertain whether essential examination variables are defined and whether these variables are controlled within the limits specified by the applicable Code and other specification/contract requirements. To accomplish this perform the following evaluations:
 1. Verify that the type of apparatus to be used including frequency range as well as linearity and signal attenuation accuracy requirements, is specified.
 2. Verify that the extent of coverage (beam angles, scanning surface, scanning rate and directions) as well as the scanning technique are specified and are consistent with the applicable ASME Code and contract requirements.
 3. Verify that calibration requirements, methods, and frequency including the type, size, geometry, and material of calibration blocks as well as location and size of calibration reflectors within the block are clearly specified and consistent with the applicable ASME Code and contract requirements.
 4. Verify that the sizes and frequencies of search units are specified and are consistent with the applicable ASME Code and contract requirements

5. Verify that beam angle or angles are specified and are consistent with the applicable ASME Code and contract requirements.
6. Verify that methods of compensation for the distance traversed by the ultrasonic beam as it passes through the material including distance - amplitude correction curves, electronic distance - amplitude correction and transfer mechanisms, if used, are specified and are consistent with the applicable ASME Code and contract requirements.
7. Verify that reference reflectors for accomplishing transfer and the frequency of use of transfer mechanisms, if applicable, are specified and in accordance with ASME Code and contract requirements.
8. Verify that the reference level for monitoring discontinuities is defined and the scanning gain setting specified and that these values are in accordance with the applicable ASME Code and contract requirements.
9. Verify that methods of demonstrating penetration and coverage are established.
10. Verify that levels or limits for evaluation and recording of indications are specified and are in accordance with applicable ASME Code and contract requirements.
11. Verify that method of recording significant indications is established and that the reporting requirements are in accordance with applicable ASME Code and contract provisions.
12. Verify that acceptance limits are specified or referenced and are in accordance with the applicable ASME Code and specific contract requirements.

022 Work Observation

- a. Observe the performance of a ultrasonic examination for a randomly selected weld sample of at least (three) but not more than (ten) welds and conduct the following reviews:
 1. Determine whether the applicable drawing, instructions or travelers clearly specify the test procedure to be used and that a copy of the procedure is available in the area where the work is being performed.

2. Identify for subsequent record review the personnel performing the examination and ascertain whether they are qualified to perform the assigned task.
3. Determine whether the required equipment and materials (as specified in the examination procedure) are available at the work station. Identify materials/equipment serial number(s) for subsequent review of calibration records and certifications as required.
4. Determine whether the specific areas, locations and extent of examination are clearly defined.
5. Determine whether the test attributes are as specified in the applicable test procedure and, consistent with the limits or ranges given in paragraph 021c above.
6. Ascertain whether the indications are evaluated in accordance with the procedure requirements, correct acceptance criteria are used and the inspection results are reported in a prescribed manner.
7. Verify that sequencing or timing of the examination relative to other operations such as machining, heat treating or painting, etc., is clearly specified and is in accordance with applicable ASME Code and contract requirements.

023 Record Review

- a. Review qualification records for all UT inspection personnel and ascertain whether the qualification records properly reflect the following:
 1. Employer's name
 2. Person certified
 3. Activity qualified to perform
 4. Level of qualification
 5. Effective period of certification
 6. Signature of employer's designated representative
 7. Basis used for certification
 8. Annual visual acuity, color vision examination and periodic recertification.

- b. Review the calibration records and material certification records for the equipment and materials recorded during the work observation inspection of paragraph 022a3. Review a sample of calibration and certification records for equipment and materials listed in the records reviewed in paragraph 023c below.
- c. Review the records of a representative sample of examinations for compliance with procedures requirements for recording of examination and evaluation data and results.

57080-03 INSPECTION GUIDANCE

031 General Guidance

- a. Applicable portions of the SAR should be reviewed to determine licensee commitments relative to nondestructive examination of components and equipment. The applicable Code editions and special requirements will generally be indicated in specification, drawings and/or construction QA manuals. The inspector is responsible for determining the acceptance criteria for each individual application.
- b. Inspection of ultrasonic examination as outlined in this procedure can be described as a three-phase, progressive review: First, a general audit is made of the applicable UT procedure to verify that it is properly prepared, approved, and qualified in accordance with the applicable Code and contract requirements. Secondly, the use of the procedure is observed to verify that the work is planned, scheduled and accomplished in accordance with the licensee's/contractor's QA program and that personnel performing the examination are properly qualified. Finally, records are reviewed to verify that they are complete, accurate, and retrievable. It is preferable to complete all phases of the inspection during a single inspection. However, this may not always be possible since there may be no ultrasonic examination in progress during a particular inspection. Under such circumstances, completion of a specified phase of the procedure may be deferred and resumed during a subsequent inspection.
- c. Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution or being in violation and requiring correction. When significant inadequacies are identified indicating possible generic deficiencies, the issue should be addressed at the appropriate level of licensee management.

