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Welding and Nondestructive Examination Issues at Seabrook Nuclear Station

An Independent Review Team Report

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ABSTRACT

In response to congressional concerns about the adequacy of the welding and nondestructive examination (NDE) programs at the Seabrook Nuclear Station, NRC senior management established an independent review team (IRT) to conduct an assessment. The IRT focused on the quality of the finished hardware and associated records, as well as on the adequacy of the overall quality assurance program as applied to the fabrication and NDE programs for pipe welds. This report documents the findings of that investigation.

EXECUTIVE SUMMARY

In response to congressional concerns about the adequacy of the welding and nondestructive examination (NDE) programs at Seabrook, many of which were raised in conjunction with Mr. Joseph Wampler's work at Pullman-Higgins (P-H) during 1983-1984, NRC senior management established an independent review team (IRT) to conduct an independent assessment.

The IRT focused on the quality of the finished hardware and associated records as well as on the adequacy of the overall quality assurance (QA) program as applied to the P-H fabrication and NDE programs for pipe welds.

The review consisted of (1) interviews and discussions with former P-H employees, including Mr. Wampler, and current Yankee Atomic Electric Company (YAEC) and New Hampshire Yankee (NHY) employees, who were involved with and knowledgeable of the P-H pipe welding and NDE processes as well as the QA efforts applied to these activities; (2) evaluation of records associated with fabrication and NDE of 145 pipe welds from different plant systems, pipe sizes, and fabrication codes and periods; (3) evaluation of records involving identification, evaluation, and disposition (including reporting to NRC) of about 300 nonconforming conditions that had occurred during fabrication and NDE of pipe welds; (4) evaluation of the training, qualification, and certification records for 24 NDE personnel who had reviewed and accepted final radiographs of pipe welds; (5) evaluation of procedures used for P-H welding and NDE activities and for the QA efforts applied to these activities; (6) evaluation of records associated with about 200 QA surveillances and audits of P-H pipe welding and NDE activities; (7) evaluation of records associated with investigations of 34 employee concerns about P-H pipe welding and NDE activities; and (8) visual inspection of appropriate pipe welds.

On four occasions during this review (April 3, May 25, June 29, and July 2, 1990), the IRT met with congressional committee staff at the request of the committee to hear, first hand, concerns regarding Seabrook, to discuss interim IRT findings, and to respond to questions.

The IRT's findings and conclusions can be summarized as follows:

- The quality of the final welds was good, and all but one final weld (weld 1-DG-4351-01-F0101) complied fully with the applicable codes and NRC requirements. Weld 1-DG-4351-01-F0101 had a code-rejectable linear indication which exceeded the maximum code-allowable length by 1/8 inch, and had not been identified during reviews by the licensee and its contractor, P-H. During this independent review, the licensee determined that the weld was acceptable for its design service conditions. The team agreed.

- Although weld control packages were difficult to review because of their volume, complexity, numerous corrections, and pen-and-ink-type changes, the licensee properly identified and resolved most of the welding problems that arose during the construction period.

- Radiographs representing the final weld condition were conservatively interpreted and met the applicable codes in all cases. However, some of the film package radiographic inspection reports (RIRs) were confusing because incorrect entries had been made during the initial radiography. As a result of these early errors, incorrect radiographic techniques were used initially and caused some problems. When these problems were discovered, the welds were radiographed again and many of the associated RIRs were corrected, although some errors still existed. Despite these errors, radiographs were of acceptable quality.

- Procedures used for welding and NDE activities and for the QA efforts applied to these activities met NRC requirements, although weaknesses were noted in the radiographic testing (RT) procedures. Also, NDE personnel who had reviewed and accepted radiographic film of pipe welds were appropriately qualified.

- The methods used at Seabrook for resolving nonconforming conditions met NRC requirements and complied with the appropriate codes, except for (1) conditions that the licensee could not reasonably have been expected to be aware of immediately (the Padovano case involving deliberate falsification and the weld rejects listed in Wampler's personal logbook that he hadn't formally identified before he left his job) and (2) one condition concerning the fourth repair to a non-safety-related weld.

- The audit and surveillance programs provided an adequate QA overview; they were active throughout construction, generally identifying problems and obtaining corrective actions. The findings from these programs supported the team's conclusion that, at least through the 1983 period, P-H continued to experience problems in fabrication and NDE of pipe welds. These problems, for the most part, were administrative-type mistakes involving weld records and RT technique problems. This conclusion was also consistent with earlier NRC findings.

- P-H failed to identify and correct film and weld deficiencies until long after they occurred, violating NRC requirements and permitting the same mistakes to keep occurring. However, through the YAEC film overview program, the licensee did eventually resolve these problems by ensuring that the final welds and associated film met applicable code requirements.

- In some instances, records and procedural adherence-type problems of lesser safety significance may have violated NRC requirements during the construction period. These problems were investigated to the depth necessary to reach a conclusion regarding their safety significance.

In specific response to concerns expressed by Wampler:

- A substantial backlog of film packages existed beginning in early 1983 and continuing into late 1984. Although the backlog interfered with pipe welding and NDE activities, it did not constitute a safety concern because the pipe weld and radiographic film rejects were properly dispositioned during the construction period. P-H should have provided additional NDE assistance sooner to keep pace with production film and to evaluate the backlog film.

- The reject rates resulting from the overviews of radiographic film were higher than normally expected for a project like Seabrook, and indicated that basic weaknesses in the P-H program had existed over a long period of time. However, these rates were influenced to a degree by the conservative nature of the film overviews.

- Adequate methods for controlling pipe welding and welding repairs which were consistent with the applicable codes had been implemented at Seabrook and the number of weld repairs was not considered excessive.

- The radiographic film backlog did not result in a condition where a weld was inaccessible (for reshot or repair) or where a weld was accepted without the code RT being performed.

- The licensee took adequate action regarding all the welds Wampler was planning to write NCRs on at the time he left Seabrook. Since discrepancies noted by Wampler had been effectively removed or reworked for all of these welds, there were no "missing" NCRs associated with weld discrepancies discovered by Wampler.

- The other concerns expressed were appropriately handled with the exception of documenting an evaluation of one deficiency report, DR-527 (no records could be found), and none of them represented a safety concern.

The pipe welding and NDE programs were generally consistent with applicable codes and NRC requirements and resulted in technically acceptable pipe welds at Seabrook.

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APPENDICES

ABBREVIATIONS

AAR	-	audit action request
ANI	-	authorized nuclear inspector
ANSI	-	American National Standards Institute
ARCR	-	allegation resolution correction request
ASME	-	American Society of Mechanical Engineers
ASNT	-	American Society for Nondestructive Testing
BMR	-	base material repair
BWR	-	boiling-water reactor
CAR	-	corrective action request
CBS	-	containment building spray
CDR	-	construction deficiency report
CFR	-	Code of Federal Regulations
CODA	-	CODA Technical Services, Inc.
CQA	-	construction quality assurance
CQAM	-	construction quality assurance manager
CSL	-	controlled speed letter
DEDR	-	Deputy Executive Director for Nuclear Reactor Regulation, Regional Operations and Research
DN	-	deviation notice
DR	-	deficiency report
EAR	-	employee allegation resolution
ECA	-	engineering change authorization
EDO	-	Executive Director for Operations
FQA	-	field quality assurance
FSAR	-	final safety analysis report
FTR	-	field trouble report
FW	-	feedwater
GTAW	-	gas tungsten arc welding
GWS	-	general welding standard
IAL	-	immediate action letter
IAR	-	immediate action request
ID	-	inside diameter
IGSCC	-	intergranular stress corrosion cracking
IMS	-	information management system
IRT	-	independent review team
ISI	-	inservice inspection
ISO	-	piping isometric drawing
MAR	-	management action request
MT	-	magnetic particle test

NCR	-	nonconformance report
NDE	-	nondestructive examination
NOV	-	notice of violation
NRBRF	-	nonconformance review board response form
NRC	-	Nuclear Regulatory Commission
NSR	-	not safety related
NYH	-	New Hampshire Yankee
OCA	-	Office of Congressional Affairs
OD	-	outside diameter
OTS	-	on the spot
PCSG	-	Pipe Crack Study Group
P/FSAR	-	preliminary/final safety analysis report
P-H	-	Pullman-Higgins
PQR	-	procedure qualification record
PSNH	-	Public Service Company of New Hampshire
PT	-	liquid penetrant test
PWHT	-	post-weld heat treatment
PWR	-	pressurized-water reactor
QA	-	quality assurance
QAER	-	quality assurance engineer
QAR	-	quality activities report
QC	-	quality control
RC	-	reactor coolant
RIR	-	radiographic inspection report
RT	-	radiographic test
RV	-	reactor vessel
SALP	-	systematic assessment of licensee performance
SCC	-	stress corrosion cracking
SDE	-	supervising discipline engineer
77W77	-	1977 Edition with Winter 1977 Addenda
SG	-	steam generator
SMAW	-	shielded metal arc welding
SR/Q	-	safety related/quality concern
SWO	-	stop work order
TC	-	thermocouple
UE&C	-	United Engineers and Constructors
Ug	-	geometrical unsharpness
UT	-	ultrasonic testing
VT	-	visual testing
WPS	-	welding procedure specification
YAEC	-	Yankee Atomic Electric Company

1 INTRODUCTION

1.1 Background

On March 23, 1990, the Nuclear Regulatory Commission's (NRC's) Executive Director for Operations (EDO) was advised by memorandum from the NRC Office of Congressional Affairs (OCA) of allegations by congressional committee staff that there were serious questions regarding the adequacy of the radiographic and welding programs at Seabrook Nuclear Station, raised in conjunction with Mr. Joseph Wampler's work at Pullman-Higgins (P-H) during 1983-1984. Joseph Wampler was employed by P-H during the period in question as a Level III examiner. Additionally, the congressional committee staff raised other relevant safety matters regarding the Seabrook facility and challenged the adequacy of certain NRC activities relative to Seabrook.

In a memorandum dated March 27, 1990, in response to the information received from OCA, the EDO appointed the new (incoming) Deputy Executive Director for Nuclear Reactor Regulation, Regional Operations and Research (DEDR), as his representative to ensure adequate NRC action with regard to the allegations concerning Seabrook received from the congressional committee staff. The DEDR informed the EDO, by memorandum (see Appendix 1 to this report) on the same date, that he was establishing an independent regulatory review of welding issues at Seabrook and that NRC staff and consultants who have had previous significant involvement at Seabrook would not be a part of the team. The overall plan to address the welding issues, including the composition of and charter for the independent review team (IRT), was included in the memorandum. The charter of the IRT only involved the pipe welding and nondestructive examination (NDE) issues, and thus the other concerns raised by the congressional committee staff involving Seabrook would be addressed by other elements of the NRC staff.

On March 30, 1990, the DEDR, after earlier unsuccessful attempts, reached Wampler by telephone and arranged for the IRT to interview him on April 24, 1990, in the NRC office in Rockville, MD. This interview was arranged in response to a letter from Wampler to the EDO, dated March 18, 1990.

During the week of April 1, 1990, the IRT developed a detailed plan consistent with its charter (see Appendix 2 to this report) to conduct the review. The plan was approved by the DEDR on April 5, 1990. On April 3, 1990, the DEDR, the IRT leader, and other NRC staff met with congressional committee staff to hear, firsthand, concerns regarding Seabrook in order to obtain as much specific information as possible, as well as to gain a better understanding of the concerns. Also, the NRC's overall plan to address these concerns was discussed.

1.2 Scope and Objectives

The DEDR directed the IRT to conduct a review of welding issues such as those raised by Wampler regarding the Seabrook plant, and to determine whether the issues had been evaluated and dispositioned by the licensee consistent with NRC requirements. The DEDR specified that the IRT's activities include: (1) an interview with Wampler, (2) the development of a specific plan for review of all

issues raised by Wampler and a weld and NDE spot sample of similar activities preceding and subsequent to Wampler's employment at Seabrook, (3) the approval of the review plan by the DEDR, (4) a determination of whether licensee activities related to the welding and NDE issues reviewed by the IRT were consistent with NRC requirements, and (5) the documentation of the IRT's findings in a detailed report.

To provide the review of welding issues specified by the DEDR, the IRT evaluated the quality of the finished hardware and associated records at the Seabrook plant and the adequacy of the overall quality assurance (QA) program as applied to the P-H piping fabrication and NDE programs. The IRT's objective was to conduct an after-the-fact, independent assessment to determine whether or not the pipe welding and NDE activities performed by P-H, including evaluation and disposition of nonconforming conditions, had been accomplished in accordance with applicable code and NRC requirements, and to assess the safety significance of the issues involving Wampler.

1.3 Methodology

The review began at NRC headquarters the week of March 25, 1990, with the development and completion of the general plan and charter for the IRT and the selection of the IRT members. The IRT was headed by an NRC senior manager and included three NRC inspectors and a consultant who had expertise in nuclear power plant construction practices and NDE techniques for piping. As the review progressed, the team was supplemented (May 15-17, 1990) by the addition of an NRC staff specialist and a consultant who had expertise in metallurgy.

During the week of April 1, 1990, the detailed evaluation plan was developed and approved, and the IRT commenced its onsite review at Seabrook (April 6, 1990). To supplement the plan, the IRT established criteria it would use for the selection of welds to be examined by radiographic review (see Appendix 3 to this report). Also, as discussed above, the IRT leader participated in a meeting on April 3, 1990, with congressional committee staff to hear, first-hand, concerns regarding Seabrook. Toward the end of the review, the IRT leader and selected members participated in three other meetings (on May 25, June 29, and July 2, 1990) with congressional committee staff members at their request to discuss interim review findings and to respond to questions about their concerns. The onsite review continued during the week of April 8, 1990.

During the week of April 15, 1990, the review continued off site (at NRC offices), and it continued the following week with a transcribed interview of Wampler on April 24, 1990 (see Appendix 4 to this report), as discussed above, and with the onsite work at Seabrook recommencing on April 25, 1990, and continuing the week of April 29, 1990.

The review continued off site (at NRC offices) the week of May 6, 1990, and it recommenced at the Seabrook site the week of May 13, 1990. During the remaining weeks of May and June and into the first three weeks of July, the IRT's review continued almost exclusively off site (at NRC offices) as the licensee provided additional records and verbal information in response to questions. The exception was an additional day (June 25) of onsite work at Seabrook by an IRT member to review additional records and hold discussions with the licensee. Also, during this period, the IRT worked on completing this report, which documents

its independent review of the allegations by congressional committee staff regarding the adequacy of the radiographic and welding programs at Seabrook.

The scope and nature of the review were as follows:

- Interviews and discussions were held with 11 individuals, who were former P-H employees, including Wampler, Yankee Atomic Electric Company (YAEC) employees, and New Hampshire Yankee (NHY) employees who had been involved with and were knowledgeable of the P-H pipe welding and NDE processes as well as the QA efforts that had been applied to these activities.

- Plant records that documented the quality of the finished hardware and the identification, evaluation, and disposition (including reporting to NRC) of nonconforming conditions were reviewed. This included the final radiographs, other available radiographs showing defects before repair, all associated inspection reports and nonconformance reports, and a sample of more than 20 weld control packages for 145 pipe welds from different systems, different piping sizes, and different fabrication codes and dates. The weld sample was significantly biased to include welds with known (or potential) problems. The nonconforming conditions spanned the period of fabrication and NDE of pipe welds and included about 30 reports issued by YAEC and about 300 reports issued by or against P-H. The reports covered such issues as: pipe weld radiography, weld repair cycles, radial shrinkage, repairs to reactor pressure vessel and steam generator nozzles, repair of defects, inaccessible welds, material traceability, welder qualification, and missing or other weld records deficiencies.

- Plant records involving the training, qualification, and certification of NDE personnel for 24 individuals who had been involved in the review and acceptance of pipe weld radiographs were reviewed.

- Plant records of QA audits and surveillances and the employee concerns program investigations which involved P-H pipe welding and NDE activities were reviewed. The review covered the period of fabrication and NDE of pipe welds and included 44 YAEC audit reports, 146 YAEC surveillance reports, 48 quality activities reports for the YAEC NDE review group, 21 controlled speed letters issued by the YAEC NDE review group, 22 P-H internal audits, and 34 employee concerns program investigation reports. Also, higher level control documents such as stop work orders, immediate action requests, and management action requests were reviewed.

- Several of the procedures, including their revisions, which had been used for welding and NDE activities and for the QA efforts that were applied to these activities were reviewed.

- Installed hardware was visually inspected in cases where questions arose during the review of plant records.

Throughout the course of this review, the IRT met frequently to review its findings and team activities as prescribed by the review plan. This resulted in some additions and changes to the plan including: (1) the review of selected P-H weld procedures was added; (2) more weld packages, radiographic film packages, nonconformance reports (NCRs), and YAEC surveillance reports and associated records to be reviewed were included; and (3) the review of selected QA procedures which

had been applicable to P-H welding and NDE activities was added. Also, when the radiographic review was performed, the same film was routinely examined by two different individuals, and in cases where there were questions or concerns about code acceptance, the film was examined by the entire team. This method of team review was also used for each question or concern that was raised by an individual team member. Additionally, the team routinely received administrative and resource support from the former NRC Senior Resident Inspector (Construction) for Seabrook, the NRC Resident Inspector Secretary assigned to Seabrook, and the NRR (Office of Nuclear Reactor Regulation) Project Manager for Seabrook; as a result, other elements of the NRC staff were kept abreast of the IRT's activities.

The IRT leader met routinely with licensee representives to keep them apprised of the team's activities, plans, and findings. The principal individuals contacted by the team were

R. Donald, NHY Lead QA Auditor
M. Drew, Former P-H NDE Level II Reviewer (by telephone)
T. Feigenbaum, NHY Senior Vice President
T. Frolo, NHY Welding Engineer
W. Gagnon, NHY EAR Program Manager
T. Harpster, NHY Licensing Manager
D. Julian, YAEC QA Engineer
R. Kountz, Former UE&C Welding Engineer
J. McDonald, YAEC QA Manager
J. Nay, YAEC QA Engineer
P. Oikle, YAEC NDE Level III
J. Peschel, NHY Regulatory Compliance Manager
N. Pillsbury, NHY Director of Quality Programs
S. Volk, YAEC ISI Engineer
J. Wampler, Former P-H NDE Level III Examiner

Other licensee personnel were contacted as necessary during the duration of the review.

2 PIPING FABRICATION PROGRAM

Pullman-Higgins (P-H), a contractor to United Engineers and Constructors (UE&C), the architect-engineer for the Seabrook Nuclear Station, installed the piping and supports for Seabrook Units 1 and 2. The work on site commenced in 1979 and the piping installation for Unit 1 was completed in early 1985. The team reviewed the history of P-H's methods of fabricating and inspecting pipe welds. The team's review concentrated on the documentation associated with the welding and nondestructive examinations (NDEs) of pipe welds. The purpose of this review was to ascertain whether or not the records documenting these activities were complete and if they supported the proper completion of welding and NDE. The team did not review other fabrication activities that P-H performed on site, such as activities regarding structural supports.

The team also reviewed the results of NRC inspection and enforcement activities concerning P-H that began concurrent with the start of piping installation.

2.1 Quality Assurance Program Requirements

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Sections III and V, 1977 Edition with Winter 1977 Addenda (77W77), is the Seabrook code of record for safety-related welds. With some exceptions, it required Class 1 and 2 pipe welds to be examined by radiographic testing (RT). The code of record for other pressure piping welds considered important to safety was the American National Standards Institute (ANSI) B31.1 Code for Power Piping (77W77). (Other pipe welds important to safety included those welds whose failure might cause damage to safety-related systems or components or those that must remain functional during and after a seismic event.) ANSI B31.1 also required RT of certain welds. These codes specified certain minimum criteria as well as specific acceptance standards and technique requirements. The specified acceptance standards applied to the finished weld are discussed further in Section 12 of this report. For example, such in-process examinations as RT may be used to progressively evaluate the weld quality; however, the RT requirements for technique and sensitivity need not be met until the weld is inspected and accepted in its finished condition.

After the technique has been judged acceptable, the exposed radiographic film must be interpreted by at least one qualified (specified in the codes by referencing American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A) Level II or higher examiner. The codes have specified minimum acceptance criteria for determining that a weld is defective. To ensure conformance to minimum code requirements, the NRC has required (as specified in 10 CFR Part 50, Appendix B, Criteria V and IX) that activities (including welding and radiography) affecting quality be prescribed by appropriate documented procedures (i.e., those including at least minimum code requirements), and that the activity adhere to these procedures. P-H Procedures IX-RT-1-W77 and IX-RT-3-W77 were issued for performing the radiography of pipe butt welds and nozzle welds, respectively, in conformance with the requirements just noted. The NRC team reviewed these procedures and their revisions and found them acceptable, as discussed in Section 6 of this report.

If the qualified Level II reviewer judges that the film and weld are acceptable, the codes have been met (assuming controls and interpretations were adequate). Figure 2.1 (flow chart) describes the licensee's review and acceptance of RT film in comparison with code requirements. [Note: Before about 1984, the authorized nuclear inspector's (ANI's) review sometimes took place before the Yankee Atomic Electric Company (YAEC) review. Figure 2.1 represents the ANI's review process after this time period.] If the film has been interpreted to have unacceptable weld defects or RT technique deficiencies, further rework and additional radiography are required. When acceptable film and welds have been obtained, the film that represented the unacceptable conditions can be discarded, provided the repair areas have otherwise been documented on a process sheet or checklist which included the corrective actions and reinspection results.

Additionally, in conformance with 10 CFR Part 50, Appendix B, Criterion II, the licensee must establish a quality assurance (QA) program requiring that activities affecting quality be accomplished consistent with their importance to safety, and also in compliance with the specified requirement, that is, the radiographic procedure. The criterion also required that the licensee regularly review the status and adequacy of the QA program. The review can consist of audits, surveillances, sample inspections, 100-percent overviews, or a combination of these--whatever has been deemed necessary to ensure that the required quality is achieved.

To ensure achievement of quality, the licensee's agent for the administration of the QA program at Seabrook Station, that is, YAEC, determined that it was necessary to perform an overview inspection of P-H pipe weld radiographs. YAEC performed the review within the framework of its QA surveillance program by requiring experienced film reviewers to inspect and interpret all P-H pipe weld radiographs of the finished weld, as well as to review samples of in-process pipe weld radiographs. Before April 1984, the review was performed against the P-H procedure using a detailed checklist per YAEC Procedure 3. After April 1984, this procedure was changed to YAEC Procedure 7, and YAEC Procedure 5 was issued to provide more formal details for the film review. This overview effort was added to routine, periodic YAEC QA audits and surveillances of the welding and NDE processes. The team's review of YAEC audit and surveillance reports is discussed in Section 3 and Appendix 8 to this report.

From the start of the piping fabrication and NDE processes to about mid-1982, P-H pipe weld film packages found unacceptable during YAEC review of film for acceptance were informally returned to P-H for correction. The unacceptable conditions were documented on the QA surveillance report, although one deficiency report (DR-037) documenting unacceptable film, issued in January 1980, was located in the licensee's records. After mid-1982, P-H pipe weld film packages, found unacceptable during YAEC review for acceptance, were returned to P-H for correction, and a DR or deviation notice (DN) was routinely issued in most cases. The exceptions to this included some administrative-type rejects that were easily correctable under the P-H program and did include some instances in which a controlled speed letter (CSL) was used, as provided in Field Quality Assurance (FQA) Manual, Procedure 9 (see Section 3 for further details).

Regardless of the mechanisms used, after any film discrepancies were identified by YAEC, the films were then returned to P-H for disposition and were re-reviewed by YAEC following corrective action by P-H. Under the P-H program, any films rejected by the YAEC overview were required to be evaluated and dispositioned in

accordance with P-H's QA program requirements, and these actions were subject to YAEC's review and acceptance. If weld quality was defective, a nonconformance report (NCR) had to be issued per P-H Procedure XV-2. The team observed numerous instances throughout the piping fabrication period where P-H or UE&C issued NCRs to document and disposition nonconforming welds found by or resulting from the YAEC overview program. NCRs were also issued for similar conditions found by P-H reviews.

Thus, concurrent with the start of radiographic examinations of piping in 1979, YAEC began an overview of all P-H pipe weld film with the intent to reduce the 100-percent overview when confidence in P-H's ability to properly identify and correct deficiencies had been obtained. The overview continued throughout the piping installation and appeared to have resulted in YAEC performing a 100-percent overview of all P-H final pipe weld radiographs.

2.2 NRC Inspection History

Early NRC Region I inspections of the pipe fabrication program (September-November 1980) identified deficiencies in P-H's controls of welding and weld repairs of sufficient concern to warrant the region's issuance of an immediate action letter (IAL) to the licensee. IAL 80-55, dated December 22, 1980, confirmed the contractor's issuance of a stop work order to halt all weld repairs performed by P-H and establish measures to ensure that correct welding procedures and inspection criteria were specified and properly observed. As a result of the IAL, P-H revised Specification JS-IX-14, "Defect Removal and Repair by Welding," to provide for more effective controls over the entire repair welding process.

Additionally, an NRC inspection of welding activities, conducted at Seabrook during June-July 1982, resulted in the issuance of a notice of violation (NOV) regarding interpretation of radiographic film. The licensee's response to the NOV, dated November 9, 1982, stated: "Pullman-Higgins will provide a secondary review of radiographs prior to turning them over to the Owner." The licensee committed to implement the corrective action by December 31, 1982.

The team noted that numerous other Region I inspections had been conducted in the piping and NDE areas.

The team reviewed the previous NRC Region I systematic assessment of licensee performance (SALP) evaluations for the functional area of "piping systems and supports" issued during the construction phase at Seabrook. The following ratings were noted:

01/01/80 - 12/31/80 - Below average performance
07/01/80 - 06/30/81 - Category 2
08/01/81 - 07/31/82 - Category 3
07/01/82 - 06/30/83 - Category 3
07/01/83 - 12/31/83 - Category 3
01/01/84 - 12/31/84 - Category 2 (with improving trend)

The rating "Category 3" suggests that both NRC and licensee attention should be increased. Licensee management attention or involvement was acceptable and considered nuclear safety, but weaknesses were evident: licensee resources appeared

strained or not effectively used such that minimally satisfactory performance (with respect to construction) was being achieved.

2.3 Findings and Conclusions

The team's review of issues associated with pipe welding indicated that, at least through the 1983 period, P-H continued to experience problems in fabrication and nondestructive examination of pipe welds, even though the contractor made several changes and improvements to its program. These problems, for the most part, were administrative-type mistakes involving weld records and RT technique problems. This conclusion is also consistent with the SALP findings discussed previously.

However, the team found that, in response to continuing problems, multiple overview programs of weld package records and radiographic film had resulted from the various corrective actions carried out by the contractor (P-H) and the licensee's agent (YAEC). These overview programs were 100-percent reinspections. For example, in the review of radiographs, the team found that P-H committed to YAEC (in July 1982) to have qualified overviews done on all film accepted by the P-H Level II reviewer. This applied to film that had not been reviewed and accepted by the YAEC overview. Then, the licensee made a similar commitment to the NRC in December 1982, in its response to a notice of violation. Additionally, as noted above, YAEC was performing a 100-percent overview of all film previously accepted by P-H. Both of these 100-percent inspection activities were in excess of the ASME Code, the ANSI B31.1 Code, and 10 CFR Part 50, Appendix B requirements normally employed at a construction site. The team concluded, however, that these additional overviews needed to be performed in order to identify deficiencies missed by the piping contractor.

In its determination of the final quality of the hardware and associated documentation, the team considered the additional overviews to be part of the total corrective action program. For example, if P-H's program missed identifying a deficiency, even if significant, and it was discovered later by one of the 100-percent reinspection programs, the team considered the program effective. Therefore, in addition to evaluating the P-H QA program, the team concentrated on determining if any significant deficiencies had been missed by the various programs. To make this assessment, the team reviewed documentation and radiographic film against the specific requirements of the ASME Code, the ANSI B31.1 Code, and Appendix B to 10 CFR Part 50.

On the basis of its review of various

- YAEC DRs, DNs, CSLs
- YAEC audit and surveillance reports
- P-H audit reports
- P-H and UE&C NCRs

in the specific area of first-level reviews (Level II), and to some degree second-level reviews (Level III), of radiographic film interpretation, the team concluded that P-H failed to reject and correct the apparent pipe weld radiographic film and weld deficiencies before final acceptance by P-H and to take timely and effective corrective action to resolve identified deficiencies affecting the RT program. The P-H film reviews failed to reject, before acceptance, some indications that were weld defects which exceeded the ASME or ANSI B31.1 Code and required repair.

Also, data entered on reader sheets contained administrative discrepancies, and the film contained technique deficiencies requiring re-radiography. The team concluded that the 100-percent overview performed by the licensee's agent, YAEC, was an effective program for radiographic film interpretation, in that it successfully found and required the contractor to correct the missed deficiencies. The team's analysis of this issue is discussed in Section 4.

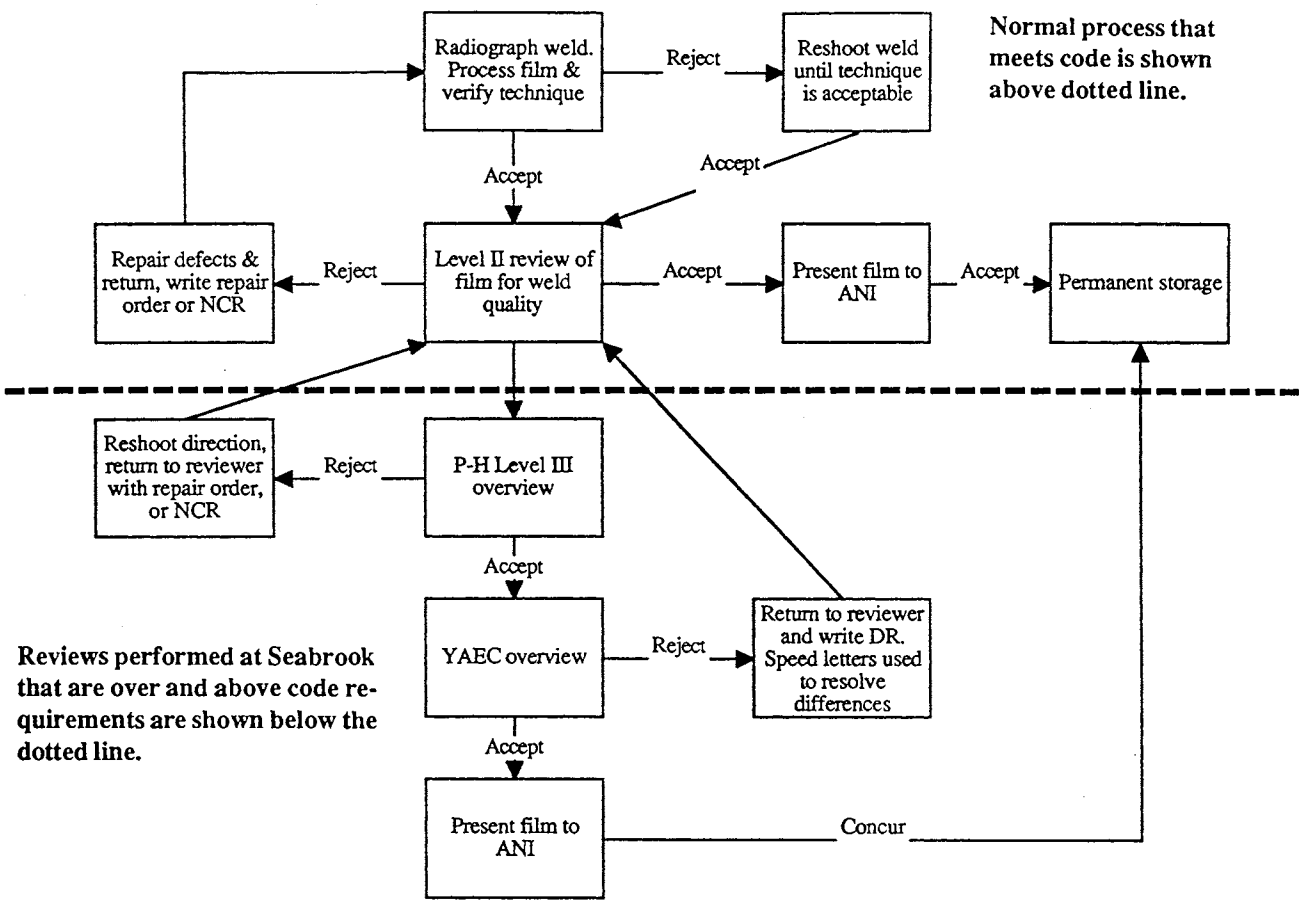

Figure 2.1 Flow chart of the radiographic process

3 QUALITY ASSURANCE AUDITS AND OVERVIEW OF PULLMAN-HIGGINS WORK

During construction, a multilevel system of audits and quality assurance (QA) overview was in effect for Pullman-Higgins (P-H) work as follows:

P-H, as the piping contractor, had the primary quality control (QC) responsibility on site. In addition, the P-H QA group performed internal audits of construction activities according to 10 CFR Part 50, Appendix B criteria. These audits were governed by P-H Procedure XVIII-4, "Site Internal QA Audit Program," and covered all aspects of the pipe welding and nondestructive examination (NDE) programs.

Public Service Company of New Hampshire (PSNH) had the overall responsibility for QA and delegated to Yankee Atomic Electric Company (YAEC) the responsibility for development, execution, and administration of the QA program. YAEC Construction QA, as the licensee's agent, performed routine surveillances of welding and NDE as well as 10 CFR Part 50, Appendix B audits. These audits and surveillances were governed by YAEC Procedure 3, "Field Surveillance Procedure" (changed in October 1984 to Procedure 7, "Surveillance Group"), and Procedure 9.1, "General Audit Procedure," and were performed by QA personnel at the site.

As part of the surveillance program, YAEC NDE personnel performed an overview of P-H NDE, including the review process on radiographic film. As noted in Section 2 of this report, this overview of the P-H radiographic review was performed as part of the surveillance program using detailed checklists per YAEC Procedure 3 (before April 1984). In April 1984, this procedure was changed to Procedure 7, and Procedure 5, "QEG NDE Review Group," was issued to provide more formal details of the activities of the NDE review group and the overview of P-H film review. The procedure detailed requirements for reviewing film and managing discrepancies. It specified that film be reviewed to the same criteria used by the originator. The film was also to be reviewed for archival quality. The activities of the review group were to be summarized in a quality activities report (QAR), and the film reviews were to be documented using the YRT-1 and YRT-2 forms. Deficiencies were to be handled in accordance with Procedure 10, and items that could not be resolved by the NDE review group were to be brought to the attention of the YAEC Level III examiner in a controlled speed letter (CSL).

Procedure 10, Revision 0, dated April 10, 1984, and Revision 2, dated April 1, 1985, specified documenting conditions adverse to quality in accordance with a DR/DN (deficiency report/deviation notice). The procedure gave details for completing the DR/DN form as well as guidelines for determining when to issue a DR/DN. The guidelines required issuing a DR/DN when deficiencies were discovered and the condition was not immediately corrected or the contractor did not include the deficiency in its corrective action program. Both Procedures 3 and 7 contained similar requirements for issuing DRs/DNs.

Starting with Revision 3, Procedure 10 required that surveillance reports be issued when deficiencies were discovered and the condition was not immediately corrected or included in the contractor's corrective action program. The procedure also required review of deficiencies for 10 CFR 50.55(e) reportability, although no details for the review were provided in Procedure 10.

More important quality concerns required a higher level of attention. For these, the program provided for use of immediate action requests (IARs), management action requests (MARs), and stop work orders (SWOs). These controls were covered by the following procedures:

- YAEC Station Procedure 10, "Reporting/Tracking/Trending"
- YAEC Station Procedure 3, "Field Surveillance Procedure"
- YAEC Station Procedure 7, "Surveillance Group"
- Framingham Procedure Q-117, "Corrective Action Requests"

Procedures 7 and 10 replaced Procedure 3 in April 1984. The MAR, issued by the construction QA (CQA) supervisor, was used when adequate and timely corrective action did not occur for discrepant conditions discovered during inspections, surveillances, or audits, and it was issued by the CQA supervisor. When the CQA manager (CQAM) determined that conditions existed which required immediate action by a contractor's executive level management, an IAR was prepared and submitted to a licensee vice president for processing and forwarding to the offending contractor. The SWO was used by field QA personnel with the concurrence of the CQAM to halt unsatisfactory work. The IAR was a YAEC home office document used at all Yankee sites and was used for P-H until early 1984, when after a reorganization, the MAR, designed specifically for Seabrook, was used.

3.1 QA Audits and Surveillances

In addition to the review of these P-H and YAEC audit and surveillance procedures, the team selected a number of audit and surveillance reports for review. The reports covered the construction period from 1979 through 1985, and were reviewed to determine the general level of QA applied to P-H welding and NDE and the types of problems identified by QA personnel. In addition, the reports were reviewed for insight into problems with a purportedly high reject rate for pipe welds, excessive repairs to reactor coolant (RC) loop welds, and a high film backlog during late 1983 and 1984.

At the request of the team, the licensee developed and provided lists of YAEC audits of P-H welding and NDE and P-H internal audits which included the audit number, the audit date, and the general subject of the audit. The lists included 56 YAEC and 50 P-H audits. From the lists, the team selected and reviewed 44 YAEC and 22 P-H audits using microfilm files in the records vault. If a more detailed review was required, parts of the audit, and in some cases the entire audit, were copied. The team's review is summarized below and detailed in Appendix 8 to this report.

In general, the audits made use of detailed checklists and were very comprehensive, covering virtually every aspect of the welding program and NDE, including welding, repair welding, radiography, nonconformance reports (NCRs), weld monitoring, corrective actions, and personnel certifications. Although the team did

not note specific audit findings that were tied directly to a high rate of rejected welds and the P-H radiographic film backlog, almost every audit identified problems in the P-H welding program. On the basis of the team's experience, the types and numbers of problems identified appeared to be typical for a large nuclear construction project such as Seabrook. Although individual findings, specifically to areas such as radiographic film viewing and NDE personnel certifications, were not indicative of major problems, collectively the audit findings supported the team's conclusion that continuing problems were experienced with the P-H program. However, the audits and findings indicated that YAEC and P-H had active QA audit programs in place throughout construction that identified construction problems and obtained appropriate corrective actions.

The licensee provided a non-QA log of surveillances performed by YAEC on all contractors. The log listed a total of 9859 surveillances covering the construction period. The team selected 146 of the surveillances covering P-H for further review. The review is summarized below and discussed in detail in Appendix 8 to this report.

Of the 146 surveillances reviewed, 76 covered YAEC review of radiographic film. The team's review indicated that YAEC was involved, on almost a daily basis, in the review of P-H film. YAEC routinely reviewed in-process and completed film. In the early phase (before 1982), the review was less formal and documentation was not always clear about whether deficiencies identified on the surveillances were in-process deficiencies identified by P-H or final film deficiencies identified by YAEC. Discussions with YAEC personnel involved with the film review indicated that if the deficiencies listed on the surveillance report were identified by YAEC as part of a final review of film accepted by P-H, this fact would be clearly stated in the surveillance report. Otherwise, the deficiencies noted were in-process deficiencies identified by P-H as part of the film review process. In addition, in the early phases, YAEC appeared to return unacceptable film to P-H on an informal basis. Documentation of the review process became more formal starting in 1982, clearly indicating that final film packages were being reviewed and accepted by YAEC on a systematic basis. Also, unacceptable conditions were documented more formally using DRs or DNs, although one DR (DR-037), issued in January 1980, was found in the licensee's files.

The team requested for its review the YRT-1 and YRT-2 forms covering the YAEC NDE review group's review of P-H pipe weld final film. The licensee indicated that although the forms had been maintained through construction, they were lost during plant turnover after construction. The licensee also indicated that at that time the records had not been considered as quality records and were not turned over for microfilming because the YAEC review and acceptance of radiographic film were documented on other quality records, that is, the film package records in the vault. However, the team found that Paragraph 6.0 of Procedure 5 required controlling the forms per Procedure 11, which indicated that the records were quality records and should have been maintained, since the procedure requirements had not been changed.

Since the YRT-1 and YRT-2 forms for P-H pipe weld film were not available for review, the team requested the QARs for review. These had also documented in summary form film reviews performed by YAEC. The licensee provided a copy of the QAR log (non-QA record maintained by YAEC). The log identified QAR reports

by number, the group responsible for issuing the reports, and the date the reports were issued. The log covered the period May 1984 - August 1986, and listed 462 reports. Of these, 49 reports covered the activities of the NDE review group. Copies of 48 of these reports, covering the period of May 1984 - December 1985, were obtained from the licensee and the team reviewed them.

The reports listed the activities of the NDE review group for the period covered by the report (typically 1 or 2 weeks). The reports showed that radiographic film packages of P-H pipe welds (both production and backlog), as well as radiographic film for other vendors and contractors, were routinely reviewed for acceptance. Also, closeout of NCRs, DRs, DNs, CSLs, and so forth, that involved the group were recorded. The team's review and evaluation of NCRs, DRs, and DNs are addressed in Sections 14 and 15 of this report.

The eight YAEC CSLs referenced in QAR-083 were reviewed on site by the team using the licensee's microfilm files (copies were not obtained at that time). On June 27, 1990, the team obtained copies of these and 13 other CSLs that discussed P-H pipe welding and NDE issues from the licensee and evaluated them. The team's review of these CSLs is summarized below and the CSLs are listed in Appendix 8 to this report.

The team found that YAEC began issuing CSLs in November 1983, starting with CSL-089, dated November 30, 1983. Apparently, YAEC sometimes used a CSL in lieu of a DR or a DN to cause P-H to take some type of action under its program. The CSLs were used to resolve singular type deficiencies identified by YAEC, such as film exhibiting rejectable type defects (CSL-181 and CSL-214 are examples) and also to identify unusual conditions, such as missing radiographs (CSL-187 is an example). The team concluded that if the issues identified in a CSL resulted in a valid nonconformance, then either YAEC issued a DR or DN or P-H issued an NCR, or each company issued its own report. For example, as noted in CSL-171, DR-626 was issued for "unacceptable conditions," and CSL-214 resulted in P-H issuing NRC-7869. The team also determined, on the basis of its review and telephone discussions with the licensee, that because there were cases in which final film had been rejected by YAEC and the CSL (documenting the condition) had only resulted in action by P-H, including the issuance of an NCR, the YAEC reject rates of P-H final film (discussed in Sections 4 and 14) were biased, since they had been tabulated by the licensee solely on the basis of data taken from the DRs and DNs.