032 Specific Guidance

The guidance below refers to specific subsections of 02, above.

- 021 The ultrasonic examination method described in Section V or III of the ASME Code is applicable to most conditions encountered during fabrication. However, the Code recognizes that special conditions may be encountered which require modification of these techniques. If modified procedures are used, they must be equivalent or superior to the Code techniques. Such special procedures must also be proven by demonstration to be capable of detecting discontinuities to at least the same extent as the applicable Code technique under normal conditions. This applies to all nondestructive examination procedures used to meet Code acceptance criteria.
- 022 The number and location of welds to be inspected should be selected by the inspector. The selected number of welds scheduled for observation should be adequate to permit an effective evaluation of the inspected ultrasonic examination activities.

In addition the sample selection should include considerations such as contractors performing the work at the manufacturing facility or plant site (construction or modification), combination of systems, weld configurations, and difficulties of performing the required NDE.

Qualification of NDE personnel involved in the performance, evaluation, or supervision of nondestructive examination should meet the qualification requirements set forth in the applicable codes and standards referenced in the licensee's SAR. Qualification certificates, visual acuity, color vision examination and periodic recertification should be included in the licensee's or contractor's procedures.

033 References

1. 10 CFR 50, Appendix B, Criterion IX.
2. ASME Boiler and Pressure Vessel Code Sections III and V.
3. Society for Nondestructive Testing - Recommended Practice No. SNT-TC-1A
4. Regulatory Guide 1.88 - Collection, Storage and Maintenance of Nuclear Power Plant QA Records
5. Regulatory Guide 1.19 - Nondestructive Examination of Primary Containment Liner Welds
6. Regulatory Guide 1.58 - Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel

7. ANSI N45.2.9 - Requirements for Collection, Storage and Maintenance of QA Records for Nuclear Power Plants
8. ANSI N45.2.6 - Qualification of Inspection, Examination and Testing Personnel

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INSPECTION PROCEDURE 57090

NONDESTRUCTIVE EXAMINATION PROCEDURE
 RADIOGRAPHIC EXAMINATION PROCEDURE
 REVIEW/WORK OBSERVATION/RECORD REVIEW

PROGRAM APPLICABILITY: 2512, 2515, 2730

57090-01 INSPECTION OBJECTIVES

- 011 To determine whether radiographic examination procedures used by the licensee/contractor meet the applicable AWS/ASME Code, regulatory, specification and contract requirements:
- 012 To determine through direct observation whether the radiographic examination is being conducted by properly qualified personnel in accordance with qualified procedures and the licensee's/contractor's approved QA program.
- 013 To review a sample of radiographs and records to determine whether they are prepared, evaluated, and maintained in accordance with applicable commitments and/or requirements.

Recommended Inspection Schedule

<u>Inspection</u>	<u>May Be Started</u>	<u>Must Be Started</u>	<u>Must Be Completed</u>
1st Inspection	After work is 10% complete.	-----	Before work is 25% complete.
2nd Inspection	After work is 75% complete.	Before work is 90% complete.	Before start up of the plant.

The schedule listed above applies to inspection of nuclear construction site and other long-term inspection effort. For short-duration projects and vendor inspections, a different schedule may be more practical.

57090-02 INSPECTION REQUIREMENTS

021 Procedure Review

- a. Review the active radiographic procedure(s) and ascertain whether it has (they have) been issued and approved in accordance with the licensee's/contractor's QA program.

- b. For each radiographic procedure ascertain whether the examination variables are defined and whether these variables are controlled within the limits specified by the applicable Code and other specification/contract requirements.

To accomplish this, determine whether the radiographic examination procedure contains information or references a general radiographic procedure or supplementary instructions sufficient to assure that the following parameters are specified and controlled within the limits permitted by the applicable Code and other additional specification requirements.

1. Material and weld surface condition requirements (irregularities, weld ripples, surface finish, etc.).
2. Types of material to be radiographed.
3. Material thickness range.
4. Type of radiation source, effective focal spot or effective source size, X-ray equipment voltage rating and equipment manufacturer, as applicable.
5. Film brand or type and number of films in cassette.
6. Minimum source to film distance.
7. Blocking or masking technique, if used.
8. Type and thickness of intensifying screens and filters.
9. Exposure conditions for procedure qualification, if applicable.
10. Radiographic film processing requirements.
11. Quality of radiographs - limits on mechanical, chemical or other blemishes, such as fogging, process marks, scratches, finger marks, loss of detail or false indications.
12. Film density limits for single and composite viewing.
13. Use of densitometers for assuring compliance with film density requirements.
14. System of radiograph identification.

15. Use of location markers.
16. Records for showing film and source location with reference to the part being radiographed.
17. Use of intensifying screens.
18. Methods of reducing and testing for backscatter.
19. Description of or reference to the welding procedure.
20. Material type and thickness restrictions for isotope radiography.
21. Geometrical unsharpness limitations.
22. Selection and use of penetrameters including:
 - (a) Penetrameter design
 - (b) Selection of essential hole
 - (c) Penetrameter thickness including special requirements for single and double wall viewing
 - (d) Penetrameter placement including special requirements for single and double wall viewing.
 - (e) Number of penetrameters
 - (f) Shims under penetrameters
23. Radiographic technique requirements for double wall viewing.
24. Qualification of radiographic procedure (radiographs taken to demonstrate procedure capability).
25. Requirements for evaluation and disposition of radiographs.
26. Records requirements.

022 Work Observation

- a. Observe the performance of a radiographic examination including processing of the film for a randomly selected weld sample of at least three but not more than ten welds and conduct the following reviews:

1. Determine whether the applicable drawings, instructions, or travelers clearly specify the examination procedure to be used and that a copy of this procedure is available in the area where the examination is being performed.
2. Identify for subsequent record review the personnel performing radiography and evaluate the examination results to ascertain whether they are qualified to perform the assigned task.
3. Determine whether the required equipment and materials (as specified in the examination procedures) are available at the work station. Identify materials/equipment serial number(s) for subsequent reviews of calibration records and certifications as required.
4. Determine whether the specific areas, locations, and extent of examination are clearly defined.
5. Determine whether the examination attributes (as applicable) are as specified and consistent with the limits or ranges given in paragraph 0.21b.
6. Determine whether the radiographic film is being processed in accordance with the applicable procedure requirements and that processed film is free of chemical and mechanical blemishes which could interfere with interpretation.

023 Record Review

- a. Review a randomly selected sample of at least 10 but no more than 30 accepted radiographic film and determine if radiographic quality is in accordance with the applicable procedure and Code requirements. Specifically, verify the following:
 1. Penetrameter type, size, placement
 2. Penetrameter sensitivity
 3. Film density, density variation
 4. Film identification
 5. Film quality
 6. Weld coverage (overlap)

- b. Review qualification records for all RT inspection personnel and ascertain whether the qualification records properly reflect the following:
 1. Employer's name
 2. Person certified
 3. Activity qualified to perform
 4. Level of qualification
 5. Effective period of certification
 6. Signature of employer's designated
 7. Basis used for certification
 8. Annual visual acuity, color vision examination and periodic recertification
- c. Review equipment and material certifications and calibration records for materials and equipment (densitometer peretrameter) identified in paragraph 022a3 to ascertain whether the documents are retrievable, complete and accurate.

57090-03 INSPECTION GUIDANCE

031 General Guidance

- a. Applicable portions of the SAS should be reviewed to determine licensee commitments relative to nondestructive examination of components and equipment. The applicable Code editions and special requirements will generally be indicated in specification, drawings and/or construction QA manuals. The inspector is responsible for determining the acceptance criteria for each individual application.
- b. Inspection of radiographic examination as outlined in this procedure can be described as a three-phase, progressive review: First, a general audit is made of the applicable RT procedure to verify that it is properly prepared, approved and qualified in accordance with the applicable Code and contract requirements. Secondly, the use of the procedure is observed to verify that the work is planned, scheduled and accomplished in accordance with the licensee's/contractor's QA program and that personnel performing the examination are properly qualified. Finally, records are reviewed to verify that they are complete, accurate and retrievable. It is preferable to complete all phases of

the procedure during a single inspection. However, this may not be possible since there may be no radiographic examination in progress during a particular inspection. Under such circumstances, completion of a specific phase of the procedure may be deferred and resumed during a subsequent inspection.

- c. Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified indicating possible generic deficiencies, the issue should be addressed at the appropriate level of licensee management.

032 Specific Guidance

The guidance below refers to specific subsections of 02, above.