However, the team recognized that these data were tabulated by the licensee and provided to the team "for information only" at its request to help assess the extent of the deficiencies found by the YAEC overview. The team determined that CSL data, if used, would have slightly increased the reject rates provided. As stated in Section 4, the team concluded that the reject rates found by the YAEC overview were considered high and, therefore, established the basis for the 100-percent overviews that the team concluded were necessary to meet its quality requirements. Thus, the additional data would not have affected the licensee's actions under its QA program, nor changed the team's conclusions relative to P-H's deficiencies in radiographic film review.

In summary, the team's review of surveillance reports, QARs, CSLs, DRs, DNs, and NCRs revealed YAEC involvement in the review of P-H pipe weld radiographic film (both in-process and final film) on a continuing basis throughout the

period of pipe fabrication and NDE. With the exception of the missing YRT forms, as discussed above (procedure problem), the team had no problems with the documentation of the YAEC surveillance program. The reports identified numerous problems with the P-H pipe welding and NDE processes that, on the basis of the team's experience, were typical for the type of activity, with the exception of the high level of radiographic film discrepancies identified by the YAEC overview after P-H had accepted the film. The team concluded that the YAEC surveillance program was active throughout construction, generally identifying and obtaining corrective action for the problems identified.

Except as noted above, the team found no problems with the QA audit and surveillance programs and the programs provided an adequate QA overview for a construction project such as Seabrook. The P-H/YAEC audit and surveillance findings supported the team's conclusion that, at least through the 1983 period, P-H continued to experience problems in fabrication and nondestructive examination of pipe welds, even though several changes and improvements were made to its program. These problems, for the most part, reflected administrative-type mistakes involving weld records and RT technique problems.

3.2 High-Level QA Corrective Action

The team reviewed MAR, IAR, and SWO logs and selected the documents that appeared to be related to problems with P-H welding and NDE programs. The documents were reviewed to evaluate their function as a part of the total QA program. The following material summarizes the documents reviewed.

Immediate Action Requests

Of the six IARs issued by YAEC, two were issued against P-H, Nos. 001 and 004:

- IAR-001, dated January 18, 1983, was written for bypassing hold points and recommended the following corrective action:

  (1) Identify to all applicable department levels the importance of adherence to established hold points.

  (2) Follow up on identified nonconformance reports for root cause.

  (3) Evaluate corrective action taken to present time and further steps taken to prevent recurrence.

  (4) Evaluate the necessity and effectiveness of hold-point practices currently in existence with emphasis on action to preclude further violations of hold-point application.

  P-H determined the root cause to be neglect or failure by supervision or craft personnel to follow the details of the process sheet and honor the hold points, and so forth, as defined in procedures.

  P-H corrective actions included meetings with all P-H personnel stressing the importance of hold points and written instructions delineating their

responsibility and corrective action to be taken should further violations occur; more definitive corrective action on NCRs; and constant surveillance, monitoring, and followup auditing to determine effectiveness of corrective actions.

- IAR-004, dated November 4, 1983, was issued because engineering change authorizations (ECAs) for pipe supports were not identified on drawings. This was identified by YAEC Audit SA738CS284.

Management Action Requests

Of the 18 MARs issued by YAEC, 1 MAR related to welding (MAR-4) was issued against P-H.

MAR-4 was issued on July 5, 1984, because of inadequate and ineffective records management. The report cited a records review summary covering the period of June 4-8, 1984, which showed 541 deficiencies in 2416 records reviewed. Typical deficiencies were for the magnetic particle test (MT) report identifying wrong pipe size, inspection signoff and date missing, missing weld stencils, QA final check missing or incorrect dates of QA check, missing process sheet review by ANI and QA, NCR numbers wrong, dwell time missing on the liquid penetrant test (PT) report, and so forth.

Corrective actions included issuance of new procedures and guidelines, personnel changes, additional surveillance of process by YAEC and P-H, plans to hire records experts, and review for accuracy a sample of documents by NDE and QC personnel.

Stop Work Orders

Of the 11 SWOs issued by YAEC, 4 were issued against P-H:

- SWO-1 was issued in April 1979 and pertained to mechanical material erection.

- SWO-3 was issued on December 3, 1981, for P-H exceeding three repairs on weld 1-RH-155-02, F0203 without notification of the construction manager as required by UE&C Specification WS-1. The SWO was lifted on December 18, 1981, after corrective actions were taken.

- SWO-5 was issued on August 25, 1982, to stop work on reactor coolant pipe whip restraints because P-H had not complied with implementing a program covering limited access welding. The SWO was lifted on August 30, 1982, after corrective actions were taken.

- SWO-7 was issued on July 28, 1983, because of failure to record ECAs on drawings. On the basis of meetings and planned corrective actions, the SWO was lifted the same day it was issued.

No problems were identified with the IAR, MAR, and SWO programs.

4 BACKLOG OF RADIOGRAPHIC FILM AND REJECT DATA FROM RADIOGRAPHIC TESTING

During the interview with Mr. Joseph Wampler on April 24, 1990, Wampler indicated concerns with the Pullman-Higgins (P-H) welding and nondestructive examination (NDE) programs relative to a backlog of radiographic film and a high reject rate from radiographic testing (RT). The team addressed these concerns in four ways:

(1) onsite interviews and a telephone interview with Yankee Atomic Electric Company (YAEC) and P-H personnel involved in the review and disposition of film during construction

(2) review of selected RT film and weld control packages

(3) review of nonconformance reports (NCRs), deficiency reports (DRs), and deviation notices (DNs)

(4) review of quality assurance (QA) surveillances

As a result of these interviews and review of the records, the team came to the conclusions that follow.

A substantial backlog of radiographic film packages began in early 1983 and continued into late 1984. This backlog (which ranged anywhere from 600 to 2000 film packages, depending on the time frame before the backlog was reduced to zero) existed for many reasons, including setting film aside (pigeon-holing), the high turnover rate of qualified film examiners at a time when field radiographic work was high, built-in process inefficiencies resulting from the multiple reviews by qualified reviewers which included a period of time (2-4 months) when P-H did not have a Level III examiner on site to perform the final acceptance preceding YAEC review, construction scheduling priorities which did not always permit timely access to backlog welds for reshots and repairs, and poor administrative control and management of NDE and weld fabrication records.

The results of the team's review of radiographic film (see Section 8) indicated that the initial reviews by the P-H Level II reviewers had been performed in a timely manner, and when the Level II reviewer's interpretations required further tests or repairs, these actions had also been processed in a timely manner. However, the quality (adequacy) of the Level II reviewer's assessment, and to a degree the P-H Level III examiner's review, had led to having all film (previously reviewed by the Level II reviewer, or Level III examiner on some occasions) overviewed by the P-H Level III examiner (see YAEC DRs-211, 241, and 527). This action by P-H placed added burden on its Level III examiner, and the team found (from its review of film) that the P-H Level III overviews were not always timely. Thus, the backlog was created by the accumulation of radiographic film waiting for the P-H Level III overview (a review that was untimely).

Management of the backlog was affected by these factors (timeliness or adequacy, or both, of various P-H reviews), in addition to those reasons discussed above.

This backlog prevented the deficiencies that, apparently, were continuing to occur in the welding and NDE processes from being identified and corrected sooner. As a result, people performing field activities kept on making the same mistakes because they didn't know about the errors. When the overviews did identify these deficiencies, several film packages already existed that had to be reshot or repaired. In many cases, these activities took place long after the weld had been fabricated. The backlog created several administrative problems, and it probably created confusion regarding the status of the weld between the time it was filmed and its acceptance or rejection, since many of the backlog weld packages reportedly included multiple shots of the same weld for no apparent reason. As a result of the backlog, some welds were radiographed many times before the weld quality was acceptable.

Many of the reshots could have been prevented had the original film been properly exposed, recorded, and interpreted. The backlog was eventually reduced and the film and welds were reviewed and accepted by the P-H Level III examiner, the authorized nuclear inspector (ANI), and the YAEC reviewer. Additionally, the team concluded that P-H should have provided additional NDE Level II or III assistance sooner to keep pace with production film and to evaluate backlog film sooner. Although P-H experienced problems, including the backlog which impacted construction, the problems did not raise a safety concern because the team determined, with a high degree of confidence, that the weld and radiographic film rejects were properly dispositioned during the construction period, as discussed in Sections 3, 8, 9, 14, 15, and 16 of this report.

Relative to Wampler's concern about a high reject rate for radiographs, the team evaluated data from Wampler's logbook. A summary of the data examined is included at the end of this section. Details for the four days with the highest reject rate for backlog film are as follows:

November 15, 1983	77 film packages read with 9 weld defects and 3 technique deficiencies for a total of 12 rejects; that is, 15.58-percent total reject level and 11.69-percent weld defect level
November 16, 1983	53 film packages read with 8 weld rejects and 3 technique deficiencies for a total of 11 rejects; that is, 20.75-percent total reject level and 15.1-percent weld defect level
November 20, 1983	23 film packages read with 3 weld rejects and 6 technique deficiencies for a total of 9 rejects; that is, 39.1-percent total reject level and 13.0-percent weld defect level
December 2, 1983	23 film packages read with 4 weld defects and 1 technique deficiency for a total of 5 rejects; that is, 21.7-percent total reject level and 17.4-percent weld defect level

The data indicated that the rejection rate levels for weld defects were generally not as high (20%) as Wampler recalled. The overall daily reject rate levels for backlog film were near those claimed by Wampler for only four days during

his employment period, although the total reject rate for all backlog film that he had reviewed was not as high (see the summary of data at the end of this section). Additionally, 59 percent of Wampler's backlog weld rejections were subsequently reevaluated as acceptable by P-H and YAEC, thereby reducing the actual reject rates for backlog welds shown in the summary of data at the end of this section. The team agreed with these reevaluations as discussed in Section 8 of this report.

As discussed in Section 2 of this report, the team found that because of continuing radiographic film problems, multiple overview programs resulted from the various corrective actions carried out by P-H and YAEC. These overview programs created by P-H and YAEC were, in many instances, 100-percent reinspections. As noted in Section 14 of this report, the team found that the YAEC overview of P-H film resulted in high radiographic film reject rates (17.1% in 1983, 31% in 1984, and 12% in 1985). This overview was performed after the P-H Level III overview. These rates included rejects for all reasons. It should be noted (see Section 14 of this report) that only a fraction of a percent was for weld defects. The large majority of the discrepancies were due to poor film quality and administrative defects. Although not recorded by percentage, the P-H Level III overview also resulted in a high radiographic film reject level (supporting Wampler's concern).

As discussed in Section 2 of this report, P-H failed to take timely and effective corrective action to resolve identified deficiencies affecting the RT program. This failure to take timely corrective action resulted in failure to reject some indications (identified by the YAEC overview) that were found to be weld defects that exceeded the American Society of Mechanical Engineers (ASME) or American National Standards Institute (ANSI) B31.1 Code and were repaired. Also, as discussed above, the P-H backlog of radiographic film contributed to this situation by masking these problems and increasing the time needed to achieve corrective actions. The team concluded that the licensee's contractor (P-H) had failed to identify and correct these problems (nonconformances) in a timely manner; this appeared to be in violation of NRC requirements as specified in 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions." Subsequently, however, the licensee, through the YAEC film overview program, did take adequate corrective actions to resolve these problems, so that the final welds and associated film met applicable code requirements.

Since the radiographic film reject data (based on the YAEC overview) were not representative of the actual weld reject rate, the team evaluated non-QA weld reject data maintained by P-H and United Engineers and Constructors (UE&C) during construction (see Section 12 of this report). The data revealed that on a linear inch basis, the overall weld reject rate was within normal ranges for a project like Seabrook. However, the team concluded that the radiographic film review reject rates found by the P-H Level III overviews and the re-reviews by YAEC were higher than normally expected, and indicated that basic weaknesses had existed in P-H's RT program over a long period of time. However, the team recognized that these reject rates were influenced to a degree by the conservative film overviews, as discussed in Section 8 of this report.

From the in-depth inspections performed in this area, the team had a high degree of confidence that the weld and film rejects (identified from backlog and production welds) were properly dispositioned. Although the records for radiograph

reviews contained errors, the final film quality and weld quality were found to be above average. The final radiograph reviews were found to be conservative. Also, the team concluded that the final weld quality and film quality were achieved, in part, because of the 100-percent overviews performed by P-H and YAEC.

Evaluation of Data Taken From Joseph Wampler's Logbook

Total welds reviewed by Wampler during his employment - 787

Total production welds reviewed - 517

Production welds with discontinuities reported in Wampler's personal logbook, which included 16 weld discontinuities and 4 radiographic technique discrepancies - 20

Total backlog welds reviewed - 270

Backlog welds with discontinuities reported in Wampler's personal logbook, which included 27 weld discontinuities and 13 radiographic technique discrepancies - 40

Total percentage of welds rejected versus welds reviewed by Wampler during 4 months of employment - 7.62%

Total production weld reject level, including weld defects plus technique deficiencies - 3.85%

Total production weld reject level (weld defects only) - 3.09%

Total backlog weld reject level, including weld defects plus technique deficiencies - 14.8%

Total backlog weld reject level (weld defects only) - 10.0%

Note: The total number of rejects for backlog welds included eight rejects for porosity with tails, which is an acceptable condition provided the porosity surface area does not exceed the size limitations in the code. The porosity involved with these rejected welds was considerably less than that allowed by the code. Fifty-nine percent of Wampler's backlog weld rejects were subsequently reevaluated as acceptable by P-H and YAEC. The team agreed with these reevaluations.

5 EVALUATION OF QUALIFICATIONS OF PULLMAN-HIGGINS AND YANKEE ATOMIC ELECTRIC COMPANY NONDESTRUCTIVE EXAMINATION LEVEL II AND III REVIEWERS

The team evaluated the qualification and certification program for nondestructive examination (NDE) personnel (P-H and YAEC) involved in radiographic testing (RT) of pipe welds at Seabrook during the 1980-1985 construction phase. The applicable construction codes were the 1977 Edition with Winter 1977 Addenda (77W77) of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section III, and the American National Standards Institute (ANSI) B31.1 Code. In accordance with these codes, American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A, 1975 Edition, as modified by applicable subsections of Section III of the ASME Code, specifies requirements for qualification and certification of NDE personnel. The following P-H procedures implemented these requirements:

- II-3, "Control and Administration of Examination, Qualification and Certification of Nondestructive Examination of Level III Personnel"

- II-2, "Level I and II Nondestructive Examination Personnel - Control & Administrative Examination, Qualification & Certification"

As noted in Section 2 of this report, YAEC reviewed all accepted radiographic film for all P-H pipe welds. This was done by a YAEC Level II reviewer and four contract personnel (two from CODA Technical Services, Inc. and two from United Engineers and Constructors, UE&C). The four contract personnel worked for the YAEC Level II reviewer. All discrepancies identified by the contract personnel were reviewed by the YAEC Level II reviewer before disposition and returning the film to P-H for action. The YAEC film review program was under the overview of the YAEC Level III examiner. If there were any discrepancies identified that could not be resolved between the YAEC Level II reviewer and P-H, the YAEC Level III examiner became involved. In some cases, if P-H and YAEC did not agree, an outside Level III examiner was brought in to aid in the final disposition.

The team reviewed the qualification and certification records for the YAEC Level II reviewer and Level III examiner and the four contractors. The YAEC personnel had many years of experience in RT work and appeared to be well qualified, as substantiated by detailed retrievable records. YAEC did not require the four contract personnel to maintain certification since the YAEC review was a "third party" review over and above required code reviews. However, all four had extensive RT backgrounds and appeared to be qualified for interpreting film. In addition, the two UE&C personnel were certified by UE&C as Level II film reviewers.

As noted in Section 2 of this report, because of the large number of radiographic film discrepancies identified by the YAEC review of film accepted by P-H, P-H had a Level III examiner review all film before submitting it to YAEC. This 100-percent Level III review started about July 1982 in response to Deficiency Report (DR) 211 and continued through the completion of pipe welding and NDE

review of radiographic film (about mid-1985). In addition to reviewing the P-H procedures (noted above) for qualification of NDE personnel, the team reviewed site records of qualification and certification for the nine P-H Level III examiners who worked at the site from 1980 to 1985, and a sample of the nine Level II reviewers employed at the site during the 1978-1986 period. In general, the records indicated compliance with code requirements. However, the team identified the following weaknesses in the records:

- For certification as a Level III examiner, ASNT SNT-TC-1A requires either (1) graduation from a 4-year engineering school plus 1 year's experience in nondestructive testing, (2) completion of 2 years of engineering study plus 2 years' experience as a certified Level II reviewer in the applicable test method, or (3) 4 years' experience as a certified Level II reviewer in the applicable test method. ASNT SNT-TC-1A allows replacing part of the experience requirements in the applicable method with experience as a certified Level II reviewer in other methods "as defined in employee's written practice." The applicable written practice, P-H Procedure II-3, did not define the rules to be followed in substituting experience in other methods. Since the P-H program did not, as a normal occurrence, document experience time by NDE method, it was difficult to determine for a number of the Level III examiners that the required months of experience were met. However, on the basis of the data available in the individual files (résumés, individual's total NDE experience, etc.), the team concluded that all individuals met ASNT SNT-TC-1A requirements for certification and were qualified to perform as Level III examiners.

- Paragraph 9.6.1.f of ASNT SNT-TC-1A requires that copies of current graded examinations, and of grades for all previous examinations, and descriptions of practical test objects be included in the personnel records of certified individuals. This guide was implemented by Paragraph 11.2 of P-H Procedure II-3 (Level III) and Paragraph 10.2 of P-H Procedure II-2, which require, "Copies of all personnel records, experience, education, physical and proficiency examinations, and certifications, as applicable, shall be maintained by the Quality Assurance Manager at the job site where the individual is employed for all levels of qualification." All Level III records reviewed, except for one, contained the latest examination grades, but did not contain copies of current graded examinations and all previous examination grades. The one Level III record also did not include the latest examination grades. During the course of the inspection, the licensee obtained these records from off site. Absence of these examination data from the site (several years after the completion of construction) did not detract from the validity of the qualification and certification process. Common industry practice would be to maintain such records at the site only during the active period of certification.

- For one P-H Level II reviewer, the onsite files did not contain records of experience (past employment). The individual was certified as a Level II reviewer in RT on September 24, 1982, and was evaluated for continuing satisfactory performance on June 21, 1983. The individual left the project on September 30, 1983. On the basis of completeness of the records for other Level II reviewers, the audits and surveillances performed on NDE personnel certification records throughout construction by both YAEC and

P-H (see Section 3 of this report), and the NRC reviews of personnel certification (see Region I Inspection Reports 50-443/83-22 and 84-05 as examples), there is little doubt that these records had existed during the active period of certification. However, the records have less significance since all radiographs that were reviewed and interpreted by this individual had been subjected to additional reviews by a P-H Level III examiner and a YAEC certified Level II reviewer.

Notwithstanding the weaknesses identified in the P-H records, the team concluded that the P-H NDE personnel met code qualification requirements.

6 EVALUATION OF PROCEDURES FOR RADIOGRAPHIC TESTING

The team evaluated the radiographic testing (RT) procedures used by Pullman-Higgins (P-H) during construction at Seabrook. The applicable codes were:

- American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section V, Article 2, 1977 Edition with Winter 1977 Addenda
- ASME Boiler and Pressure Vessel Code, Section III, 1977 Edition with Winter 1977 Addenda
- American National Standards Institute (ANSI) B31.1 Code, 1977 Edition with Winter 1977 Addenda

These codes were implemented by the following P-H procedures:

- IX-RT-1-W77, Radiographic Procedure, Source: IR-192, "Butt Welded Pipe," Winter 1977 Addenda
- IX-RT-3-W77, Radiographic Procedure, Source: IR-192, "Nozzle Welds," Winter 1977 Addenda

The team reviewed all revisions of these procedures. The procedures contained minimum details on source-to-film distance and information relative to calculation of geometric unsharpness (Ug). In addition, during review of film and deficiency reports and deviation notices (see DN-90), the team found that numerous reshots were required because of Ug problems. The team believed that the weak procedure contributed to this problem. Although the procedures could have been strengthened by including additional information relative to calculation of Ug and source-to-film distance, the procedures met code requirements and were adequate to provide good radiographic testing. The above-average final radiographic film quality identified in the film review (see Section 8 of this report) attests to the overall adequacy of the procedures.

7 EVALUATION OF WELDING PROCEDURES

In order to assess the adequacy of welding procedures used by Pullman-Higgins (P-H) for pipe welding, the team reviewed the welding procedure specifications (WPSs), supporting procedure qualification records (PQRs), and the general welding standard (GWS) listed below, used for welding American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Class 1 welds. The procedures were compared with the requirements of Section IX of the ASME Code.

- WPS-24-III-8-KI-12, "Welding Procedure Specification Qualified in the As Welded Condition"
- WPS-250-III-8-KI-A1, "Automatic GTAW [Gas Tungsten Arc Welding] As Welded"
- WPS-251-III-8-BR-A1, "Automatic GTAW Welding As Welded"
- PQR-110, "Procedure Qualification Record 110-8-OB-12 As Welded"
- PQR-120, "Procedure Qualification Record 120-8-KI-1 As Welded"
- PQR-126, "Procedure Qualification Record 126-8-KI-A1 As Welded"
- PQR-133, "Procedure Qualification Record 133-8-KI-12 As Welded"
- GWS-III, "General Welding Standard per ASME Section III," July 8, 1985

In general, the WPSs and supporting qualifications met ASME Code requirements and were consistent with industry practice. The WPSs listed broad ranges of essential and nonessential welding variables rather than specific narrow ranges that would actually be used in welding. Although not the ideal, there was no evidence that this practice had any effect on the quality of welding at Seabrook.

8 RESULTS OF RADIOGRAPHIC FILM REVIEWS

The team wanted to determine whether the licensee's quality controls related to pipe welding and radiographic testing (RT) were applied in accordance with applicable codes, specifications, and licensee commitments. The determination was made by reviewing and evaluating the radiographic film packages and other quality records for the pipe welds reported in Sections 8.1, 8.2, and 8.3 (below) and in Appendix 5 to this report. The team reviewed radiographs of selected pipe welds (see Table 8.1) as well as their associated radiographic inspection reports (RIRs), nonconformance reports (NCRs), deficiency reports (DRs), and deviation notices (DNs). In many cases, the team examined complete quality records (i.e., the completed weld control packages) associated with the welds in question. The team weighted its weld sample significantly to include pipe welds with known (or potential) problems.

8.1 Review of Radiographic Film for the 15 Welds Listed in Senator Kennedy's Letter of March 12, 1990

The team examined and evaluated radiographs for these 15 welds to ensure that the welds conformed to the applicable codes. The team also examined applicable quality records to ensure that the welds had been inspected, evaluated, repaired where necessary, reinspected, reevaluated, and properly documented. The applicable codes for the examination of the welds were the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Sections III and V, 1977 Edition with Winter 1977 Addenda (77W77), for nuclear piping, and the American National Standards Institute (ANSI) B31.1 Code, 77W77, for non-nuclear pressure piping, that is (1) piping classified as non-nuclear but which may cause damage to safety-related systems or components if permitted to fail and (2) non-nuclear systems that must remain functional during and after a seismic event.

The team's review of film for the 15 welds also included additional data for evaluation and assessment as to whether the specific history for the weld involved was typical and reasonable. These data included: date original film was exposed, date it was reviewed, certification level of the first reviewer, disposition of the review, Weld Repair Log dates (if applicable), Pullman-Higgins (P-H) Level III overview examination date and any NCRs resulting from that review, and the date that the Yankee Atomic Electric Company (YAEC) reviewed the film. The team's findings are summarized in Section 8.4 below, and specific findings for each weld are given in Appendix 5 to this report.

8.2 Review of a Sample of Other Radiographic Film Packages

The team selected radiographic film packages for 107 welds from different piping systems for review. The selection criteria used by the team are listed in Appendix 3 to this report, and they provided a range of differences in such variables as code classes, carbon and stainless steel materials, pipe diameters and thicknesses, construction time periods, various Level II and III film interpreters, and potential problem welds, that is, dissimilar metal welds and welds from systems denoted by Wampler as problem areas during his interview

with the team. The selected sample was chosen by reviewing the P-H Weld Repair Log, Wampler's logbook, congressional correspondence, Region I inspection reports, piping isometric drawings, and numerous NCRs, DRs, DNs, and controlled speed letter (CSLs).

The team reviewed these radiographs to determine whether the welds conformed to applicable codes and whether their quality was the result of an appropriate quality assurance (QA) program, that is, whether the welds were properly radiographed, evaluated, repaired where necessary, reinspected, reevaluated, and documented as required by the construction codes, specifications, and licensee commitments. The review included associated NCRs, DRs, DNs, and when applicable, the completed weld control packages. The films also were reviewed to determine if aging had impaired film quality and if the following radiographic requirements were met: technique, film density, geometric unsharpness (Ug) factor, film speed, source location in proximity to film and penetrameter, radiographic sensitivity (i.e., 2-2T), penetrameter specifics (size, number, and location), weld coverage, and documentation (a radiographic inspection report (RIR) signed and dated by a qualified Level II reviewer).

The team also examined the type of historical data for the 107-weld sample as was reported above for the 15 welds listed in Senator Kennedy's letter. This examination was conducted to ascertain whether the history for the welds involved was typical and reasonable for the construction of nuclear power plants. Data examined included: date original film was exposed, review date, level qualification of the reviewer, disposition of the review, Weld Repair Log dates (if applicable), P-H Level III examination date and results of examination, and YAEC's examination date. The team's findings are summarized in Section 8.4 below, and specific findings for each weld are provided in Appendix 5 to this report.

8.3. Evaluation of Welds Listed in Joseph Wampler's Logbook as Potentially Missing Nonconformance Reports

During an interview with the team on April 24, 1990, Joseph Wampler stated that when he left Seabrook he was aware of approximately 16 rejectable welds (based on his film review) on which he needed to write NCRs in order to initiate corrective action. He indicated that he had identified these problems while employed as the Level III NDE examiner for P-H, but because he didn't have enough time to do it, he had not written the NCRs before leaving Seabrook, and he was not sure what had happened to the 16 welds after he left. During the interview, Wampler, at the request of the team, made his daily logbook available for copying.

The team conducted onsite interviews and a telephone interview with YAEC and P-H personnel involved in the review and disposition of P-H pipe weld film. From these interviews, the team found that no one could recall whether there were any outstanding NCRs that Wampler needed to issue at the time he left Seabrook, or that he had issued any when he left. However, personnel recalled the process used for handling film packages, including any problems dealing with the packages, whether identified by the P-H Level III examiner or YAEC reviewers. Personnel were also familiar with the layout of the work desk area and the practice of pigeon-holing film for subsequent review by the P-H Level II or III examiner. It was expressed with certainty that the 16 or so packages Wampler was concerned about had been handled within the established system after his departure.

The team's review of Wampler's logbook revealed that he had identified potential weld defects for 27 welds out of the total of 270 backlog welds that he had reviewed. The team selected these welds for detailed review. Six of these had been previously identified in Senator Kennedy's letter. The team also reviewed one additional weld (1-CO-4059-04-F0403) about which Wampler had expressed a concern during his interview with the team. This weld was not identified in Wampler's logbook as a backlog weld, and Wampler had signed the RIR indicating his acceptance. The team was unable to find any record (other than Wampler's logbook) that documented his rejection of the 27 backlog welds.

The team reviewed the radiographs and RIRs for all 28 welds. For the 27 welds identified as rejected (for weld defects) in Wampler's logbook and not documented in a nonconformance report, the team assessed whether the discrepancies had been identified later by P-H or YAEC and properly dispositioned. The team's findings are summarized in Section 8.4 below, and the specific findings for each weld reviewed are provided in Appendix 5 to this report.

8.4 Findings and Conclusions

The team found the final welds were of good quality, and in all but one case (discussed below) the final welds complied with the minimum requirements of the specified national code standards. In many cases, the welds exceeded these standards. The welds were smoothly blended with the base materials and the volume of the welds (through-wall) was clean. Weld discontinuities or film discrepancies which approached rejection criteria, or that otherwise could have become the subject of differing opinions resulting from the subsequent reviews, were repaired. Discontinuities detected by radiographic testing (RT) in the initially finished welds were generally very small and not representative of improper welding, but were isolated indications that are normally seen in present-day, large-scale welding operations at nuclear power plants. The team recognized that the contractor had performed in-process RT on the reactor coolant (RC) loop pipe welds which eliminated some of the more major defects before the code RT.

The team found one previously unidentified discrepancy. Weld 1-DG-4351-01-F0101 (26-inch diameter, 0.375-inch wall thickness, carbon steel, circumferential weld in diesel generator 1A exhaust line) had a code-rejectable linear indication (slag, about 3/8 inch long). This weld indication was not identified during the P-H and YAEC reviews which had accepted the film. YAEC's Level III examiner re-reviewed the film and agreed with the team's finding. The maximum code-allowable indication for this thickness of weld was 1/4 inch. The weld was a B31.1 Code pipe weld which was not safety related, except for seismic considerations. The indication was faint and was easy to overlook. The licensee performed an engineering evaluation (IMS H10.02.13) of this indication and determined that the weld in its existing condition was acceptable for its design service conditions. The team concurred with this engineering evaluation.

The team also determined that radiographic techniques, penetrameter selection, and film development processes were effectively performed for radiographs representing the final weld condition. Radiographic sensitivities always met, and generally exceeded, code requirements (minimum code-required sensitivities were listed on the RIRs). However, the film package RIRs, especially for RC piping, were confusing in some instances because of incorrect entries made during the

initial radiography for pipe wall thickness, weld thickness, and pipe diameters. As a result, incorrect techniques were initially used to perform some radiography which resulted in radiographic geometrical unsharpness (Ug), density errors, and penetrameter placement discrepancies. These problems were subsequently discovered (primarily by the P-H and YAEC overview examiners), and radiographic reshots of the welds were required. YAEC also corrected the associated RIRs. However, the team found that errors relative to RC pipe diameters were still listed on some RIRs. The team determined that these errors did not make these radiographs unacceptable.

The team concluded that the licensee had reviewed the final radiographs thoroughly. They were normally reviewed for acceptance by at least three separate radiographic examiners (P-H Level II, P-H Level III, and YAEC), although the national codes only required the Level II review. In many cases, the films were reviewed several additional times by different Level II and III examiners because of technique problems identified by the subsequent P-H and YAEC reviews and commitments made by P-H to correct these errors. YAEC also reviewed and required RT reshots to ensure that final radiographs and welds were acceptable. Radiographic interpretation and acceptance were conservative. For example, very small discrepancies such as "porosity with tails," which should have been classified as "porosity and measured for acceptance," were evaluated by P-H as "porosity and lack of fusion." The-lack-of fusion classification would cause the weld to be unnecessarily rejected when the actual total indication length was less than 3/32 inch.

The team determined that apparently Wampler had been laying aside (pigeon-holing) film that he had read and rejected. This occurred with film that was in the backlog and not currently produced film. The team interviewed several people who stated that Wampler had more work to do than one person could reasonably handle. His responsibilities included the duties of radiation safety officer as well as P-H's Level III examiner on site, responsible for overviewing all daily production film and reviewing all film that was backlogged. As discussed in Section 4 of this report, the team concluded that P-H should have provided additional NDE Level II or III assistance sooner. Generally, when a weld was rejected during the first review by the P-H Level II or Level III examiner or when Wampler rejected a production weld, the necessary rework was scheduled immediately. However, when Wampler rejected a backlog weld, he apparently took no action other than making an entry in his personal logbook. Reidentification of the discrepancy was dependent on a separate subsequent review, and lengthy delays (over a year) often had occurred before the necessary corrective action was initiated. Thus, Wampler's apparent lack of formal action regarding his rejection of backlog welds (as required by the governing procedures) contributed to delays in correcting the deficiencies involved.

As noted above, the team identified 27 backlog welds listed in Wampler's logbook for which he should have initiated corrective action, including issuance of NCRs in several cases. However, these weld discrepancies had apparently not been formally reported to P-H personnel at the time Wampler left Seabrook. The team concluded that these welds constituted the complete population of welds on which Wampler intended to write the 16 NCRs. These included 9 ASME Class 2 welds, 17 ANSI B31.1 welds, and one ASME Section VIII base material repair. The ANSI welds were considered particularly relevant because even though they were not safety related, they had been reviewed and accepted by the licensee under the same overview programmatic controls as the ASME welds. They were

also considered to represent an adequate sample for review in response to congressional concerns expressed about non-nuclear welds. Weld 1-CO-4059-04-F0403 was added to the sample as a result of the interview with Wampler because he indicated it represented an example of the level of confusion that existed during his attempt to organize the backlog of radiographic film packages. (However, Wampler did not indicate that it was a backlog weld.)

The team examined all 28 welds to determine whether appropriate action had been taken to ensure that the welds were repaired or other appropriate disposition had been made. In the case of weld 1-CO-4059-04-F0403, Wampler and the licensee had taken appropriate actions to correct the weld condition and obtain the final radiographs. Actions taken by the licensee on the 27 welds (from Wampler's logbook) were as follows.

Nine ASME Welds

Three of the welds rejected by Wampler were identified by the P-H or YAEC overview process and NCRs were issued to correct the discrepant condition. The P-H/YAEC overview process also showed that radiographs for two welds rejected by Wampler were inadequate because of incorrect technique, which caused the film to exhibit geometrical unsharpness (Ug) beyond the limits allowed by the ASME Code (one of these also had to be reshot to satisfy a previous rejection through one of the NCRs referenced above). These two welds were radiographed again using the correct technique, and the indications noted by Wampler were not present. These two welds were reevaluated as acceptable. The radiographic films for the reexamined welds were excellent in quality and demonstrated sensitivities that exceeded minimum code requirements. The team's evaluation of these radiographs agreed with the overview results in that no rejectable indications were observed in the final radiographs. Two other welds were also accepted when their radiographs were reevaluated. The final three ASME welds were subsequently removed as a result of engineering change authorizations (ECAs), which authorized replacement of the valves associated with the weld joints and modification of the piping. The licensee and the team reviewed the radiographs for the new welds and found them acceptable. (Thus, for these three welds, film rejected by Wampler could not be evaluated because the film of the original weld had been discarded; the code does not require that the film be retained.)

Seventeen ANSI B31.1 Welds

The final status of the 17 ANSI B31.1 welds rejected by Wampler was as follows. NCRs were issued for two of the welds. One weld was removed as a result of a system design change. (Thus, film rejected by Wampler for this weld could not be evaluated because the film had been discarded.) Three welds not meeting density or Ug requirements were reshot and accepted. Eleven other welds rejected by Wampler were reviewed and accepted by P-H and YAEC reviewers. The team concurred with these reviews.

ASME Code Section III Repair

One NCR was issued on the ASME Code Section VIII repair clarifying that radiography was not required.

The team found that, in all cases, further reviews had been performed and properly dispositioned and adequate corrective actions were subsequently completed by the licensee. The team concluded, on the basis of corrective actions taken or subsequent evaluations performed by the licensee, that discrepancies noted by Wampler were effectively removed or reworked. Because the licensee had taken adequate action for all of these welds, the team concluded that there were no "missing" NCRs associated with weld discrepancies discovered by Wampler (as recorded in his logbook) while he was employed at Seabrook Station. However, the team found that P-H had not issued an NCR to address the fourth repair to a non-safety-related ANSI B31.1 Code weld (1-CO-4063-01-F0101) as required by established procedures (see Section 12 and Appendix 5 to this report).

The team's review of the radiographic film and certain associated records for the 28 welds showed that Wampler was very conservative in his review regarding weld discontinuities. However, weaknesses were identified in his evaluation of acceptable film techniques, particularly for factors involving Ug. The team also had some technical differences with Wampler's film interpretations for some types of defects ("porosity with tails" was an example).

From its review of the data for the 145-weld sample (see Appendix 5 to this report), the team concluded the following:

(1) Radiographic film coverage of all welds was adequate.

(2) No instances were found of radiographic film falsification or improper radiography of welds because of inaccessibility.

(3) In isolated cases, the P-H Level III reviews had not been performed.

(4) All films were reviewed by a P-H Level II or III film interpreter.

(5) The P-H Level II review was timely.

(6) The P-H Level III review was not always timely.

(7) All final films were reviewed by a YAEC reviewer.

(8) The films were of archival quality and no browning or yellowing of the film was noted.

(9) All films requested by the team were readily available except for those of welds that had been cut out. In these instances, the team was given the applicable engineering change authorization.

(10) In most cases, films showing weld defects that had been repaired were also available in the film packages provided (although not required by code).

In summary, on the basis of its evaluation of the radiographic film and certain associated records for the selected weld sample, the team concluded that the final film quality and weld quality of these welds were in compliance with applicable construction codes (ASME and ANSI B31.1, 77W77) with the exception of one ANSI B31.1 weld as discussed above. The results of this review further supported the team's conclusion regarding the uniform application of the

licensee's overall QA program during the fabrication and examination of pipe welds at Seabrook Station. Specific team findings for the welds examined are provided in Appendix 5 to this report.

Table 8.1 Pipe weld radiographs selected for review

Welds Listed in Senator Kennedy's Letter

1-RC-3-01-F0102	1-MS-4013-02-F0201*
1-RC-9-01-F0102	1-MS-4005-20-F2003*
1-RC-10-01-F0101	1-MS-4005-22-F2204*
1-RC-10-01-F0102	1-MS-4009-01-F0109*
1-RC-49-01-F0101	1-MS-4012-02-F0201*
1-RC-49-01-F0102	1-MS-4016-02-F0204*
1-RC-49-01-F0103	2-CBS-1214-F011
	2-CBS-1214-F015

NRC Weld Sample

1-CBS-1201-05-F0507	1-FW-4609-03-F0305
1-CBS-1214-05-F0503	1-FW-4626-01-F0103
1-CBS-1214-05-F0512	1-FW-4628-02-F0201
1-CBS-1216-04-F0403	1-FW-4630-01-F0114
1-CBS-1216-06-F0607	1-FW-4634-03-F0303
1-CBS-1225-08-F0805	1-MS-4001-F0102
1-CC-821-F001	1-MS-4005-10-F1001
1-CC-821-F002	1-RC-2-01-F0101
1-CC-821-F003	1-RC-2-01-F0102
1-CC-821-F004	1-RC-2-01-F0103
1-CC-821-F019	1-RC-3-F0101
1-CO-4053-30-F3001	1-RC-4-01-F0101
1-CO-4068-08-F0807	1-RC-5-01-F0101
1-CS-357-F0406	1-RC-5-01-F0102
1-CS-365-01-F0101	1-RC-5-01-F0103
1-CS-365-01-F0111	1-RC-6-01-F0101
1-CS-366-02-F0203	1-RC-6-01-F0104
1-CS-374-1-F037	1-RC-7-01-F0101
1-CS-374-10-F001	1-RC-7-01-F0102 & BMR-103
1-CS-377-01-F0103	1-RC-8-01-F0101
1-CS-431-02-F0203	1-RC-8-01-F0102
1-CS-432-03-F0301	1-RC-8-01-F0103
1-CS-523-01-F0101	1-RC-11-01-F0101
1-DG-4351-01-F0101	1-RC-11-01-F0102
1-DG-4351-01-F0102	1-RC-11-01-F0103
1-DG-4351-01-F0103	1-RC-11-01-F0104
1-DG-4355-01-F0112	1-RC-13-02-F0202
1-DG-4355-01-F0113	1-RC-13-04-F0403
1-DG-4363-01-F0101	1-RC-13-07-F0703
1-DG-4363-01-F0102	1-RC-13-07-F0704
1-DG-4363-F0112	1-RC-15-04-F0403
1-FW-4600-06-F0602	1-RC-15-05-F0504
1-FW-4607-03-F0309	1-RC-15-07-F0702
1-FW-4607-17-F1704	1-RC-30-01-F0101

*Also noted in Joseph Wampler's logbook.

9 EVALUATION OF WELD CONTROL PACKAGES

The team reviewed weld control packages and associated records for welds in both American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Class 1 and 2, and American National Standards Institute (ANSI) B31.1 Code piping systems to verify that the fabrication and construction were documented as having been performed in compliance with the licensee's commitments. The licensee had committed to fabricate and inspect the safety-related piping to the ASME Code, Section III, 1977 Edition with Winter 1977 Addenda (77W77). The non-safety-related critical piping was to be fabricated and inspected to the ANSI B31.1 Code.

The team reviewed 15 weld control packages for compliance with the requirements listed below contained in the ASME Code, Section III, and 6 weld packages for welds classified as non-safety-related critical piping constructed to ANSI B31.1. The B31.1 weld packages were to be controlled to the same requirements as the ASME weld packages stated below. The team also reviewed the radiographs and associated radiographic inspection reports for these welds as discussed in Section 8 of this report.

(1) Paragraph NA-4450, "Control of Fabrication Processes," stated, "The Manufacturer or Installer shall operate under a controlled system such as process sheets, shop procedures, check list, travelers, or equivalent procedures. Measures shall be established to assure that processes including welding and heat treating are controlled with the rules of this section of the code...."

(2) Paragraph NA-4500, "Examinations, Test and Inspection," stated, "Inprocess and final examinations and tests shall be established to assure conformance with documented instructions, procedures and drawings."

(3) Paragraph NA-4520, "Hold Points," stated, "Mandatory hold points, at which witnessing or examination is required...and beyond which work shall not proceed without consent...shall be indicated on the process sheet."

(4) Paragraph NA-4800, "Corrective Action," stated, "During...installation, measures shall be established to assure that conditions adverse to quality such as failures...and nonconformances are promptly identified and reported to appropriate levels of management."

(5) Paragraph NA-5241, "Stipulations of Inspections Prior to Issuance of Process Sheets or Controls," stated, "Prior to issuance of process sheets...the installer shall review them...with the Inspector (Authorized Inspector) who shall then stipulate the inspections he intends to make in order to fulfill the requirements of...."

(6) Paragraph NB-4453, "Requirements for Making Repairs of Welds," stated, "Unacceptable defects detected visually, by the examinations or test required by NB-5100 or NB-6100 (nondestructive examinations) shall be

removed...(and) the area prepared for repair shall be examined and comply with the requirements of NB-5340 (magnetic particle) or NB-5350 (liquid penetrant). The examination of weld repairs shall be repeated as required for the original weld except that repair of defects originally detected by magnetic particle or liquid penetrant methods, when the repair cavities do not exceed the lesser of 3/8 inch or 10% of the thickness, need only be re-examined by the magnetic particle or liquid penetrant method."

(7) Paragraph NB-5120, "Time Of Examination Of Welds," was silent regarding the stage (time) of fabrication that a weld is required to be radiographed. However, Appendix I of the ASME Code, Section III, Paragraph IX-3331, "Preparation of Weld Surfaces," stated that welds to be radiographed shall have the weld ripples or weld surfaces irregularities, on both the inside and outside, removed by any suitable mechanical process to such a degree that the resulting radiographic image due to any irregularities cannot mask or be confused with the image of any unacceptable discontinuity. This requires that the weld be finished before the rules of Appendix I apply regarding radiographic sensitivity and technique. Therefore in-process radiography does not require compliance with Appendix I of the ASME Code, Section III. For the records reviewed, the team focused on code compliance of radiographs taken after the weld was finished, visually inspected, and accepted.

(8) Paragraph NB-4132," Documentation of Repair Welds of Base Materials," stated, "The...installer who makes a repair weld shall prepare a report which shall include a chart which shows the location and size of the prepared cavity,...of repair welds exceeding in depth the lesser of 3/8 inch or 10 percent of the section thickness."

(9) Additionally, the team evaluated the weld control packages to determine whether or not all welds were accessible for appropriate nondestructive examinations, particularly radiography of welds and weld repairs.

Findings and Conclusions

Item (1): The team verified dual repair process sheets were used as required by the controlling procedure for repairs. The first process sheet was dedicated to excavation, dimensional characteristics, and evaluation of the defective area. If weld repairs were required, the team verified a second process sheet for repair welding was used to document the repair requirements. The team verified all welding documented on the process sheets included a welding procedure specification, inspection criteria were specified for the weld/repairs, and verification by appropriate quality control (QC) inspections was documented as having been accomplished. The team verified the process sheets contained controls for preheat, postheat, and interpass temperatures. The team verified the process sheets identified the welder (by symbol), and the weld material consumed was documented on the process sheets. The team found the documentation contained numerous corrections and pen-and-ink-type changes which made the documentation difficult to review. For example, changes to revisions of procedures referenced on the process sheet were routinely documented to reflect the applicable procedure in effect at the time the tests were performed. The changes were made properly in accordance with requirements. One line was drawn through the change and then the change was entered, initialed, and dated. Also, numerous clarifications made on the front and back of the process sheets created confusion for

the team when reconstructing the events based on the process sheet review. The changes occurred at various stages of weld completion. Some were made at the time the process sheets were issued, many of the changes were made during the welding and inspection processes, and several of the corrections were made when the documentation reviews were performed. With minor exceptions, all entries were properly documented.

The team noted some unauthorized grinding (weld RC-3-F0101 is an example) was apparently performed on a weld to remove defects. "Unauthorized" means there was not an approved step on a process sheet to perform the grinding. The contractor had identified this deficiency, issued a nonconformance report (NCR), and satisfactorily repaired the area.

Some process sheets were missing from the package (welds RC-49-F0103 and RC-3-F0102 are examples); however, the team found the contractor had documented the missing process sheets on an NCR and implemented corrective actions. In some cases, the process sheets were reconstructed on the basis of available data.

The team noted numerous weld repairs had been made to the reactor coolant loop piping during fabrication on the basis of the results of in-process weld inspections (radiography) and were indicative of some problems with the automatic welding process; however, all areas were repaired successfully and passed all required nondestructive examinations (NDEs) after the repairs were finished. The records indicated the welds were checked for radial shrinkage, and when abnormal conditions were detected, corrective actions such as weld buildup were taken. The radial shrinkage issue is discussed in more detail in Sections 12 and 13 of this report.

After welding the reactor vessel/steam generator to the reactor coolant loop piping, numerous defects were discovered by liquid penetrant examinations on the surfaces adjacent to the welds. This problem was associated with an Inconel weld made at the factory. The contractor either was unaware that an Inconel weld existed nearby or inadvertently welded stainless steel onto the Inconel, causing cracks to occur. Extensive repairs were required to correct the cracking, and eventually all repair areas were adequately corrected and properly documented. This issue is discussed in more detail in Section 10 and Appendix 7 to this report.

Item (2): The team reviewed each process sheet to verify NDEs required by Section III of the ASME Code were specified at the proper sequence, referenced an approved test procedure including revisions, and were signed off as being completed according to the procedure. The team did not attempt to verify that in-process radiography was performed according to an approved procedure because, from the team's experience, it is not possible to achieve the technique requirements specified in Appendix I to the ASME Code. For example, obtaining the specified film density is a problem because of the transition changes from the base material (full thickness) to the weld thickness (less than full thickness). Also, as discussed earlier, Appendix I requirements only apply after the weld is finished and the surfaces (transitions from base material to weld material) are adequately prepared.

The team noted liquid penetrant examinations on some welds (RC-10-F0101 is an example) were performed at temperatures below the qualified range (58°F rather

than 60°F). The contractor had identified the deficiency, written an NCR, and requalified the procedure to the satisfaction of the authorized nuclear inspector (ANI).

The team noted instances in which the liquid penetrant inspections were apparently not performed by the inspector who signed the test as complete (welds RC-3-F0101 and RC-9-F0102 are examples), and cases in which visual inspections were signed (initialed) by an unknown person (RC-49-F0103 is an example). In each case, the team found the contractor had previously identified the deficiency, issued NCRs, and implemented corrective actions.

The team found the contractor had properly issued NCRs and disposition was taken in a timely manner on all conditions observed.

Item (3): The team verified hold points were specified on the process sheets and were signed off and dated as required. The team's review of NCRs revealed some instances in which QC hold points had been bypassed; however, they were apparently isolated instances and were appropriately resolved by the NCR. None were identifed by the team during its review of the weld control packages.

The team found that with the exception of bypassed hold points, as identified on NCRs, the program was properly implemented.

Item (4): The team determined nonconformances (conditions adverse to quality) were promptly identified and corrected by the contractor's program through the issuance of NCRs. The team found the NCRs were generally issued in a timely manner. The exceptions noted were conditions that occurred that the contractor was not aware of. Some examples were

(a) Radiographic film that was awaiting the Pullman-Higgins (P-H) or Yankee Atomic Electric Company (YAEC) overview (backlogged film), and was subsequently rejected, frequently did not receive NCRs until several months after the film was originally exposed and initially accepted. However, once the nonconforming condition was known (with the exception of rejects listed in Wampler's logbook), NCRs were issued promptly.

(b) Wall thickness measurements were accepted on the basis of erroneous minimum wall thicknesses entered on the process sheet. Approximately 10 months later, when the nonconformance was identified during a records review, an NCR was issued promptly.

(c) A visual inspection was signed off inappropriately and resulted in a missed inspection that was not identified until some 19 months later. When the nonconformance was identified, an NCR was issued promptly.

(d) Liquid penetrant inspections, initially performed and accepted by an individual who did not always perform the test, found rejectable defects when the tests were re-performed (up to a year later). When the nonconforming conditions were identified, an NCR was issued promptly.

The team found the contractor's program for issuing and resolving nonconformances was effective in identifying and implementing corrective actions.

Item (5): The team reviewed weld control packages to ascertain that before the work package was issued, the ANI had the opportunity to review each package and stipulate required hold points. The team determined process sheets contained work activities or inspection functions that were signed off as having been reviewed by the ANI before the package was issued and again after the process sheet activities were completed. Various hold points had been entered by the ANI and were signed off as having been completed.

The team found these areas were implemented correctly.

Item (6): The team reviewed weld control packages to ascertain excavated cavities were examined by the required surface examinations, before the cavity was re-welded. Also, the team verified proper NDEs were performed or re-performed after the cavities were completed. For in-process radiography, the team verified any resultant cavities from repairs received a surface examination before being re-welded, and if the cavity extended into the base material, a proper cavity chart was prepared.

Except for through-wall cavities, which a code case addresses and exempts from surface examinations, the team found required NDEs were documented as having been performed. Additionally, base material repairs were documented as required.

Item (7): The team reviewed the weld control packages to ascertain radiography and other required nondestructive examinations were performed after welding and surface preparation were completed. If subsequent surface grinding (preparation for inservice inspections) was performed, the team verified the required NDEs were repeated.

The team found this area was properly implemented.

Item (8): The team reviewed the weld control packages to ascertain that during defect removal, any cavities extending into base metal were charted to show the size and location of the cavity and whether the cavity resulted in a weld repair exceeding the lesser of 3/8 inch or 10 percent of the section thickness.

The team found this area was properly controlled.

Item (9): The team concentrated its review of weld control packages on the accessibility of the weld for radiography, particularly since the film backlog resulted in some defect repairs being performed well after the time the original film was exposed and assumed to be acceptable.

The team determined all available quality assurance (QA) records indicated welds were accessible for all required radiographic examinations.

In summary, the team concluded the welds were fabricated in accordance with applicable codes. The problems that occurred during the fabrication and NDE processes, as discussed previously, were properly identified and dispositioned by the licensee during the construction period in accordance with the licensee's overall QA program. The problems noted were not significantly different from those noted by the team at other nuclear construction projects like Seabrook except, as indicated previously, the weld control packages were difficult to review because of their volume, complexity, numerous corrections, and pen-and-ink-type changes.

10 EVALUATION OF BASE MATERIAL REPAIRS TO REACTOR VESSEL AND STEAM GENERATOR NOZZLES

The team was concerned about the numerous weld repairs made in the vicinity of the reactor vessel (RV) and steam generator (SG) nozzle low-alloy steel (P-3) base material that had received a final post-weld heat treatment (PWHT) at the factory. The concern arose because the records initially provided to the team did not have cavity charts with the process sheets, or other records documenting the size and location of the repaired area, to show that the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section III, was met when the repairs were performed, and the low-alloy steel base material may have been exposed.

Pullman-Higgins (P-H) experienced cracking problems on the outside diameters of weld surfaces because of the unfavorable interaction between materials that occurred when P-H unknowingly welded stainless steel onto Inconel. When this happened, the weld surface cracked.

The RV and SG nozzles are low-alloy steel P-3 material and the reactor coolant loop pipe is stainless steel P-8 material. Since P-3 material requires final PWHT at 1100°F, and PWHT at this temperature causes sensitization of P-8 material, the RV and SG manufacturers attached P-8 safe-ends to the P-3 nozzles during shop fabrication. This was done so that welding and, thus, an 1100°F PWHT would not be required on the P-3 material in the field. The final PWHT was performed at the factory and was not to be repeated in the field, as long as the field weld was of P-8 material. Field welds like those in the main steam piping (P-3 to P-3) would receive a PWHT after field fabrication without the concern of weld sensitization.

The Seabrook construction code (ASME Code, Section III, Paragraph NB4640) allows limited repairs to P-3 materials after PWHT without re-PWHT provided certain criteria are met. Specifically, the code only allows these repairs when the depth of the repair is not greater than 3/8 inch and the individual area is not greater than 10 square inches. From the review of the process sheets, the team could not ascertain the repairs had been limited to the criteria stated above. The team's review of various nonconformance reports (NCRs) and weld control packages (process sheets) disclosed numerous repairs had been made in the vicinity of the carbon steel to Inconel/stainless steel juncture.

The team advised the licensee of this concern and asked the licensee to reevaluate all repairs made on the welds connecting P-3 and P-8 materials (RV and SGs) to the reactor coolant loop piping and produce sufficient records to show the repairs had been made properly. The licensee sent this information by express mail and the team received it on May 23, 1990.

The information included 13 weld control packages involving repairs in the field, either in the low-alloy steel, Inconel, or stainless steel materials. These packages included additional information, such as NCRs, records obtained

from Westinghouse, and in some cases additional information gathered and reconstructed on site. The weld control packages are listed in Appendix 7 to this report.

The team determined all areas where the potential for welding on low-alloy steel existed had been repaired using a welding procedure qualified for P-3/P-8 materials. The areas of repair were less than 3/8 inch deep and less than 10 square inches in surface area. The team reviewed records of the contractor's certification on a certificate of compliance that the repairs conformed to ASME Code Section III, Division 1, 1977 Edition with Winter 1977 Addenda (77W77).

The team concluded that the repairs made to low-alloy steel base material were controlled in accordance with the ASME Code. Repairs were performed using special qualified weld procedures; that is, procedures were qualified using a half-bead technique. The team verified that the welds received a modified PWHT for 2 hours at a temperature of 450°F, as required by the ASME Code. The team also verified that nondestructive examinations were carried out in accordance with special requirements; that is, welds were examined by magnetic particle or liquid penetrant, or both, after the weld was finished and allowed to cool for 48 hours. This inspection gave assurance that delayed hydrogen cracking had not occurred. The combination of half-bead welding, modified PWHT, and delayed nondestructive examination is designed to reduce heat-affected zone hardness and weld stresses, thus reducing the probability of cracking without performing an 1100°F PWHT after repairs.

The team determined sufficient records existed to show each of these weld repairs had been performed in accordance with the special requirements specified in the ASME code of record. The team had no further questions on this issue.

11 EVALUATION OF SIGNATURE ON WELD PROCESS SHEETS

During the interview with Joseph Wampler, he stated that weld package RC-9 contained a signature purportedly his, but it was not his. The signature in question was printed and dated and he always signed in a different manner. During the interview and afterwards, he was unable to point this entry out to the team, but said he would send it later, if he found it. The team received nothing further on this matter.

The team reviewed many weld packages, including the RC-9 package, paying particular attention for entries using Wampler's name. The team noted that weld package RC-9-F0101, process sheet 1958, sheet 1 of 2, operation 17, "Radiography," was signed off as acceptable by J. Wampler on August 20, 1983. Additionally, the team found another process sheet attached to the one signed by J. Wampler that highlighted step 17. The attached sheet was stamped "Document Enhanced" and in the signoff area "J. Wampler, 8-20-83" was printed. Documents are enhanced to make a particular event legible, in this case, to make J. Wampler's signoff legible for future reviews and reproduction of the record for archival purposes. The team found this practice is controlled by a procedure.

Additionally, the team reviewed the Pullman-Higgins (P-H) log that contained the names, signatures, and initials of P-H quality control inspectors. J. Wampler's signature, listed as No. 442 on the log, was compared with the signoff signature in question, at step 17, to verify they matched. Also, the team reviewed several process sheets and compared J. Wampler's signature with the signature at step 17. In each case, the signatures matched.

The team noted J. Wampler's name printed on weld package RC-4-01-F0101; apparently he did not print it. Page 14 of this process sheet, step 54, "Radiography Final Weld," lists the completion of the test as follows: "S. Volk for J. Wampler on 11-8-83, signed by S. Volk 5-9-84." When this entry was made, J. Wampler was not employed at Seabrook and S. Volk was the P-H NDE Level III examiner.

The team's review of this item disclosed that Wampler had reviewed and accepted this weld on November 8, 1983, that is, Wampler had signed and dated the radiographic inspection report (RIR) for weld RC-4-01-F0101. This RIR was signed and dated the same way J. Wampler signed and dated all the other RIRs reviewed by the team. Therefore, the team concluded that J. Wampler's successor (S. Volk) noted the film had been previously accepted by another Level III examiner and corrected the oversight (missing signature) on the process sheet by printing Wampler's signature and signing for him during the record assembly process for this weld package.

The team determined that on at least two occasions the name J. Wampler was printed on a process sheet by someone other than J. Wampler. In each case, the team found that the entries were proper and in agreement with accepted practices. Backup documentation supported the new entries. This issue is considered closed.

12 REVIEW OF LICENSEE'S PROGRAM FOR REPAIRING WELDS AND ISSUING NONCONFORMANCE REPORTS

The team reviewed the Pullman-Higgins (P-H) and United Engineers and Constructors (UE&C) methods for limiting repairs to welds. The team also reviewed P-H's program for monitoring and correcting multiple repairs to welds and base materials.

P-H controlled the number of weld repairs allowed by issuing a nonconformance report (NCR) when a weld was repaired more than three times. This program was an internal requirement established by P-H to help control weld repairs, and it was more than the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) required.

The team reviewed the following procedures that controlled this activity:

- UE&C Procedure WS-1, "Requirements for Welding and Nondestructive Examination for Nuclear Components & Nuclear Power Piping"

  Paragraph 3.8.2 of this procedure specified that unacceptable weld defects detected by the methods required by the applicable subsections of the ASME Code, Section III, Division 1, shall be eliminated and repaired. Specific approval had to be obtained for repair welds after the third cycle of repair, and in these cases, if specific approval was not received, the weld had to be cut out 100 percent, and 1/8 inch more had to be cut out on each side of the joint.

- P-H Procedure JS-IX-14, "Defect Removal and Repair by Welding"

  Paragraph 1.3 of this procedure specified that in-process conditions that could be corrected during the welding operation within the controls established on the process sheet did not need to be reported under this procedure.

- XV-2, "Procedure for Handling Nonconformances," issue date June 22, 1979, and Revisions 10, 12, 13, and 17 through 23

Additionally, the team interviewed licensee personnel who were familiar with the construction practices used during the piping fabrication at Seabrook.

The team determined that the issuance of NCRs, based on repetitive weld repairs, varied somewhat during the time piping was fabricated at Seabrook, as a result of different interpretations of procedure requirements and because of changes made to the procedures themselves. For example, Paragraph 8.4.3 of Procedure XV-2 required that after three unsuccessful repairs the weld was to be cut out. Revision 17 to this procedure dated May 16, 1983, revised this requirement to state: "Repairs required in base metal or welds after the third cycle of repair shall require an NCR."

Normal in-process repairs made during welding were not to be counted in determining the number of repairs, that is, if three repairs were made during the course of completing the weld, they did not count toward the three allowed repairs and, therefore, did not require an NCR. However, some exceptions were made to this practice; for example, if a planned inspection, such as half-fill radiography, was performed during the welding process and the results required a process sheet for making the repairs, then the process sheet would show "R1" (repair 1) and R1 would be counted as one of the three repairs. However, if the defect could be removed without necessitating a change to the existing process sheet, it was not counted as one of the three repairs.

During the construction phase (late 1984), P-H changed the requirements of counting in-process repairs toward an NCR condition. Paragraph 1.0 of Procedure JS-IX-14 (December 10, 1984), allowed in-process conditions, upon discovery, to be corrected during the welding operation within the controls established on the process sheet and did not require reporting such repairs. On many of the process sheets reviewed by the team, the number of repairs that occurred in process was lined out and initialed and not counted toward the three repairs. After completing the weld sequence, any repair made to the weld required a process sheet and was counted as a weld repair.

The weld is considered to be finished after completing the weld deposit to complete fill, after surface preparation is completed, and after any required visual examinations are completed and accepted. Procedure JS-IX-14 clarified this as follows: "As an example, if during a visual inspection following a surface preparation for examination, an unacceptable condition is discovered, the crafts may repeat the surface preparation sequence," that is, the weld is not considered finished until the visual examination is accepted. The procedure further clarified this position in Paragraph 2.1.2 as follows: "Weld deposit may be reduced to the minimum allowable during attempts to remove unacceptable conditions. If upon reduction of deposit to the minimum allowable, the condition is not reduced to an acceptable size, work shall be stopped and a Repair Order shall be generated." Examinations performed after visual acceptance, such as liquid penetrant, magnetic particle, or radiography, are required by the code to be done using qualified procedures and qualified personnel. Unacceptable findings on finished welds are considered as deficiencies (nonconformances) and require (by the code rules) process sheet control. Also, the industry practice for determining weld reject rate is based on data collected from these test results. The team's findings concerning reject rate data (discussed below) were based on finished weld data and did not consider any in-process examinations that may have been made.

Each sequence of repairs constituted a repair cycle and counted toward the three repairs. For example, if radiography located three places on a weld that required repair and all three were repaired at the same time, that would have constituted one repair cycle (R1). If these areas were repaired, and upon reinspection a defect was found in the weld/repair area, another process sheet would have been issued and it would have been counted as a second repair (R2). If later inspections found other defects, such as liquid penetrant rejects, another process sheet would have been issued constituting the third repair (R3). If this repair proved unsuccessful, or if later repairs became necessary for any reason, then either the weld would have been entirely cut out, or an NCR would have been required before work could proceed (R4).

The ASME Code, Section III does not contain requirements regarding the number of repairs allowed on a weld. However, the contractor was concerned about the field doing an excessive number of repairs to welds and adjacent base material without involving the welding engineer. The NCR process was the mechanism used to involve the engineering group in the repair process. When issuing an NCR, the engineer was required to evaluate the condition and provide direction regarding the repair. For example, the engineer could have specified weld removal or such weld parameter changes as changing from an automatic to a manual welding process, changing welders, or changing heat input. Also, after the engineer's review was complete, he could have determined that no changes were needed and allow field welders to continue welding in the same manner. In any case, the program was designed to involve the welding engineer when unsuccessful repairs occurred.

The team found that with the following exceptions the NCR program worked as intended and the welding engineer was involved after three unsuccessful weld repairs were attempted by the craft. The following exceptions were noted: (1) The YAEC field quality assurance (FQA) group issued Stop Work Notification 3 to P-H on December 3, 1981, because more than three repairs had been done on field weld 1-RH-155-02-F0203 and the construction manager had not been notified (by an NCR), as required by Paragraph 3.8.1.(3) of UE&C Specification WS-1. (2) As discussed in Section 8 and Appendix 5 to this report, the team found that P-H had not issued an NCR as required by its procedures (XV-2 and JS-IX-14) to address the fourth repair to a non-safety-related ANSI B31.1 weld (1-CO-4063-01-F0101) during its fabrication in August-September 1982. P-H had decided, as a conservative measure, to impose the same requirements on ANSI piping as it had imposed on ASME piping; the latter was required to meet UE&C Procedure WPS-1. This matter was an internal P-H procedural violation; however, its consequence was of no safety significance because of the class and type of piping involved and the fact that the weld was successfully repaired and met applicable code requirements.

The team reviewed the contractor's program for monitoring (during welding or after completion of welding) and correcting multiple repairs. The reactor coolant loop piping welding was monitored by placing tram marks at specific separation points on the adjacent base metal before beginning the welding operation. During and after welding, the distances between the tram marks were measured to determine the amount of material shrinkage. These inspections were generally established as hold points on the weld process sheets and required signoffs to assure the measurements were done. The team's review of fulfilling hold points is discussed in Section 9 of this report. The data were collected and evaluated in accordance with Procedure FI-132, using Attachment C, and kept with the weld process sheet. Ultrasonic thickness measurements were taken, as necessary, of any suspect thin area to verify actual wall thickness. Excessive shrinkage or minimum wall violations were reported to the engineer for evaluation and disposition via an NCR.

The team found that piping other than the reactor coolant loop piping was controlled differently. For example, small-diameter piping that experienced problems during repair was usually cut out and replaced because of the inability to adequately remove defects without opening up a large cavity and creating concentrated, localized stresses. Additionally, if the cavity protruded to the inside surface, there was no way to rework the surface. For other piping, the

welding engineer reviewed the type, size, and location of the defects, welding process being used, and type of material being welded in order to make a determination regarding removal of the weld, changing essential or nonessential variables (or both), or continuing with the same process. This decision was left strictly to the welding engineer and each repair was evaluated individually.

For stainless steel welds that were most affected by the high heat from normal weld deposit or from the additional heat input that resulted from making weld repairs, the contractor implemented a program to evaluate each weld after the welding and repairs were completed. This program was controlled by the contractor in accordance with the procedures listed below.

(1) "Specification for Assembly and Erection of Piping and Mechanical Equipment for Public Service Company of New Hampshire, Seabrook Station, Unit Nos. 1 and 2," October 4, 1976, No. 9763-006-248-51

(2) Engineering Change Authorization (ECA) No. 735366C, January 20, 1984

(3) "General Welding Standard per ASME Section III," GWS-III, July 8, 1985

(4) "Procedure for Handling Nonconformances," XV-2, June 22, 1979

The concern regarding excessive heat input from welding or repairing welds stems from the fact that radial shrinkage from welding (readily observable in stainless steels) can induce residual stresses in the heat-affected zone of the weld which may make the weldment more susceptible to intergranular stress corrosion cracking (IGSCC). The other concern regarding radial shrinkage is the effect of localized stress concentration on the weld and adjacent base material.

The team determined the contractor had implemented a program that considered stress intensification factors when the shrinkage occurred greater than a predetermined amount (acceptance criteria). The team's review of welds that experienced excessive radial shrinkage (documented in NCRs) is discussed in Section 13 of this report.

The effects of excessive repairs are generally limited to the following conditions:

(1) Excessive repairs can cause concentrated stresses and cracking may occur. Such cracks are readily detected by such surface and volumetric-type examinations as liquid penetrant and radiography.

(2) Excessive repairs can cause localized shrinkage, increasing stress factors and affecting design loading.

(3) Excessive repairs can cause sensitization of stainless steel materials and make them more susceptible to IGSCC.

The team reviewed the contractor's controls to assure that if any of the three conditions identified above had occurred, a program was in place to address the concern.

Controlling the method of repair using process sheets with step-by-step sequence of fabrication, qualifying both the welder and weld procedure within controlled parameters, limiting the number of repairs performed by the welder, and nondestructive examinations of the finished weld were some of the methods used by the contractor to ensure multiple repairs had not weakened the weld material or base material (or both). Also, the contractor calculated stress on weld materials that shrank excessively. The contractor used ultrasonic and visual inspections to assure surface contour and minimum wall were maintained, if the surfaces appeared affected from welding or weld repairs. Welds that exhibited excessive shrinkage were often completely removed and replaced with a short section of piping that required two welds. As discussed below, special programs to reduce the weld reject rate and repairs were implemented on site by the contractor in an effort to reduce the number of repairs. For difficult welds, the contractor used in-process nondestructive tests to detect defects early. Radiography was used on the large reactor coolant loop piping at various stages of welding so that unacceptable defects were removed before the weld was finished. This process resulted in only removing a minimum amount of weld and reducing the amount of redeposit, thus minimizing the total heat input.

With respect to material sensitization and the potential for inducing IGSCC, the team's review of this issue (discussed in Section 13 of this report) determined that even though repairs do increase the sensitization of stainless steel materials, this issue is not a concern at a pressurized-water reactor (PWR) such as Seabrook because one of the conditions needed for IGSCC is a corrosive environment (normally oxygen) that PWRs do not provide. Furthermore, the licensee's inservice inspection program is designed to monitor welds and adjacent base material to detect such in-service type defects as IGSCC early. However, to date, IGSCC has not been found in the primary system at a PWR facility, and those events that have occurred in the secondary lines of PWRs did not represent significant safety issues.

Also, the team questioned the licensee about the extensive repairs made on the piping welds that connect the piping to the steam generator and reactor pressure vessel. The licensee, in turn, contacted Westinghouse about the effects of multiple weld repairs on piping welds. On May 15, 1990, Westinghouse's senior metallurgical and welding engineer submitted a letter to the Seabrook licensee that stated the following:

> There are no restrictions in the ASME Boiler and Pressure Vessel Code limiting the number of weld repairs to a weld joint. This includes weld repairs in the same location, adjacent location, or to another location on a particular weld. Also from a metallurgical standpoint there is no concern that repeated weld repairs in the same location or in close proximity to each other will result in degradation of material properties.

The team obtained a copy of a task force report from the Wolf Creek site, dated February 1981, that discussed the weld reject rate at that facility. The report indicated that Diametrics automatic welding equipment similar to that used at Seabrook for certain welds was also used at Wolf Creek. The task force was apparently formed to evaluate and provide conclusions and recommendations to reduce the reject rate for welds that were being radiographed. This report indicated that the reject rate for accumulative joint-to-joint pipe welding

requiring radiography was about 50 percent for about 2 years. The task force concluded that the reject rate was a factor of (1) organization structure of the welding department, (2) inadequate feedback to the engineering department, (3) inexperienced welders, and (4) very conservative interpretation of the radiographic film.

Just as the Wolf Creek film reviews were found to be conservative (item 4 above), the team reached a similar conclusion at Seabrook that radiographic film reviews performed by the P-H Level III examiners and YAEC were conservative. This is discussed in Section 8 of this report. The reject rate at Wolf Creek was higher than the rate at Seabrook. However, on the basis of its experience, the team considered a 50-percent reject rate above the norm at a nuclear construction site.

In order to aid in assessing the weld repair controls and the quality of welding performed by P-H during the construction period, the team reviewed weld reject data from the beginning of construction (1979) until the pipe welding was essentially complete (1985). The information reviewed came from non-QA records kept by P-H and UE&C throughout the construction period. Additionally the team compared the weld reject rate at Seabrook to the rate at another facility (Wolf Creek) that welded the reactor coolant (RC) loop pipe with automatic welding equipment similar to the welding equipment used for RC loop welding at Seabrook.

In an effort to control the pipe weld reject rate, both UE&C and P-H tracked the weld reject rate. In addition to tracking the overall reject rate, comprehensive records were kept on the reject rate for each individual welder. Responsible personnel indicated that these individual records were used in the welder training program for making such determinations as the need for additional training for individual welders and for assigning the better welders to those welds that required the highest quality work.

UE&C tracked, on a daily basis, the P-H reject rate on a per-weld basis (the ratio between total number of welds rejected and the total number of welds produced on a given day) from the beginning of 1980 until early 1984 (the majority of the pipe welding had been finished by this time). On a per-weld daily basis, the rate would fluctuate greatly from 0 percent one day to maybe 80 or 90 percent the next day. In order to smooth out the fluctuations, the data were trended by month and by year. Similar data were also kept on repair welds. The following table summarizes these data.

Year	Avg. new weld reject rate (%)	Avg. total (new weld & repair) reject rate (%)
1980	30.6	33.8
1981	24.9	25.0
1982	28.3	30.3
1983	13.7	15.1

These data were also collected by plant area, for example, containment and turbine building. As an example, for 1983, the reject rate in the containment

for new and repair welds combined was 15.7 percent. This lower rate for the containment building may be a result of the contractor's use of in-process radiography to inspect the automatically welded RC loop piping welds (located in the containment). To monitor the weld quality as the weld was being deposited, in-process radiography was used; however, in-process radiographic testing (RT) results were not included in the weld reject rate data. According to the records reviewed, after the weld was finished, it was radiographed according to the techniques specified in the ASME Code, including sensitivity, and any rejects found (except cosmetic surface grinding type of defects) were included in the weld reject rate.

Although tracking and trending reject rate data on a per-weld basis, as described above, provides valuable information, it does not give a true picture of the reject rate since it does not take into account the actual quantity of weld being evaluated, that is, its diameter and thickness. On a per-weld basis, rejecting a 1-inch-diameter, 0.120-inch wall weld counts the same as rejecting a 31-inch-diameter, 3.5-inch wall RC weld. It is obvious that the amount of weld metal deposited in these two cases does not compare. A more realistic method of tracking and trending weld reject data is to track and trend the reject rate based on the linear inches of weld, that is, the ratio between linear inches of rejected weld and total inches of weld. Although this method still does not given an entirely accurate picture, since the thickness of the weld is not taken into account, it is commonly used to track and trend weld reject rates.

In addition to the per-weld method used by UE&C, P-H and UE&C also tracked and trended weld reject rates based on the per-linear-inch method. These data were only kept on a running cumulative basis, that is, a ratio was determined between the total inches rejected to date (from the beginning of the construction period) and the total inches RT inspected to date. The following table summarizes these data (in-process repairs are not included).

Date	Reject rate (%)
03/27/80	4.75
12/19/80	3.84
06/01/81	3.43
12/31/81	3.17
07/01/82	2.67
12/31/82	2.84
07/01/83	2.63
12/31/83	2.51
04/18/84	2.47

Throughout the construction phase, UE&C monitored the P-H reject rate and strived to reduce it. In May 1983, a cash incentive program was initiated whereby P-H was awarded money to reduce the per-weld reject rate to below 16 percent and to hold it below 16 percent for certain periods of time. For the remainder of 1983 and 1984, P-H kept the per-weld reject rate below 16 percent.

Interviews with welding personnel who were on site during construction, and the review of non-QA records of weld reject rate tracking and trending data for P-H, indicated that the reject rate was tracked and trended on a daily basis in an effort to improve and control it. This effort appeared to have been successful; the cumulative per-inch-of-weld reject rate was reduced to below 3 percent by early 1982 and continued below 3 percent for the remainder of construction.

The team concluded that, when using the realistic method of calculating the linear inches of deposit versus the linear inches of rejected welds, the reject rates stated above are not considered to be above the normally expected rate. From the team's experience, a reject rate in the range of approximately 2 to 4 percent was not considered to be inordinately high. The team noted cases in which the rate exceeded this range. However, the overall reject rate was within this range. The team found the contractor continually attempted to reduce this rate, and the values shown above indicate some success.

Additionally, the team found the contractor did involve welding engineering through the NCR process for multiple weld repairs, although, as discussed above, the team found one case where an NCR had not been issued by P-H to address the fourth repair to an ANSI B31.1 weld. Also the team concluded that the contractor and the licensee were conservative in the radiographic film review process. Further, the team found the contractor implemented an inspection program to detect and evaluate radial shrinkage (the effect of excessive heat input that could occur from repairs) after the welds were finished. The contractor also instituted a program for tracking the reject rate for individual welders and performed additional training, where needed, in an effort to control the reject rate.

The team concluded that the contractor had implemented adequate welding controls that were consistent with applicable codes and comparable to controls at other nuclear plants. The team did not consider the amount of weld repairs to be excessive.

13 REPAIR OF WELDS AND RADIAL SHRINKAGE

During the interview with Joseph Wampler on April 24, 1990, Wampler expressed a concern about the possible damage to materials because of excessive repairs to welds. Also, during its onsite review of nonconformance reports (NCRs), the team noted numerous reports that identified varying degrees of base material shrinkage.

On May 15-17, 1990, two members were added to the welding inspection team to help the team evaluate the issue of radial shrinkage that occurred in base material adjacent to various welds in different piping systems. The team reviewed records and supplemental documentation regarding radial shrinkage. This review covered various NCRs, procedures, and specifications, in addition to Wampler's recorded testimony and NRC correspondence. The team also discussed the subject with licensee personnel. The purpose of the review was to evaluate the propensity for deleterious metallurgical effects on the safe operation of the plant as a result of radial shrinkage in circumferential pipe welds and repairs to those pipe welds.

In conjunction with this review, the team reviewed the following documents:

(1) United Engineers and Constructors (UE&C) memorandum from H. J. Kaplan to J. J. Parisano and K. C. Robertson, Subject: "Evaluation of Two Type 304 Stainless Steel Pipe Spools With Unusual Amounts of Radial Shrinkage" with attached metallurgical test report of the same title, March 27, 1984.

(2) Proceedings of Interview With Mr. Joseph Wampler on April 24, 1990.

(3) Review of 53 NCRs that identified base material shrinkage due to heat input during the welding and weld repair process. See Table 13.1.

(4) Integrity Test Cover Sheet GT-IT-01-F01, Revision 10, "Test Package RC-IT-01," November 16, 1984.

(5) General Test Procedure GT-IT-01, Revision 23, May 1, 1987.

(6) "Specification for Assembly and Erection of Piping and Mechanical Equipment for Public Service Company of New Hampshire, Seabrook Station, Unit Nos. 1 and 2," No. 9763-006-248-51, October 4, 1976.

(7) Engineering Change Authorization 735366C, January 20, 1984.

(8) "General Welding Standard per ASME Section III," GWS-III, and associated procedure qualification records, July 8, 1985.

13.1 Shrinkage

Shrinkage from welding (readily observable in stainless steels) can induce residual stresses in the weld which may make the weldment more susceptible to

intergranular stress corrosion cracking (IGSCC). This phenomenon results from the interaction of three factors:

(1) susceptible material
(2) tensile stress
(3) corrosive environments

The team evaluated each of these factors as they relate to the residual shrinkage questions at Seabrook.

13.1.1 Susceptible Material

Austenitic stainless steels (typically types 304 and 316) with carbon content of 0.03 weight percent and greater are prone after welding to develop a microstructure susceptible to IGSCC. The process of forming this microstructure is called "sensitization."

Sensitization occurs when austenitic stainless steels are kept in the temperature range of between 800°F and 1600°F. At such temperatures, carbide particles precipitate at the steel's grain boundaries, depleting chromium from the surrounding material. The welding process can induce these temperature ranges in the weldment's heat-affected zone. A selected review of material test reports of the stainless steel piping used at the Seabrook Unit 1 plant showed that the carbon content ranged above 0.03 weight percent, and that some heats were in the 0.07 weight percent range. This is typical of the range of material found at other pressurized-water reactors (PWRs).

Multiple welding repairs increase the amount of sensitization and the potential susceptibility to IGSCC. The amount of sensitization increase is related to the heat input into the material, so more repairs generally mean more sensitization. Again, this condition of multiple repairs is typically found at other nuclear plants.

13.1.2 Tensile Stress

The second condition needed to promote IGSCC is tensile stress, either applied or residual. The amount of tensile stress developed in the weld is a function of the heat put into the joint and amount of distortion resulting from weld shrinkage. The amount of distortion is generally controlled through a qualified welding procedure which controls the heat put into the weldment.

The heat input is generally controlled through electrode size, width of weave (bead), voltage and amperage input, and control of the weld's interpass temperature. These variables are taken into account and generally incorporated into a qualified procedure. Procedures qualified to both the American National Standards Institute (ANSI) B31.1 Code and Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) were in effect at the Seabrook site during construction of the plant. A typical procedure reviewed (24-III-8-KI-12, dated September 15, 1982) and its associated procedure qualification records (PQRs) took these variables into account. This procedure was qualified for P-8 (stainless steels) materials in the thickness range of 0.063 inch to 8 inches and for pipe up to 8 inches in diameter. The joint type was a consumable insert root, welded with gas tungsten arc welding

(GTAW) and a weld out "through thickness" using shielded metal arc welding (SMAW). This type and quality of procedure are typically found at other nuclear sites.

It is generally concluded that if multiple repairs are performed on a stainless steel weld, the joint will receive a greater heat input with a resultant increase in radial distortion due to weld shrinkage. Although radial shrinkage is not specifically addressed by any construction code, the question of radial weld shrinkage has been addressed as a code case interpretation (III-1-79-68) for the ASME Code. This interpretation stated:

> Question: What value of radial shrinkage in circumferential welds of piping is permissible for which this geometrical discontinuity can be ignored for stress computations in accordance with ASME Section III, NB 3600 and Code Case N-47?
>
> Reply: Neither NB-3600 nor Code Case N-47 establish a minimum radial weld shrinkage below which stress intensification effects may be ignored. Evaluation of stress intensification effects at circumferential welds in piping is required in all cases.

For each of the NCRs reviewed, a nonconformance review board response form (NRBRF) typically stated that any "accept as is" disposition has been reviewed to acceptance standards established by UE&C Engineering - Philadelphia and meets code and design specification requirements.

Additionally, the site changed its erection procedure (9763-248-51) to reflect acceptance procedures for radial shrinkage (without a nonconformance report (NCR) on January 20, 1984, with an engineering change authorization (ECA-73/5366C) which stated the following:

3.5.4.1.9	Radial shrinkage measured from the outside surface of ASME Class 1 piping shall be acceptable when it is:
3.5.4.1.9.1	Less than 25% of the nominal wall thickness of the thinner part being joined for all pipe diameters.
3.5.4.1.10	Radial shrinkage measured from the outside surface of ASME Class 2 and 3 and ANSI B31.1 piping shall be acceptable when it is:
3.5.4.1.10.1	Less than 35% of the nominal wall thickness of the thinner part being joined for pipe diameters 4" and less.
3.5.4.1.10.2	Less than 50% of the nominal wall thickness of the thinner part being joined for pipe diameters 6" and greater.
3.4.5.1.11	Radial shrinkage exceeding the above criteria shall be reported to the Construction Manager by an NCR or an FTR [field trouble report], as applicable.

The establishment of these acceptance criteria and the evaluation of any welds not meeting the initial criteria (NCR being generated) appear to meet the intent of the code interpretation. Again, this technique of evaluation of stress intensification factors for radial shrinkage of individual welds (as needed) would be comparable to or more conservative than that used at other nuclear plants.

13.1.3 Corrosive Environment

The third necessary factor for IGSCC to occur is a corrosive environment. In the case of stainless steels (in reactors), oxygen is the most common corrosive agent. Additionally, halogens and sulfur have contributed to IGSCC in the past. Although it is a significant contributor to IGSCC in boiling-water reactors (BWRs), oxygen plays a minimum role in PWRs, since the oxygen levels are maintained in the 0.10 part-per-million (ppm) range when the coolant temperature exceeds 200°F (93°C), which is well below the limits at which IGSCC would normally occur. Oxygen is usually controlled with either hydrogen additions or hydrazine additions (if ecologically approved).

In "Investigation and Evaluation of Cracking Incidents in Piping in Pressurized Water Reactors," NUREG-0691, the NRC staff evaluated the potential for stress corrosion cracking (SCC) in both primary and secondary systems in PWRs. This report stated that

- <u>For primary systems</u>

  No occurrences of IGSCC have been reported to date in piping for PWR primary coolant systems....Furthermore, IGSCC is not expected to occur in primary piping because all the conditions required for IGSCC are not present....

- <u>For secondary systems</u>

  Austenitic stainless steel pipes in some secondary PWR systems have experienced SCC. The affected systems typically have low or stagnant flow conditions, contain borated solutions, and have piping with relatively high carbon contents. Service experience indicates that the SCC is found by small leaks; no significant coolant loss is associated with SCC.

  For those PWR lines in secondary systems where SCC has occurred, the nature of the cracks, the relatively low loads on the systems, and the ability of the system to maintain function led the Pipe Crack Study Group (PCSG) to conclude that these incidents did not represent a substantial safety problem....

These conclusions apply to the affected lines at Seabrook.