- 021 The radiographic examination method described in Section III or V of the ASME Code is applicable to most conditions encountered during fabrication. However, the Code recognizes that special conditions may be encountered which require modification of these techniques. If modified procedures are used, they must be equivalent or superior to the code techniques. Such special procedures must also be proven by demonstration to be capable of detecting discontinuities to at least the same extent of the applicable Code technique under normal conditions. This applies to all nondestructive examination procedures used to meet Code acceptance criteria.
- 022 The actual number and location of welds to be inspected should be selected by the inspector. The selected number of welds scheduled for observation should be adequate to permit an effective evaluation of the inspected radiographic examination activities.

In addition the sample selection should include considerations such as number of NDE technicians or contractors performing the work at the manufacturing facility or plant site (construction or modification), combination of systems, weld configurations and difficulties to perform the required NDE.

Qualification of NDE personnel involved in the performance, evaluation or supervision of nondestructive examination should meet the qualification requirements set forth in the applicable Code and standards referenced in the licensee SAR. Qualification certificates, visual acuity, color vision examination, and periodic recertification should be included in the licensee's or contractor's procedures.

033 References

1. 10 CFR 50, Appendix B, Criterion IX.
2. ASME Boiler and Pressure Vessel Code Section III and V.
3. Society for Nondestructive Testing - Recommended Practice No. SNT-TC-1A and Supplements.
4. Regulatory Guide 1.88 - Collection, Storage and Maintenance of Nuclear Power Plant QA Records.
5. Regulatory Guide 1.19 - Nondestructive Examination of Primary Containment Liner Welds.
6. Regulatory Guide 1.58 - Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel.
7. ANSI N45.2.9 - Requirements for Collection, Storage and Maintenance of QA Records for Nuclear Power Plants.
8. ANSI N45.2.6 - Qualification of Inspection, Examination and Testing Personnel.

END

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ASME
Handbook
Progressive
Report
Safety
Containment
Station Blackout
Reactor Risk Document
Decommissioning

COMPLIANCE WITH THE ASME CODE IS
A PREVENTIVE SAFETY MEASURE

LEMENTA
POWER

State	Nuclear Plants	Section III	Section XI
Alabama		No	No
Arizona		Yes	Yes
Arkansas	B & P	Yes	Yes
California	B & P	Yes	Yes
Colorado	B	No	No
Florida	B	No	No
Georgia	B & P	No	No
Illinois	B & P	Yes	Yes
Iowa	B & P	Yes	Yes
Kansas	B	Yes	Yes
Kentucky	B	No	No
Louisiana	B & PV	Yes	Yes
Maryland	B & PV	Yes	Yes
Maryland	B & PV	Yes	Yes
Mass.	B & PV	Yes	Yes
Michigan	B	Yes	Yes
Minnesota	B & PV	Yes	Yes

After Law Only

B & PV = Boiler and Pressure Vessel L

State Nuclear Plants Section III Section XI

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State	Nuclear Plants	Section III	Section XI
Mississippi		No	No
Missouri		Yes	Yes
New Hamp.	B & PV	Yes	No
New Jersey	B & PV	Yes	Yes
New York	B	Yes	No
N. Carolina	B & PV	Yes	Yes
Ohio	B & PV	Yes	Yes
Oregon	B & PV	Yes	Yes
Penn.	B & PV	Yes	Yes
S. Carolina	No	No	No
Tennessee	B & PV	Yes	Yes
Texas	B	Yes	Yes
Vermont	B & PV	Yes	No
Virginia	B & PV	Yes	Yes
Washington	B & PV	Yes	Yes
Wisconsin	B & PV	No	No

B & PV = Boiler and Pressure Vessel Li. B = Boiler Law Only.