Additionally, in order to minimize contamination of the system, Seabrook test personnel performed their hydrostatic tests with demineralized water of the following makeup:

pH	6.0 - 8.0
Specific conductivity	≦ 2.0 μmhos/cm
Chloride content	≦ 0.15 ppm
Fluoride content	≦ 0.15 ppm
Turbidity	≦ 1 TDU
Visual oil or sediment	None

This, again, was consistent with standard industry practice. It did not appear that the coolant environment at Seabrook would differ significantly from that seen at other PWRs.

13.2 Findings and Conclusions

The documentation and specification review at the Seabrook plant disclosed that the methods used at Seabrook were consistent with applicable codes and comparable to or more conservative than those used at other nuclear plants for addressing radial shrinkage in circumferential welds and their subsequent repair or acceptance or both. The licensee had procedures in effect to evaluate the code acceptability of welds that exceeded the specified acceptance standards for radial shrinkage.

The normal practice (at Seabrook) of only three repairs to a finished weld before it must be reviewed by the engineering group was consistent with applicable codes and was comparable to or more conservative than practices at other nuclear sites and, for those welds, the stress intensification factors (code requirement) were taken into account and evaluated via the NCR process. But, even if a stainless steel weld received more than three repairs, the conditions present in the primary system of a PWR are not conducive to the occurrence of IGSCC and, for PWR lines in secondary systems, IGSCC has not represented a substantial safety problem.

The team concluded that the licensee had evaluated and controlled radial shrinkage of stainless steel welds at the Seabrook site in an acceptable manner. Also, the licensee's inservice inspection program is designed to monitor welds and adjacent base material to provide early detection of such in-service type defects as IGSCC.

Table 13.1 Pullman-Higgins Nonconformance Reports

No.	Description of NC	Disposition	System*
		Unit 1	
2070	Shrinkage	Accept as is	SI
2383	Radial shrinkage	Accept as is	SI
2472	Radial shrinkage	Repair/build up	CC
2491	Radial shrinkage	Accept as is	SI
2532	Radial shrinkage	Accept as is, then reevaluate and cut out/replace	CS
2580	Radial shrinkage	Accept as is	RC
4123	Shrinkage	Accept as is	CS
4232	Excessive ovality, radial shrinkage	Cut out/replace weld	CS
4806	Radial shrinkage	Accept as is	RH
4807	Radial shrinkage	Accept as is	RH
4808	Radial shrinkage	Accept as is	RH
4809	Radial shrinkage	Accept as is	RH
4814	Radial shrinkage	Accept as is	RH
4815	Radial shrinkage	Accept as is	CS
4832	Radial shrinkage	Accept as is	CBS
4833	Radial shrinkage	Accept as is	CBS
4834	Radial shrinkage	Accept as is	CBS
4840	Radial shrinkage	Accept as is	CBS
4844	Radial shrinkage	Repair as needed (minimum wall), then accept	RH
4845	Radial shrinkage	Accept as is	RH

*See notes at end of table.

No.	Description of NC	Disposition	System*
4846	Radial shrinkage	Accept as is	RH
4847	Radial shrinkage	Accept as is	RH
5160	"Necking in" of weld	Accept as is	CBS
5292	"Necking in" of weld	Accept as is	CBS
5344	"Necking in" of weld	Accept as is	CBS
5345	"Necking in" of weld	Accept as is	CBS
5346	"Necking in" of weld	Accept as is	CBS
5347	"Necking in" of weld	Accept as is	CBS
5351	"Necking in" of weld	Accept as is	CBS
5353	"Necking in" of weld	Accept as is	CBS
5354	"Necking in" of weld	Accept as is	CBS
5364	"Necking in" of weld	Accept as is	CBS
5365	"Necking in" of weld	Accept as is	CBS
5366	"Necking in" of weld	Accept as is	CBS
5367	"Necking in" of weld	Accept as is	CBS
5368	"Necking in" of weld	Accept as is	CBS
5380	"Necking in" of weld	Accept as is	CBS
5381	"Necking in" of weld	Accept as is	CBS
5382	"Necking in" of weld	Accept as is	CBS
5383	"Necking in" of weld	Accept as is	CBS
5390	"Necking in" of weld	Accept as is (carbon steel)	FW
5402	"Necking in" of weld	Accept as is	DG
5403	"Necking in" of weld	Accept as is	DG
5404	"Necking in" of weld	Accept as is	DG

*See notes at end of table.

No.	Description of NC	Disposition	System*
5414	"Necking in" of weld	Repair/accept as is	RC
5474	"Necking in" of weld	Accept as is	DG
5487	"Necking in" of weld	Accept as is	CBS
5515	"Necking in" of weld	Accept as is	CBS
5519	"Necking in" of weld	Accept as is	CBS
5522	"Necking in" of weld	Accept as is	CBS
5609	"Necking in" of weld	Accept as is (upgraded B31.1)	BRS
		Unit 2	
5154	"Necking in" of weld	Accept as is	DG
5257	"Necking in" of weld	Accept as is	CBS

System Designation:

BRS - boron recovery system
CBS - containment building spray
CC - component cooling water primary
CS - chemical and volume control
DG - diesel generator
FW - feedwater (carbon steel)
RC - reactor coolant
RH - residual heat removal
SI - safety injection

14 EVALUATION OF DEFICIENCY REPORTS AND DEVIATION NOTICES ASSOCIATED WITH RADIOGRAPHS OF PIPE WELDS

The team reviewed 17 deficiency reports (DRs) and 11 deviation notices (DNs) issued by Yankee Atomic Electric Company (YAEC) against Pullman-Higgins (P-H) during the period of pipe fabrication that involved the YAEC overview of radiographic film. The specific DRs and DNs reviewed are listed in Appendix 11 to this report. Also, the team's review of procedures governing YAEC review of radiographic film and issuance of DRs and DNs is discussed in Section 3 of this report. To analyze the events that had surrounded the numerous DRs and DNs issued as a result of the film reviews performed by YAEC, the team interviewed people involved in the radiographic process, including P-H and YAEC film examiners.

At the team's request, the licensee provided a rundown (by year) for the period 1979-1986 of total weld packages reviewed by YAEC, and the number and percentage of radiographic film rejects found during the period from mid-1982 through 1986. The reject data were based on information from DRs and DNs and were characterized as film-quality rejects/discrepancies, weld-quality rejects, and administrative-type rejects/discrepancies. The data follow in the table that appears below.

For the period preceding 1982, the licensee handled the review of radiographic film in a less formal manner under the provisions of the quality assurance (QA) surveillance program, using the surveillance report to document immediate corrective action, when necessary, although one DR was issued during the period. These surveillances were performed by only a few people in the P-H work area on a one-on-one basis. Thus, for this period, radiographic testing (RT) reject data were not readily available in an easy-to-use fashion and are not included in the table that follows. However, on the basis of discussions with the licensee and a sampling review of YAEC surveillance reports and NCRs, the team determined that as a result of these reviews, some of the film was rejected. These rejects were similar in nature to those characterized above. Additionally, as a result of routine, periodic YAEC QA audits, similar radiographic film rejects were identified that required evaluation and disposition by P-H. The team's review of audit and surveillance reports and of nonconformance reports (NCRs) appears in Sections 3 and 15, respectively, of this report.

The team also determined, as discussed in Section 3 of this report, that in a few cases during the period of interest, YAEC reviewers handled the identification and disposition of radiographic film rejects via controlled speed letters (CSLs) rather than by DRs or DNs because the deficiency was handled by the P-H program. For these cases, the rejects had not been included in the data tabulated by the licensee (shown below).

Year	No. reviewed	Film-quality rejects/discrepancies		Weld-quality rejects		Administrative-type rejects/discrepancies	
		No.	%	No.	%	No.	%
1979	4	-	-	-	-	-	-
1980	167	-	-	-	-	-	-
1981	465	-	-	-	-	-	-
1982	537	2	0.37	0	0.00	3	0.5
1983	684	36	5.2	1	0.14	81	11.8
1984	1492	299	20.0	9	0.60	156	10.4
1985	723	85	11.7	2	0.27	0	0.00
1986	105	0	0.00	0	0.00	0	0.00

The percentages given by year for the data readily available, as shown above, were somewhat skewed because YAEC was reviewing the current field radiographs and the backlog at the same time. In many cases, the backlog film represented radiographs taken much earlier. This made it seem as if the radiographic film reject rate was increasing significantly each year. The actual reject rate of weld deposit obtained from plant construction records is discussed in Section 12 of this report. As previously stated, the data did not include rejects identified in the YAEC overview program before mid-1982, those found through the YAEC QA audit program, or those that were handled by sending CSLs rather than by issuing DRs or DNs.

Despite potential inaccuracies, the team considered that the YAEC overview of P-H final pipe weld film had resulted in high radiographic film reject rates (17.1% for 1983, 31% for 1984, and 12% for 1985), especially considering that the YAEC overview was performed after multiple reviews by P-H, including its Level III overview. As shown above, these rates included all rejects, although it was noted that only a fraction of a percent was for weld defects. The large majority of the discrepancies were for film quality and administrative-type defects. The team's review and evaluation of these data are discussed in more detail in Section 4 of this report.

The first deficiency report (DR-037) located in the licensee's files that was issued as a result of YAEC's overview was dated January 3, 1980. This DR noted that several film-quality-type discrepancies existed and that film inadequately placed on the weld had prevented full weld coverage. The contractor reradiographed the welds in question to correct the deficiencies. The YAEC review of the corrected deficiencies indicated that no adjustments were needed in the YAEC program because YAEC was presently reviewing all (100%) P-H radiographic film.

The P-H program appeared to have worked well in 1982. YAEC's overview of 537 packages found 7 discrepancies, none requiring repair. However, P-H was to start a review of all film and associated paperwork by two people, a Level II reviewer and a Level III examiner, based on their response to DR-211, dated July 16, 1982. Additionally, P-H was to modify and strengthen this practice, based on their response to DR-241, dated September 16, 1982, by adding an additional review by a Level II reviewer before the review by the Level III examiner (now a third review).

YAEC reviewed 684 packages in 1983, and rejected 118. The first DR of the year, DR-527, was issued on December 7, 1983, and identified 117 rejectable conditions. The only other DR for 1983 was issued on December 28, and identified one reject. Thus, YAEC did not issue any DRs from September 16, 1982 (DR-241) until December 7, 1983 (DR-527), more than a year later, when YAEC reviewed 184 packages.

DR-527 stated, "Most of the film packages were shot/interpreted/reviewed in late 1982 and 1983. Reviews were completed and signed by many P-H Level III's, yet these conditions were not identified or corrected." The team believed that the film was apparently being backlogged because P-H did not have enough film interpreters and because of other factors. The P-H response to DR-527 required that all film packages not in the licensee's information management system (IMS) be re-reviewed by the Level III examiner on site before they were submitted to YAEC for review. This apparently increased the backlog even more for P-H Level III examiners.

Note: This response from P-H just reaffirmed what P-H supposedly instituted in 1982. From the available records, it appeared (although the team was not certain) that YAEC continued to review film that had not been re-reviewed by P-H Level III examiners per their response to DR-527. For example, DR-574 was issued on February 9, 1984, and identified a reject rate of 49.3 percent on film supplied to YAEC reviewers. That DR stated that all radiographic film packages had been returned to P-H for corrective action. On February 18, 1984, P-H responded by letter and stated that although the film packages YAEC rejected represented valid concerns, most of the items identified were documental-type errors in film taken several months earlier and did not reflect present practices implemented since corrective actions were taken. The letter further stated, "It is understood that the quality of film packages generated by P-H had improved tremendously...before return of these packages."

The team interviewed the author of DR-527 and the YAEC construction QA manager concerning the evaluation of reportability under 10 CFR 50.55(e) of DR-527 which was checked as requiring a report. The team was advised that the required review (since the report had been so checked) by UE&C and then by New Hampshire Yankee (NHY), if deemed reportable by UE&C, had probably not been performed because there were no records initially available to show how this DR had been handled, nor were there records to show that YAEC or UE&C had performed the review. The team was further advised that, in hindsight, this DR had been incorrectly checked as requiring such a review, since none of the discrepancies involved weld-quality defects.

The licensee subsequently located CSL-095, dated December 12, 1983, that forwarded DR-527 to YAEC - Framingham for review and necessary action. The CSL indicated that the YAEC construction field QA group had identified the DR as a potential significant deficiency (10 CFR 50.55(e)). The licensee gave the team a copy of the CSL on June 26, 1990, and continued to search for records showing how the CSL had been handled. Thus, it appeared that a documented review should have been performed, even though such a review would have concluded the condition was not reportable.

The team interviewed the author of DN-90 to understand how radiographic film, mostly from the 1981-1983 period, that had been reviewed and accepted by P-H

and YAEC reviews could later be found to have film quality discrepancies (geometric unsharpness, Ug) and to evaluate the nature and extent of the corrective actions taken. Particularly, the team questioned if all the film in the document control (vault) had been evaluated for Ug. The author advised that this condition had been identified by chance, during routine indexing and inventory of the film in the vault, and that all weld packages had been evaluated for Ug, which was how the 85 welds listed on the DN had been identified. Additionally, this DN, including the results of actions taken by P-H, required evaluation under the P-H program. Thus, any defects identified by the reradiography would be identified by P-H on NCRs. The team evaluated NCRs to assess the results of the reshot findings and found three welds, identified by NCRs, that had code-rejectable indications requiring repairs. These findings are discussed in Sections 15 and 17 of this report.

Findings and Conclusions

The team's evaluation of the DRs and DNs determined that (1) they were handled properly, with the possible exception of documenting an evaluation of reportability (DR-527) in accordance with procedures, (2) they were not reportable under 10 CFR 50.55(e), and (3) the hardware had been adequately dispositioned.

15 EVALUATION OF NONCONFORMANCE REPORTS ASSOCIATED WITH PULLMAN-HIGGINS PIPE WELDING AND NONDESTRUCTIVE EXAMINATIONS

The team reviewed nonconformance reports (NCRs) involving Pullman-Higgins (P-H) activities in the areas of pipe welding and nondestructive examination (NDE) to ascertain the contractor's and licensee's compliance with the requirements specified in 10 CFR Part 50 (Appendix B), Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), and 10 CFR 50.55(e). The team's review of NCRs consisted of the following determinations:

(1) Was the NCR issued in a timely manner?

(2) Was disposition of the NCR appropriate, in compliance with the applicable codes, and timely?

(3) Did the NCR indicate that a 10 CFR 50.55(e) evaluation was performed, where appropriate?

(4) Was the NCR properly closed?

(5) Did the NCR identify any weld that was inaccessible for NDE?

(6) Was the NCR retrievable?

The team's review is summarized below, and the NCRs that were reviewed are listed in Appendix 10 to this report.

The team also reviewed the governing procedure, P-H Procedure XV-2, "Procedure for Handling Nonconformances and Limited Work Authorization," dated June 22, 1979, and Revisions 10 (July 1, 1981), 12 (December 15, 1981), 13 (March 5, 1982), 17 (May 16, 1983), 18 (July 14, 1983), 19 (January 17, 1984), 20 (April 10, 1984), 21 (December 28, 1984), 22 (April 29, 1985), and 23 (November 4, 1985). This review was limited to the issuance, processing, voiding, and dispositioning of NCRs in the areas of pipe welding, nondestructive examination (NDE), and repair of unacceptable conditions found.

The team reviewed the pertinent requirements of the original procedure, as listed below, for pipe welding and NDE (particularly radiography). If later revisions of this procedure altered these requirements or added to them, the revision is also listed, and the team reviewed it, too.

P-H Procedure XV-2

Paragrah 3.2 - The field quality assurance (QA) manager shall evaluate all nonconformances for applicability for reporting to the customer under 10 CFR 50.55(e).

Paragraph 4.1 - Unacceptable conditions will exist that do not require an NCR. These can be corrected at the time of discovery under the control and to the satisfaction of the inspector, or during the course of subsequent operations as outlined on the process sheet. Unacceptable conditions may be removed by additional grinding or machining, provided: The remaining thickness is not reduced below minimum wall thickness, the depression is blended uniformly into the surrounding surface, and the area is examined by magnetic particle or liquid penetrant methods after the defect is removed.

Paragraph 4.2 - An NCR shall be initiated under, but not limited to, the following conditions:

Paragraph 4.2.1 - Incorrect materials, incomplete or incorrect documentation or identification, improper pressure retaining dimensions, evidence of special process out of control, serious misalignment during installation, or when required by another approved procedure. In no case shall a condition described in Paragraph 4.2 be processed as detailed in Paragraph 4.1.

Paragraph 6.1 - All Section III NCRs shall be reviewed, dispositioned, and approved by the construction manager through the nonconformance review board.

Paragraph 8.1.1 - For nonconformances not meeting the code, the item may be scrapped, returned for replacement, repaired, or reworked to bring it within code requirements.

Paragraph 8.1.2 - For nonconformances meeting the code, but deviating from customer requirements, the item may be scrapped, returned, reworked, repaired, or accepted "use as is."

Paragraph 8.4.3 - Unacceptable weld defects shall be eliminated and repaired. If the joint has not received final acceptance after the third repair cycle, the weld will be cut out 100 percent. When P-H repairs a weld, it shall prepare a report that includes a chart showing the location and size of the prepared cavity.

Revision 17 Changes, May 16, 1983

Paragraph 3.3 - UE&C (United Engineers and Constructors) shall provide the disposition of all NCRs, through the nonconformance review board.

Paragraph 4.2 - Additional NCR conditions:

- Weld repairs to base metal exceeding 1/3 of nominal thickness.
- Repairs required in base metal or welds after the third cycle of repair. (Note: In earlier revisions, the weld was required to be cut out.)
- Weld repairs required to end preps.
- Repair welding following final leak testing or final heat treatment.
- Any inability to meet fitup at closure joints on piping runs without the use of external force.

Paragraph 7.3.1 - If the review determines that the condition does not warrant reporting as an NCR, or should be reported by other means (i.e., non-code reporting procedure), the NCR shall be voided.

Paragraph 13.1 - If it becomes necessary to void an NCR, it shall be voided only by the QA manager or his designee. The reason for voiding shall be identified on the NCR, along with the QA manager's (or designee's) signature and date.

Paragraph 13.2 - Concurrence with the action shall be obtained from the chief field engineer (or designee) and the authorized nuclear inspector (ANI) only when their previous review and signature had been obtained. Concurrence shall be documented by signing and dating the voided NCR.

Paragraph 13.6 - NCR control numbers are assigned upon initial reporting of suspected nonconforming conditions. After further evaluation, the originator may determine that the suspected nonconforming condition is actually a conforming condition. In such cases, the originator will notify QA-NCR so that, if concurrence has not yet been obtained, the NCR control may be deleted from the log. Deleted NCR control numbers are not considered "voided" NCRs and the control number may be reassigned.

Paragraph 14.1.1 - When steps to prevent recurrence have not been taken in a timely manner or were not effective, the QA manager, or his designee, may issue a corrective action report.

Revision 19 Changes, January 17, 1984

Paragraph 2.1.1 - Nonconformance reports shall be classified as either minor or major. A minor nonconformance is one that may be dispositioned as rework or scrap. UE&C evaluation/disposition is not required for minor nonconformance reports. A major nonconformance is one that cannot be dispositioned as rework or scrap. UE&C evaluation/disposition is required for all major nonconformances.

Paragraph 3.2 - The chief field engineer or his designee shall disposition all minor NCRs.

Revision 21 Additions, December 28, 1984

Paragraph 15.1 - Technical changes shall be made and identified by revising the NCR using a capital letter after the NCR number (i.e., B is the first revision).

Paragraph 15.3 - Each NCR revision shall be complete and will supersede earlier revisions.

Revision 22 Deletions and Changes, April 2, 1985

"Repairs required in welds or base material after the third cycle" was deleted as an NCR condition.

Paragraph 8.5 - Engineering shall be responsible for stating the final disposition of minor NCRs. The QA manager or his designee shall be responsible for dispositioning minor NCRs for documentation-type deficiencies involving correction or regeneration.

The team had no questions regarding the procedure controls used for issuing, processing, voiding, and dispositioning NCRs involving P-H pipe welding, nondestructive examination, and repair of defects. All areas reviewed were found acceptable.

To perform the review of NCRs as discussed above, the team obtained a computer printout from the licensee that listed the BNCRs and NCRs (approximately 14,000) that were issued by or against P-H during the construction period. The printout contained a reference to the NCR or BNCR number and a brief description of the nonconformance. The team reviewed the printout, starting with the first entry and stopping with entries dated September 1985, a period that spanned the P-H pipe installation work (except for structural and pipe supports) at Seabrook and selected about 245 NCRs from the printout for further review.

The selection was based on the description of the event, including such conditions as repair of defects, radiography results, film interpretation issues, weld shrinkage, inaccessible welds, base metal repairs, inadequate QC inspections, third or multiple weld repairs, shop weld deficiencies, weld cavities, material traceability, welder qualification, and missing or other weld records deficiencies. A copy of each NCR selected was obtained from the licensee.

The team reviewed each of these NCRs and determined which warranted a more detailed review. For example, those that pertained to structural steel, pipe supports/base plates, non-safety-related welds, and so forth, were not reviewed any further. A total of 191 NCRs were selected for the detailed review and are identified in Appendix 10 to this report. Additionally, the team reviewed numerous other NCRs as part of this inspection. For example, the team reviewed NCRs that (1) were referenced in weld control packages or radiographic film packages, (2) involved the weld shrinkage issue, (3) involved repairs to the reactor vessel/steam generator nozzles, (4) were associated with YAEC QA surveillances (DRs and DNs) of radiographic film and NDE processes, (5) were associated with employee allegation resolution (EAR) files, and (6) were sorted by the licensee (in answer to the team's request) using the licensee's NCR computer database and key words of welds "accept-as-is" or welds "inaccessible". Some of these NCRs also may be identified in Appendix 10 even though they were evaluated and discussed in other sections of this report.

Findings and Conclusions

The team found that the contractor's methods for processing, dispositioning, and retaining records of NCRs met NRC requirements and were comparable to the methods used at other nuclear sites during the construction phase.

The contractor's NCR program provided a means to: identify nonconformances, receive reviews by proper management (welding engineering review for welding problems was an example), receive evaluations for 10 CFR 50.55(e) reportability,

receive review and comments from the ANI, provide disposition of the nonconforming condition, and control and retain appropriate documentation in the archival records vault.

The team concluded that NCRs were written and issued in a timely manner (the exceptions to this were conditions that the licensee was not immediately aware of, for example, those like the Padavano case or those listed in Joseph Wampler's logbook that appeared to be nonconforming conditions and were not yet issued when Wampler left P-H and a condition identified by the team that involved the fourth repair to an ANSI B31.1 weld as discussed in Sections 8 and 12 of this report), that NCR dispositions were appropriate for resolving the nonconformances and were in compliance with the appropriate codes, that NCRs received an adequate review for 10 CFR 50.55(e) reporting (except for three NCRs discussed in Section 17 of this report (no records could be found)), that NCRs were closed in a proper manner, and that none of the NCRs evaluated by the team identified welds that were inaccessible for examinations resulting from the radiographic film backlog. The team did note other conditions of inaccessibility for examinations because in one instance an inspector had not performed examinations that he had signed off on as acceptable on the process sheets and inspection reports. This issue dealt with surface examinations only, was identified on an NCR (NRC-4490) and reported to the NRC as a 10 CFR 50.55(e) item, and was evaluated by the licensee's EAR program and NRC inspections. Thus, the team did not address it any further.

The team determined that the licensee's records retrieval system was acceptable as the licensee was able to retrieve in a timely manner all of the NCRs that the team requested.

16 WELD ACCESSIBILITY ISSUES

During the interview with Joseph Wampler on April 24, 1990, Wampler questioned whether weld rejects identified during the review of backlog radiographic film (reshots or repairs) could be dispositioned as needed because of potential accessibility problems.

Throughout the inspection, the team focused its review on this concern in the following manner:

(1) Work packages were reviewed to ensure that all nondestructive examinations (NDEs) were completed as required by Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). The review included evaluation to ensure that repairs rejected by NDEs were completed, heat-treated if necessary, and reexamined by visual, surface (liquid penetrant or magnetic particle), and volumetric inspection before completing the ASME Code data form.

(2) Radiographic inspection reports and radiographic film were reviewed to ensure that all welds were inspected, evaluated, repaired where necessary, reinspected, reevaluated, and properly documented on the required forms before completing the ASME Code data form.

(3) The team interviewed several people who were involved in the pipe installation and construction activities. They were questioned about the possibility of items becoming inaccessible because radiographic film packages were processed after some delay. Also, each person was asked if he was aware of any welds that became inaccessible because the film packages were processed after such a time delay. All persons interviewed said that they were unaware of any weld not receiving a final inspection, as required. Also, the people being interviewed said that when items were found inaccessible because scaffolds had been removed, or because of any other obstruction, the obstruction was removed, making the item accessible.

(4) The team reviewed nonconformance reports (NCRs), deficiency reports (DRs), and deviation notices (DNs) to ascertain whether NCRs were written that discussed disposition of inaccessible pipe welds. The team asked the licensee to search the NCR computer database (approximately 14,000 entries of nonconforming conditions) on the basis of the words "welds," "inaccessible," or "accept as is," and to make copies of the NCRs identified by this screening process available to the team for review. The team's review of these NCRs (about 80) and other NCRs, as discussed here and in Sections 10 and 11 of this report, did not disclose any inaccessible conditions being identified or instances of a weld being accepted without the required radiographic testing (RT) being performed. Likewise, the team's review of DRs and DNs provided the same results.

(5) Further, the team reviewed licensee documentation addressed to the NRC to determine if any requests for exemption from Section XI of the ASME Code,

regarding compliance with the code of record because of a weld being inaccessible, had been submitted under 10 CFR 50.55(a), "Codes and Standards" rule. The review found that exemptions for inaccessible pipe welds had been requested; however, the requests were made because the welds could not be fully scanned using ultrasonic techniques, or the grain structure was such that ultrasonic waves would not penetrate the welds as required by Section XI, "Inservice Inspection." In all cases, the exemption request indicated that radiography (Section III requirements) was performed during the fabrication process, thus indicating the welds were accessible during construction.

On the basis of this review, the team did not substantiate this concern and concluded that the radiographic film backlog did not result in a condition where a weld was inaccessible (for reshot or repair) or where a weld was accepted without the required RT being performed.

17 POTENTIAL REPORTABILITY REVIEWS

To evaluate the effectiveness of the licensee's compliance with the reporting requirements specified in 10 CFR 50.55(e) in the area of pipe fabrication, the team reviewed the programs established by Pullman-Higgins (P-H), United Engineers and Constructors (UE&C), and Yankee Atomic Electric Company (YAEC). To make this assessment, the team interviewed personnel at the site who had been involved in the program during construction, reviewed the controlling procedures, and evaluated the final accepted product--specific nonconformance reports (NCRs) and their review--for reportability.

The following controlling documents were reviewed:

(1) New Hampshire Yankee Division of Public Service Company of New Hampshire, "Seabrook Station Quality Assurance Manual"

- Procedure 1.1, "Program - Design and Procurement"

- Procedure 1.2, "Program - Construction"

(2) UE&C QA Specification 9763-QAS-1, "Quality Assurance Administrative and System Requirements for Nuclear Safety Class Items"

(3) UE&C QA Procedure QA-15, "Nonconforming Materials, Parts or Components"

(4) UE&C Administrative Procedure 48, "Home Office Review and Issue of Significant Deficiencies (10 CFR 50.55(e))"

(5) New Hampshire Yankee Project Procedure ASP-3, "Nonconformances"

(6) P-H Procedure XV-2, "Procedure for Handling Nonconformances and Limited Work Authorization (Field)"

These documents detailed different aspects of the nonconformance program, specifying different levels of review for a 10 CFR 50.55(e) determination. The program changed in September 1984, with the issuance of Procedure ASP-3. Before ASP-3 was issued, P-H had its own program under Procedure XV-2, which included classifying NCRs as "major" or "minor" and determining if the NCR was potentially reportable under 50.55(e). NCRs considered potentially reportable under 50.55(e) and major NCRs were forwarded to the UE&C engineering department for evaluation, including reportability determination. After ASP-3 was issued, UE&C adopted the minor/major concept and all NCRs came under the UE&C umbrella. All major NCRs were routed to the engineering group for evaluation and reportability determination. Minor NCRs were forwarded to UE&C engineering personnel for their information. If the quality assurance (QA) group considered that a minor NCR was potentially reportable, the NCR was changed from minor to major and was forwarded to the supervising discipline engineer (SDE) for evaluation.

Discussions with personnel still on site, who had been involved and had responsibility for the program during construction, indicated that in actual practice UE&C evaluated all NCRs, minor and major, for 50.55(e) reportability. Procedures are not clear on this point, however. If determined to be potentially reportable by 50.55(e), the SDE prepared a potential 50.55(e) report, transmitted it via letter to the YNSD project manager, and forwarded the report to home office engineering staff for the 50.55(e) review board to make a final evaluation. NCRs determined to be potentially reportable by the engineering group were evaluated by the UE&C home office in accordance with Administrative Procedure 48. After YAEC concurrence, the YNSD project office notified NRC.

In addition to these programmatic requirements, the team reviewed the final accepted product against the specific requirements of the ASME Code or American National Standards Institute (ANSI) B31.1 Code, and Appendix B to 10 CFR Part 50. Additional overviews performed by UE&C or YAEC of the piping fabricator, if implemented 100 percent of the time, were considered as part of the total corrective action program for purposes of evaluating the QA program and the final quality of the hardware and associated documentation, and whether specific occurrences had been reported to the NRC, as required.

If the P-H program missed a deficiency, even a significant one, and that deficiency was discovered later by one of the 100-percent reinspection programs (overviews), the team considered the program effective. The team concentrated on determining if any significant deficiencies were missed by the total program. For example, normally a defect missed in the contractor's final review suggests that a defect would have gone uncorrected because no additional reviews are required, except auditing or surveillances or both. The team did not consider audits and surveillances to be the same as inspections. The licensee is required to evaluate such a condition under the assumption that it had gone uncorrected.

If evaluation shows the defect could have impaired the safety of operations at the nuclear plant, it must be reported to the NRC, as specified in 10 CFR 50.55(e). However, if additional overview programs are implemented that are 100-percent complete inspections and prevent such a condition from remaining uncorrected, then this defect would not be considered as going uncorrected, even though the piping contractor missed it. Conversely, if the other (later) programs missed such a defect, then it is assumed the defect remained uncorrected. The licensee would then be required to evaluate the condition for its effect on safety. If significant, the licensee must determine if a breakdown occurred in any portion of the QA program. If a breakdown occurred, it would require evaluation for reportability. Therefore, the team concentrated on the success of the total program by assessing whether an uncorrected defect or program breakdown occurred.

The team's review of various deficiency reports (DRs), deviation notices (DNs), and nonconformance reports (NCRs) identified four conditions involving unacceptable hardware conditions (weld defects) that appeared to be potentially reportable to the NRC pursuant to 10 CFR 50.55(e) because each condition had been missed by the various inspection programs in place that should have identified the deficiency. For example, P-H completed its review and acceptance of the welds based on the review of radiographic film, and YAEC had reviewed and accepted the welds on the basis of film review. Additionally, the required surface examinations were completed and accepted. The deficient conditions,

although identified and corrected as described by the NCRs, were found (by chance) via mechanisms outside the framework of the total program.

The team performed detailed reviews of these NCRs and reviewed the radiographic film packages for each weld to assess the type and significance of the defects that were apparently overlooked by the licensee's QA program.

NCRs 11251, 11252, and 11065, issued by P-H, found that field welds CS-523-F0101, CS-431-F0203, and RC-97-F0203 had been reradiographed per YAEC DN-90 and rejectable weld indications had been noted that required repairs.

Note: As stated elsewhere in this report, YAEC issued DN-90 because the final radiographic film reviews performed by P-H and YAEC missed the geometrical unsharpness (Ug) deficiencies in 85 weld packages. The deficiencies were noted when the films were being filed. At the time it was issued, the DN was not considered reportable because defects were not apparent. Further, the Ug factor alone did not constitute a reportable condition, although it was a specified code requirement. The licensee recognized this deficiency and issued the DN to have the welds reradiographed to meet the Ug factor. Therefore, at that time there was no concern regarding weld quality. The reradiographs did, however, identify weld defects that exceeded the allowable acceptance criteria. The contractor issued NCRs to document the condition and performed the necessary repairs to restore each weld to code-required quality, in accordance with the governing procedures.

P-H issued NCR-4548 when a craft worker reported a "slot-shaped indication" in weld SI-201-F0201. The film re-review (film was previously read and accepted by P-H, the authorized nuclear inspector (ANI), and YAEC) verified the existence of a code-unacceptable defect that required repair. P-H evaluated the condition as not reportable and performed the necessary repairs to restore the weld to code-required quality.

For the other three NCRs, one involved a weld that had been hydrostatically tested and, as required by YAEC Procedure ASP-3, this would have required the NCR to be designated a major NCR. The team found that the NCR had been correctly identified as a major NCR. Major NCRs were dispositioned by UE&C. The other two were considered minor NCRs and were dispositioned by P-H. In each case, these NCRs were not documented (no records could be found) as having been evaluated for reportability.

NHY issued Procedure ASP-3 on July 26, 1984. ASP-3 deleted the requirement of indicating (on the NCR or elsewhere) that an evaluation per 50.55(e) had been performed. Three NCRs in question were issued after this procedure became effective and, therefore, for these NCRs, the evaluation was not required by procedure to be documented. Further, the team could not verify that these conditions had been evaluated. Procedure ASP-3, Paragraph 5.1.1, required the contractor's evaluation (P-H for minor NCRs and UE&C for major NCRs) for 10 CFR 50.55(e) reportability. If determined to be potentially reportable, Paragraph 5.1.5.2 required documentation submittal to the engineering group for evaluation by the discipline engineering manager. The team found that Procedure ASP-3, Revision 3, dated October 30, 1985, had revised the NCR form to require the initial evaluator to indicate on the NCR a yes or no decision regarding the potential for

10 CFR 50.55(e) reportability. Thus, it appeared that the licensee had recognized this procedural weakness by reinstating the earlier requirement. Discussions with personnel on site who were familiar with the reportability review practices during construction indicated that for the particular issue of Ug they were confident that proper evaluations had been performed.

The team performed its own evaluation of these issues to determine whether they should have been reported. In addition to the interviews discussed above, the team reviewed the radiographic film for the four welds in question and concluded that the discontinuities that had been noted on the film were code-rejectable-type defects. However, the team found that they were faint and difficult to see, making them dependent on the individual interpretation of the film reviewer. In the team's technical judgment (based on its review of the film which showed the indications before repair), two of the four welds were acceptable per the code, one weld could have been called either way in terms of code acceptance, and the fourth weld was rejectable per the code.

Based on the merit of each weld individually, a 10 CFR 50.55(e) review would have concluded that these conditions were not reportable. This conclusion would have been based on the significance of the indications that were missed. In all four cases, the indications, although classified (by P-H) as rejectable by code, were minor in nature and would not have impaired the safety of plant operations had the deficiencies remained uncorrected. Although the conditions (individually or collectively) were not considered reportable, the team noted a weakness in the program in that it could not be ascertained from the records that the DN for the 85 film packages containing rejectable Ug was reevaluated for reportability after P-H had reradiographed the welds and determined that code-rejectable indications were present, or whether the three NCRs were evaluated as a group because of the root cause of the event. Such reevaluations could have been done, but the programs in place and the available records did not prove that they were done.

18 EVALUATION OF THE EMPLOYEE CONCERNS PROGRAM

The licensee established its employee concerns program in December 1984. The program was detailed in New Hampshire Yankee Procedure 16421, "Employee Allegation Resolution (EAR)." This section summarizes the program and the team's review.

The team reviewed Procedure 16421 and additional informal guidelines on training of personnel and administration of the program. Concerns were entered into the program by means of phone-ins (P), walk-ins (W), mail-ins (M), exit interviews (E), and surveys (S). The first element of the EAR file designation was assigned depending on how the concern originated, that is, "M" for mail-in, "E" for exit interview, and so forth. The second element of the file designation identified the year the concern was raised. As part of the program, every employee terminating employment at the site was required to interview with the EAR program manager. Any concerns identified in these interviews were identified by a file designation starting with "E."

The team reviewed the licensee's EAR concern log covering the period December 1984 to the present to identify potential issues involving Pullman-Higgins (P-H) welding or nondestructive examination (NDE) quality or both. A total of 48 concerns were identified that fell into this category. All of the concerns had been evaluated and dispositioned under the provisions of this program. Forty of the concerns were classified as safety related, and the other 8 were classified as not safety related. Thirteen of the concerns were substantiated by the licensee's investigation, and the other 35 were not. Of the 13 concerns that were substantiated, 9 were classified as safety related and the other 4 were classified as not safety related. The team reviewed 34 of the 48 files that appeared to be related to concerns with P-H welding or NDE or both. The team's review is summarized below and is discussed in more detail in Appendix 9 to this report.

On the basis of the team's review, the licensee's EAR program appeared to be organized and functioning well to assist the quality process. The licensee's investigations were always very detailed and every concern appeared to receive appropriate attention. In many cases, even though it was clear the concern did not merit much attention, extra time was spent to be sure no safety issues were missed. Although a number of issues were raised through the process relative to P-H welding, the issues were investigated in depth and none of the concerns resulted in serious safety issues relative to P-H pipe welding or NDE. The more important issues raised were:

(1) Unauthorized Weld Repairs - Six of the EARs reviewed related to unauthorized weld repairs. Three of the six were substantiated, but none of the three were related to P-H pipe welding.

(2) Excessive Number of Repairs on Reactor Coolant Loop Welds - One EAR (E-86-117-1) questioned the number of repairs made on reactor coolant loop welds. This concern was not substantiated. The team also evaluated

this question as part of its inspection (see Section 12 of this report) and did not identify problems.

(3) Cold Pulling of Pressurizer Surge Line - Two EARs concerned cold pulling of the pressurizer surge line during weld fitup. These concerns could not be substantiated.

(4) Disposition of Nonconformance Reports - Five EARs concerned proper disposition and timeliness of disposition of nonconformance reports (NCRs.) One (E-85-32) of the five was substantiated. This EAR questioned the timeliness of disposition of NCRs. Although the licensee identified problems with the timely disposition of NCRs as part of its EAR investigation, it identified no safety problems.

(5) Unqualified Welders - One EAR (S-85-064-3) concerned deletion of the requirement for the quality assurance (QA) review to verify welder qualification. This concern was not substantiated. QA review for welder qualification during acceptance of welding records had been deleted from the procedure because welder qualification was verified at the rod room as well as during in-process welding. In addition, the investigation found that only 18 cases of unqualified welders had been identified by QA review. The licensee's investigation compared the 18 to the total number of NCRs issued to date (approximately 12,000) for the project and concluded that the number was insignificant. The team questioned the licensee's justification and believed that a more thorough analysis should have been made to determine the type of qualification deficiencies covered by the NCRs. The team reviewed 16 of the NCRs and found that the majority of the qualification deficiencies were for welding on small-bore pipe when the welder qualified only for welding larger diameters or qualified for thickness that was slightly less than the thickness welded. All of the deficiencies were resolved by either cutting out and replacing the weld or proving the welder's qualification on a coupon. Although technically in violation of code, such qualification deficiencies have little safety significance. Therefore, the team concluded the licensee's decision to discontinue QA verification of welder qualification during acceptance of welding records did not present a safety concern.

Overall, the EAR program appeared to be working well and the team did not have any concerns with the program.

19 EVALUATION OF JOSEPH WAMPLER'S CONCERNS

As part of the team's independent review of welding issues at Seabrook that were raised by congressional committee staff, the team interviewed Joseph Wampler on April 24, 1990. The transcript of this interview is included as Appendix 4 to this report. During the interview, Wampler agreed to allow the NRC to copy the logbook he had kept while he was employed as the Pullman-Higgins (P-H) nondestructive examination (NDE) Level III examiner at Seabrook from late August 1983 to early January 1984. In reviewing the welding issues, the team considered the information provided by Wampler in the interview and contained in his logbook. The material that follows summarizes Wampler's more significant concerns and the team's actions to pursue them during its review.

(1) Concern

Unacceptable reject rate (19% to 20%) of radiographic film reviewed by Wampler that previously had been reviewed and had not been rejected by P-H Level II and III examiners. The film had been stored in a file cabinet since 1981-1982; there were probably 800 packages of film. The biggest percentage involved repairs to the weld, not just reshots. On November 22, 1983, Wampler, Dick Julian, and Phil Oikle met to discuss the high reject rate that Wampler and Yankee Atomic Electric Company (YAEC) were finding, and supposedly YAEC was going to issue a 50.55(e) report.

Team's Actions

The team reviewed Wampler's logbook to understand and evaluate the basis for this concern. The team's findings concerning its review and evaluation of the information in Wampler's logbook are provided in Sections 4 and 8 and Appendix 5 to this report. The team confirmed there was a high reject rate of radiographic film, but the data in Wampler's logbook indicated that his reject rate levels (for weld defects) were generally not as high as he had recalled. The team also confirmed there was a substantial backlog of film packages. Although the backlog had a negative impact on pipe welding and NDE activities, it did not constitute a safety concern.

The team reviewed and evaluated the results of YAEC's review of radiographic film and data from non-QA (quality assurance) records from P-H and United Engineers and Constructors (UE&C) that provided historical trends of weld reject rates. The team's findings are detailed in Section 4 of this report. The team concluded that the reject rates resulting from the overviews of radiographic film were higher than normally expected and indicated that basic weaknesses in P-H's radiographic testing (RT) program had existed over a long period of time. However, these rates were influenced to a degree by the conservative nature of the film overviews.

By reviewing available records and talking with responsible licensee personnel, the team reviewed and evaluated the reportability issue. The team's

findings are detailed in Sections 14 and 17 of this report. The team determined that the documentation of an evaluation for Deficiency Report DR-527 per 10 CFR 50.55(e) was not appropriately handled (no records could be found). However, this condition was not reportable per 10 CFR 50.55(e).

(2) Concern

Weld packages could not be put together properly in terms of timeliness and with assurance that all of the paperwork was there. Examples were RC-9-F0102 and RC-10-F102. Wampler provided his interpretation of the code in terms of required documentation or he questioned the requirements of the code, and he did not think the requirements were being met because records and radiographs were missing. He was also concerned that the welds had many repairs which could not be determined from the weld packages given to him because of missing reader sheets and weld repair orders.

Team's Actions

The team reviewed and evaluated weld control packages, including the examples cited. The review ascertained the adequacy of the records, documented what the code requires in terms of documentation and how the procedures implemented complied with the code, and determined the degree of compliance with these requirements. The team's findings are detailed in Sections 8 and 9 and Appendices 5 and 6 to this report. The team determined that adequate methods for controlling pipe welding and welding repairs consistent with applicable codes had been implemented, although the weld control packages were difficult to review.

(3) Concern

Wampler stated a specific concern about weld CO-4059-F0403.

Team's Actions

The team reviewed and evaluated the radiographic film and weld control package for this weld to determine acceptability. The team's findings are detailed in Section 8 and Appendix 5 to this report. The team determined that the final weld and radiographs met code requirements.

(4) Concern

Wampler found a report in the RC-9 weld package that had his signature which he did not write; it was printed and dated and he always signs in a different manner. He could not find the form, but promised to send it if he did.

Team's Action

The team reviewed this concern in conjunction with Concern 2. The team's findings are detailed in Section 11 of this report. The team determined that Wampler's signature had been properly documented.

(5) Concern

There were an excessive number of weld repairs. What was this doing to the material? Example was reactor coolant system piping.

Team's Actions

The team assessed the controls implemented on weld repairs, including required documentation, evaluation, and process controls on preheat, interpass temperature, and post-weld heat treatment. As part of this assessment, the team reviewed and evaluated welding and nonconformance report (NCR) procedures, weld packages, and NCRs. The team's findings are detailed in Sections 12 and 13 of this report. The team determined that adequate methods for controlling pipe welding and welding repairs consistent with applicable codes had been implemented and did not consider the number of weld repairs to be excessive.

(6) Concern

Wampler questioned whether weld rejects (reshots or repairs) could be fixed because of potential inaccessibility.

Team's Actions

The team pursued this issue by interviewing knowledgeable licensee personnel and reviewing NCRs, deficiency reports (DRs), deviation notices (DNs), Weld Repair Log entries, Wampler's logbook entries, and radiographic film and weld control packages. The team's findings are detailed in Section 16 of this report. The team determined that the radiographic film backlog did not result in a condition in which a weld was inaccessible (for repair or reshot) or was accepted without the required code RT being performed.

(7) Concern

Wampler questioned if the approximately 16 NCRs he was going to write at the time he left Seabrook had been completed. He was unable to provide any new information to help identify the welds.

Team's Actions

The team reviewed Wampler's logbook entries and selected radiographic film packages that he had listed as having been rejected because of weld discontinuities to determine if they could be the welds in question. The team included radiographic film packages, using the P-H weld repair log to select likely candidates, and any associated NCRs in this review, and also interviewed responsible licensee personnel. The team's findings are detailed in Section 8 and Appendix 5 to this report. The team determined that adequate actions regarding all these welds had been taken and that there were no "missing" NCRs associated with weld discrepancies discovered by Wampler.

APPENDIX 1

NRC MEMORANDUM DATED MARCH 27, 1990, "INDEPENDENT REVIEW OF WELDING ISSUES AT SEABROOK"

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

March 27, 1990

MEMORANDUM FOR: James M. Taylor
Executive Director for Operations

FROM: James H. Sniezek
Deputy Executive Director
for Nuclear Reactor Regulation, Regional
Operations and Research (April 1, 1990)

SUBJECT: INDEPENDENT REVIEW OF WELDING ISSUES AT SEABROOK

Pursuant to our discussions on March 26, 1990, I am establishing an independent regulatory review of the welding issues at Seabrook such as those raised by Mr. Wampler. NRC staff and consultants who have had previous significant involvement with pipe welding activities at Seabrook will not be a part of the review team.

Mr. Lee Spessard of AEOD will lead the Independent Review Team which will include NRC staff who have achieved NDE Level III qualification. Messrs Cerne, Nerses and Murphy will provide administrative and resource support for the Independent Review Team. The Team will take management direction from and report directly to me. The Director, NRR and Region I Administrator have been advised of this activity and informed that any future staff activity regarding the issues raised by Mr. Wampler are to be coordinated with and concurred in by me. The Director, OI and Director, Congressional Affairs have also been advised of the independent review activities.

Enclosed is the Charter for the Independent Review Team.

My overall plan includes:

1. A meeting with Mr. Chris Paine and Dr. Henry Myers to gain an understanding of the issues enumerated in the March 23, 1990 memorandum from Dennis Rathbun. Mr. Rathbun will arrange the meeting, to include Mr. Spessard, a representative of the Inspector General and myself.

2. A meeting with Mr. Wampler by the Independent Review Team and others to clearly identify and understand his concerns. I am attempting to contact Mr. Wampler today to set the date and place for the meeting.

3. Subsequent to the meeting with Mr. Wampler, the Independent Review Team will conduct an onsite review of welding issues to determine whether they have been evaluated and dispositioned consistent with NRC requirements. The results will be documented in a report from the Team to me. I will provide you with status updates and a written report of the team's findings, including appropriate followup recommendations, if any.

I will provide you with an overall schedule once the meetings with the Congressional staff and Mr. Wampler have been held.

James H. Sniezek
Deputy Executive Director
for Nuclear Reactor Regulation, Regional
Operations and Research (April 1, 1990)

Enclosure: Independent
Review Team Charter

cc: T. E. Murley
T. T. Martin
D. Williams
B. Hayes
D. Rathbun
E. Jordan
L. Spessard
G. Walton
W. Crowley
N. Economos
A. Cerne
V. Nerses
D. Murphy
S. Ebneter

Distribution:
JHSniezek

Charter
Independent Review Team

Purpose: Conduct review of welding issues such as those raised by Mr. Wampler regarding the Seabrook Plant. Determine whether the issues have been evaluated and dispositioned by the licensee consistent with NRC requirements.

Team Composition: Lee Spessard, Team Leader
Glen Walton, Senior Resident Inspector, Watts Bar
Bill Crowley, Reactor Inspector, RII
Nick Economos, Reactor Inspector, RII

Note: The team may be expanded as necessary depending on the results of the meeting with Mr. Wampler.

Resource Support: A. Cerne, Region I
V. Nerses, NRR
D. Murphy, OI

Team Activities:

1. Interview Mr. Wampler to determine and understand his pipe weld/NDE concerns. The interview should be transcribed.

2. Based on the interview, develop a specific plan for review of all issues raised by Mr. Wampler and a weld/NDE spot sample of similar activities preceding and subsequent to Mr. Wampler's employment at the Seabrook station. The review plan should be approved by Mr. Sniezek.

3. Determine whether licensee activities related to the weld/NDE issues reviewed by the team were consistent with NRC requirements.

4. Document findings in an inspection report.

Priority: This team assignment takes precedence over other assigned responsibilities.

James H. Sniezek

Approved: James H. Sniezek
Deputy Executive Director
for Nuclear Reactor Regulation, Regional
Operations and Research (April 1, 1990)

APPENDIX 2

PLAN FOR TEAM INSPECTION AT SEABROOK

PLAN FOR TEAM INSPECTION AT SEABROOK

Team Leader - Lee Spessard

OVERVIEW:

An independent regulatory review team has been established to review certain pipe welding issues at Seabrook. The team was established under the direct authority of Jim Sniezek, Deputy Executive Director for Nuclear Regulation, Regional Operations and Research.

TEAM:

Lee Spessard, Director, Division of Operational Assessment, AEOD, was named the team leader, and the team members are: Glenn Walton, Senior Resident Inspector at Watts Bar, Bill Crowley and Jim Coley, Region II Specialist in NDE, and Brozia Clark, a consultant in nondestructive examination.

Two team members (Spessard & Walton) convened in the Rockville NRC office on April 2, 1990, and started reviewing the issues and developed the inspection plan provided below. Jim Sniezek and Lee Spessard met with Dr. H. Meyers and other Congressional staff members on April 3, 1990, to obtain the specific information regarding Congressional interest. On April 6 -12, 1990, the team will visit Seabrook and begin the inspection as outlined in the plan. On April 24, 1990, Mr. Wampler will be interviewed at the NRC office in Rockville by the team members to obtain the details surrounding his welding issues at Seabrook. The team will then perform further inspections onsite commencing April 25,1990, to complete the remaining portions of the plan. The target date for completing the onsite work is May 4, 1990. The team will convene in the Rockville office on May 7, 1990, to complete the report.

PURPOSE:

The objective of the review is to provide an after-the-fact, independent assessment to determine whether or not the pipe welding/NDE activities performed by Pullman-Higgins, including evaluation and disposition of nonconforming conditions were accomplished in accordance with applicable codes and NRC requirements, and to assess the issues involving Mr. Wampler, a Level III radiographer employed by Pullman-Higgins.

INSPECTION PLAN:

The inspection plan, as described below, as well as the team composition, may be modified at the discretion of the team leader based on future discussions with Mr. Wampler and results of the team's inspection findings. The plan consists of the following:

(1) By telephone, if possible, interview Mr. Wampler regarding pipe welding and NDE issues at Seabrook (See Sniezek to Wampler letter dated March 30, 1990). SPESSARD & WALTON

(2) Obtain and review the work packages for the 15 welds referenced in Senator Kennedy's letter to the NRC dated March 12, 1990. If work packages reference other documents, obtain and review those documents. WALTON

(3) Review the radiographic film for the 15 welds referenced in Senator Kennedy's letter. Determine & record the following: Date original film was exposed, date it was reviewed and level qualification of reviewer, disposition of review, record repair date, if applicable and basis for repair, record the P-H Level III's overview date and results of the review, record the YAEC Level III's overview date and results of the review. CLARK & WALTON

(4) Review the on-site data regarding Level III re-review of radiographs performed by Pullman-Higgins, and YAEC. Determine the following: CROWLEY

(a) Was a 100 percent review done by Pullman-Higgins and YAEC for all radiographs?

(b) Why was the review done?

(c) When did the review start?

(d) How long did the review continue?

(e) What did the review find? Number of rejects, type of rejects, etc. How were the rejects handled; e.g., documented?

(f) How many were rejected due to film quality?

(g) How many were rejected due to weld quality?

(h) Were all rejected welds accessible for repair and/or re-radiography? If not, what disposition was made ?

(i) Were all rejectable welds repaired? If not what disposition was made?

(j) Was the final disposition of all welds reviewed and accepted by the the utility and the ANI? NOTE: Pay particular attention to welds that were inaccessible.

(k) Were any exceptions taken to the ASME code of record?

(5) During the time period before, during, and after Mr. Wampler was employed as a Level III radiographer at Seabrook, review the radiographic film for approximately 100 welds to ascertain code compliance. Also determine if aging has affected the film quality. In this review verify the following: film density, geometric unsharpness factor, technique, film speed, source location in proximity to film and penetrameter, sensitivity requirements; i.e., 2-2t, penetrameter size, number, location, and weld coverage. Review the technique sheet with each weld and determine if the documentation supports the condition.

Verify that acceptable indications are recorded on the reader sheet, sheet is dated and signed by at least a qualified Level II reviewer, a qualified RT procedure is referenced on each reader sheet, and each weld is properly dispositioned. Verify the Level III's involvement. Record data as required by paragraph 3. COLEY & CLARK

(6) Review the radiographic film for at least 10 welds that Mr. Wampler had reviewed and determine the validity for his acceptance or rejection of the film. For those rejected, review the reshot and determine if repairs were required and achieved. Record data as stated in paragraph 3. COLEY & CLARK

(7) Review the radiographic procedures for compliance with the ASME Code. CROWLEY

(8) Review several representative training and certification records for Pullman-Higgins Level II film interpreters. Review qualifications of P&H and YAEC Level III radiographers involved. Verify compliance with ASNT-TC-1A. CROWLEY

(9) Review nonconformances (DR's, NCR's) associated with the P&H pipe welding program. Request a word search of " WELDS" and "NONDESTRUCTIVE EXAMINATION" from the computer system and determine if Wampler issued any of them or caused any of them to be issued. Review each non-conformance and verify it was dispositioned in compliance with the FSAR and ASME Section III code (1977 Edition, Winter Addenda). Determine if any of the DR's, NCR's were or should have been reported to the NRC as required by 50.55(e). WALTON

(10) Determine if the licensee issued any 50.55(e) reports on P-H pipe welding or NDE issues during the construction phase. WALTON

(11) Review the licensee's employee concern program and determine if the licensee received any concerns about P-H's pipe welding and/or nondestructive examination program. CROWLEY

(12) As discussed by Wampler in letter dated March 18, 1990 a P-H "Radiography Backlog" is discussed. Determine if such a list exists. Evaluate it's contents for appropriateness for implementing this plan in terms of sample selection. WALTON

(13) Review any QA Audits conducted of the P-H pipe welding/NDE activities. Evaluate to assure weld and film quality findings were properly dispositioned. CROWLEY

(14) Obtain a legible copy of each document reviewed as part of this inspection for inclusion as an enclosure to the Inspection Report. Specifically include all documents that purport to resolve any deficiencies identified during the review. Request clearance from the licensee that the information is not proprietary.
ALL MEMBERS

Issue a detailed report which fully describes the extent of inspections performed and results of the review. The records collected will be included in the report as attachments. Issue regulatory actions if required.
SPESSARD/ALL MEMBERS

Submitted by : Lee Spessard — 4/5/90
LEE SPESSARD — Date

Approved by : J.H. Sniezek — 4/5/90
JIM SNIEZEK — Date

APPENDIX 3

NRC CRITERIA FOR SELECTING SAMPLE OF 100 WELDS FOR RADIOGRAPHIC REVIEW

(1) Include Code Class 1 and 2. Note: ANSI B31.1 welds were also included in the sample.

(2) Include carbon steel and stainless steel material.

(3) Consider different line sizes.

(4) Consider different film interpreters.

(5) Consider time frame that the radiograph was taken and include the following:

   (a) A small percentage (approximately 20%) of the early stages of starting the piping welds.

   (b) A small percentage (approximately 20%) of the late stages of completing the piping welds.

(6) Consider date film was reviewed in the following cases:

   (a) A period before Wampler reviewed film (5-10%).

   (b) A period while Wampler was performing reviews (5-10%).

   (c) A period after Wampler left the site (5-10%).

   (d) A sample from those radiographs taken before Wampler worked at Seabrook, but which were reviewed by a Level III examiner shortly after Wampler left the site (select as many as possible).

(7) Select welds from different systems, for example, main steam, feedwater.

(8) From the inspector's experience, select welds that are potentially problem welds, for example, dissimilar welds.

(9) P-H apparently backlogged film from 2nd and 3rd reviews before the middle of 1983. Read a significant sample of this film to determine if repairs were performed and if these repairs were evaluated as required by code (Level II or III).

(10) Of the welds selected, ask the licensee to determine how many are covered in the in-service inspection (ISI) program and received a baseline inspection. (Note: This was determined to be unnecessary, although several of the welds selected were inspected in the ISI program.)

APPENDIX 4

TRANSCRIPT OF INTERVIEW WITH JOSEPH WAMPLER

1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

3 NUCLEAR REACTOR REGULATION

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6 In the Matter of: :

7 INTERVIEW OF JOSEPH WAMPLER :

8 with NRC Staff Concerning :

9 Disposition of Weld Radiographs:

10 at Seabrook Power Plant :

11 - - - - - - - - - - - - - - - - - -X

12

13 Nuclear Regulatory Commission

14 One White Flint Mall

15 Conference Room 12 B-11

16 Rockville Pike

17 Rockville, Maryland

18

19 Tuesday, April 24, 1990

20

21 The above-entitled matter commenced at 10:06

22 o'clock a.m., when were present:

23

24

25

1 James H. Sniezek, Deputy Executive Director,
2 Nuclear Reactor Regulation, NRC
3 Lee Spessard, AEOD
4 Nuclear Regulatory Commission
5 Bill Crowley, Region II
6 Nuclear Regulatory Commission
7 Glenn Walton, Region II
8 Nuclear Regulatory Commission
9 Jim Coley, Region II
10 Nuclear Regulatory Commission
11 B.H. Clark, OEDO
12 Nuclear Regulatory Commission
13 Tony Cerne, Region I,
14 Nuclear Regulatory Commission
15 Dan Murphy, OI,
16 Nuclear Regulatory Commission
17 Vic Nerses, Seabrook Project Manager,
18 Nuclear Regulatory Commission
19 Mike Callahan, Congressional Affairs,
20 Nuclear Regulatory Commission
21 Dennis Rathbun, Office of General Counsel
22 Nuclear Regulatory Commission
23 Frank Forgione, Office of Inspector General
24 Nuclear Regulatory Commission
25 Henry Myers, Committee on the Interior

1 U.S. House of Representatives

2 Chris Paine, Staff Member,

3 Office of the Honorable Edward Kennedy,

4 U.S. Senate

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1 P R O C E E D I N G S

2 [10:06 a.m.]

3 MR. SNIEZEK: Good morning. My name is James H.
4 Sniezek. I am the Deputy Executive Director for Nuclear
5 Reactor Regulation, Regional Operations in Research, NRC.
6 It is now 10:06 a.m. on April 24, 1990, and this is an
7 interview of Mr. Joseph Wampler, who has expressed a
8 willingness to assist the NRC in its activities regarding
9 disposition of weld radiographs at Seabrook.

10 This offer to assist the NRC was documented in a
11 letter dated March 18, 1990 from Mr. Wampler to Mr. James
12 Taylor, the Executive Director for Operations. Mr.
13 Wampler's offer of assistance was readily accepted by the
14 NRC in a letter from me to Mr. Wampler dated March 30, 1990.

15 The conditions of the interview were documented in
16 the referenced letters and included Mr. Wampler's request
17 that the interview be transcribed. Mr. Wampler was a former
18 senior radiographics examiner at the Seabrook nuclear
19 station who was identified to the NRC by the Oversight and
20 General Investigations Subcommittee and Staff as a non-
21 destructive examination professional who had knowledge of
22 the weld quality situation at Seabrook during the time he
23 was employed by Pullman Higgins as a Level III examiner.

24 Although the NRC has made its overall safety
25 judgment regarding Seabrook, as evidenced by issuance of the

1 operating license, as a result of the concerns raised by
2 certain members of Congress and the Congressional staffs,
3 the NRC is conducting and after-the-fact, independent
4 assessment to assure the quality of welds at Seabrook.
5 It is in the light of this background that we are
6 interviewing Mr. Wampler. The actual interview will be
7 conducted by Mr. Lee Spessard and his team of NRC and
8 consultant experts who are conducting the reexamination of
9 the weld quality issue at Seabrook.
10 It is through this direct interaction between the
11 NRC expert team and Mr. Wampler that the NRC team will be
12 able to fully understand and appropriately follow up on the
13 weld quality concerns that Mr. Wampler may have. I would
14 ask that other parties present hold any questions or
15 comments they may have until such time as the discussions
16 between the NRC expert team and Mr. Wampler are completed.
17 Before I ask Mr. Spessard to introduce the NRC
18 team and I ask the other parties present to identify
19 themselves and their affiliation, I want to thank you, Mr.
20 Wampler, for agreeing to assist the NRC in this important
21 endeavor.
22 Mr. Spessard?
23 MR. SPESSARD: Thank you. My name is Lee
24 Spessard. I'm the senior NRC manager who is leading this
25 independent team. I've been with this agency for almost 20

1 years now, and I have a considerable amount of inspection
2 and enforcement experience, having worked 15 years in two
3 different regional offices and five years here in
4 headquarters. My team that you see, these four gentlemen
5 here -- Glenn Walton is the Senior Resident Inspector at
6 Watts Bar. Bill Crowley and Jim Coley are both from our
7 Region II office, and Mr. Clark is an NRC consultant and NDE
8 to the team.
9 What I'd like to do is to ask each of these
10 members of the team to briefly discuss their experience with
11 you so you understand who you are talking to today.
12 MR. WALTON: My name is Glenn Walton. I am
13 currently assigned as the senior resident inspector at Watts
14 Bar Nuclear Plant in Spring City, Tennessee. I've been
15 employed with the NRC for 16 years and I'll give you a brief
16 description of my previous experience in the non-destructive
17 examination area.
18 I was with Babcock and Wilcox Company as an NDE
19 technician in radiography, ultrasonics, liquid penetrants
20 and magnetic particle methods beginning in 1956. I was
21 promoted to NDE section head at Babcock and Wilcox in 1968,
22 qualified as level 2 when an SNT TC1A was published. I also
23 was qualified as a test examiner in ultrasonics for NAVSHIPS
24 250-1500.
25 I was promoted to QC manager, BNW Mt. Vernon,

1 Indiana works in 1972, held level 3 certifications in all
2 NDE methods. I was at that time also the radiation safety
3 officer at the Mt. Vernon works. That's all I have.
4 MR. SNIEZEK: Bill?
5 MR. CROWLEY: My name is Billy Crowley. I'm
6 presently employed with the NRC in Region II as a Reactor
7 Inspector. I've been with the NRC for 13 years in the
8 inspection program, a large part of which has been spent
9 inspecting welding and in non-destructive testing. I have a
10 B.S. Degree in Mechanical Engineering and numerous formal
11 courses in metallurgy, welding and non-destructive
12 examination.
13 I spent 11 years in nuclear submarine construction
14 programs, including 9 years as a welding engineer where I
15 was qualified as an NDE Level III examiner to NAVSHIPS
16 2501500-1 for radiography, penetrant, magnetic particle and
17 ultrasonic testing. I spent four years working for
18 Combustion Engineering as a nuclear welding engineer.
19 Then, as I said, I've spent 13 years in the NRC
20 inspection program, inspecting welding and non-destructive
21 examination.
22 MR. MYERS: I don't mean to interrupt, but can you
23 tell me why these -- everybody is reading their credentials
24 here?
25 MR. SNIEZEK: I want Mr. Wampler to understand

1 that the people that he's going to discuss with understands.

2 MR. MYERS: I think he probably accepts that.

3 MR. SNIEZEK: I would prefer that they read their

4 credentials into the record so that Mr. Wampler does

5 understand them.

6 MR. MYERS: I think we have more important things

7 than just putting their credentials into the record.

8 MR. SNIEZEK: I think we will -- I would like him

9 to understand who he is talking to, also.

10 MR. COLEY: My name is Jim Coley. I am classified

11 as a reactor engineer, mechanical. I have worked as a

12 member of the Region II technical staff since December 1,

13 1979 in the Materials and Process Section of the Engineering

14 Branch. My duties have consisted of inspecting nuclear

15 power plant welding, non-destructive testing and in-service

16 inspection activities.

17 I have also been responsible for maintaining

18 Region II's non-destructive test laboratory and performing

19 independent measurement activities in all phases of NDE at

20 sites throughout the Southeast. Prior to NRC, I worked for

21 7 and a half years for SVSHIP Pacagoula for the United

22 States Navy as a Quality Assurance Specialist, where I had a

23 Level III test examiner's certification to NAVSHIPS 250-

24 1500-1 in radiography, ultrasonics, magnetic particles and

25 liquid penetrant testing.

1 As a Quality Assurance Specialist, I was totally
2 involved in the building of three nuclear submarines and the
3 refueling and overhaul of 4. Prior to SVSHIP Pacagoula
4 service, I worked at the Charleston Naval Shipyard for 12
5 years, of which 6 years was as a Metals Inspector A.
6 During those 6 years, I held Level II Examiner
7 Certifications in all phases of ultrasonics, liquid
8 penetrants and magnetic particle testing. I was also
9 qualified as a radiographic assistant during those days.
10 MR. SNIEZEK: Bill?
11 MR. CLARK: I'm Brozia H. Clark, referred to as
12 Bro. I have a B.S. Degree in Mechanical Engineering from
13 the University of Houston, primarily in pressure vessel
14 design and fabrication, particularly for Section VIII,
15 Divisions I and II, including the API standards. I also
16 have a certificate of completion at the Institute of Nuclear
17 Studies, University of Tennessee through OR&L National
18 Laboratory as a radiation supervisor for Union Carbide for
19 ten years.
20 I've been 33 years in the petrochemical
21 industries. I retired in '82 and I'm self-employed as a
22 consultant. I have a total of 30 years of non-destructive
23 examinations in RT/UT/PT/MT/ET/LT/VT and acoustic emission.
24 I'm a Level III since '68 and helped to write the SMT-TC-18
25 requirements. I'm a Fellow in the ASMT since 1978.

1 I'm currently active on the ASME pressure vessel
2 code, Section 5, no-destructive examination since 1964.
3 I've been a member of five CAT teams of filtration since
4 1984. Thank you.
5 MR. SPESSARD: Mr. Wampler, the reason for
6 introducing my team and letting them tell you their
7 credentials is, we take this job very seriously and when you
8 have to go into a plant that was constructed five to ten
9 years, after the fact, to do an independent assessment, you
10 have to have a good team.
11 I have taken this job very seriously and I have
12 put together a quality team, and we're going to do that
13 independent assessment, and we're also going to assess in a
14 very objective and thorough manner, any concerns that you
15 have. So, we really want to hear from you today so that we
16 can understand what your concerns are. Before we start --
17 MR. MYERS: Can I make a point. I think it's
18 relevant. Mr. Wampler did not come here, he did not bring
19 his concerns to the NRC. I believe the NRC sought him out
20 and I think that should be clear in the record, because his
21 employment prospects are hampered by any implication that he
22 came to the NRC with his concerns recently. I think that to
23 say that, you know, you are welcoming him here, leaves out
24 the fact that it was the NRC that sought him out, and, in
25 fact, implied to him that if he did not appear voluntarily,

1 he would be subpoenaed.

2 I think everybody agreed that it would be better

3 if he appeared voluntarily. I just hope that the record

4 would reflect that.

5 MR. SNIEZEK: My name is Jim Sniezek, and I agree

6 completely with what Dr. Myers has just said. We have

7 sought out Mr. Wampler. He is here on a volunteer basis. It

8 was not necessary to issue a subpoena. We greatly

9 appreciate the fact that Mr. Wampler is willing to talk to

10 us, so that if he does have any concerns, we may fully

11 address them during our re-review of the weld situation at

12 Seabrook. I agree with what you said, Dr. Myers.

13 MR. SPESSARD: Fine. At this time, what I'd like

14 to do is have the others present in the room introduce

15 themselves for the record and state their affiliation,

16 please.

17 MR. CERNE: My name is Tony Cerne. I'm an

18 Inspector from NRC Region I.

19 MR. MURPHY: My name is Dan Murphy. I'm an

20 Investigator with the Office of Investigations.

21 MR. NERSES: My name is Vic Nerses. I'm the

22 Seabrook Project Manager here at Headquarters, responsible

23 for the licensing of the plant.

24 MR. CALLAHAN: Mike Callahan, NRC Congressional

25 Affairs.

1 MR. RATHBUN: Dennis Rathbun, Director of
2 Congressional Affairs.
3 MR. LEWIS: Steven Lewis, Office of the General
4 Counsel.
5 MR. FORGIONE: Frank Forgione, Office of the
6 Inspector General.
7 MR. MYERS: Henry Myers, staff, House Interior
8 Committee.
9 MR. SPESSARD: Thank you.
10 Thank you, Mr. Wampler. We're happy to see you.
11 I think you know I've tried to get in touch with you on the
12 phone a few times, and we just couldn't quite get together,
13 so it is a pleasure to finally meet you.
14 What I'd like to do is just let you talk, give us
15 your own story, about your work experience at Seabrook, the
16 concerns you had. From some of the things the team has been
17 able to read, we understand there is an issue of a high weld
18 reject.
19 There is an issue of some 15 or 16 NCRs that were
20 drafted at the time just before you left, and you had a
21 concern, as we understand it, how those were handled. So,
22 what we'd like to do is just hear from you, and we'll try
23 not to interrupt you; we want to listen. Then, at that
24 point, the team will have some questions it would like to
25 ask.

1 We would like to keep this as open as possible, so
2 feel free to loosen your tie. We'd like to break
3 approximately every hour. Also, we'll take a lunch break,
4 if that's suitable with you and if we haven't finished by
5 that time.
6 So, I'm done. We'd like to hear from you.
7 MR. WAMPLER: I just have a few things. As Henry
8 already said, I do want to make it clear that I'm not here
9 of my own initiative, okay? In fact, you know, I got the
10 clear impression that if I didn't show up, I was going to be
11 subpoenaed, and I want -- I'm saying it now to -- you
12 requested that I show up, and I'm here.
13 The nature of my work at Seabrook was I was the
14 Sight Level III. I was responsible technically for all
15 radiography on the site. I reviewed all the radiographs,
16 issued any weld repair orders, weld procedures. I'm an ASNT
17 Level III. I've been doing this about 25 years.
18 My major job there was to review 1981/82
19 radiographs. The partial part of my job was to do
20 production radiographs, which was a very small part of my
21 job. The major portion was '81/'82s, and this was in 1983,
22 I was reviewing them.
23 All of these radiographs -- prior radiographs I
24 was reviewing were already approved by Level II and Level
25 IIIs from Pullman-Higgins. So, they were not first time

1 through. They had been approved and sitting around since
2 early '82. That was where my major concerns lied.
3 In the process of this review, I discovered a, to
4 me, unacceptable reject rate. I was looking at 19 to 20
5 percent reject rate from prior Level IIIs. Totally
6 unacceptable.
7 I brought these concerns to Yankee Atomic, Dick
8 Julian, Singleton, Phil Oikle. We had a lot of
9 conversations about these, about my interpretation of the
10 code, my interpretation of the indications. We had a lot of
11 classes -- I mean, we could call them classes -- where the
12 three of us, Oikle, Julian and myself, would sit down and
13 make sure that we're all reviewing the radiographs to the
14 same criteria. We even made drawings of what porosity in a
15 tail looks like so that we had no misconceptions.
16 Not a lot of film rejects. There was a lot of
17 brown film, but basically, a film reject is a weld reject,
18 if you really look at it schematically. But the biggest
19 part were repairs to the weld, and I was sitting there with
20 a 20 percent reject rate of repairs to weld, not just
21 reshoots, okay?
22 I kept bringing these up to Pullman-Higgins, my
23 boss, Richard Davis, Ray Donald, Rick Beckstead. Richard
24 Davis went so far as to say, you know, "It's my problem.
25 This is going to reflect on me. Do something." Since they

1 took my powers away, my nose doesn't work, so I just kept
2 rejecting the film.
3 Most of that film was Michael McCray. There was
4 some Hinse film in there, but the biggest bulk of it was
5 Mike McCray. This film was all in a big storage cabinet.
6 When I walked onto the site, they said, "There is your job,
7 and here's a four-drawer cabinet full of film," probably 800
8 packages. Well, I don't want to go digging. About 800
9 packages.
10 I accomplished 263 of those -- 300 -- I better get
11 the book, huh?
12 [Pause.]
13 MR. WAMPLER: I'll look for it and talk. Some of
14 the rejects were -- basically, a lot of them were lack of
15 fusions, porosities, transverse linears, slag. So, they
16 weren't minor problems, okay?
17 Back on November the 3rd, I had 650 film or weld
18 packages to review. That was as of November 3rd. So there
19 was a considerable amount. I had only picked up 266, so I
20 was pretty close -- 300. So, I had reviewed 266 since I
21 started, which was in August of '83.
22 Yankee Atomic -- their film review was turning up
23 almost a 19 to 20 percent reject rate over and above what I
24 was bringing to them. So what they were pulling -- when I
25 brought this to Dick Julian's attention, he started looking

1 at the film that was in the vault and started finding a
2 large reject rate himself. We had a little meeting between
3 Dick Julian, Phil Oikle and myself, and it was determined
4 that they were going to -- Yankee Atomic was going to issue
5 a 50.55(e) Report because of a 19 percent reject rate, and
6 that was on November the 22nd.
7 At that time, I went to my boss, and again, I was
8 told, you know, "This is going to reflect on you. Do
9 something about it."
10 So, Pullman-Higgins was definitely aware of what I
11 was finding. A lot of the major problems I was having was I
12 would bring concerns to him, and it was -- you know, it was
13 a continuous argument. I was the designee of the corporate
14 Level III there at Seabrook, and as such, I answered to
15 corporate, but I very rarely got through to corporate.
16 Dick Julian was a little bit upset, and so was
17 Phil Oikle, over the fact that they may have had rejectable
18 radiographs in the vault that hadn't been reviewed prior to
19 me getting there. I don't know if the procedure prior to me
20 there required that Yankee review the film. The indications
21 I got were that they weren't, that it was a percentage
22 review and that they would just kind of spot check as the
23 film went into storage.
24 One of the other concerns that I was bringing up
25 was the damage to base metal because of the excessive

1 repairs that we were doing on in-production welding.

2 The other concern was that we couldn't put weld

3 packages together. The documentation was -- trying to get a

4 package put together was a day-long project. If it was a

5 long weld, you're looking at two weeks, and you still

6 weren't assured that you had all the paperwork.

7 RC-9 is a perfect example. It was one of the

8 welds I had done. I reviewed it and did the final buy-off

9 of the weld, RC-9, FO 102, I believe.

10 The only reason I know all this is I'm sitting

11 here with six pounds of paper, and I've since reviewed a lot

12 of this package over the last month.

13 Yes, RC-9, FO 102. It was a 4490 weld, which was

14 a Padovano weld. We had one, two, three, four repairs to

15 the same area, basically -- one, two, three. And it should

16 have received an NCR for three weld repairs, all to the same

17 station, all to the same area. It didn't, because we

18 couldn't get the package put together.

19 So, this was part of it. You know, the missing

20 documents -- it was just -- trying to get -- they were

21 missing process sheets, were missing weld repair orders. We

22 were missing -- I don't know the system. Their system was

23 they would do a process sheet to start the weld. If you had

24 a weld repair from either penetrant or radiography, then,

25 now, we had another process sheet and a weld repair order.

1 Then you would end up, if that was rejected, a new weld
2 repair order, a new process sheet, and this would just keep
3 going on and on, and all of the sudden, you just couldn't
4 put the package back together.
5 My interpretation of the code was my package had
6 to be complete; it had to be a stand-alone package. I had
7 to be able to -- to be able to track my weld from beginning
8 to end, which included my first radiographs, any radiographs
9 or repairs, and if I went back through and did any more
10 repair, then a final radiograph. I had to have all my
11 paperwork and all my x-ray reader sheets, and that was the
12 way I interpreted the package.
13 RC-10, FO 102, which was also a Padovano weld, and
14 Padovano welds I didn't really know. Nobody had really
15 taken the time to tell me what the differences were until
16 later on in the system.
17 RC-10, FO 102 -- according to what I have put
18 together, we're missing reader sheets, and this is the
19 package that was supplied to me to look at. None of the
20 x-ray reader sheets are in the package. A lot of the weld
21 repair orders were missing from their chronological order.
22 I think there was only one that wasn't in here.
23 The three stations in this weld: 0 to 1 was
24 repaired four times with no NCR; 4 to 5 was repaired three
25 times with an NRC; and 6 to 7 was repaired four times

1 without an NCR. We had almost 12 repairs just on one weld,
2 not counting base-metal repairs, nozzle work, end-prep work.
3 We had some repairs in nozzles. And I was bringing these
4 concerns to my boss, asking are we doing anything about the
5 fact that we have all these base metal problems? Are we
6 doing anything or are we investigating why we can't make a
7 weld? Over 100 weld repairs to 30 welds; about 32 welds,
8 and we had over 100 weld repairs, and that was all RC loop
9 piping.
10 So, I'm bringing these concerns. It was -- and I
11 just kept bringing them. You know, my concerns were what
12 are we doing to the base metal? If we're weld-repairing in
13 the same station four times, if we're doing 100-percent
14 grind out of this weld, if we're welding up in -- there is
15 one spot in here where they put the Inconel ring and then
16 weld-repaired it with stainless steel and had to grind that
17 back out.
18 I felt these were valid concerns at the time. I
19 was not getting any answers. And it's consistent to the RC
20 49. I mean I can go on. RC 49 -- let's skip RC -- I'll get
21 to that one.
22 How about CO-4059, FO 403, which was -- this one
23 was rejected. This was an NCR 5528, and this one was --
24 this weld was closed back -- and I don't have the date that
25 it was closed -- and it was getting ready to go through

1 tests. I reviewed the film that was prior accept. I
2 rejected the film and wrote the NCR for a slag inclusion in
3 excess of the code. Come to find out the weld had an open
4 cavity and that the weld repair order was closed, and this
5 weld is getting ready to go through tests. So, I ended up
6 writing a Speed Memo and say void the NCR, because it was
7 written up, but it was never closed, but the weld repair
8 order was closed. So, they went ahead and reopened the weld
9 repair order and started welding that weld back up.
10 A lot of the paperwork that was given to me from
11 the 1984s, after I left, that was -- I mean a lot of the
12 film on the reader sheets was thrown away because it was
13 discolored. Half of this paperwork I couldn't even read.
14 And I don't know, but I was kind of hoping I was going to be
15 able to read some of these reports. Some of them are just
16 completely unreadable. Some of them are best guess. But
17 it's -- a lot of them, film discarded. Then they redid it
18 for final acceptance.
19 I found a report in here on RC-9 that had my
20 signature that I have never done. I never print my
21 signature. I sign it. And there is a form in here that's
22 got it printed on it with a date.
23 A lot of what we were finding, I think, was -- I
24 don't know if I want to use the word "accident".
25 Shop welds: We found a Dravo weld that had an

1 indication in it, but there was no x-ray report from Dravo.
2 I guess that was -- actually, we didn't find it; you did.
3 But there is no x-ray report for shop welds. We never had
4 any paperwork on shop welds.
5 RC-49, F0103. The original, I guess, NCR was
6 written for, I don't know. Trying to put these together in
7 some logical order is almost an impossibility anymore. It
8 was written because of documentation problems, and from that
9 they started finding a lot of other problems.
10 There's five nonconformance reports ranging from
11 end prep from excessive rude openings, radio shrink,
12 suspected forgeries, a lot of documentation problems, but a
13 lot of major welding problems. It was like the NDE people
14 couldn't keep up. We had no idea where we were, and we took
15 it to everybody. We kept telling them we're just not
16 watching what we're doing.
17 NCR 57-81 was generated document review again, and
18 they discovered a lot of problems. Part of it was that
19 there was -- that HFT weld repair order was initiated for
20 removal of three indications, and then they ended up with
21 four throughwall cavities. An NCR was generated that
22 covered one and the documentation on the cavities were for
23 one station, 0-1, and another one for 3-0, but there wasn't
24 any mention in any of the paperwork about two throughwall
25 cavities in 1-2, so when the NCR went for disposition, the

1 disposition was to accept as-is an item 2 which said the NCR
2 was not true. It was documented over here that there was a
3 radiograph that showed all these weld repairs. You get over
4 to the disposition and it says that the NCR was not true.
5 Nowhere in weld repair order in the NCR does it state that
6 there were four throughwall cavities. Well, I have a
7 radiograph that shows four throughwall cavities, but because
8 it wasn't documented on a piece of paperwork, it's accepted
9 and said that it's untrue.
10 Per code, in-process cavities do not need to be
11 recorded. I'm not sure. I don't write the codes, but knew
12 that we were documenting all throughwall cavities, so they
13 just say it's a paperwork error and they write it off.
14 This weld started in 1981, and it was supposedly finished in
15 1984. This is part of the reasoning. I mean, there wasn't
16 a weld that you started in '81 that would go right through
17 the system.
18 This package alone was missing documentation to
19 try and put it together. They put a chronology, but the
20 chronology was close. I guess my major concerns at that
21 time were, you know, what are we doing to this material, why
22 are we having all these problems. Has anybody done anything
23 to check any of this material; has anybody done anything to
24 find out why our welders can't seem to weld. I mean, the RC
25 loop system was an automatic welder. You set it on a chain,

1 you set it up and if it set right, it's supposed to work.
2 You're not supposed to have to do 12 repairs to an RC loop.
3 And when I do a hundred repairs to this system, I start to
4 question that.
5 It's just the documentation and I don't think the
6 procedures were followed that Pullman had. I thought they
7 were just kind of the magnitude, they just couldn't keep up
8 with the paperwork. It's evident in everything that I've
9 read over the last month, I mean, even you, the Nuclear
10 Regulatory Committee, had been writing them up because they
11 couldn't keep up with their paperwork, because they weren't
12 doing the quality job that they were supposed to do. That
13 was not anything real new, but it didn't really seem to have
14 any bearing because nothing seemed to ever get done about
15 it. That was prior to me leaving, of course. I don't know
16 what happened after.
17 There was a lot of NCRs and it's been said that I
18 didn't keep a listing of what they were. I assumed that
19 somebody would leave them where they belonged and write
20 them. From all the records, nobody ever wrote them. I
21 never got anything back from the NRC six years ago that told
22 me what had even transpired with anything. The most I had
23 ever gotten was, oh, that's nice. Nothing ever came back.
24 Nobody ever looked for any causes. The standard out there
25 was, a welder could stay there for two weeks to get

1 qualified.

2 I'm sure that just by looking at this and what I
3 had seen while I was there, there were a lot of weld repairs
4 that weren't being documented. Maybe not intentional, but
5 the document never found its way home, and when I brought up
6 RC-9, it was obvious. I did that weld. I did the final
7 buy-out on that weld and I had no idea we had repaired that
8 weld three times, and nobody in the shop, even as it went
9 all the way through all of the review cycles in MD Yankee,
10 nobody picked it up. I sat here over the last month and
11 just tracked down all the weld repair orders and wrote what
12 stations and that's the only way I just picked it up.

13 As far as I'm doing all these weld repairs and
14 I've got into the RC loop, the RC loop wasn't the only
15 system; I mean, they were having that problem consistent. I
16 don't know what we were missing with radiography. If we're
17 looking at a 2T sensitivity, we can always assume that 2
18 percent you're not going to see, and the design function
19 probably says I don't need to see it. But, I don't know
20 what kind of damage we were doing to base metal.