Enforcement of the Illinois Boiler and Pressure Vessel Safety Act

at Nuclear Power Plants

Department of Nuclear Safety

at Other Facilities

Office of the State Fire Marshal

THE A PROGRAM ASSURES THAT
BOILER PRESSURE VESSELS ARE

Constructed in Accordance with the
ASME Code

Inspected Safely

and Maintained Properly

NUCLEA STEMS MUST BE INSPECTE

ACCORDANCE WITH SECTION XI OF

ASME CODE

3

STAFF WOLF

0690

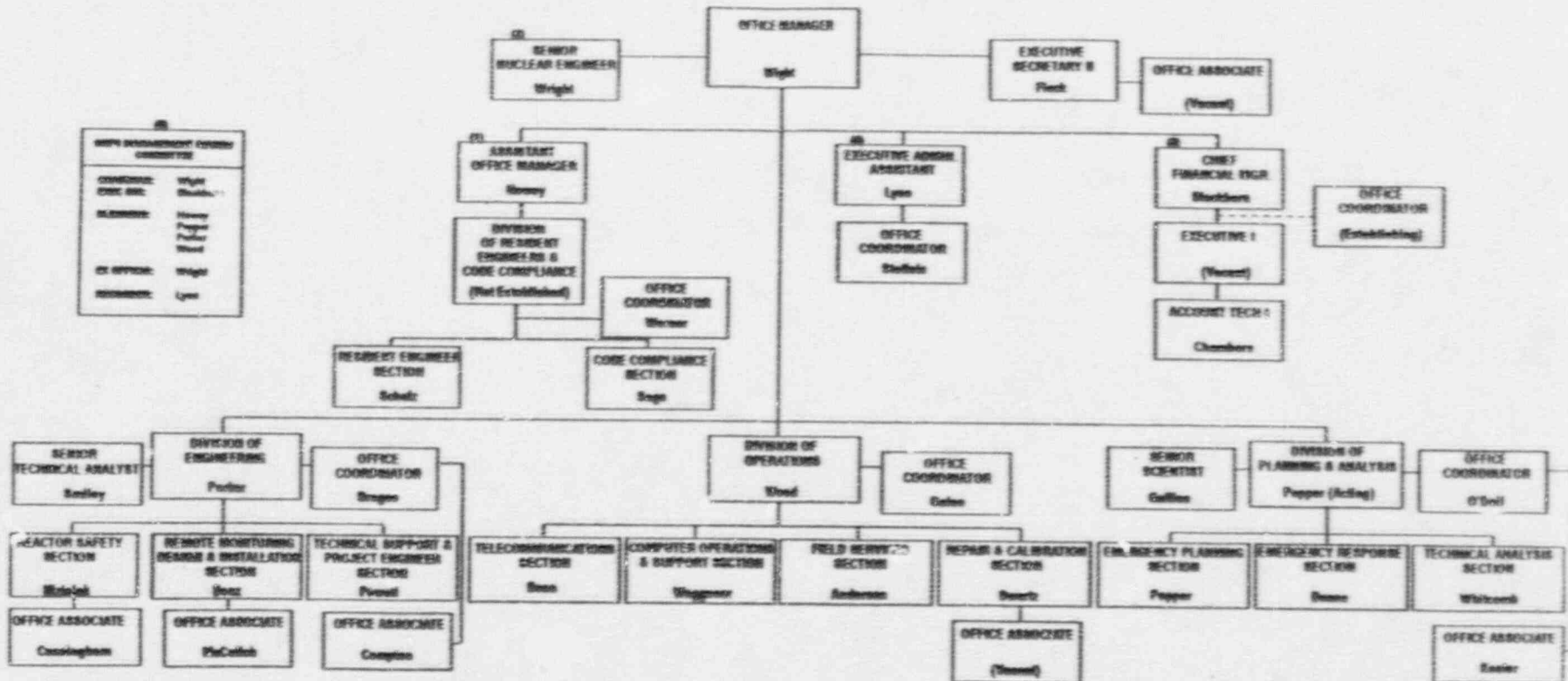
relations with NRC

EXCEPTIONS

AGING AND PLANT LIFE
MAKE COMPLIANCE WITH THE
ASME CODE IMPORTANT

Engineering, Safety are Linked

OFFICE OF NUCLEAR FACILITY SAFETY



DIVISION OF RESIDENT ENGINEERS & CODE COMPLIANCE

- Enforcement of Seller and Process Owner Act at worker facilities.
- On-site Resident Engineer Program.

DIVISION OF ENGINEERING

- Design or installation of Remote Monitoring Systems and other equipment.
- Analysis of Power's Monitoring System operating data.
- Review of the completed and start-up design of worker facilities.
- O&M management and planning for plant operations and O&M utility fees.
- Review of Worker assessments.
- Analysis of worker incidents or breakdowns.
- Analysis of structural safety levels.
- Total Program (TRP).
- Preparation of engineering proposals.
- Research development activities.
- Maintain O&M Technical Library.
- Nuclear facility personnel operators monitoring.
- Remote Monitoring System reliability programs and software development.
- Analysis, testing and implementation of Remote Monitoring System hardware and software modifications.
- Hardware configuration control.

DIVISION OF OPERATIONS

- Maintenance and repair of electronic monitoring systems and equipment.
- Installation and maintenance of data communication systems.
- Performance, operation, and maintenance of O&M computer hardware.
- Development and maintenance of O&M computer software codes.
- Software security and configuration control.
- Development of software access protocols and manuals.
- Maintenance and repair of other O&M equipment.
- Installation, operation, and maintenance of O&M telecommunications systems.