21 I was and still am a very conscientious Level III.
22 I don't compromise and I do my job to the best of my
23 ability. I interpret the codes and I read the codes. That
24 was all I had to go on during my whole time there. I kept
25 logs, not just my diary, but we had a log sheet that we

1 logged in all of our production welds. We had log sheets
2 for all of our repair orders. We had log sheets that
3 documented all of our nonconformance reports and everything
4 was logged in some place, so at least the radiographers were
5 trying. It wasn't that they weren't.
6 I know that Yankee Atomic, they were taking log
7 sheets. I know after I left, because of the problem with
8 the film, I know Yankee said they were going to review it
9 and I'd heard that Pullman was reviewing and they found a
10 lot of brown film. I didn't know what happened after I
11 left.
12 I believe there's a lot of people floating around
13 out there that have a lot of knowledge about Seabrook and
14 some of the problems with Seabrook. The problem is, they're
15 not about to talk about it. A lot of them have seen what
16 has happened to me under the Whistleblower's Act six years
17 ago. What they see happening to me again, that the
18 Whistleblower's Act is basically a joke, that you become
19 very unemployed. 90 percent of the people cannot afford to
20 go out and bring up a concern and find themselves
21 unemployed. I know they're not going to talk. They saw
22 what happened to me six years ago; a lot of them are seeing
23 what's happening again.
24 I have one question. Who -- and this has
25 absolutely nothing to do with the weld. I just kind of want

1 to know for my own benefit who authorized Jacques Durr to
2 come to my house, call my wife a liar, threaten her with
3 subpoenas, and just generally upset her when she had
4 absolutely nothing to do with this. She's a new wife. This
5 whole thing cost me a wife six years ago. Just for my own
6 knowledge, I'd like to know who authorized him to fly out to
7 my house, call my wife at night and pound on my door at 7:20
8 in the morning and call her a liar and threaten her with
9 subpoena power. And that is a question that I'd like an
10 answer to.
11 MR. SNIEZEK: I had no knowledge that Mr. Durr did
12 the things, especially call your wife a liar. Nobody would
13 have authorized him to do that.
14 MR. PAINE: Who authorized him to go out there?
15 MR. SNIEZEK: I'm sure he had official travel
16 orders, likely assigned by the regional administrator, but
17 no one authorized him to do the things that Mr. Wampler just
18 indicated.
19 MR. WAMPLER: See, when this whole thing came to
20 light, I had calls from the NRC and I was in the process of
21 a long-awaited vacation to New Orleans. I did not want to
22 talk to anybody; in fact, I didn't want to think about
23 anything. I informed them then that I would contact them on
24 my arrival, which would have been the 13th, and I would set
25 up a time depending on what my schedule was like for the

1 week. All of a sudden, I'm called out of town, he's
2 pounding on my door, and I'm going, "Wait a minute. I was
3 supposed to call and set up the time." It wasn't that
4 automatically assumed that, great, he gets back on Monday;
5 we're going to see him on Tuesday. That's not the way it
6 was set up. So that did kind of upset me, and my wife, that
7 poor woman didn't know anything about Seabrook. She knows a
8 lot about it now.
9 MR. SNIEZEK: Mr. Wampler, for any inconvenience
10 or distress that I caused you or your wife, we would
11 apologize for that. I'm sure that was not intentional.
12 MR. WAMPLER: Thank you. Henry.
13 MR. MYERS: There is a problem. There are a lot
14 of problems. On that particular one, it seemed to us that
15 sending Mr. Durr to talk to Mr. Wampler was not an effort
16 that was intended to get to the bottom of whether there was
17 a radiograph problem at Seabrook, because the people who had
18 the most knowledge of that problem are still at Seabrook.
19 And the documents are at Seabrook. And this whole thing
20 started off that it was we that brought the attention of Mr.
21 Wampler to the Commission. From day one it appeared that
22 the effort was to make it appear that the welds were okay
23 and everything was okay, and maybe Mr. Wampler is some sort
24 of crank. That is what, maybe they didn't intend to do
25 that, but that is how they all set off to do it. The very

1 people who said the welds were wonderful welds from day one
2 were the people that were all chasing after Mr. Durr, or Mr.
3 Wampler. Why did these people not seek to interview Mr.
4 Julian at great length? Why did they not insist that they
5 be given the records of the Seabrook welds, such as may be
6 going on now. But we wonder if it is even going on now,
7 because the records at least that we have been given are
8 illegible.
9 MR. SNIEZEK: Dr. Myers, this is not hte subject
10 of this interview. This interview is to discuss with Mr.
11 Wampler the technical team to get the most technical facts
12 we can from Mr. Wampler. When we are finished with that, I
13 will gladly go into that discussion. But I will want to
14 keep going forward with the technical issues so that the
15 team can get back to the site and continue with their re-
16 review of the weld issue at Seabrook.
17 MR. MYERS: And let me say, we are the first to
18 agree that that is the issue. But unfortunately, these
19 other things seem to intrude.
20 MR. SNIEZEK: I understand that.
21 MR. MYERS: And we support getting to the bottom
22 of the problem.
23 MR. SNIEZEK: The agency does not intentionally
24 try to make life difficult for anyone, and that is why on
25 behalf of the agency I apologize to Mr. Wampler for any

1 distress we may have caused him or his wife. But I would
2 like to go on with the technical aspects of the interview.
3 MR. WAMPLER: That is basically it in a nutshell.
4 I mean, there was a lot of concerns. Base metal, nozzle
5 repairs, weld repairs, you know. What was being done I
6 still don't know. I don't know if anybody ever went after
7 it. So I mean, they were the same questions I asked six
8 years ago.
9 MR. SPESSARD: What I would like to do now is, I
10 think Mr. Paine is here, have him introduce himself and
11 state his affiliation for the record, and then, in keeping
12 with our opening remarks -- we have gone approximately an
13 hour -- I think we could take a break for about 10 minutes
14 to go to the restroom or get a cup of coffee, if you like,
15 and then the team will get together and then we will
16 continue.
17 MR. PAINE: Christopher Paine, Office of Senator
18 Kennedy.
19 MR. SPESSARD: Why don't we take about a ten-
20 minute break.
21 MR. SNIEZEK: Reconvene at 11:10, please.
22 [Brief recess.]
23 MR. SNIEZEK: Back on the record.
24 MR. SPESSARD: Just prior to the break, I think
25 you had finished, but now that we have had a break, was

1 there anything else that you wanted to add that maybe you
2 didn't cover before the team starts asking you some specific
3 questions to help us?
4 MR. WAMPLER: I'm glad you said that. I forgot
5 tow of my questions.
6 MR. SPESSARD: Okay.
7 MR. WAMPLER: The film quality that I brought up
8 earlier was a big concern of Yankee. In fact, they did
9 issue 1, 2, 3, 4 deficiency reports, 544, 574, 527, and 662,
10 addressing film quality, and hte lack of. And another
11 point, while I was reviewing these, is there are no heat
12 records, and this is the part on the weld repairs. There's
13 no heat record of how much heat was put in as to whether
14 pre-heat, post-heat, any heat treat charts. That wasn't in
15 any of the packages. And it would seem to me that that
16 would be part of a package that you would want to know if
17 you did a post-heat or pre-heat or what you did to that
18 weld, especially with that many repairs.
19 One of my other concerns in all this was that I
20 remembered after reading some of this, too, and reviewing my
21 notes, is that a lot of the welds during the Padovano thing,
22 had become inaccessible. Back during the 1981-82, a lot of
23 those radiographs of some of those welds were also
24 inaccessible. It was, you know, the question I guess would
25 be the integrity of the radiograph itself. I guess that is

1 probably an easy way to say it. You know, since all I am
2 sitting there looking at is a final, but if it was in the
3 prior state, then what happens?
4 MR. MYERS: Are you saying that there is a
5 question of whether the radiograph, if there is only a final
6 radiograph in the package, that there is question as to
7 whether that radiograph is a radiograph of the weld in
8 question?
9 MR. WAMPLER: It's kind of a tossup. But you
10 know, probably. You know, if it's an inaccessible, I mean,
11 how would I have that weld radiographed? You know, the
12 1981-82s, some of those were in areas that you really
13 couldn't get to again and I don't know exactly which ones or
14 where or any of that. But that was another one of the
15 question is how am I going to get in here, how do I know
16 that I have a radiograph?
17 MR. SNIEZEK: If it was rejectable, there is no
18 way you could do another shot, if it was inaccessible.
19 MR. WAMPLER: Right.
20 MR. SPESSARD: You can do a repair, is what you
21 are saying.
22 MR. WAMPLER: Right. And how would I know that
23 that did happen. Correct.
24 MR. CLARK: You are saying more or less
25 duplication of the initial procedure.

1 MR. WAMPLER: Right. Because it would be
2 impossible if you could.
3 MR. SPESSARD: Okay. Mr. Wampler, what we would
4 like to do is, since we've got so many people here, we are
5 not going to fire questions at you one right after the other
6 from five different people. So what we have tried to do is
7 to interview you and get some of the information that we
8 really would like to get. We have kind of divided our areas
9 of focus, if you will. One to focus on your duties and
10 responsibilities and relationships, you know, in your job at
11 Pullman-Higgins, will be one area, so that we have a good
12 understanding of that. The next area would deal with the
13 reject rate, if you will, and all aspects of that. And then
14 into those so-called draft NCRs and any other specific welds
15 that you have an issue of.
16 And so what I would like to do is start with the
17 first area. And Bill Crowley will be the principal guy in
18 that area. And then after he is done, then the team will
19 ask any other questions they want to. So hopefully, we will
20 keep a little order on our questions of you.
21 MR. WAMPLER: Okay.
22 MR. SPESSARD: Go ahead, Bill.
23 MR. CROWLEY: Mr. Wampler, you have stated your
24 responsibilities when you first went to Seabrook. Do you
25 know how these responsibilities compared with the Level III

1 prior to your time?

2 MR. WAMPLER: As far as I knew, it was about the

3 same. I had a letter drafted from corporate and signed by

4 Richard Davis to put pointblank exactly what my duties were.

5 I had the technical responsibilities, but no supervisory

6 responsibilities over the technicians, or over supervisors.

7 I acted as the radiation safety officer, Level

8 III, developed the training, did all the procedure preps,

9 procedure quals, and film review. But that was documented.

10 MR. CROWLEY: Do you know how much time elapsed

11 between the time you left and the next Level III came

12 aboard?

13 MR. WAMPLER: No. But talking to some of the

14 friends of mine that still talk to me, it was a few months.

15 It was quite some time before they had somebody else in. I

16 believe he was a Contract Level III. I'm not sure. I don't

17 know.

18 MR. CROWLEY: We have knowledge of 670 welds that

19 have been mentioned, or packages that have been mentioned in

20 a previous hearing. And I think we may have clarified some

21 of them already. But I would like to go over that one more

22 time.

23 Were these films that had been backlogged prior to

24 your arrival, and not films that were being backlogged after

25 you started to work?

1 MR. WAMPLER: No. It wasn't after I started.
2 That was 1981-82 film that had already been approved by
3 Level III.
4 MR. CROWLEY: Okay. Do you have in your logbook a
5 list of those welds?
6 MR. WAMPLER: I don't have the 670. I have a lot
7 of what I had reviewed.
8 MR. CROWLEY: And you still have that logbook?
9 MR. WAMPLER: Yes.
10 MR. CROWLEY: Would it be possible to get a copy
11 of that logbook?
12 MR. WAMPLER: Okay.
13 MR. CROWLEY: The other question I had, the other
14 NDE of people that you associated with, what did you think
15 of the quality of their work?
16 MR. WAMPLER: Most of the technicians were
17 conscientious. You know, Seabrook wasn't a whole lot
18 different than the rest of the world. They did have
19 different problems. I mean, we lost a couple technicians
20 because of drugs. That was, I guess, during that time, I
21 guess everybody was, you know, kind of over in that corner.
22 Most of them tried real hard. The Level IIs, I
23 mean, they had one job to do and that was to go out and do
24 radiography. I hired a kid named Michael Drew that his
25 entire job was to review film. I worked with him; Julian

1 worked with him; everybody worked with him to make sure he
2 was reading the same way we were. And he stayed in long
3 after I was gone.
4 MR. CROWLEY: What about the Yankee Atomic NDE
5 personnel?
6 MR. WAMPLER: I got along great with Dick Julian.
7 Phil Oikle, he was a lot of fun. He was like the rest of us
8 Level IIIs. We automatically put up this monster wall. And
9 then once the conversations get going, you find out that you
10 are both on the same wavelength. Phil was good. Everybody
11 at Yankee, they were concerned. I mean, I got along real
12 good with Singleton, Julian, Riggins, who was the new
13 interpreter that came on just about the time I left, and
14 Phil Oikle. And I've talked to him a couple times since.
15 MR. CROWLEY: Were there other Level III Pullman
16 people there at the same time you were?
17 MR. WAMPLER: No. I was the only Level III
18 onsite.
19 MR. CROWLEY: Thank you. That's all LI have.
20 MR. SPESSARD: Glenn.
21 MR. WALTON: Yes. My name is Glenn Walton. You
22 said you start reviewing radiographs at Level II, and Level
23 III had already approved the other one; is that right?
24 MR. WAMPLER: Correct.
25 MR. WALTON: And why were you reviewing those?

1 MR. WAMPLER: It was, I guess Pullman had found --
2 I don't know. All I knew is that Pullman said hey, we are
3 not sending these over to Yankee, we want you to review
4 them. My interpretation at the time, and it still sits that
5 way, is that they knew that there were some questions about
6 these radiographs, that they weren't real happy with them.
7 MR. WALTON: I don't have any other questions on
8 that. Do you guys have any others?
9 MR. SPESSARD: Can you tell me this; had the A&I
10 accepted that film that you had reviewed?
11 MR. WAMPLER: I don't believe so. I think it was
12 yanked and then put in the box for -- it was there until I
13 got there and I got there in August of '83. Some of the
14 film was like June of '82.
15 MR. SPESSARD: Okay. If you reviewed the film and
16 accepted it, did it then go to Yankee for their review?
17 MR. WAMPLER: All right, it got into the document
18 package and then the whole package would go over. Most of
19 the time, we would take -- in the beginning, I was finding a
20 lot of the problems and automatically, I assumed that, whoa,
21 maybe I'm reading too hard and that's why we had the
22 classes.
23 It was discovered at that time that, you know,
24 Yankee is looking at me like, ah-oh, you know, maybe you're
25 not reading too hard, and yes, we probably do have a problem

1 here. So we went after it and at that point, we had them
2 send back -- I told them to send back everything he had to
3 be re-reviewed that hadn't been reviewed prior to the vault.
4 I'm sure that probably happened. That was after I was gone
5 and I don't know.
6 Then we pulled all of the prior film that was
7 still there at Pullman.
8 MR. CROWLEY: I have one other question about the
9 backlog. Do you have some opinion why that large backlog
10 was there when you started?
11 MR. WAMPLER: Well, it was all prior approved
12 film, but you know, I still get the impression that -- I
13 mean, Pullman knew that that film probably had some problems
14 with it, because when I brought it to their attention, it
15 was like it wasn't anything new.
16 It wasn't that I wasn't taking it to their
17 attention. I kept taking it and it's -- I don't know.
18 MR. CROWLEY: Thank you; that's all I have.
19 MR. SPESSARD: Glenn?
20 MR. WALTON: My name is Glenn Walton. What I'd
21 like to do is to talk about the 20 percent reject rate and
22 specifically what I think we're talking about, it was found
23 that it was read, interpreted, dispositioned by qualified
24 Level II, re-read -- in all cases they're not -- but, re-
25 read carefully and a disposition by Pullman-Higgins Level

1 III and then by you.

2 MR. WAMPLER: Correct.

3 MR. WALTON: That's the scenario. At that point,

4 you were finding a 19 percent reject rate.

5 MR. WAMPLER: Right, 19-20 percent.

6 MR. WALTON: All right, what I would like to know

7 is what that is based on. Is it by weld, by film, linear

8 inches or is it --

9 MR. WAMPLER: By welds.

10 MR. WALTON: Okay, so, 19 percent of the welds you

11 looked at, you rejected the film? I'm not going to hold you

12 to these numbers. I understand they're approximate. Maybe

13 they are accurate; I don't know.

14 Was that for weld quality?

15 MR. WAMPLER: Yes. Out of the dailies, there

16 might have been a couple that had film quality, but the

17 biggest percentage of them were weld quality, lack of

18 fusions and things like that.

19 MR. WALTON: Okay, help me out here then. For

20 those, you'd require an NRC condition.

21 MR. WAMPLER: They weren't done NCRs. They'd just

22 issue a weld repair order.

23 MR. WALTON: Is that contrary to the procedure?

24 MR. WAMPLER: I don't know. As far as I knew

25 which was what I was told by Richard Davis, was that since

1 they hadn't turned the film over to Yankee, it didn't
2 require an NCR. There was a lot more that was in that same
3 corner and that was, you know, question, too. Now, if we
4 found that I did generate one NCR that had 8 inches of lack
5 of fusion, I generated an NRC on that one.
6 MR. WALTON: Okay, so you would fill out a repair
7 order and that would go back to Pullman Higgins to go out
8 and re-repair; is that the process?
9 MR. WAMPLER: Right, I guess the system was; we'd
10 do a weld repair order. We'd do the drawing of where there
11 indications were. We'd make a skin; send that paperwork
12 over to somebody in Quality and they'd generate a weld
13 repair order and then a process sheet to go with the weld
14 repair order.
15 Depending on where it went from there, it would go
16 into a full blow process sheet or just the quick sheet grind
17 weld and --
18 MR. WALTON: So, would you enter a reject on the
19 process sheet, or just on the regular sheet?
20 MR. WAMPLER: On the process sheet, we'd have a
21 reject on it, too.
22 MR. WALTON: Again, Lee has already asked this
23 question, but the A&I was not involved in this process at
24 that time, or was he?
25 MR. WAMPLER: He was aware of it. I mean, I think

1 everybody was aware that we were having some major problems
2 with their welds.
3 MR. WALTON: The browning you talked about when
4 you were talking about aging or lack of proper processing;
5 what percent rate were those that you ran into? Do you have
6 any feel for that?
7 MR. WAMPLER: During my review, it wasn't too bad.
8 Percentage-wise, I couldn't tell you. It wasn't real bad as
9 far as just the browning.
10 MR. WALTON: Do you see that as a problem or was
11 it something that was being corrected when you --
12 MR. WAMPLER: Well, when I got there, I had my
13 processor check and we started doing our tests. I looked at
14 the log and they weren't really doing the tests like they
15 were supposed to, so we checked the processor, changed some
16 of the chemistry. We had a lot of artifact problems so we
17 ended up putting carpet in the processor room to keep the
18 dirt and dust down and it seemed to start clearing it up.
19 There are production radiographs that cleaned up
20 considerably. After I left, I was told they had a lot of
21 problems though and I don't know how much.
22 MR. WALTON: The accessability issue that you
23 brought up; how best can we attack that issue? I'm
24 struggling with that, Joe, because if you have a final
25 radiograph that's acceptable -- you know, the weld may have

1 become unacceptable through the process after the radiograph
2 was taken; if you had a reject on the film and the weld was
3 inaccessible -- you had to go out and make it accessible --
4 MR. WAMPLER: Right.
5 MR. WALTON: Either put scaffolding up or check
6 concrete or whatever, and that's what the code requires --
7 I'm struggling to understand how something could become
8 inaccessible if you have an acceptable radiograph that would
9 be an issue. I'm not -- I don't know and that's the reason
10 I'm asking.
11 MR. WAMPLER: Let me look through something here.
12 I thought I had a question on one of these -- did you mean
13 that -- I think he meant the part of the radiographs that
14 were rejectable; by the time that they had become
15 rejectable, that the weld -- at that time that the welds had
16 become inaccessible.
17 MR. WALTON: If that's the case, I can understand
18 that. Is that a fact?
19 MR. WAMPLER: Yes, there were some inaccessibles
20 by '83 that we couldn't get to.
21 MR. WALTON: Do you know if any of those -- that's
22 why I'm looking for help so that I can go and put my hand on
23 them. I don't know how to go about solving that problem if
24 it occurred, because you have to end up with an acceptable
25 radiograph, unless they go and take it off of another weld,

1 which we are going to be looking for, by the way, and see if
2 you have any benchmarks or basemarks that you can compare to
3 make sure you radiographed the right weld.
4 I don't know how you could come up with an
5 acceptable film. Now, there may be some that are not closed
6 out. I mean, obviously, we haven't looked at the records
7 yet and we're going to be doing that.
8 MR. WAMPLER: I guess while I was reviewing some
9 of the reader sheets, is where my questions -- this was
10 prior to -- I have a readers sheet. Well, this was RC-10,
11 our favorite one. But all views except 5 to 6 discarded
12 weld -- re-shot 360 and it doesn't tell you why they threw
13 the film away. So now, I have no -- see, maybe my
14 interpretation of the code is off, but if I have to build a
15 package, is a final radiograph enough to buy that weld, or
16 do I need to be able to track my repairs and make sure that
17 I do have it, okay?
18 Maybe my interpretation is out, but I know that
19 through the years, our packages have always been complete
20 from this x-ray, weld repair, repair, repair, repair. My
21 interpretation says that even if my film is brown or
22 unreadable or if there's artifacts, I still have to keep it
23 in that package. I still have to have some kind of backup;
24 maybe not as a code, but a backup that says, well, okay,
25 here's why I have a hundred percent and at least maybe --

1 even brown film, you can almost read.

2 I mean, it does give you some kind of a

3 backup, so it's like a lot of these, I'm looking at that

4 they had thrown the film away, you know. A lot of them re-

5 shot because they said that the UG was off. Well, all of a

6 sudden, the film was good, okay? We went through a big

7 class with that UG, because everybody was taken length and

8 diameter.

9 For your benefit, that's for them; they know that.

10 But there's a cross section that you take across there,

11 because you're only using the effective focal spot.

12 MR. WALTON: Okay. I guess you're saying, Joe,

13 you would expect to see the process sheet goes through the

14 step sequences to tell you what happened to weld, when it

15 was repaired, how it was repaired, whether it got, if that's

16 what he treated, whether it got pre-heat. We expect that

17 also. It isn't a disagreement there.

18 We expect to see a radiograph of 100 percent of

19 the weld. That's a final radiograph that says it was

20 acceptable. It may not say, for example, that the weld was

21 rejected because of the outlining order, and geometric on

22 sharpness. It won't repair either, for that matter.

23 There's documentation to show you had to repair, but not

24 necessarily keep the film.

25 MR. WAMPLER: Well, that was my problem in here,

1 and I don't mean to interrupt you -- is that I can't track
2 that weld. So, if I don't have the documentation to track
3 it, I better have a radiograph to track it. Something, one
4 or the other, I have to have. Right? If I don't have this
5 one, I'd better have this one.
6 MR. WALTON: Okay, so you're saying that if the
7 documentation falls short, then the radiograph would be
8 needed to support that.
9 Okay. Now, I believe it's true, they did a lot of
10 information radiography and half fill. They made repairs
11 and they called that in-process, I believe.
12 MR. WAMPLER: Right.
13 MR. WALTON: We didn't go into the base metal, and
14 throw the film away.
15 MR. WAMPLER: On information only.
16 MR. WALTON: Do you have any problem with that?
17 So, we're talking about the final acceptance and the process
18 that we used to get there.
19 MR. WAMPLER: RC-9 was accepted in 1981 or '82. I
20 don't know. I have a final RT report that, if somebody can
21 read it, thank you very much, because I can't. Then all of
22 a sudden, it started being repaired after that, and I was
23 the one who final bought it off. Now, for that particular
24 weld, if it was already bought off as a final, I would have
25 interpreted that I should be able to track that system

1 through, but maybe not. I don't know.

2 MR. WAMPLER: You said RC-9 F102?

3 MR. WAMPLER: 102. See, trying to put these

4 packages back together, you need a degree in reading. Some

5 of these, it's a little bit scary; it's like the one I found

6 my initials on. I'm going, whoa.

7 MR. WALTON: Which one was that Joe?

8 MR. WAMPLER: RC-9.

9 MR. WALTON: And you're saying that the part

10 that's initialled on one of the film reviewers is --

11 MR. WAMPLER: It was not on a process sheet.

12 MR. WALTON: The sign-off or the acceptance of the

13 radiograph?

14 MR. WAMPLER: Where is it? I thought I tagged it.

15 It was a supplementary process sheet that brought off --

16 okay. It was just barely readable. It's not real readable.

17 My signature's assigned to it. Initials were signed and

18 then my signature was signed.

19 MR. CROWLEY: We have that.

20 MR. WAMPLER: You can't miss my chicken

21 scratching. I can't find it for him.

22 MR. WALTON: We would like to get that, though,

23 before you leave. I think that's very important.

24 Did Pullman-Higgins have another Level III out of

25 the home office?

1 MR. WAMPLER: Al Bair. That's where I went down
2 and took all my exams for him. He bought my SNT exams, but
3 then he still says, okay, here, go write a procedure and he
4 gave me his exams down there.
5 MR. WALTON: Did he come up to the site and look
6 at it?
7 MR. WAMPLER: Never. Not while I was there.
8 MR. WALTON: Did you ever ask him to?
9 MR. WAMPLER: I wanted him up there on a couple
10 occasions and then -- in the beginning I was supposed to go
11 direct to Al Bair and I didn't have to go through Richard
12 Davis. And then I was making conversations with Al Bair and
13 all of a sudden I found that I had to go through Richard
14 Davis to Al Eck to Al Bair. I mean, they just put so many
15 roadblocks in front of me that it was hard to get anything.
16 Like the DOL where the safety violations, all of a sudden
17 everybody's on my side until it comes down to the nitty
18 gritty and all of a sudden they don't agree. I mean, I get
19 Al Bair and Al Eck saying, you're right, you're right. Then
20 all of a sudden, they're history. They disappear.
21 But it was just trying to get through Davis. I
22 mean, I was arguing with Richard Davis about the
23 interpretation of ASNT TC1A, for criminy sake.
24 MR. WALTON: What qualifications did Al Davis
25 have?

1 MR. WAMPLER: He had none. As far as I knew, he
2 didn't know anything about NDT, or NDE for the nuclear side.
3 MR. WALTON: He was a QA?
4 MR. WAMPLER: He was a QA manager. The same thing
5 happened, even for radiographs. When we reach rejects, I'm
6 arguing with him and Ray Donald, and Ray Donald was one of
7 the ones that was doing the safety thing with the barriers,
8 and he was also one of the ones that was arguing with me
9 about my interpretation of the code and my interpretation of
10 the radiographs.
11 MR. WALTON: Did Donald have any qualification?
12 MR. WAMPLER: Centuries ago.
13 MR. WALTON: In radiography?
14 MR. WAMPLER: As far as he said, he had some
15 radiographic background. A lot of us can walk around out
16 here and say, we're radiographers and we've been doing it
17 for a hundred years. But there's a definite difference
18 between a radiographer and a film interpreter. A film
19 interpreter is not somebody you drag in and train them as a
20 Level II, and he works for a couple years and all of a
21 sudden he's an interpreter. An interpreter, you give him a
22 lot of classes; in fact, ASNT and the ASME has come out with
23 a class dedicated to weld interpretation, and that's a 40
24 hour course, which I teach. There is a major difference
25 there.

1 MR. WALTON: Did you feel comfortable with the
2 Yankee interpretations?
3 MR. WAMPLER: Most of the time. We had our
4 differences of opinion. We're all going to have it.
5 Interpreters, you try and read the same, but sometimes you
6 have a little difference.
7 MR. WALTON: So you were actually the person put
8 in between to read the film before it went over to Yankee to
9 get it correct.
10 MR. WAMPLER: Well, I read something in one of the
11 SALT reports. I always wondered why I was there, but there
12 is a SALT report someplace that said they had to have a
13 Level III there. That was just prior to me coming onboard.
14 You knew that they had that same problem.
15 MR. WALTON: Do you feel Yankee was over-
16 conservative in their cause?
17 MR. WAMPLER: No.
18 MR. WALTON: You felt they were good
19 interpretations? Okay.
20 MR. WAMPLER: We both worked the same way. We'd
21 read that code and then go back and look for code
22 interpretations and draw and --
23 MR. WALTON: You talking about Dick Julian? No
24 wonder he was talking about all --
25 MR. WAMPLER: Dick and Phil Oikle.

1 MR. WALTON: I think he had three or four people
2 working with him.
3 MR. WAMPLER: There was only Julian and myself for
4 a long, long time, and then when we started having these
5 major problems with the film, they brought on Riggins and
6 then I don't know how many people they put on the system
7 after that. I read their procedure in here for review, and
8 the only thing it said was, they were looking for archival
9 quality film. I knew Julian was looking at it.
10 MR. WALTON: I'm still confused, I guess. When
11 you got there, there was a lot of the film packages in the
12 vault that were signed off for all practical purposes. Were
13 they signed off by Yankee?
14 MR. WAMPLER: No.
15 MR. WALTON: Were they eventually going to be
16 reviewed?
17 MR. WAMPLER: Well, the vault radiographs, I don't
18 remember if they were or not. I'm sure they were. So, if
19 they got to the vault, they would have had A&I and Yankee,
20 but I don't know if Yankee had to buy them at that time.
21 MR. WALTON: Okay. I guess that's where I'm
22 confused.
23 MR. WAMPLER: I don't think that Yankee had to
24 come into the system until around the time that I got there,
25 because I know that Yankee was looking at maybe a percentage

1 of the radiographs as they went through. And then when we
2 started finding problems, Julian was looking at a few more.
3 MR. MYERS: Were you saying that the 700 that he
4 reviewed are in the vault?
5 MR. WALTON: I understood that.
6 MR. WAMPLER: They were in a file cabinet over at
7 Pullman.
8 MR. WALTON: That had been reviewed by a Level II
9 and Level III.
10 MR. WAMPLER: At Pullman, right. And then they
11 were just put over into a file cabinet and had never been
12 submitted, because I didn't see a lot of signatures. Those
13 were the ones that I was working at.
14 MR. WALTON: So, that never went over there, to
15 Yankee.
16 MR. WAMPLER: No. After we found that problem in
17 that file drawer, Julian and Yankee started looking at their
18 own film and they weren't real happy with what they saw over
19 there.
20 MR. WALTON: Did they pull those back out then?
21 MR. WAMPLER: Right.
22 MR. WALTON: How about the ones in the vault?
23 MR. WAMPLER: He started sending them back.
24 MR. CLARK: Is that where the 19 percent came in
25 on that review?

1 MR. WAMPLER: Their review, right, was out of
2 there.
3 MR. WALTON: Okay.
4 MR. WAMPLER: So we were tracking just about the
5 same all the way through.
6 MR. WALTON: On the shop welds, and I may be
7 getting a little ahead of myself here, you found the shop
8 weld and then you said one man at the NRC had identified
9 that it did not have the proper paperwork. Is that what I
10 heard? Can you tell me a little more about that?
11 MR. WAMPLER: It was a Dravo weld. It was during
12 the same time that the NRC found GE film and the nozzles
13 were missing. Where was that?
14 MR. WALTON: Is this -- Jim, did I hear you say it
15 didn't get x-rayed, or --
16 MR. WAMPLER: Well, according to the package, it
17 didn't. This was NRC 2790, which related to some deficiency
18 reports. I'll try and give you the numbers. I'm trying to
19 put this together, which is really fun. The DRAVO spill was
20 a DR, Deficiency Report, 654, which related to NCR 2790.
21 MR. WALTON: Okay.
22 MR. WAMPLER: In that, there were also two others.
23 One was 661 against GE, Wooley was 662, and 653 was Perini
24 platform. So, it was all --
25 MR. WALTON: NRC identified those things? Are

1 those all things --

2 MR. WAMPLER: Right. It was a CAT review.

3 MR. WALTON: At one point, you talked about

4 welding on Inconel, I assume with the steam generator or

5 reactor vessel. Could you tell me a little bit more about

6 that?

7 MR. WAMPLER: Which one was that? RC-10, my

8 favorite. RC-10 was -- that was -- RC-10 -- probably, there

9 were twelve -- there were twelve documented repairs, plus

10 there were a few that weren't -- maybe one, I think, that

11 wasn't. What did I do with it? All right. So, we give up

12 on the Dravo? All right.

13 RC-10. Where did I -- I might have tagged it. I

14 tried to tag this so I could find my way through here,

15 because trying to get these back -- and they had a lot of

16 repairs, base metal repairs on that one, on the FO 102

17 pipeside. They had a lot of repairs on end-preps, a lot of

18 end-prep problems. Here we go.

19 [Pause.]

20 MR. WAMPLER: It's somewhere. Inlet nozzle, they

21 were having problems with. I should have put big asterisks.

22 [Pause.]

23 MR. WAMPLER: No, I didn't tag it. Can we look at

24 that one?

25 MR. WALTON: Yes, that would be fine.

1 You mentioned the Padovano. Did the Padovano
2 issue particularly surface? Were you involved in any of
3 those?
4 MR. WAMPLER: No. Here's -- it was an MTPT, but
5 they were going back and doing a lot of radiography because
6 a lot of the welds were already welded out, and in order to
7 back up that reinspection, they were doing RT. We found
8 some and -- still questionable. I don't know how many were
9 found. One paper says one. One says another. There was a
10 bunch.
11 MR. WALTON: Okay. I have no further questions.
12 MR. SPESSARD: Do you guys have any on that
13 subject? Jim?
14 MR. COLEY: Joe, from the documentation we
15 reviewed, it indicates that you were in the process or you
16 had written about 16 non-conformance reports at the time
17 that you were dismissed from Seabrook. Had you written any
18 of these?
19 MR. WAMPLER: Two of them were done. The rest of
20 them were in a cubbyhole for review to be written. They had
21 all the paperwork -- I mean, there were notes on them that
22 said, "This one, we need an NCR for this, this, and this."
23 I don't ever know what happened. I never logged them in,
24 and I probably should have. I didn't know I was going to be
25 leaving.

1 MR. COLEY: Was one of the two the one that you
2 had on the eight inches of --
3 MR. WAMPLER: That was one of them. Okay. I've
4 seen that one. And there was one more that -- the other one
5 that I wrote was on the reject of the acceptable film, and
6 then we went out and found out that it was ground out, and
7 the weld repair order was closed. That was at 555-88, or
8 whatever. Then we ended up reopening the repair order.
9 MR. COLEY: But you have the criteria for the
10 reject available to the next person that would be filling
11 your --
12 MR. WAMPLER: Correct.
13 MR. COLEY: What kind of -- well, you didn't issue
14 a report, but would these have been weld repair orders, or
15 would they have been NCRs like the two you had issued? Were
16 you intending to write NCRs on these?
17 MR. WAMPLER: Yes.
18 MR. COLEY: Even though you previously stated you
19 didn't write NCRs unless it had gone to Yankee and --
20 MR. WAMPLER: There was a criteria, and I don't
21 remember where we -- I mean, that was like the one I wrote
22 for eight inch. There was an area over there that says,
23 "Okay, you can write the NCR if you get to this," okay? I
24 don't remember what it was. That was six years ago. I had
25 it real sharp then, but today, it's not that sharp.

1 MR. COLEY: And you intended to write NCRs on all
2 16 rather than work order repairs?
3 MR. WAMPLER: A lot of the others had already gone
4 through on work order repairs. There was something about
5 these, you know, either misalignment, or excessive lack of
6 fusion, and if you're losing 50 percent of the pipe -- I
7 don't remember all the criteria that they had set up that
8 required you to write the NCR.
9 MR. COLEY: Okay. Now, I guess we're discussing
10 the criteria for writing the NCR versus a well repair order.
11 MR. WAMPLER: Right.
12 MR. COLEY: And you say there's a procedure or
13 something?
14 MR. WAMPLER: Yes. There was something documented
15 that told you which way to go. It was like if it had
16 already gone through tests, or they had done any -- you
17 know, after heat treat or stress relieve or any of that,
18 then that's an NCR.
19 MR. COLEY: Was this in the NCR procedure, or was
20 this a Pullman QA document, or was this in the radiographic
21 procedure?
22 MR. WAMPLER: I think it was a Pullman requirement
23 because the RT procedure didn't tell us when to write NCRs.
24 That would have got into the documentation side.
25 MR. COLEY: So, it was your opinion that it was

1 going to be 16 NCRs, right?

2 MR. WAMPLER: Yes.

3 MR. COLEY: Can you identify any of the welds --

4 you already have on the eight inch.

5 MR. WAMPLER: Right. I wish I could. I mean, I

6 did -- that was -- you know, they had been stacking up, and

7 I never logged it in. Of course, I didn't know I was going

8 to be leaving the day that I was there, either. Otherwise,

9 I would have logged them all down. It's the same with all

10 the pre-'81, '82 film. If I had known that I was going to

11 have to track it, I would have had a listing. I thought

12 Pullman had a list of all that film that was prior review

13 film.

14 MR. COLEY: Of the 16 NCRs that you were going to

15 write at the time, was it your opinion then that any of

16 these welds were inaccessible?

17 MR. WAMPLER: I don't remember.

18 MR. COLEY: Okay. We have discussed already that

19 you felt there were welds that were inaccessible that were

20 made in '81. Is that correct?

21 MR. WAMPLER: Yes.

22 MR. COLEY: Did you have any problem when you

23 rejected film or wanted a reshot having these reshots made?

24 MR. WAMPLER: No. The technicians -- you know, I

25 had no problem with the techs. In the beginning, I had

1 problems -- I mean, the new kid on the block -- but after a
2 while, they figured out where I was coming from, and I never
3 had a problem with the radiographers going out doing what I
4 needed.
5 I would have problems with production or, you
6 know, the QA people. They'd say, "We need them to go do
7 this." Well, I'd say, "Well, I need them to do this."
8 MR. COLEY: That was my next question. How about
9 production? How could you work it in when you were having
10 reshots?
11 MR. WAMPLER: It was probably one of the worst
12 places to work as a Level III. I mean, I've worked at a lot
13 of other nuclear plants, and at least you had some control.
14 There was no control. I mean, I had absolutely no control
15 over the technicians, had no control over what production
16 did. I mean, I could schedule -- I'd say, "Okay, I need you
17 to do a qualification of a procedure, and if you don't do
18 it, we're going to bust all these welds," and that -- I
19 mean, I would fight to get that into the system. So, it was
20 -- you know, you were always in the middle.
21 MR. COLEY: Well, bottom line, were you able to
22 achieve what you were --
23 MR. WAMPLER: With some semantics and some
24 graphics, yes, I would end up getting it through.
25 MR. COLEY: One of the other questions I had was

1 the type of problems that you were identifying, basically
2 percentage wise. Could you go through that again?
3 MR. WAMPLER: The biggest percentage out of the
4 reviews were weld integrity, you know, lack of fusions,
5 porosity with tails, transverse linears, and then a few
6 would come in there with densities, maybe brown film,
7 incorrect penetrometers.
8 That wasn't the bulk of it. I mean, we always had
9 a problem with the wrong pene. I mean, when you have a
10 radiographer out there, you always have that problem. And
11 with the size of the sources they were using, you'd
12 sometimes run into some UG problems.
13 MR. COLEY: Was Pullman having you focus primarily
14 on weld type defects, look at it for weld quality, or was
15 the review as much your review for quality technique type
16 problems as it was for insuring that the weld quality was --
17 MR. WAMPLER: I think in the beginning, what they
18 were looking at is just to kind of re-review it and send it
19 on its way, but I'm aggressive when I look at the film. I
20 mean, I want to make sure that I have a quality radiograph;
21 I want to make sure I have a quality weld.
22 I mean, that was the whole purpose for
23 radiography, was you had a permanent visual record, and I
24 don't like things to come back. So I always read it for
25 weld integrity, film integrity, and paperwork. I did all of

1 it. I did it as if it was a whole new package. It was the
2 same as I did for my production weld.
3 MR. COLEY: The reason I'm asking, in looking at
4 the DRs that Yankee Atomic had written in their review, it
5 appears that most of them were film quality technique and
6 this type of thing. There were weld defect problems, but
7 from a review standpoint, it looked like Pullman was
8 concentrating on weld quality, and Yankee was looking at the
9 whole picture.
10 MR. WAMPLER: No. Well, maybe after, but I know
11 -- you know, I think, in the beginning, Yankee was just kind
12 of giving it a quick over. You know, they had assumed that
13 the Level III prior had done their job. When I started
14 bringing up some problems, then we started looking at the
15 entire package. I looked at the entire package, not just
16 weld quality, but as far as documentation.
17 Five-twenty-seven, they listed -- or 574, they
18 listed a lot of film type artifacts, and densities,
19 exposures. I mean, that's -- you know, the exposure date
20 was kind of minor to me; that not real to the problem.
21 Repair status, incorrect. I mean, they never did get that
22 right. Even by looking at this, they never got repair
23 status right.
24 Source to film distance was questionable. Type of
25 viewing. Artifacts. Source site. I mean, they use a

1 source site pene with film site markings, and it's not
2 identified. Those happened all the time.
3 Illegible or incomplete information. That's
4 consistent. I'm looking at it. Film type incorrect. I
5 don't know. Pipe diameter.
6 I noticed that in a lot of the forms in here, the
7 pipe diameters -- not only does the pipe diameters change
8 from form to form, but the thicknesses change. I mean, you
9 can start off with a 31-inch pipe, and all of a sudden one
10 form says it's 29. You started off, and the original
11 paperwork said it was 2.7 inches, and all of a sudden it's a
12 2.4-inch pipe. I was really having some serious questions
13 whether anybody knew exactly what size it really was.
14 MR. COLEY: I ran into the same problem, and I
15 think they were going by nominal pipe schedules, which are
16 always OD measurements, and this is a specially made pipe,
17 and which is all ID measurements. I ran into that same
18 thing, and there was confusion in the reports.
19 What kind of confidence level do you have in the
20 Yankee review, the final review?
21 MR. WAMPLER: I was pretty comfortable with it.
22 You know, you can tell I got along good with Dick. We had
23 our major confrontations, but he was conscientious. I don't
24 know how much of it was reviewed. You know, that would be a
25 question. I mean, did they go back in and review everything

1 that was prior for '81 and '82? I don't know. I know that
2 when we started bringing it up, he got real paranoid.
3 MR. COLEY: I guess I have two more questions, and
4 I think you've answered part one of them. Do you know of
5 any weld defect or unacceptable film at Seabrook that was
6 not corrected or improperly dispositioned?
7 MR. WAMPLER: Well, we talked about RC-49 with the
8 disposition. I don't know -- you know, a lot of them, I
9 don't know what happened to them.
10 MR. COLEY: Yes.
11 MR. WAMPLER: Once I started my paperwork, I have
12 no idea what happened.
13 MR. COLEY: And this other portion, I think we've
14 answered before, but I wrote it down, so I'd like to get an
15 answer for it. Should we look at any specific weld or
16 radiograph that you know of right now?
17 MR. WAMPLER: You could look at RC-9 and RC-10.
18 That's always a fun trip.
19 MR. COLEY: Yes. We've already got those.
20 MR. WAMPLER: RC-49, that was fun, too.
21 Personally, I would look at the RC loop piping. I mean, if
22 I have a hundred-and-some repairs on 30 welds, that tends to
23 make things a little bit paranoiac when I have base metal
24 repairs on the nozzle side, I have base metal repairs on the
25 pipe side, I have end-prep problems.

1 It was the same questions I had asked then. You
2 know, I mean, have we done our material? What's the
3 problem? I mean, why do I have a misalignment with a 31-
4 inch, three-inch weld pipe. I mean, that should not happen.
5 MR. COLEY: Well, that's the kind of concern I
6 would like -- think a minute. Can you think of any other
7 systems? We will be taking a hard look at the reactor
8 coolant system. Any other trouble areas that --
9 MR. WAMPLER: I'd check out main steams. Main
10 steam is really not in the Class I side. I mean, it's not
11 probably a major problem, but I do know that not a lot of
12 attention was put on the main steam, and there were a lot of
13 problems over there.
14 There were some other systems that -- I mean, even
15 the welders knew that they hadn't consumed the consumable
16 insert, and they went ahead and welded it up because there
17 was no radiography here, no inspections.
18 I don't remember exactly what system, and I don't
19 think I brought the paperwork, you know, because I was
20 working at a coal plant out in California when the main
21 steam blew, and 28 people died. I mean, some of the pieces
22 we found were just belt buckles. I mean, but that wasn't --
23 you know, it -- feedwater system -- some of that is
24 underground, so good luck. I thought we made him dig up one
25 of the feedwaters. We had a lot of problems in feedwater.

1 What was the FI?

2 MR. WALTON: FI?

3 MR. WAMPLER: I knew you guys were going to know

4 this. There was no requirement on it anyway. I just

5 wondered.

6 MR. COLEY: It wasn't nuclear systems; there's no

7 FI system.

8 MR. CERNE: Field Instruction.

9 MR. WAMPLER: I just wondered. I saw it in my

10 book. I don't remember what it was.

11 MR. COLEY: You know, I'm trying to get to the

12 root of a problem and if you can remember, trouble systems,

13 trouble wells, I want to look where the action's at, as well

14 as you can remember, and make my sampling as unique and as

15 effective as it can be.

16 MR. WAMPLER: This was only main steam. A

17 reactor. How about RC-44 08 807. It says that a visual

18 recommended a complete cut-out of the weld. That was back

19 in '84. See, the RC system, there's a lot of weld repair

20 orders, some of them that aren't on the book. Diesel

21 generator was a lot of fun over there too. I think if you

22 look for your weld repair order log, you could kind of get

23 an idea of what systems were really in major problems. You

24 know, the diesel generator had some major problems. A lot

25 of it was arc strikes, but it looks like it was a lot of

1 welds for the diesel generator that had arc strikes. These
2 were all '84 so I can only assume that would have been
3 through the walk-down that they started finding arc strikes.
4 It kind of brings another questions as when I did
5 a final visual, why didn't I see that arc strike. If I wait
6 until I do a walk-down, you follow the diesel generator, and
7 I'm going almost weld-by-weld through the weld repair order
8 and I see a lot of visual walk-down, or visual inspections
9 for arc strikes, I don't know because I don't have the
10 packages, if it was done during a walk down -- I don't know
11 because I don't have the packages if it was done during a
12 walk-down or if it was done at the final buy-off.
13 It would just seem that some place between the
14 start of that weld and the end in radiography of that weld,
15 somebody's going to see an arc strike.
16 MR. COLEY: I guess, bottom line, what I'm saying
17 is, is there any weld you're uncomfortable with that I can
18 go look at that you know the number or anything, and if you
19 have any problems.
20 MR. WAMPLER: Which ones can you get in to look
21 at?
22 MR. COLEY: I mean, look at the final radiographs.
23 You may have not seen the final radiographs on them.
24 MR. WAMPLER: I don't know. There's RC-10, RC-9,
25 RC-49, I would take a look at those. And then I would, if I

1 was you, probably take a waltz through and take a look at a
2 lot of the RC systems, because there was a lot of extra
3 welds added to the system, a lot of work done on the nozzle
4 end, a lot of work done on the other end, pipe-to-pipe,
5 generator, or whatever.
6 MR. COLEY: Well, you know that, of course, the RC
7 systems is the one we're primarily concerned in and we will
8 be taking a hard look at that one. We're looking for other
9 associated systems that raised the concern with you with the
10 way it was welded due to a group of welders making -- you
11 can't have real good radiographic welders everywhere. You
12 kind of focus them on your best stuff, so is there any
13 systems that have problems that are normal to plants that
14 you're concerned about?
15 MR. WAMPLER: The main steam, they'd seemed to
16 have a lot of problems with that one. Feedwater, they've
17 had some problems. That was all pre-'82. And then,
18 depending on some of the -- I don't remember exactly which
19 ones were triggering a lot of this. It was just the same
20 questions, as why are these problems? Did we have the same
21 problem with shop weld? According to what I've heard, no.
22 They didn't have any problems with shop weld. Shop welds
23 are a little bit easier. I can just put them in a turner
24 and go for it. But I should still not have that many
25 problems out in the field. I'd ask, can you get me a shop

1 weld package for this particular line. I want to see if
2 they had the same problems that we're having, and it was
3 like talking to the wall.
4 MR. COLEY: Well, in answer to that, and I hadn't
5 reached that position yet, but most of your welds out in the
6 field are going to be dissimilar metal wells, and they're
7 always more problem than shop welds, which would be similar
8 metal welds. You know?
9 MR. WAMPLER: Every once in a while, if you had a
10 shop weld that was close and you had a little bit larger
11 piece of film, you'd find things in the shop weld. So, then
12 we'd end up going back into repair shop weld. As you're
13 sitting there, you're looking at all these things and you're
14 going, wow, why aren't we doing something? Do we have a
15 problem with material, do we have a problem welders, do we
16 have a problem with rod, do we have a problem with
17 procedures? What is the problem? And you could never get
18 the answer.
19 You get a welding engineer that says, aw, don't
20 worry about it. You get a quality manager that says it's
21 not your job; you just have NDT to do. Most of us have all
22 had NDT and we know that we get involved in the material,
23 you get involved in heat-treat, you get involved in
24 everything in NDE. We just can't live in this little
25 nutshell that says you're an NDE tech, because you have to

1 know the material, you have to heats, you have to know all
2 that in order to make some kind of a judgment.
3 MR. COLEY: That's all the questions I have. I
4 appreciate your answers.
5 MR. WALTON: You mentioned the feedwater line
6 being buried. Were you talking about service water, or were
7 you actually talking about feedwater?
8 MR. WAMPLER: Maybe it is service water.
9 MR. WALTON: Yeah. I think it probably is.
10 MR. COLEY: But we already had that meeting
11 requiring RT.
12 MR. WAMPLER: One of them is lined?
13 MR. WALTON: That's service water.
14 MR. WAMPLER: Service water. And that one we
15 really didn't have it. There were some feedwater problems.
16 Feedwater just runs along the topside.
17 MR. COLEY: Feedwater's to your generators.
18 MR. WALTON: Let me ask, I think I've missed the
19 welding procedures. They have to qualify weld procedures
20 and they have to it with or without heat treat, they have to
21 qualify it with or without pre-heat and they have all those
22 variables, they have to meet.
23 If we review that documentation, now the process
24 sheet may not say that you do pre-heat. What it may say is
25 reference A, welding procedure, and that welding procedure

1 then would tell you then would tell you what preheat and
2 plus what heat treat temperatures are. If we look at that
3 documentation and do analysis, if we look at the
4 radiographs, we find our radiographs, and if we look at the
5 process that got us there, in other words, the step
6 sequences that cause the weld to be fabricated, would that
7 catch the issues Joe, or are we missing something? We'll
8 concentrate on reactor cool down.
9 You mentioned base material repairs. I assume
10 that it, I'm concerned about that. We'll look at that as
11 part of the process sequence, as far as wall thinning or
12 more shrinkage. We cannot look at the issue slips on weld
13 rod; they're not available. We can't look at the process
14 sheets there to see the welder assembles there and see if
15 there was an issue for the rod was there. Maybe we can
16 backtrack and see what rod we use. We want to do the right
17 thing.
18 We want to understand the questions because, as I
19 understand, we are a snapshot in the time of fabrication.
20 In the end it was apparent they had the problem. We
21 recognized that early on and I think that shows up in the
22 sequence of our inspection reports or the Region I
23 inspection reports. That doesn't necessarily make it bad,
24 if those things got corrected. I'm not saying they did. We
25 have not looked yet, but if they got corrected, what else do

1 we need to look at to capture the concern?

2 MR. WAMPLER: Correct me if I'm wrong, but if I do
3 multiple repairs on a weld and I start getting into base
4 metal, what have I got -- there was a requirement that we do
5 an acid etch of the base metal after multiple repairs.
6 Okay, if the repairs were never documented and it never got
7 to that point of an NCR, how do you know what the base metal
8 is? How do you know what the heat-affected zone looks like?
9 Do you wait until inter-granular inspection? How do I know,
10 or how do you know that the base metal hasn't been, some
11 major problems in that.

12 I'm looking at this and it's just like the one I
13 cited that they said because the paperwork didn't say it,
14 Engineering says it doesn't exist so therefore it's okay.
15 If that's an Engineering buy-off, I'm moving. If all of the
16 engineering is going to look at just the paperwork by the
17 looks of this paperwork, if you can read it, have fun. I'm
18 not being sarcastic. I'm just being very concerned. How do
19 I know that I haven't violated the integrity of that base
20 metal? How do I know that I haven't set up some residual
21 stresses that we're not going to know about until it's too
22 late. How can I check it? How do you check? How do you
23 know that the material's good? Those are questions I don't
24 have the answers. I'm kind of lost.

25 MR. WALTON: They had a process, or I believe they

1 do. They have a process to write an NCR after a third
2 repair. That was one of the questions I was going to ask
3 when you talk about repair. You talk about multiple repairs
4 to the same area. You're talking about --
5 MR. WAMPLER: Multiple repairs to the same area.
6 MR. WALTON: Multiple repairs to the same area,
7 okay. Then they had, in the procedure, a requirement to
8 write an NCR. You're saying that didn't always happen.
9 MR. WAMPLER: No, because RC-10, there's three
10 stations that had multiple repairs. Only one of them had an
11 NCR. RC-9, which was, I was around and I didn't know it had
12 three repairs. Because of the documentation, you couldn't
13 get back to it.
14 MR. WALTON: We'd better flush out the paperwork
15 that we're talking about doing now, looking at that
16 sequence.
17 MR. WAMPLER: If you take RC-10 and just walk it
18 through the system. The only reason is I spent probably 2
19 weeks trying to follow this. Good luck, because if you can
20 find the original process sheet and then try and get it into
21 an order to move it around, you'd be in pretty good shape.
22 You're probably more familiar, I don't know if you're more
23 familiar with their paperwork. What I did was I just
24 started writing all the weld repair order numbers and
25 started tracking it out, you know, and put, okay, we've

1 started with station 0 - 1 and we did 2 base metal repairs
2 or we ended up here and we did all this, and I just tracked
3 it out that way. Those are just kind of the way, if you can
4 track it through here.
5 MR. WALTON: Okay, but if there was, for example,
6 4 repairs, and all 4 of them are in base material, then the
7 concern is there but residual stresses or not x-raying the
8 weld or what?
9 MR. WAMPLER: What if they were all just in that
10 station, because there is no documentation that tells you
11 where the repair was. You don't know where the cavity was
12 so you don't know how deep it was. You could put, probably,
13 25 questions to that, you know, and I don't have the
14 answers. I don't know if anybody has the answer to that
15 question.
16 MR. WALTON: Okay, but if you have a base metal
17 repair, you can see that on the paperwork.
18 MR. WAMPLER: Oh yeah, you'd definitely see that.
19
20 MR. WALTON: If we look at the film in conjunction
21 with the process sheet. Okay.
22 MR. WAMPLER: I'm just looking at stations on the
23 paperwork, and I say, okay, I repaired 0 - 1, 4 times; where
24 was the NCR? Because I know after 3, whether I got base
25 metal or not, I was hitting with NCRs. What happens after

1 that, where do you go with it?

2 MR. SPESSARD: I have two questions, primarily,

3 that since you stress your concern about the quality of the

4 welds, welds that you reviewed, and particularly repair and

5 the quality of those repairs which would affect the base

6 metal and the adjacent clean welds. My question comes back,

7 were you knowledgeable of the radiographer set-ups and their

8 development of the films?

9 MR. WAMPLER: Most of the time, yes. What I did

10 is, I'd go out and walk the system and let everybody know I

11 was out and say, okay, I just want to come out and look at

12 how you're setting this shot up. I want to see where you're

13 doing it. I didn't do it enough because most of the

14 radiography was done on third shift. I worked first shift.

15 There were times that I worked first, second and third

16 shift, but it wasn't one by choice.

17 MR. SPESSARD: In these radiographies which you

18 more or less observed, did you notice the amount of

19 discrepancies that they were putting into their reports that

20 had to be corrected by initialing later by the Level II and

21 Level III.

22 MR. WAMPLER: Most of it wasn't too bad. Most of

23 it was paper work, transpositions. Once in a while, you'd

24 get the incorrect penotrometer. If you run out in the field

25 and you're putting everything in a wheelbarrow and you're

1 hoping you have enough and all of a sudden they tell you
2 you're going to go do a 3 inch line when you didn't have
3 quite enough. Between 3 and an inch and a half, there's a
4 lot of difference. But if you're bouncing through the
5 system and all of a sudden, you get a thicker weld, then you
6 may end up short a penny.
7 It didn't happen that much. If you're running 50
8 or 60 welds a night, you're going to have paper work errors.
9 It's just got to happen. Considering how much paper work it
10 took to do this.
11 MR. SPESSARD: The other question gets back to the
12 welder's performance. Are you knowledgeable with any of
13 these welders, to any degree? You know, you take 10 welders
14 and get a bell curve out them, good and bad and you average.
15 Did you happen to observe this?
16 MR. WAMPLER: We didn't track by welders. When we
17 wanted to, we were told to stay out of it. You hear all the
18 horror story when you're sitting up there and all the techs
19 are floating around out in the field about. Well, they're
20 too lazy; they're going to use pre-heat or they're not post-
21 heating, and the welder, he's busy sleeping or he's busy
22 doing this. I watched the welders when it was taking a
23 welder, a fitter, two grunts and a foreman to put in a 6-
24 inch line, which took them a week. Some of the welders were
25 conscientious; some were just there to get paid.

1 MR. SPESSARD: The last question I have, are the
2 RT procedures and the welding procedures reviewed by the
3 radiographers plus the welders? Do they have an opportunity
4 to review or see?
5 MR. WAMPLER: The radiographers, when I got there,
6 I straightened out their RT procedure and then I had a quick
7 class, went through it all with all the radiographers and
8 then I gave them all a copy. I gave my film interpreter a
9 copy. I have this thing that, the way that I grew up in
10 this system as far as the Navy part and the aircraft
11 industry and everybody else, if you walk into somebody's
12 shop and you don't see a procedure open to the page that
13 you're working, you're in trouble. Well, that's the way I
14 was brought up in the system.
15 I imparted that part into my radiographers. If I
16 walk out on the field and I don't see a procedure sitting in
17 front of you and you're at least close to where you need to
18 be, you're going to have problems with me. Nobody can
19 memorize what they're supposed to do as far as placements
20 and everything, so I'd hand it to them. In the whole
21 business, I have always read my books, but I don't memorize
22 them because they change. So, I can always go to the page,
23 except when you have this.
24 MR. SPESSARD: Were there any feedbacks as to the
25 adjustments to the procedures, particularly, let's say, for

1 some of these inaccessible wells?

2 MR. WAMPLER: No, because if we get into something

3 that deviates from the procedure we'd have to go through and

4 qualify the procedure to prove what we've got.

5 Ultrasonics we had a lot of problems with before I

6 got there because they were doing an ultrasonic inspection

7 without a valid procedure so we ended up having to backtrack

8 and I had to try and rewrite the procedure and then qualify

9 the procedure and prove that it was in fact going to do it

10 but I don't think I ever got it done because I couldn't

11 really get it done.

12 MR. CLARK: That's all I have.

13 MR. COLEY: I've got another one. Going back to

14 the 16 reports, you stated that you'd written two and that

15 you had information available for the other 14.

16 Did you give this information to anybody? Was

17 there a turnover on it?

18 MR. WAMPLER: The only turnover was "Wampler, get

19 your stuff and get out of here. That was the turnover."

20 MR. COLEY: So this information was just on your

21 desk.

22 MR. WAMPLER: It was sitting in a pigeon-hole and

23 I had different areas of film that was documented. It was

24 like Level II to review, repairs; Level III review, Level

25 III problems and it was over there but it was like I walked

1 in at 7 o'clock or whatever it was and they said okay.

2 MR. COLEY: Was it your opinion that the

3 procedures that Pullman-Higgins had, the decision to make

4 these a NRC in lieu of a repair order, whoever would have

5 got this information would have had to come to the same

6 conclusion on that?

7 MR. WAMPLER: Yeah.

8 MR. COLEY: -- the NRCs --

9 MR. WAMPLER: Uh-huh, because a lot of it would

10 have been like after Hydros or after final heat treat or

11 stress relief or whatever they were doing because these were

12 the '81s, '82s, so I mean they were through the system quite

13 a ways so you didn't know exactly and then you'd have to go

14 back and chase it down and figure out where the weld was.

15 You know, I can't say what somebody else would

16 have done. I know that I was running pretty true with

17 Yankee on their assumptions.

18 MR. COLEY: I guess my next question is you had

19 this information on these 14 or how many ever welds, but you

20 hadn't signed anything saying you had completed a review.

21 These welds were still outstanding as far as getting the P

22 and H Level III overview done to them yet?

23 MR. WAMPLER: No, they would have had Mike

24 McCray's signature on them or a Hinse signature.

25 MR. COLEY: I mean they -- I understand that and

1 of course your overview was over a Level II and a Level III
2 and this was the process they were in right now.
3 MR. WAMPLER: Uh-huh.
4 MR. COLEY: I imagine you had some method or
5 Pullman had some method to determine how far they were along
6 with this backlog?
7 MR. WAMPLER: No. I don't think they knew. The
8 only way they even knew how many were there was I kept
9 telling them.
10 I mean they'd tell me that I started in August and
11 I was doing a lot of procedures and getting prequalifieds
12 done and things like that. All of a sudden he come up and
13 says, hey, that whole file cabinet has got to be done by
14 November the 15th and I look at him and laugh because during
15 that time I'd only done maybe a hundred of them.
16 By the time November came around I had 200 and
17 some of them done. That would have been a full time job for
18 quite some time and as one person looking at them plus doing
19 everything else -- and there were days I'd do maybe 50 or 60
20 packages.
21 MR. COLEY: You say some of them had gone to
22 Hydro. Well, they can't get to Hydro without Yankee Atomic
23 looking at them and the Code inspector looking at them.
24 So what you're telling me is some of these welds
25 have been through the full circuit and accepted by Yankee

1 Atomic and accepted by the Code inspector and you were
2 overviewing them?
3 MR. WAMPLER: To tell you the truth, I don't
4 remember all of them but I mean if you dig out some of the
5 reviewed packages and look at them, you will know more about
6 it because you can get to them.
7 Go back and look at the '82s and see if A&I had
8 them.
9 I am not sure if it was Hydro or if they did a
10 different test to them. You know, I'm not that up on what
11 they were doing.
12 MR. COLEY: I'm trying to get to them.
13 MR. MYERS: Excuse me, why can't you get to them?
14 MR. COLEY: Do you know the numbers?
15 MR. MYERS: No. I think -- I mean that Joe Wampler
16 clearly doesn't know the numbers. I mean he says he doesn't
17 know --
18 MR. COLEY: But he indicated that these things
19 have gone through Yankee review and a Code review and --
20 MR. MYERS: He's got the numbers --
21 MR. COLEY: -- not in a position to read them at
22 that review.
23 MR. MYERS: -- numbers of those he reviewed. I
24 don't think he's got the numbers of those he didn't review
25 so these things presumably exist in the Pullman-Higgins

1 logs.

2 MR. SNIEZEK: Dr. Myers, I think the line of

3 questioning that Mr. Coley is asking is right on.

4 If I am following the conversation, he is trying

5 to get to those that Mr. Wampler said he had some concerns

6 with but he didn't write any NCRs yet because he was let go

7 by Pullman-Higgins and that is the line of questioning.

8 I think you must be thinking on a different line

9 of questioning. I would like if they could proceed on their

10 technical discussion.

11 MR. COLEY: I think we have gotten to the point --

12 what I am really looking for is you gave an indication, had

13 it gotten to Hydro or anything they have already gone

14 through everybody's signature and that is the concern that

15 is concerning me right now.

16 MR. WAMPLER: That would have been everything that

17 was in the vault as of, what, around December of '83 when

18 they started pulling it back out.

19 Now some of it had come to me.

20 I don't remember how many pieces of film went

21 through with everybody's signature on it. There are some in

22 here that had all the signatures. I don't remember which

23 ones they were. Six years ago I could have probably gave

24 you all the numbers.

25 MR. COLEY: Just so it is clear to everybody, if

1 you had NCRs to write and it was just his review, then we
2 don't have -- we know somebody else is going to look at this
3 problem and if he has got weld quality problems the Yankee
4 review appears to be a real good review and it's -- Joe has
5 indicated he had a high confidence level in it but my
6 concern is we were getting stuff out of the vault and
7 reviewing it that had everybody's signature on it?
8 MR. WAMPLER: Right.
9 MR. COLEY: Then we rejected it -- came up with
10 weld defects.
11 MR. WAMPLER: 10 percent, right.
12 MR. COLEY: And this was what you were looking at
13 in 1983?
14 MR. WAMPLER: That was what Yankee was at. I was
15 at things that hadn't made it. I think some of them had
16 been to the vault. Some had been sent back. It was a
17 conglomerate of errors. To tell you exactly where they
18 were, I can't. I can give you the weld numbers of the ones
19 I did look at, you know, and then figure out where it went
20 from there.
21 I mean --
22 MR. COLEY: If you can give me anything I'd
23 appreciate it.
24 MR. WAMPLER: Like if you went -- I need to check
25 as close as I can -- SLXs, we don't care about that.

1 Well, these were like in December I did a few of
2 them and some of the problems there were, you know, no
3 source sizes and unacceptable UG but that was about in
4 December.
5 If you get back into November -- main steams.
6 You can take a look. I mean you are going to get
7 a copy of this anyway.
8 MR. COLEY: Okay.
9 MR. WAMPLER: Then just take a look at them.
10 These will get you back to the areas -- this was welded in 7
11 of '82, 6 of '82. Then you can just kind of trace that
12 package and hopefully find the original with Mike McCray and
13 see how far it went because I don't remember.
14 MR. COLEY: Let me ask one more question. That
15 is, had you been at another site at this stage of
16 construction where you were getting a volume of welds and
17 repairs because we were doing most of our welding from '81
18 to '85 and that is a tremendous amount of welds coming
19 through and all the reshoots and everything you all were
20 doing.
21 Not considering anybody having a weld problem, had
22 you been at that stage of production in a nuclear plant?
23 MR. WAMPLER: No. The other jobs I mean we've run
24 a lot of film.
25 MR. COLEY: The rate of defects that come in from

1 that stage of production?

2 MR. WAMPLER: At Diablo we only did the restraints

3 for the faults so we didn't have that, not in that part of

4 construction.

5 I mean I have talked to a lot of other people and

6 they didn't really have that big of a problem. I'd sit

7 there and talk to them and say, my god, you know, you

8 couldn't get a weld through, did you have the same problem?

9 Well, not really, not that often -- so I don't know.

10 Is this what -- do they all have that problem at

11 this stage?

12 Do they all go through that many weld repairs?

13 MR. COLEY: The thing that I was impressed about

14 what you're saying is the amount of backlog that you were

15 putting back on the radiographers, fitting it into

16 production and the mass production we're having in four

17 years. We built -- they built a nuclear plant in four

18 years, '81 is generally where it started -- '85's where it

19 completed and we got thousands and thousands of RT-able

20 joints and you all were working a backlog on top of that but

21 two and repairs.

22 To me the fact that you over your head and I don't

23 make any assumptions, it's just that the tremendous job that

24 was being undertaken at that time.

25 I was just wondering if you'd seen that type of

1 thing?

2 MR. WAMPLER: Well, it was overwhelming when I
3 walked onto the site but I mean working out in the field a
4 lot, I mean it is not hard for me to do 20 hours. I mean I
5 used to do that when I was young. I am too old to do that
6 now. I have problems with 8 to 10, you know, but when I was
7 young I didn't have a problem with those hours and I mean
8 even when I was at Pullman I was averaging 12 to 14 hour
9 days, trying to catch up.

10 MR. COLEY: But like I say, the time period
11 involved and the amount of welds you all had, amount of
12 repairs and not so much the amount of repairs but the fact
13 that you were going back and reshooting welds for technique
14 and everything, there's not many nuclear plants that were
15 built from a time period of four years. I mean they stretch
16 out longer than that, you know.

17 They got all of the welding done so I see it as a
18 tremendous volume of welds.

19 If anything happened with the normal process of
20 things you could build a backlog real fast and I know that's
21 no excuse for '81 to '83 backlog.

22 MR. WAMPLER: And yet welds that were started in
23 '81 that weren't completed until '85.

24 MR. COLEY: Well, the welds were but the RT wasn't
25 acceptable.

1 MR. WAMPLER: Right, yes. Well, you get into '85
2 and all of a sudden or '84 you see them starting to repair
3 it again. They started welding it in '81. They weld it out
4 and all of a sudden here they are in '83, '84 -- in here
5 they are repairing them again.
6 MR. COLEY: That was one reason I was asked
7 previously about the Pullman review. Were they looking just
8 at weld quality? The Level II came to the decision that if
9 the weld quality is good even knowing they may have to go
10 back and reshoot because of technique?
11 MR. WAMPLER: That would have been prior to Drew
12 because he looked at 100 percent of the package and he
13 caught a lot.
14 Before him I guess it was Richie Bolles and you
15 were there. Tony was there. I guess it was Richie and Ed.
16 I don't know what they were looking at.
17 I know what we were -- we were looking at the
18 entire package because of the fact that we had that problem
19 and I didn't want to have to have a package all the way
20 ready to go and then all of a sudden find out that I have to
21 go back and reshoot this thing.
22 I mean I just couldn't afford that so we worked
23 real hard on our production welds and we really didn't have
24 that big of a problem tracking them -- I mean we tracked
25 them. It was hard but as far as trying to keep up, we just

1 kept putting the same amount of welds in every day.

2 We took great care in our packages.

3 MR. COLEY: We've mentioned NCR 5773 that you

4 wrote the day before you left, 8 inches of lack of fusion

5 was read by McCray at that point, it was a Level III?

6 What is your opinion about McCray's film reading

7 ability?

8 MR. WAMPLER: Very, very questionable. I wouldn't

9 have hired him as a Level II film interpreter. I mean I

10 have dealt with enough film interpreters in the last 20

11 years that he would not have been one of them because I give

12 film interpreters a film interpretation test.

13 I mean I have actual radiographs that I hand

14 people and I say, okay, now write me down what this is.

15 MR. COLEY: Was there any time between the '81 and

16 '83 period that he was the only film reader there? There

17 was a time period there.

18 MR. WAMPLER: I think it was, part of it was in

19 '81. I am not exactly sure but there's a lot of times that

20 you'd see just his signature and circled Level III and that

21 would have done it and that's the personnel down in the

22 system.

23 MR. COLEY: Thank you for your answers.

24 MR. CROWLEY: I have one other question just for

25 clarification. In the form that you reviewed, the backlog

1 and the production film, the day-to-day production, did you
2 review the film a hundred percent? In other words, after
3 the Level II had reviewed the film, and you were to review
4 the film and sign it, you would look at every film like you
5 were the original look at that film?
6 MR. WAMPLER: Right, all the time, because Mike
7 Drew was good, but you know, after probably a while, he
8 couldn't have gotten down to review one of each package or
9 maybe one or two views of the package. But until I was
10 comfortable with what was coming through there, I looked at
11 the entire package from front to back.
12 I did not want to -- you know, I was looking at
13 what I was writing up on a prior Level III. I didn't want
14 somebody coming around saying, hey, Wampler, why didn't you
15 do this? So, I mean, I went right from the beginning
16 through with them.
17 MR. CROWLEY: Thank you, that's all I have.
18 MR. SPESSARD: Let me thank you, first off. What
19 I thought we would do is take a break for lunch. If we
20 could, I think we'd like to copy your book and anything else
21 that you have that would help the team. The other thing is
22 that because of the interest of what I'll call the 15
23 Kennedy welds, and certainly some of those are very
24 interesting to you. I don't know if all of those are yours
25 or not. We have the film of those 15 welds here. We

1 actually started our effort onsite a couple of weeks ago, if
2 my memory is right. So, we have started. We are by no
3 means close to being finished, but we have at least started
4 our review of that film.
5 If you're willing, we would like to review it with
6 you. We'd like to understand some of the concerns you had
7 and there may be some radiographs that we have that are of
8 the completed weld which you may not have seen yet. There
9 may be some in there that you've rejected and they were
10 actually re-shot.
11 What I would propose, if that's acceptable to you,
12 we could take a lunch break of an hour or so and then
13 reconvene and if there's anything that you would like to
14 bring up after you've had a chance to think about it, please
15 do, because we want to get every bit of information that you
16 have that will help us. If we think of anything that we
17 would like to ask to get clarification, we'll do that, and
18 we can look at some film, if that's acceptable to you.
19 MR. WAMPLER: That's fine.
20 MR. SPESSARD: Let's meet back here at about 2:00.
21 That will give you an hour and ten minutes.
22 [Whereupon, at 12:47 p.m., the interview was
23 recessed for luncheon, to be reconvened this same date at
24 2:00 p.m.]
25

1 AFTERNOON SESSION

2 [2:08 p.m.]

3 MR. SPESSARD: Mr. Wampler, are you ready to

4 resume?

5 MR. WAMPLER: I'm ready.

6 MR. SPESSARD: Why don't we go back on the record

7 then. During the break, did you have anything that you

8 thought about that you'd like to bring up? I'll give you

9 the first opportunity.

10 MR. WAMPLER: The only thing I kept thinking about

11 is that -- I forget -- Bill, you brought up the thing about

12 whether I was comfortable with Seabrook Yankee's film

13 review. I just kept mulling it over. I'm comfortable with

14 it to the extent that I was there. I knew what we were

15 doing. After that, I don't know.

16 I don't want it to come out that I -- just a

17 blanket thing, so during the time I was there, I was real

18 comfortable. What happened after I left, I'm not a hundred

19 percent sure.

20 MR. SPESSARD: Was there anything else?

21 MR. WAMPLER: No, I don't think so.

22 MR. SPESSARD: We did copy your log and have

23 returned that to you.

24 MR. SNIEZEK: Thank you very much. We really

25 appreciate that. Hopefully that will be very useful to us.

1 MR. WAMPLER: You'll see in there that there are
2 some areas where there's nothing in, because I really wasn't
3 tracking them until like in November where I got real -- I
4 mean, we still had the same problems, but in November, it
5 was getting so repetitive that I said, whoops, I better
6 write all this in here.
7 MR. SPESSARD: Did you have anything that you all
8 wanted to pursue a little further?
9 MR. COLEY: You indicated that you didn't do
10 anything with them, but did you tell anybody about them?
11 MR. WAMPLER: Yes, Mike Drew knew about them. I
12 believe Julian knew I was compiling a list, because rather
13 than spend the time on the paperwork, we were trying to get
14 all the other stuff done and we were going to go back and
15 take care of those.
16 I'm sure some of the people at Pullman -- I know
17 Davis, he knew about it, and Becks did. You know, I'm not
18 the only one that knows about this, either, okay? I think
19 that my own opinion is that if somebody gets some
20 protection, they'll talk. I mean, not "protection"
21 protection, but rather than losing a job.
22 That is a real major sore spot in my psyche right
23 now, I guess you could say, because it has happened to me
24 twice, okay? I'm above and beyond all that now. It's --
25 you know, but I think that if there is something that

1 somebody can do to protect people that want to bring you the
2 information that you need, somehow you've got to protect --
3 somebody's got to protect them. I don't know if that's
4 what you really want to hear right here, but it is a major
5 concern, because people are just not going to do it.
6 As you can see, it's kind of a major concern on my
7 side, too. Not real major, but --
8 MR. COLEY: My concern in asking the question was
9 that somebody else was aware that you had the problems and
10 knew where the information was?
11 MR. WAMPLER: Yes.
12 MR. COLEY: Where the records were and could have
13 worked on this problem after you?
14 MR. WAMPLER: Right.
15 MR. COLEY: They made the decision that they
16 weren't going to write an NCR; that they were going to
17 handle it some other way.
18 MR. WAMPLER: They could have, yes.
19 MR. COLEY: But they knew where the problem was
20 laying and could pick up on it.
21 MR. WAMPLER: Oh, yes, there was a big box of
22 Level III problems.
23 MR. COLEY: Okay.
24 MR. SPESSARD: Were there procedures that governed
25 that review of yours in terms of when you had what I'll call

1 non-conforming conditions? It was specifically handled
2 outside of saying -- writing a weld repair or writing an
3 NCR? I mean, if you had something else, were there Pullman
4 Higgins procedures to deal with that?
5 MR. WAMPLER: I'm sure there were. I've been
6 trying to figure out exactly how that system worked, and you
7 know, it's just -- but I know that we went through the
8 system, because even if you look at mine, somebody else
9 wrote it for me.
10 MR. SPESSARD: Well, if you rejected something
11 within the system that existed at the time, did you have any
12 problem getting that fixed?
13 MR. WAMPLER: Not if I was on top of it all the
14 time. There were times that it would disappear off the face
15 of the earth and then all of a sudden, it would come back.
16 But if I was tracking or if Mike was tracking or Eddy Bolles
17 was tracking, one of us was tracking, normally, we could
18 keep up with it and find out where it went to.
19 MR. SPESSARD: But would it be a formal thing? By
20 that I mean, would it be a weld repair?
21 MR. WAMPLER: Well, it was supposed to be -- the
22 weld repair was supposed to be our formal way to track, but
23 you can see through some of these that some of the weld
24 repairs never found their way to the repair order book. I
25 was looking through the book this month and there's even

1 some in there that don't have close dates; you know, that
2 say that the repair order is still open.
3 So, I know it's -- I don't know.
4 MR. SPESSARD: Okay. Well, I want to make sure
5 that I understand. Is the concern that you have that you
6 don't know exactly how they were handled or that you have a
7 concern with the system that was put in place to handle non-
8 conforming items?
9 MR. WAMPLER: Probably both; how they were
10 handled, how they were dispositioned. If you look at these,
11 it's -- engineering only took what was on paper and then
12 maybe the system had some inequities as far as the paper
13 tracking.
14 MR. SPESSARD: But that would be documented and
15 would be available for evaluation after the fact; correct?
16 MR. WAMPLER: The problems?
17 MR. SPESSARD: Sure. In other words, if you had a
18 documented concern that, let's say, was accepted as is or
19 whatever, at least it would be documented and it would be
20 available for evaluation in terms of whether or not that
21 was, in fact, the right disposition; as opposed of it not
22 being dispositioned at all?
23 MR. WAMPLER: It's supposed to be that way, yes.
24 MR. SPESSARD: Okay. This infamous 16 -- and we
25 have a number of welds in the Kennedy letter. Are any of

1 those within the 16; do you know?

2 MR. WAMPLER: I don't think so.

3 MR. SPESSARD: Those are different, okay.

4 Any questions.

5 MR. WALTON: Yankee was rejecting 19 to 20 percent

6 of the film, and at that time they were planning to issue a

7 50, 55 report, what happened to that?

8 MR. WAMPLER: I have no idea.

9 MR. SPESSARD: Did you ever ask?

10 MR. WAMPLER: Oh, yes, but I've never gotten any

11 answers.

12 MR. SPESSARD: Any more? Let me, if I can, try to

13 tell you where I think we are in terms of trying to

14 understand what was happening at that time because we, too,

15 are just getting involved in this review and we started

16 reviewing some of the documentation that's on site, some

17 that's been made available, etc., and it appears to us that

18 if we go back to about July of 1982, is my recollection,

19 Yankee issued a DR based on results of their review of film,

20 and Pullman-Higgins' response to that included a number of

21 things, but one of the things it did include was a review of

22 that film, we'll now call a double level review, a normal

23 level two review and then a level -- and then reviewed by a

24 level three, that was their corrected action, and of course

25 that started roughly July of 1982, a year before you got

1 there, then in September, I think, of that year Yankee found
2 more problems and Pullman-Higgins then said, well, in
3 response to that they instituted a working institute review
4 by a level two, another review by a level two, and then a
5 review by a level three, so they were basically going to
6 look at it three times before Yankee looked at it.
7 Then there's a blank period in here, it looks like
8 from what we've seen from Yankee's review we go all the way
9 till, I'll call it late 1983 before they start issuing DRs
10 again, and these are things we are trying to pursue now in
11 terms of what the corrective actions were, but then you
12 started in August, late August of 1983, and started
13 rejecting film and apparently film was being held by
14 Pullman-Higgins at that time, so, we're not sure at this
15 point, and as I've said we've just started, whether or not
16 Pullman-Higgins was actually given Yankee film to read, say,
17 late 1982 into 1983 timeframe at the time you got there, we
18 just don't know that yet. Those kinds of records are just
19 hard to come by, but you had mentioned something earlier to
20 us in terms of the review that Yankee was doing of film that
21 was in the vault, and that was of interest to us. I think
22 from what we've gathered it appears that there were two
23 kinds of film in the vault. There were film in the vault
24 where a system had in fact been turned over and accepted,
25 and supposedly there was a film in the vault that was being

1 stored by Pullman-Higgins for subsequent turnover, and we're
2 not sure which film it was that Yankee was reviewing and
3 what I'll call late 1983 early 1984 timeframe because I
4 don't believe they were getting much film from Pullman-
5 Higgins in terms of whatever was backlogged, or whatever was
6 being shot in a production sense.
7 So, we're still trying to piece that together and
8 I'm wondering if I've said anything that might jog your
9 memory to help us, you know, better understand what was
10 going on at that time.
11 MR. WAMPLER: No. No, that's --
12 MR. SPESSARD: Okay.
13 MR. WAMPLER: Everything I've got was, you know,
14 was all hearsay stuff.
15 MR. SPESSARD: Was Hinse the level three just
16 prior to your arrival?
17 MR. WAMPLER: Yes, I think he was there for a
18 couple of months.
19 MR. SPESSARD: Okay. Do you know how long they
20 were -- I think there's a period of time when there was no
21 level three there before you got there, at least that's my
22 understanding, we're still trying to track that down. Do
23 you have any idea what this length of time was?
24 MR. WAMPLER: From what I had gotten it was, you
25 know, months, six months plus or something, that they had no

1 level three on site.

2 MR. SPESSARD: Okay.

3 MR. WAMPLER: And that they were sending a

4 corporate level three up every once in a while or they would

5 send procedures down to Williamsport or wherever Pullman is,

6 I guess Williamsport, wherever they're at, to have the

7 procedures written down there.

8 MR. SPESSARD: Okay. Do you recall at the time

9 whether or not any film was going to Yankee when you got

10 there, or if it was all being held?

11 MR. WAMPLER: I'm sure some of it was going,

12 I don't know how much because I know there were some

13 turnovers going through the system.

14 MR. SPESSARD: Okay. Do you guys have anything

15 else?

16 MR. WALTON: No.

17 MR. SPESSARD: Well, at this time --

18 MR. CLARK: One question, in your certification,

19 were you limited or were you across the board?

20 MR. WAMPLER: I was across the board.

21 MR. CLARK: Across the board, okay. Was any of

22 this radiography read under a magnification glass?