DIVISION OF PLANNING & ANALYSIS

- Coordination and integration of O&M Emergency Preparedness Program.
- Development of O&M.
- Preparation of emergency response SOP's.
- Local and O&M response testing.
- Exercise planning and coordination.
- Conduct technical studies, hazard analysis.
- RCAC coordination.
- Project nuclear reactor accident event tree.
- Research development.
- Development and testing of emergency response and data assessment models.
- Analyze nuclear accidents (e.g., Chernobyl, TMI) and evaluate impact on O&M's emergency preparedness program.
- Establish local interconnection test.
- Prepare and maintain emergency response equipment and material.
- Schedule and maintain O&M activities.
- O&M management and planning for radiation and environmental protection.
- Operate and maintain O&M radio and emergency telecommunication systems.

2

(1) ASSISTANT OFFICE MANAGER

- * Assists in formulating Office and Departmental policies.
- * Substitutes for Office Manager in his absence.
- * Oversees development and implementation of Division of Resident Engineers and Code Compliance programs.
- * Approves budgetary expenditures.

(2) SENIOR NUCLEAR ENGINEER

- * Plans and executes complex nuclear engineering projects.
- * Performs primary nuclear engineering research, analysis and safety studies.
- * Plans and conducts nuclear engineering and safety investigations.
- * Represents the Director and the Department on policy level issues involving nuclear engineering, safety, and emergency response applications.
- * Reviews plans and engineering components for Department equipment and projects.

(3) CHIEF FINANCIAL MANAGER

- * Develops ONFB goals and objectives.
- * Develops long range Office plans.
- * Coordinates the Office budgetary and financial management program.
- * Oversees the Office procurement process.
- * Drafts Office policy statements.
- * Coordinates presentations to be given by Office personnel.
- * Conducts briefings/presentations for VIP's
- * Administers the Office contract process.

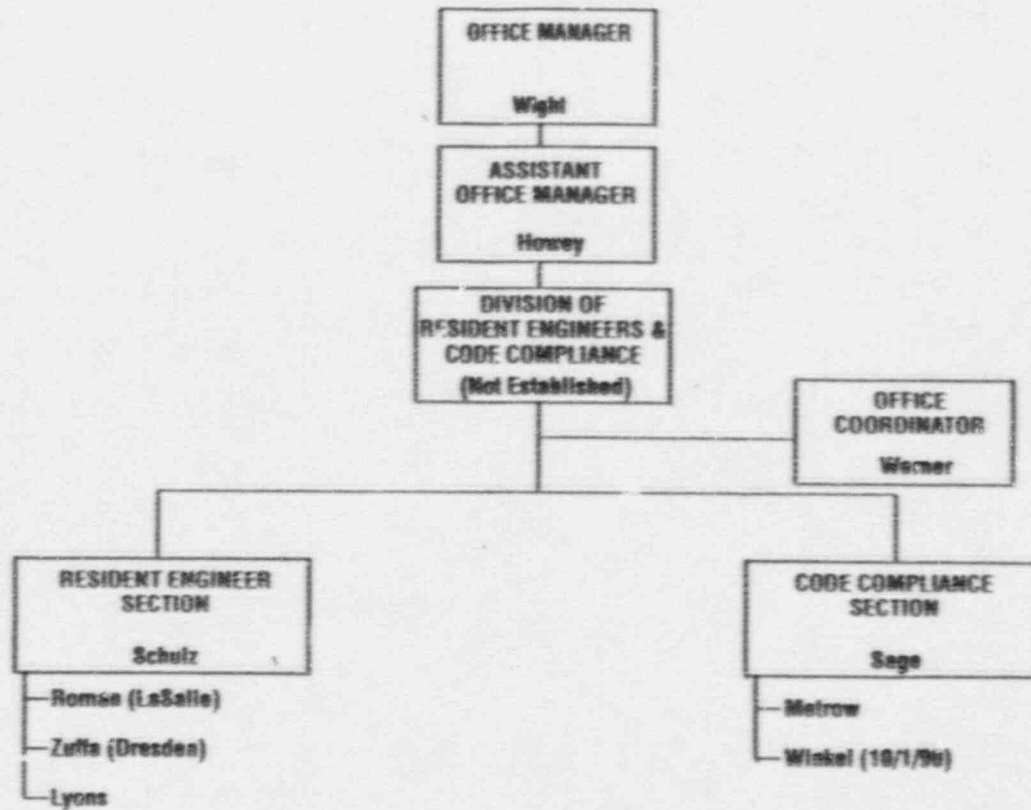
(4) EXECUTIVE ADMINISTRATIVE ASSISTANT

- * Drafts and implements Office policy statements and procedures.
- * Develops Office administrative procedures.
- * Serves as Administrative Office Manager and administers the Office personnel system, recruitment, and resume process.
- * Administers the Department personnel security program.
- * Serves as Office travel coordinator.
- * Reviews outgoing correspondence for the Office Manager.
- * Supervises the Office administrative filing system, controlled correspondence, open items listings, policy and procedures development, and goals and objectives.
- * Plans, prepares, and executes the Office administrative budget.
- * Coordinates VIP visits, meetings, and conferences.
- * Maintains the Office physical inventory process.

(5) MANAGEMENT REVIEW COMMITTEE

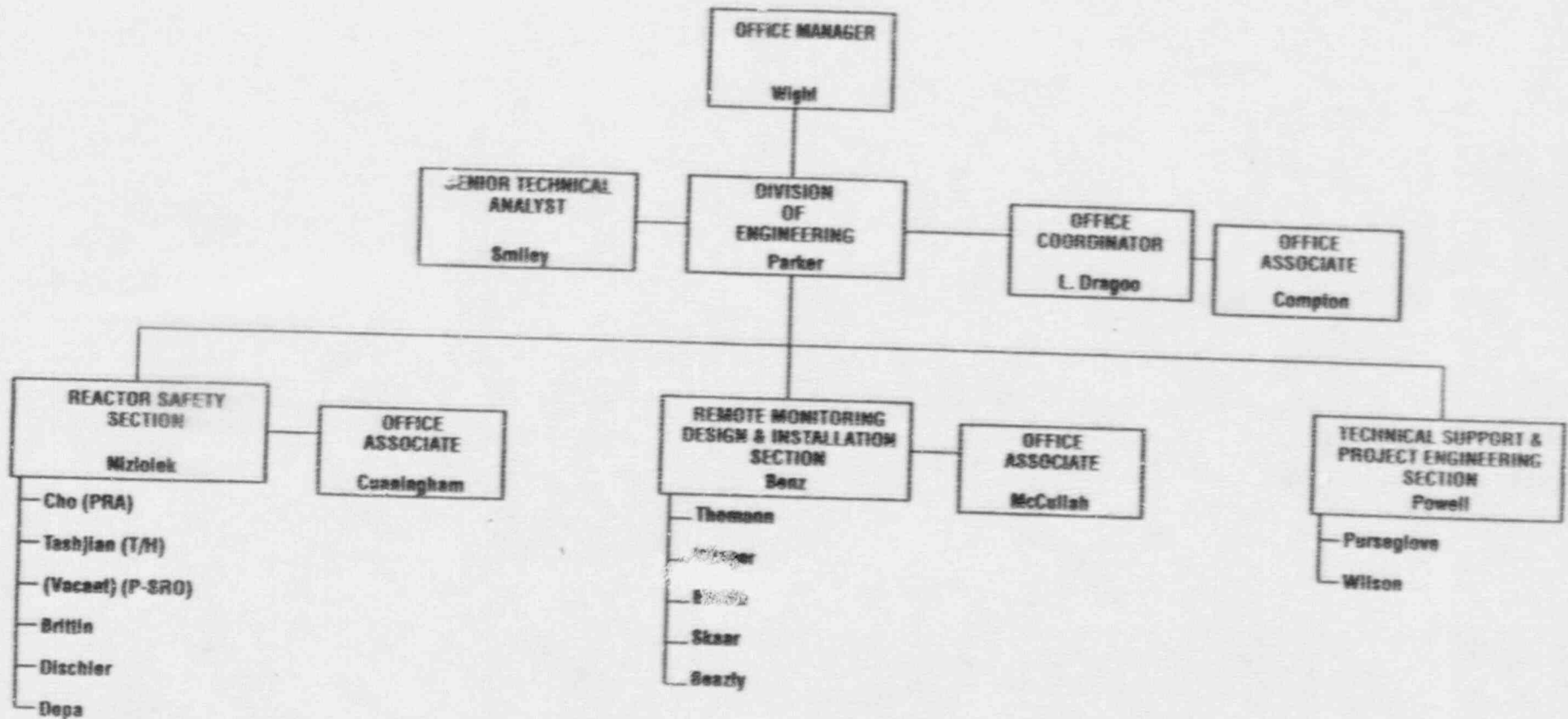
- * Reviews and approves program plans and preliminary schedules.
- * Reviews and approves Office goals and objectives.
- * Establishes Office policies.
- * Conducts annual program reviews.
- * Reviews and approves Office budget and spend plan.
- * Reviews and approves Office personnel plans.

OFFICE OF NUCLEAR FACILITY SAFETY
DIVISION OF RESIDENT ENGINEERS & CODE COMPLIANCE



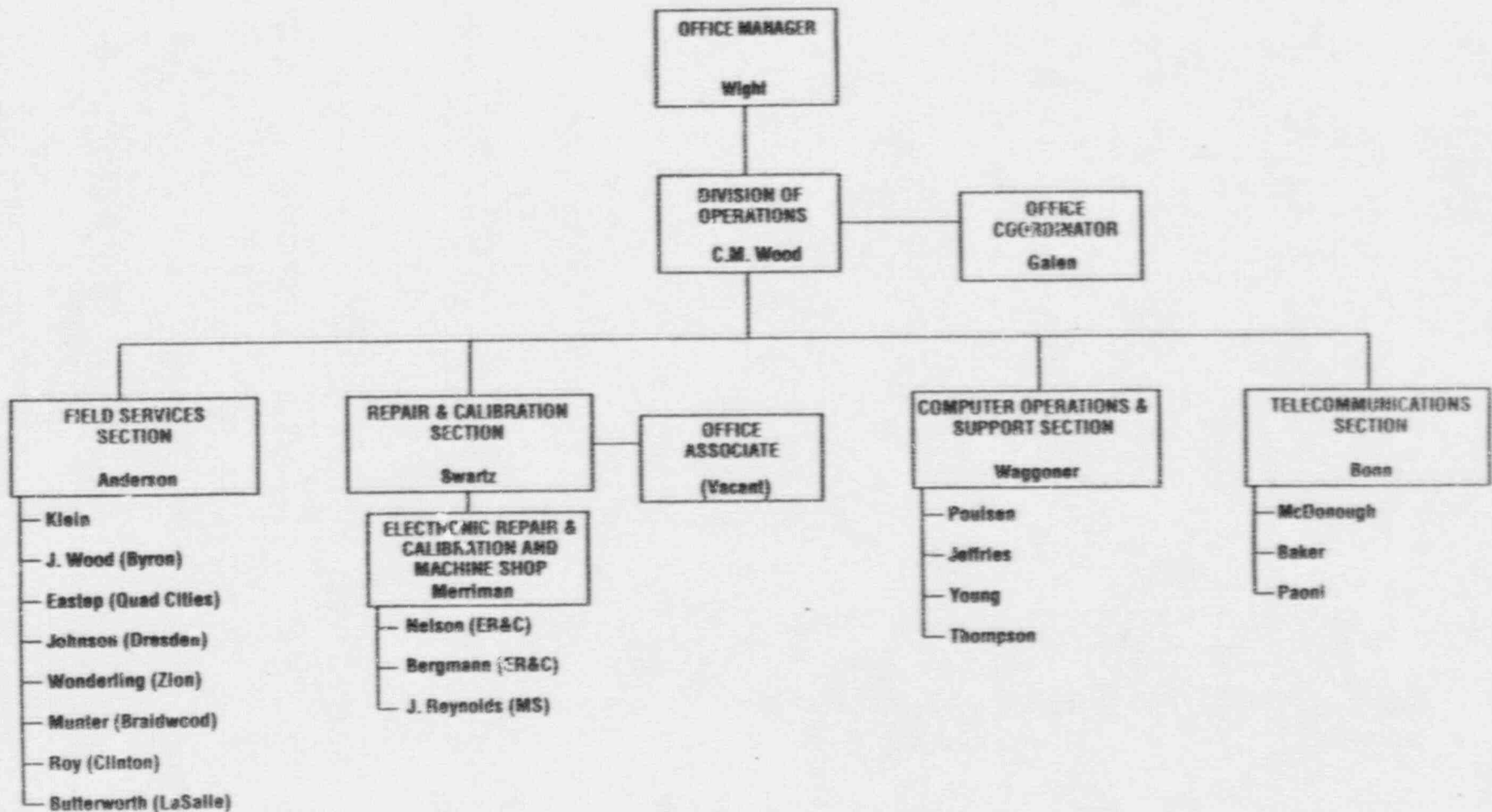
OFFICE OF NUCLEAR FACILITY SAFETY

DIVISION OF ENGINEERING



OFFICE OF NUCLEAR FACILITY SAFETY

DIVISION OF OPERATIONS



OFFICE OF NUCLEAR FACILITY SAFETY

DIVISION OF PLANNING & ANALYSIS