23 MR. WAMPLER: Sometimes we'd go with the five, but

24 not very often, most of the time it was all naked. A lot of

25 what we were seeing didn't need magnification. I've, using

1 a five on, when we're looking at 2,000ths diameter
2 perosities, but not on this, we didn't need it. A lot of
3 time, you know, there were some times that you could turn
4 your optics over and you could find out if it was really
5 there, you know, if it disappears or not. So, there were
6 all those little nifty tests that you could do to say well,
7 let's see where this goes, but mainly we read without
8 the --
9 MR. CLARK: Is the updating of the vision
10 examination, that is the Jaggers, annually, semi-annually,
11 for interpreters?
12 MR. WAMPLER: I think where we're using the
13 standard ASNTTC1A, which says only every year did you have
14 to go. Navy Nuc says once you hit 35 its every six months,
15 I think. So we're still using annuals, we're using J2s.
16 MR. CLARK: That's it.
17 MR. SPESSARD: At this time what I would propose,
18 if it's acceptable to you, is we look at some of the film of
19 some of the wells that are questionable. We can look at
20 none of them, we can look at a few, we can look at all,
21 whatever is your pleasure, and I want to make it clear, it's
22 not for me to line up four level threes against one level
23 three over here, that's not the intent whatsoever. The
24 intent is to allow you to look at them so we can discuss the
25 defects, make sure we have an understanding, and see if

1 there's anything in there you see that's new and interesting
2 that might be of concern to you, but the choice is yours.
3 MR. WAMPLER: These are all accepted packages, or
4 is this that package there, the ones that per the welds, is
5 that what they are, or --
6 MR. CROWLEY: These are all accepted packages, or
7 is this that package there, the ones for the Kennedy welds,
8 is that what they are, or --
9 MR. WAMPLER: Welds, everything is there.
10 MR. CROWLEY: So, they're all accepted packages?
11 MR. WAMPLER: Right.
12 MR. SPESSARD: Yes.
13 MR. WAMPLER: I don't mind. We're not going to
14 get into any contest here.
15 MR. SPESSARD: Be it one, two, three, four, five
16 level threes in the same corner and you always have a
17 problem.
18 MR. WAMPLER: There's no intent to do that.
19 MR. COLEY: I don't believe when you look at these
20 welds you'd have a contest, they're pretty clean.
21 MR. SNIEZEK: Let me be very open and say I think
22 what's important from the team standpoint, you may never
23 have seen these before, these may not be the ones that you
24 looked at, and what I'm interested in to make sure that --
25 if you have some concerns that the team follows up on those

1 concerns, that's what it's about, and nothing more, nothing
2 less than that.
3 MR. WAMPLER: Okay.
4 MR. SNIEZEK: I think for the purposes of that I
5 think we can be off the record if that's agreeable with you,
6 it would be very difficult for, I think when you're done
7 looking at whatever film you look at, if there's any
8 questions or comments, at that time we can go back on the
9 record for that, if that's agreeable.
10 MR. SPESSARD: In fact, what I was going to say,
11 Jim, we'll just have Jim Coley and Mr. Wampler sit there.
12 MR. PAINE: Off the record.
13 [Discussion off the record.]
14 MR. PAINE: I understand inaccessible to mean
15 physically inaccessible to RT because of additional passage
16 of time and additional construction. We've also talked to
17 former employees of Seabrook who indicate that inaccessible
18 means the company did not want to re-erect scaffolding to
19 reach a particular weld in a difficult location. So, some
20 other means of certifying that weld would be sought at that
21 point.
22 It means physically inaccessible and inaccessible
23 by means of -- by reason of cost or expenditure of effort.
24 I think you have to look at both cases.
25 MR. WALTON: Okay. One of the things we have

1 done; Section 11, which is In-Service Inspection Code, talks
2 about that you have to come in and request exemptions if you
3 cannot get access to that weld. We're not talking Class 3
4 that's buried, because that doesn't require radiography.
5 We're talking about Class 1, Class 2 welds that
6 generally are accessible. Sometimes they're not. I thought
7 you started to allude to that one time. We checked on that
8 one. It is and was re-radiographed. It was re-radiographed
9 after Joe left. We looked at the Section 11 exemptions to
10 see if there were any welds there that they cannot inspect
11 for the next 40 years, and there are some welds that they
12 can't inspect because of drain, the dissimilar welds, but
13 that's a limitation of ultrasonics. That's not anything to
14 do with radiography.
15 There are some of the welds that they don't have
16 access to both sides of the welds and you need to do the
17 scanning. Again, that doesn't prevent you from
18 radiographing, and each one of those exemption requests;
19 they make the statement that these welds were a hundred
20 percent radiographed. We're going to check those things
21 out, but we're struggling to come up with where we go.
22 You know, there's a law that says 5055-A. If you
23 can't meet the code, you have to come in and request the
24 exemption. There's no is no exemption request.
25 MR. MYERS: That was the question, I think, that

1 we have asked. I mean, it's sort of both with regard to the
2 polyvinyl welds where I think there are 193 there that were
3 accepted on some other basis and the question then came up;
4 how many of these other welds that were reviewed by Yankee
5 Atomic and Yankee Atomic said either go do an RT or fix it
6 or whatever; how many of those welds were in a situation
7 such that it became not feasible to do this? I think that
8 is at least our bottom line question.
9 MR. WALTON: We'll find that out.
10 MR. MYERS: We are not disputing that if there is
11 a final radiograph and some kind of assurance that those
12 radiographs are really of the welds that they purport to be
13 of, not questioned from -- from any questions that we ever
14 asked. We do not question the acceptability of those welds.
15 It's these other welds that may have been inaccessible that
16 are sort of the focus of what we've been asking about.
17 MR. WALTON: Okay, well, the film, you know, what
18 think that Joe's point -- at Pullman Higgins, he saw some
19 problems. He didn't see the followup. The followup, at
20 least on the ones we've looked at -- and we've only just
21 begun, because we've only looked at the radiographs for some
22 two welds -- but we thought we had the opportunity -- we
23 should at least show Joe that here's what happened after you
24 left. It might give him some reassurance that things didn't
25 stop there.

1 Even though there was problems, it didn't stop
2 there. We don't know if they're solved either.
3 MR. MYERS: I don't think that anybody questions
4 that. Certainly a lot of work went on and certainly, I'm
5 sure it wasn't that people intentionally left welds there
6 that were questionable. If they could get to them and deal
7 with them, nobody would question that they would do this.
8 The question has to do with those that were for
9 some reason becoming inaccessible or not repairable or
10 something.
11 MR. SNIEZEK: Dr. Myers, I think we understand
12 that point. You've made that point before. There's only
13 one purpose for the interview with Mr. Wampler, and that's
14 to understand his concerns as an expert in this area; to
15 follow up with him on some issues to make sure the team
16 thoroughly understands.
17 We understand the inaccessibility question; we do.
18 That's why we thought we could have one of our experts
19 discuss with Mr. Wampler to see if it was the same film he
20 had seen -- may or may not. I don't even know if he would
21 recognize it after all that years, but to see if he could
22 pick up some flaws possibly that maybe our people did not
23 see.
24 MR. MYERS: Do you mean flaws in the -- in which?
25 MR. PAINE: Do you mean accepted RT?

1 MR. SNIEZEK: Yes, in accepted RT, and so that our
2 team could discuss with Mr. Wampler, the basis approach that
3 they're taking. We do understand the issue that you do
4 raise. I mean, that's something we are following up on.
5 MR. WALTON: I think what we are saying is that we
6 want to make sure we're on the right track. We're trying to
7 pursue the right avenues, and we think we know how to do
8 that, but here's the person.
9 MR. MYERS: Just so you know that any questions
10 that come from us are not in the context of these finally
11 accepted welds, whatever -- just so you know that.
12 MR. WAMPLER: What date did you say that Pullman
13 said they were going to do Level II's and then a Level III?
14 MR. SPESSARD: It's Response to DR, issued around
15 September of '82.
16 MR. WAMPLER: They weren't doing that.
17 MR. SPESSARD: Well, that's good. You see, it's
18 hard to figure out what happened when, in reality, without
19 sitting down and reviewing every weld package in the plant,
20 date by date by date. But when you look at the DRs and the
21 corrective actions that were to be taken -- as I mentioned,
22 the first one was the Level III review and then they
23 interjected another Level II.
24 Dr. Myers, you'll be getting that because you had
25 asked for all of the DRs, I believe, in the '82-'83

1 timeframe. We had already, as part of our plan -- was to
2 look at DRs, NCRs and so forth.
3 So, that was one of the first things that we
4 started a review on in terms of trying to understand what
5 happened. So, that's there and it's coming to you. I don't
6 know if you've gotten it yet, but it's there.
7 So, what's interesting is that if you implement
8 corrective actions in late '82, obviously you wouldn't have
9 implemented that on film shot in '81 up through mid '82.
10 So, as stuff was being held, they may not have applied those
11 actions to the stuff you looked at, but not knowing what was
12 held when, it's just, you know, hard to piece that together.
13 MR. PAINE: Are you saying it's possible that PH
14 just simply ignored and gave up on this backlog and re-shot
15 everything?
16 MR. SPESSARD: Oh, no, I'm not saying that. What
17 I am saying is, as I understand the process and have been
18 putting together the process, film could have been, you
19 know, re-shot at any time. It could have been re-shot after
20 the first review or the second or the second Level II or
21 they all three could have sat down together and looked at it
22 and said, there's a question here and we're going to go back
23 and re-shoot.
24 It could happen at any time. It could have
25 happened from his review. It could have happened from

1 Yankee's review, to a film that he could have reviewed. It
2 could have happened from Yankee's review of film that was,
3 you know, in the vault, that may have never been looked at
4 by anybody but a Level II Pullman person, you see.
5 You really can't tell without going back and
6 reconstructing every single weld package to know what
7 happened when. But as we understand the process, as systems
8 were accepted, there was the re-review of that film and
9 acceptance by the Yankee review team, okay?
10 MR. PAINE: Let me ask you this: is it standard
11 for documentation to be in a state where when a team such as
12 yourself comes in to examine it, you have to reconstruct the
13 weld packages? Are you finding that the documentation that
14 you're encountering is in a state that's typical of nuclear
15 power plants?
16 Is this the standard that licensees are held to,
17 or are they held to some higher standard?
18 MR. SNIEZEK: I think that's the wrong phrasing of
19 the question, to be quite frank. I think it depends upon
20 how you look at things. Do you file it by weld number? Do
21 you file it by NRC number? Do you file it by repair order?
22 It depends upon how you file it, and I'd like one of our
23 technical experts to address that issue, and how the normal
24 climate is. I think Mr. Wampler also knows the answer to
25 that question, the normal process for filing the records.

1 MR. WALTON: I've only looked at a couple of
2 packages and the Pullman Higgins method is different. That
3 doesn't mean it's wrong or right; it's different. It's
4 something that you have to understand the system to know how
5 to put it together.
6 As an example, if they have an unacceptable
7 condition, they write an NRC and they also write a process
8 sheet that goes with that. You might have another process
9 sheet over here that says exactly the same thing. You might
10 have a third NCR that generates another process sheet.
11 So, all these things for a new person to Pullman
12 Higgins is different, and I've struggled putting that
13 together, yes. I'm not saying it's wrong. I'm saying it's
14 different.
15 MR. PAINE: So you are still evaluating that
16 question of whether this, in fact, meets an Appendix B
17 standard.
18 MR. WALTON: Oh yes, definitely; we're still
19 looking at it. We have not reached any conclusions at all.
20 MR. COLEY: Another thing on the radiographs, two
21 thirds of the plants in the Southeast, when they were
22 constructed, only kept the final radiographs. Some had the
23 techniques that Seabrook did and kept everything or tried to
24 keep everything. Those are the good plants. Those are the
25 plants you can reconstruct things in.

1 MR. PAINE: What's the ASME standard?

2 MR. COLEY: ASME doesn't -- the final weld is all

3 you've got to have.

4 MR. MYERS: We have asked about that very question

5 and where it says in ASME that an NB 4312 -- it says that

6 documentation and repair welds of base material and it says

7 the certificate owner makes a repair report which shall

8 include a chart which shall show the size of the repair

9 cavity, welding material, identification and welding

10 procedure, heat treatment and examination results of repair

11 weld.

12 That's for those welds that are less than 3/8ths

13 inch and whatever. Then it says in Table 4134-17 about

14 lifetime quality assurance records and under Item 16 there

15 is repair records when required by code.

16 Now, do you then interpret that all to mean just

17 the final radiographs?

18 MR. COLEY: Acceptance of the weld that

19 encompasses all previous repairs. You should have

20 documentation that shows, you know, the welds, but the film

21 is going to show you that it's the third repair, second

22 repair, what have you, R-2.

23 It's a practice --

24 MR. PAINE: I'm sorry to stop you there, but if

25 the whole thing is ground out and done again, why would it

1 show you necessarily that it was the third repair?

2 MR. COLEY: The film, as they shoot it, -- as the

3 guy goes down and shoots it three times, he will continue on

4 showing that it's the third repair. It's the third time

5 he's been down there.

6 MR. PAINE: But it may not be the same guy and it

7 may be a period of over three or four years as we're

8 experiencing with these welds. I'm not sure that what

9 you're saying is correct. One radiographer, one time, is

10 not going to know it was done two years before. For that,

11 you need the process sheets or the --

12 MR. COLEY: What I am saying is, if you want to

13 have a ASME code weld, then you need acceptable radiographs

14 for that weld.

15 MR. PAINE: Do you need anything else?

16 MR. COLEY: Acceptable radiographs.

17 MR. PAINE: No records as to repair orders, weld

18 repair, heat treatment of the pipe?

19 MR. WALTON: He's talking about radiographs.

20 MR. MYERS: If this weld, say, is repaired 12

21 times over a two year period, and then in the end, somebody

22 goes and does a complete set of radiographs of that weld and

23 it all looks fine, does that final set of radiographs cover

24 the requirements of a radiographic record of the weld?

25 MR. COLEY: For archives, yes.

1 MR. MYERS: For the weld package, yes. So, when
2 you go to the weld package, you do not need to see in that
3 weld package, radiographs of the 11 --
4 MR. COLEY: You need the documentation to show it,
5 but you need -- you're trying to sell a weld and what you
6 need is that final acceptable radiograph.
7 MR. MYERS: When you have the final acceptable
8 radiograph and none of the radiographs taken of the repairs
9 are there -- you just have the final?
10 MR. COLEY: They're thrown away.
11 MR. MYERS: But do you need to have the
12 radiographic inspection report there in the package? Does
13 there need to be -- say the film is not there, but do you
14 need a radiographic inspection report in that package?
15 MR. PAINE: For the intermediate shots, for all
16 the intermediate shots that were thrown away?
17 MR. COLEY: All you need is the radiographic for
18 the shot that you've got that you're certifying the weld.
19 MR. MYERS: The final radiographic does the trick.
20 MR. COLEY: A lot of people reprocess this film to
21 get the silver off it, you know.
22 MR. MYERS: Some people apparently think that you
23 do need all these radiographs, but it's the NRC position
24 that you just need the final radiographs?
25 MR. SNIEZEK: Let me caution that we aren't taking

1 an NRC position here. You're taking a position of a team of
2 technical experts. If you want the NRC position, we'll give
3 you the NRC position.
4 MR. MYERS: It's the team's position that where it
5 says the report shall include a chart which shows the
6 location, size or repair cavity, the welding material
7 identification, the welding procedure, the heat treatment
8 and the examination results of repair welds --
9 MR. COLEY: We expect to see that.
10 MR. MYERS: But the examination report, is that
11 examination results of repair weld; does that include the
12 radiographic inspection report or what do you -- what
13 constitutes the result -- the examination result of a repair
14 weld? I mean, what document?
15 MR. COLEY: The final weld.
16 MR. WALTON: Let me try again. If you go back
17 into the front of ASME, it talks about having a program and
18 it says you have some kind of a sequence so that you can
19 keep track of the event. For example, if the weld repair
20 is in base material, you have to chart the cavity. You have
21 to know what is the depth and everything about that.
22 You have to know the welding procedure used and
23 you have to know that the procedure was qualified and you
24 have to know the kind of material, you have to know the
25 welder and all that's got to be documented in some form.

1 MR. MYERS: For each repair?

2 MR. WALTON: That's reconstructable, unless you do

3 repairs together.

4 MR. MYERS: If they have, say, 12 repairs over 12

5 months and you do one a month?

6 MR. WALTON: If you do one a month, yes.

7 MR. MYERS: So then you'd have one of these

8 process sheets and one of these weld repair orders and then

9 it says the examination result of the repair weld. What

10 kind of document is that?

11 MR. WALTON: The process sheet would say liquid

12 penetrant to cavity, for example. Liquid penetrant to final

13 weld, radiographed the weld if it's more than 3/8ths or ten

14 percent, and all that would be signed off on the process

15 sheet.

16 MR. MYERS: One of these?

17 MR. WALTON: That's correct.

18 MR. MYERS: So then this constitutes then the

19 examination result of a repair weld; the fact that someone

20 has signed this or something?

21 MR. SNIEZEK: Dr. Myers, for the court reporter

22 would you tell him what you just held up and referred to,

23 please?

24 MR. MYERS: This is a field weld process sheet.

25 MR. SNIEZEK: Thank you.

1 MR. WALTON: There may be other documentation that
2 goes with that. I have not gotten involved enough yet to
3 know that. A lot of people will write a liquid penetrant
4 report that will also sign the liquid penetrant along with
5 the process sheet.
6 MR. CLARK: This is part of your quality control
7 procedures within the company, which they follow. Whatever
8 those specify, whatever they write out in compliance with
9 the code requirements, they may require that documentation
10 be maintained. Of course, the films must be maintained for
11 30 years and usually that's just the final acceptance.
12 MR. WALTON: Let me finish. Then they'll do the
13 radiograph. They'll make up a reader sheet and the reader
14 sheets will talk about each station, whether it's acceptable
15 or not, and that's the kind of remarks they'll put on the
16 reader sheets.
17 MR. MYERS: But do those reader sheets for those
18 intermediate repairs have to be maintained?
19 MR. WALTON: No, they do not.
20 MR. MYERS: The readers sheets do not?
21 MR. WALTON: Nor does the film.
22 MR. MYERS: Okay.
23 MR. WALTON: If it's documented on the process
24 sheet, --
25 MR. MYERS: If a person has signed off here where

1 it says RT on here -- a person signs off on there and that
2 means that you have one of these for each repair and then
3 you come to the end and you have the film and the reader
4 sheet for the end radiographs, then that is all that's
5 required?
6 MR. WALTON: I believe they're also suppose to
7 have a cavity chart, I think that's the procedure, that's
8 the document right there. Now, if you look and they don't
9 have a cavity chart, he brought that up, and in some cases
10 they don't, then we look at it and say what does mean in
11 regard to the quality of that weld. Does it mean it wasn't
12 repaired, and as I mentioned earlier, you can see a repair
13 that's done to a weld, generally, now that's not, you know,
14 I can't every time, but generally you'll see that repair.
15 We're doing an after-the-fact inspection. So, because there
16 may not be a process that charted that cavity, we can look
17 at the film, and we have documentation that film says we
18 know that station was re-x-rayed and it's now okay, we'll
19 address that, but we're not going to say it's a terrible
20 sin, we're going to say that was something that was missed,
21 but it's not going to be necessarily a terrible sin. Okay,
22 that's what we're trying to do now.
23 MR. MYERS: So, the absence of these radiographic
24 inspection reports and the film is not something that is --
25 MR. WALTON: No, if you have a radiographic film

1 of a 100 percent of the weld, if it requires a 100 percent,
2 and you can put this thing together so your station, you
3 know, match up, it's done after the last repair if it's more
4 than three-eighths or ten percent, you've got an acceptable
5 radiograph of that weld.
6 MR. PAINE: As long as you've got a process sheet
7 that goes with it.
8 MR. WALTON: As long as you have documentation
9 that shows if you've made any repairs on it, and that's the
10 sequence I was talking about earlier. Now, again, I'm going
11 to caution you, it's because it's not always there may not
12 be a basis for us to reject it, after the fact. Now, if we
13 were there when it happened we'd say that's a violation of
14 your procedure, but we're going to look at it now and say
15 what does this mean, you know, if we find that excessive
16 repairs, and Joe brought that up, and then that can mean
17 something different, that could mean that you have
18 sensitized the material and until we look at it we really
19 won't know.
20 MR. PAINE: That's very helpful, thank you for
21 explaining that.
22 MR. SNIEZEK: Well, do we -- have we decided that
23 we want to look at one or two welds? Do you think that
24 would be useful?
25 MR. WALTON: Yes, I think so, and I think it would

1 be wise for us to let them, but I agree, it wouldn't be
2 fair.
3 MR. SNIEZEK: All right, why don't we go off the
4 record while they do that.
5 [Discussion off the record.]
6 MR. SPESSARD: It's eight minutes until four,
7 roughly, and I guess we did look at a couple of radiographs,
8 and so we'll go back on the record now and let me ask you,
9 Mr. Wampler, if you have, you know, any additional
10 information you'd like to provide us that would be useful in
11 our follow-up inspection, as I said at the beginning we
12 certainly want to get any insights that you have, so, I'll
13 give you an additional opportunity.
14 MR. WAMPLER: No, I think I've said it all, a
15 couple of times.
16 MR. SPESSARD: All right. Does the team have any
17 questions at this point?
18 MR. WALTON: Did you find a reference to that
19 process sheet that had your ratios in it?
20 MR. WAMPLER: Oh, god, I forgot to look.
21 MR. WALTON: We need that.
22 MR. SNIEZEK: I think if it's agreeable when we
23 conclude the interview, if it's okay, Mr. Wampler can look
24 then while I get the secretary down here so she can arrange
25 for the travel reimbursement and that, if that's okay.

1 MR. WALTON: That's all I have.

2 MR. SPESSARD: Okay, well, let me say on behalf of
3 the team, and of course the NRC, we certainly do appreciate
4 you coming in and talking to us, and I guess we have no
5 further questions at this time. We will be looking, you
6 know, at your log, to use that as we best can to see if
7 there's some things in there that would help guide us on
8 this effort. So, I guess that's all I have and I'll turn it
9 over to you, Jim.

10 MR. SNIEZEK: Right, well, I want to again from
11 the senior management agency express our appreciation.
12 Again, I want to acknowledge what you said earlier on, that
13 you didn't appreciate the way your wife was treated earlier
14 on in our interactions and assure you that the agency does
15 apologize for any distress that may have caused you. We
16 assure you it was surely unintentional and I want to thank
17 you again for a copy of the log, for your willingness to
18 come in and discuss Seabrook at our request. We thoroughly
19 recognize it was not your initiative, and we did compel you
20 to come in to talk to us, and once we get a transcript of
21 the interview we will promptly send you a copy of the
22 transcript and when the team completes its inspection at
23 Seabrook you will get a full copy of the report with all the
24 documentation that goes with it so you can see yourself, the
25 final disposition from the NRC standpoint.

1 If you have nothing else I am prepared to conclude
2 the interview of Mr. Wampler by the team.
3 MR. MYERS: One question, did anything come of
4 looking at the -- I mean, did you conclude anything from
5 looking at the radiographs.
6 MR. WAMPLER: The same lines, not really, we just
7 showed that there were, you know, what the sensitivities
8 were and, you know, image quality indicators and where the
9 weld bonders were. You know, you still didn't see the
10 repairs but I think that's one you may want to check RC-10
11 for base metal and all that. You'll have, you can get to
12 the real package.
13 MR. COLEY: Well, you know, my review is like your
14 review at the site, you're given a sheet of paper and a
15 film, you know, and you are reading the big weld, whether
16 they had to do a base metal repair and they had a shot on
17 that, that was in the past, now I'm looking at the weld
18 they're presenting, you know, for acceptance based on it
19 now. I don't know if they had a base metal repair without
20 going through the packages that someone else is doing, if
21 they had problems and we coordinate this stuff, we're, you
22 know, we're all working in different areas to work towards a
23 common goal, but we ain't got there yet, you know, so
24 hopefully we'll get there in the next couple of weeks, but
25 we're going to give it our best effort, but, you know, I

1 don't know. I can't speak to that right now because I don't
2 see that.
3 MR. WAMPLER: Okay.
4 MR. SNIEZEK: I think the information did provide
5 the team -- it will be very beneficial and help us arrive at
6 a appropriate conclusion to this matter, and we sincerely
7 appreciate it. With that we'll terminate our interview with
8 Mr. Wampler with our appreciation for your cooperation with
9 us. Thank you very much.
10 MR. WAMPLER: Thank you.
11 [Whereupon, at 3:58 p.m., the interview
12 adjourned.]
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REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Investigative Interview of Joseph Wampler

DOCKET NUMBER:

PLACE OF PROCEEDING: Rockville, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Jon Hundley III

JON HUNDLEY
Official Reporter
Ann Riley & Associates, Ltd.

APPENDIX 5

DETAILED REVIEW OF RADIOGRAPHIC FILM

I. REVIEW OF RADIOGRAPHIC FILM FOR THE 15 WELDS LISTED IN SENATOR KENNEDY'S LETTER OF MARCH 12, 1990

The team evaluated radiographs of the 15 welds listed in Senator Kennedy's letter to ensure that they conformed to the applicable codes. It also examined radiographs and other quality records for the welds to ensure that the welds had been inspected, evaluated, repaired where necessary, reinspected, reevaluated, and properly documented. This examination included the assessment of such factors as proper film density, adequate sensitivity, proper penetrameter selection and placement, satisfactory radiographic technique (panoramic versus single or double wall), and acceptable geometrical unsharpness (Ug). The assessment also included the adequacy and availability of the involved quality data (radiographic inspection reports (RIRs), nonconformance reports (NCRs), deficiency reports (DRs), etc.) for the weld under review.

The team also examined data to determine if the specific history for the weld was typical and reasonable. These data included: date original film was exposed, date the film was reviewed, certification level of examiner involved, disposition of the examiner's evaluation, the Weld Repair Log dates for the repairs, Pullman-Higgins (P-H) Level III examination date, and date of Yankee Atomic Electric Company (YAEC) overview examination. The team also determined if aging had damaged the film.

Specific details regarding licensee actions associated with the review of radiographs, as well as acceptability of the weld involved, are reported in Tables 1 and 2. The RIRs that P-H used to record other specific details associated with weld acceptance criteria, radiographic technique parameters, and disposition of the different reviewers are listed in Appendix 12 to this report. The data in the tables demonstrated that the Level II radiograph reviews and repair welding were done in a timely manner; the Level III reviews, however, were not always timely. The tabulated items and their relevance to the team's evaluation are discussed below.

Code requirements for penetrameter selection for welds are based on nominal single-wall thickness plus both the maximum outside-diameter and inside-diameter reinforcement permitted by the referenced code section. However, the licensee's approach to penetrameter selection was even more conservative than that specified by code; that is, the licensee used the nominal pipe wall thickness plus a shim thickness which only represented the outside-diameter weld reinforcement. The team reviewed the weld thicknesses (including reinforcement) in relation to penetrameter selection and code-acceptable sensitivity for the final finished weld radiographs. The team also noted that reactor coolant (RC) loop piping was manufactured and purchased on the basis of the pipe's inside diameter rather than on the nominal or outside diameter specified for

most pressure piping. This distinction with respect to RC piping required that the pipe wall thickness be added to obtain the outside diameter when radiographic techniques were considered. This potential for misunderstanding by the radiographer was the most probable basis for the unsatisfactory Ug that was identified for some radiographs reviewed by the team. Occurrences of unsatisfactory Ug during the weld's history are also included in the tables. The findings from the team's review of radiographic technique (whether single or double-wall and whether a satisfactory technique was evident) are also reported for each weld.

The team evaluated all weld discontinuities for all film available for the weld of concern. However, the team was selective regarding radiographs that it evaluated for verification of code acceptability. Because of the relative importance of the final finished weld's acceptability as opposed to intermediate inspections, the team examined all aspects of code acceptability for only final finished weld radiographs. The team's examination of code acceptability for all intermediate radiographs (e.g., multiple-repair weld reshots, informational radiographs, etc.) was limited to weld discontinuities. Except for weld discontinuities, the team's review of intermediate film was aimed at assessing the weld's history, obtaining weld signatures, and verifying proper licensee programmatic controls. Therefore, the team did not reverify the accuracy of technique density or Ug for intermediate film because the licensee's dispositions were noted on the RIRs for this film. The "satisfactory" ratings in the tables for those cases were tabulated to verify the programmatic controls involved. However, the "satisfactory" listings of the NRC review constituted a report of the team's final assessment of proper programmatic control and code acceptability for the final welds listed.

The team reviewed weld signatures to determine if the radiographic film weld identification numbers actually represented the weld radiographed in order to ensure that all welds and weld-repaired areas had been radiographed. The team considered the following types of signatures when reviewing the film:

- The team reviewed film representing repaired areas to ensure that the film overlapped adjacent stations and that the overlap matched the adjacent areas in station location, weld thickness, weld type, material type, and amount of weld reinforcement.

- Where typical acceptable indications were present on the film being reviewed, the team attempted to verify that the indications were present on any previous or subsequent radiographs made of the weld to verify that the reshots represented the welds that were to be radiographed.

- When signature comparisons were questionable, the team made transparencies (onion skins) from the film and noted on the transparency such items as station location, surface conditions (reinforcement), weld type and width, and any apparent defects that might exist on the weld surface. The team then laid the transparency directly on the weld and compared the film variables to the weld variables to verify the film represented the proper weld.

- For each radiograph reviewed, the team verified that the weld identification number was apparent on the film.

- The team relied on its extensive experience in radiographic film interpretation in assessing whether the radiographic process was conducted in a professional manner and represented a conscientious quality weld inspection in order to make a final determination on whether the examinations were adequate and whether falsifications had occurred.

Additionally, the team selected many of the welds reviewed on a random basis from drawings. This selection process was used to verify a radiograph existed for each weld selected. It also provided another data point to ensure that all welds had been radiographed.

Although the methods discussed above do not prove conclusively that all welds were radiographed, the team concluded that the methods used provide reasonable assurance that radiographs were not falsified for the pipe welds that had to be radiographed and welds were identified correctly.

The team determined that the quality of the welds was good. Continued maintenance of high quality was promoted by conservative radiographic examination and acceptance. The team's review of the 15 welds listed in Senator Kennedy's letter established that they met all applicable code requirements and were indicative of the uniform application of the licensee's overall quality assurance (QA) program.

Table 1 Welds Listed in Senator Kennedy's Letter - Weld History

Weld Number	Date Film 1st Exposed	Date Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-RC-3-01-F0102 27.5" Diameter 2.6" Thk ASME - CLASS 1 Stainless Steel	10-11-83	10-11-83	III J.W.	ACC	None Required	11-1-83 J.W.	11-4-83 R.C.J.
1-RC-9-01-F0102 27.5" Diameter 2.76" Thk ASME - CLASS 1 Stainless Steel	12-8-83	12-9-83	II M.D.	Rej. STA 5-6 for Porosity with Tails	*STARTED 12-9-83 COMPLETED 2-2-84	12-9-83 J.W. O.D. Indication Visually Verified	6-15-84 J.C.R
1-RC-9-01-F0102-R-1 RESHOT STA 5-6	1-5-84	1-5-84	II M.D.	ACC	None Required	1-30-84 J.S.	6-13-84 J.C.R.
1-RC-10-01-F0101 29" Diameter 2.88" Thk ASME - CLASS 1 Stainless Steel	11-7-83	11-8-83	II M.D.	ACC **J.W. verified surface visual indication on 2-21-84.	None Required	11-8-83 J.W.**	11-22-83 R.C.J.
1-RC-10-01-F0102 31" Diameter 3.65" Thk ASME - CLASS 1 Stainless Steel	1-27-84	1-31-84	II M.D.	Rej. STA 5-6 Incomplete Fusion	*STARTED 2-2-84 COMPLETED 5-18-84	2-21-84 J.S.	3-16-84 R.C.J.
1-RC-10-01-F0102-R-1 RESHOT STA. 5-6	2-22-84	2-22-84	II M.D.	ACC	None Required	2-25-84 J.S.	3-16-84 R.C.J.
1-RC-10-01-F0102-R-1 RESHOT 100% (per DR 603)	3-16-84	5-23-84	II M.D.	ACC	None Required	5-31-84	6-14-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 1 - (continued)

Weld Number	Date Film 1st Exposed	Date Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-RC-49-01-F0101 14" Diameter 1.531" Thk ASME - CLASS 1 Stainless Steel	5-25-82	5-25-82	III M.M.	ACC	None Required	12-27-83 J.W.	2-14-84 R.C.J.
1-RC-49-01-F0102 14" Diameter 1.526" Thk ASME - CLASS 1 Stainless Steel	10-25-82	10-26-82	II R.B.	ACC Pending Re-RT of Film STA 3-0 due to film artifacts	None Required	11-17-83 J.W.	No Signature
1-RC-49-01-F0102 RESHOT STA 3-0	1-26-83	1-26-83	II R.B.	ACC	None Required	11-17-83 J.W.	No Signature
1-RC-49-01-F0102 RESHOT 100% Previous film discarded	3-5-84	3-21-84	II M.D.	ACC	None Required	10-26-84 S.V.	11-15-84 J.C.R.
1-RC-49-01-F0103 14" Diameter 1.526" Thk ASME - CLASS 1 Stainless Steel (NCR 3726 issued)	12-30-83	12-30-83	II M.D.	Rej. STA 1-2 for Lack of Fusion Reshoot STA 0-1, 2-3 & 3-0	*Started 2-22-84 Completed 2-27-84	7-24-84 S.V.	8-23-84 J.C.R.
1-RC-49-01-F0103-R-1 RESHOT STA 0-1, 1-2, 2-3 & 3-0 (NCR-5781R1)	2-27-84	2-27-84	II M.D.	ACC Pending Reshot of 1-2 for Density 4-12-84	None Required	7-24-84 S.V.	8-23-84 J.C.R.
1-RC-49-01-F0103-R-1 RESHOT STA 1-2	4-12-84	7-25-84	II M.D.	ACC Pending reshot to correct Penetrameter Placement & Density	None Required	7-24-84 S.V.	No Signature

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 1 - (continued)

Weld Number	Date Film 1st Exposed	Date Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-RC-49-01-F0103-R-1 RESHOT STA 1-2	8-16-84	8-17-84	II M.D.	ACC	None Required	8-21-84 S.V.	8-23-84 J.C.R.
2-CBS-02-1214-F015 6" Diameter 0.340" Thk ASME - CLASS 2 Stainless Steel	8-17-83	8-17-83	II R.B.	Rej. STA 0-1, 1-2 & 3-0 Incomplete Insert Melt	*Started 8-17-83 Completed 11-07-83	11-1-83 J.W.	3-17-86 J.C.R.
2-CBS-02-1214-F015 RESHOT STA 0-1, 1-2 & 3-0	11-16-83	11-17-83	II M.D.	ACC	None Required	11-20-83 J.W. 2-27-85	3-17-86 J.C.R.
1-MS-4016-02-F0204 24" Diameter 0.450" Thk ANSI B31.1 Carbon Steel	9-16-82	9-16-82	III M.M	ACC	None Required	8-22-84 S.V.	8-28-84 J.C.R.
1-MS-4012-02-F0201 24" Diameter 0.465" Thk ANSI B31.1 Carbon Steel	6-22-82	6-23-82	III M.M	ACC Pending 100% Reshot sensitivity UNACC	None Required	No Signature	No Signature
1-MS-4012-02-F0201 RESHOT 100%	11-21-84	11-21-84	II L.L	ACC	None Required	2-1-85 S.V.	2-4-85 J.C.R.
1-MS-4009-01-F0109 30" Diameter 1.276" Thk ANSI B31.1 Carbon Steel	7-28-82	7-28-82	III M.M	Rej. STA 2-3 Incomplete Fusion, Reshoot STA 0-1, 4-5 Density UNACC	Started 7-28-82 Completed 8-2-82 (Per WRO-1089)	3-22-85 J.S.	3-22-85 R.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 1 - (continued)

Weld Number	Date Film 1st Exposed	Date Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-MS-4009-01-F0109-R-1 RESHOT STA 0-1 & 3-4 YAEC NCR 82-333A Dated 10-10-84	8-9-82	8-11-82	III M.M	ACC Pending Reshot of STA 1-2, 3-4, 5-6 & 6-0	None Required	3-22-85 J.S.	3-22-85 J.C.R.
1-MS-4009-01-F0109-R-1 RESHOT STA 1-2, 5-6 & 6-0	3-11-85	3-21-85	II R.S.	ACC 1-2, 5-6 & 6-0 (3-4 missing)	Start 1-2-85 Completed 3-25-85 (Repaired on YAEC Work Request MS-306)	3-22-85 J.S.	3-22-85 J.C.R.
1-MS-4009-01-F0109-R-2 RESHOT STA 0-1, 2-3 & 3-4 NCR-82-333A	3-21-85	3-21-85	II D.P.	ACC	None Required	NONE	3-21-85 J.C.R.
1-MS-4005-22-F2204 4" Diameter 0.427" Thk ANSI B31.1 Carbon Steel	6-16-82	6-16-82	III M.M.	ACC	None Required	8-31-84 S.V.	9-6-84 J.C.R.
1-MS-4005-20-F2003 4" Diameter 0.450" Thk ANSI B31.1 Carbon Steel	8-9-82	8-9-82	III M.M.	Rej. STA 0-1 Incomplete Insert Melt	*Started 8-10-82 Completed 8-18-82	NONE	3-4-85 J.C.R.
1-MS-4005-20-F2003-R-1 RESHOT STA 0-1 & 1-2	9-23-82	9-28-82	III M.M.	ACC	None Required	NONE	NONE

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 1 - (continued)

Weld Number	Date Film 1st Exposed	Date Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-MS-4005-20-F2003-R-1 RESHOT 100% for UG	3-2-85	3-4-85	II L.L.	ACC	None Required	3-4-85 J.S.	3-4-85 J.C.R.
1-MS-4013-02-F0201 24" Diameter 0.465" Thk ANSI B31.1 Carbon Steel	8-2-82	8-2-82	III M.M.	Rej. STA 1-2, 2-3, 3-4 & 4-5 Porosity & Incomplete Fusion	*Started 8-3-82 Completed 8-18-82	NONE	NONE
1-MS-4013-02-F0201-R-1 RESHOT STA 1-2, 2-3 & 3-4	9-24-82	9-28-82	III M.M.	ACC	None Required	NONE	3-22-85 B.J.M.
1-MS-4013-02-F0201-R-1 RESHOT STA 3-4 & 4-5 NCR-82-4638	3-21-85	3-21-85	II D.P.	ACC	None Required	NONE	3-22-85 B.J.M.
2-CBS-02-1214-F011 6" Diameter 0.340" Thk ANSI B31.1 Stainless Steel	8-17-83	8-17-83	II R.B.	Rej. STA 1-2	*Started 8-19-83 Completed 12-16-83	11-1-83 J.W.	3-18-86 J.C.R.
2-CBS-02-1214-F011 RESHOT STA 1-2 & 2-3	12-14-83	12-14-83	II M.D.	ACC	None Required	12-16-83 J.W.	3-18-86 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 2 Welds Listed in Senator Kennedy's Letter - Film Quality

Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharp-ness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size, Number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-RC-3-01-F0102 NRC review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T Reqd 2-1T Achvd	45 SAT	SAT
1-RC-9-01-F0102+R-1 NRC review: SAT NCR'S Referenced: None Cont. No. Ref. A2245	NO	SAT	SAT M & T	Panoramic SAT	2-2T Reqd 2-1T Achvd	40/45 SAT	SAT
1-RC-10-01-F0101 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T Reqd 2-1T Achvd	40/45 SAT	SAT
1-RC-10-01-F0102+R-1 Reshot 100% NRC Review: SAT NCR's Referenced: None Reshots per DR 603 Dated 3-16-84	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45 SAT	SAT
1-RC-49-01-F0101 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT AX	Double wall SAT	2-2T SAT	25 SAT	SAT
1-RC-49-01-F0102 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT T	Double wall SAT	2-2T SAT	25 SAT	SAT

Table 2 - (continued)

Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharp-ness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size, Number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-RC-49-01-F0103-R-1 NRC Review: SAT NCR's Referenced: NCR 5781 R-1 NRC 3726	NO	SAT	SAT M	Double wall SAT	2-2T SAT	25 SAT	SAT
1-MS-4005-20-F2003-R-1 NRC REVIEW: SAT NCR'S Referenced: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-MS-4005-22-F2204 NRC Review: SAT NCR's Referenced: None	NO	SAT	M	Double Wall SAT	2-4T SAT	10 SAT	SAT
2-CBS-02-1214-F011-R-1 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
2-CBS-02-1214-F015 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-MS-4013-02-F0201 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	10 SAT	SAT

Table 2 - (continued)

Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharp-ness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size, Number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-MS-4013-02-F0201-R-1 RESHOT STA 1-2, 2-3 & 3-4 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	10/7 SAT	SAT
1-MS-4013-02-F0201-R-1 RESHOT STA 3-4 & 4-5 NRC REVIEW: SAT NCR's REFERENCED: NCR-82-4638	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-MS-4009-01-F0109 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T Required	17 UNSAT Pentrameter Missing STA 6-0	SAT
1-MS-4009-01-F0109-R-1 RESHOT STA 0-1, 2-3 & 4-5 NRC REVIEW:SAT NCR's REFERENCED: None	NO	SAT Insufficient Pentrameter Coverage	SAT M	Panoramic SAT	2-4T Required 2-2T Achieved SAT	17 UNSAT Reshot (4-5ACC)	SAT
1-MS-4009-01-F0109-R-1 RESHOT STA 1-2, 5-6 & 6-0 NRC REVIEW: SAT NCR's REFERENCED: NCR 82-333	NO	SAT	SAT T	Double Wall SAT	2-2T Achieved SAT	25/17 SAT	SAT

Table 2 - (continued)

Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharp-ness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size, Number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFED TO BE CODE ACCEPTABLE.							
1-MS-4009-01-F0109-R-2 RESHOT STA 0-1, 2-3 & 3-4 NRC REVIEW: SAT NCR's REFERENCED: NCR-82-333A	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	17/15 SAT	SAT
1-MS-4012-02-F0201 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT AX	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-MS-4012-02-F0201 RESHOT 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-MS-4016-02-F0204 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12/10 SAT	SAT

II. REVIEW OF RADIOGRAPHIC FILM PACKAGES FOR 107 WELDS

The team reviewed radiographic film packages for 107 welds selectively chosen from nuclear and non-nuclear piping. The sample provided a range of differences in variables such as code classes, pipe diameters and thicknesses, construction time periods, various Level II and III film interpreters, and potential problem welds (i.e., dissimilar metal welds, welds from systems designated by Wampler as problem areas during his interview with the team, etc.) The sample was chosen by a review of the Weld Repair Log, Wampler's logbook, congressional correspondence, system drawings, various nonconformance documents, and Region I inspection reports.

The team's review was intended to provide additional information relative to whether the licensee's QA program was adequate during the construction of Seabrook Station, especially with regard to welding and radiographic inspection. The team's review of the welds was the same as that of the other welds discussed in Sections I and III of this appendix. The team's review and tabulation of data for the 107 welds were completed under the same guidelines as those reported in Section I of this appendix; that is, the team assessed code acceptability for all weld discontinuities identified, weld signatures, and all aspects of code acceptability for the final finished welds. Again, the team did not reverify the accuracy of technique, density, or geometrical unsharpness associated with intermediate inspections of the welds, but did verify the programmatic controls involved. As stated previously, the "satisfactory" listings of the NRC review constituted a report of the team's final assessment of proper programmatic control and code acceptability for the final welds listed. The data in Tables 3 and 4 demonstrated that the Level II radiograph reviews and repair welding were performed in a timely manner; the Level III reviews, however, were not always timely.

The team determined that the quality of the welds listed in Tables 3 and 4 was good. The welds met or exceeded applicable code requirements in all but one case, weld 1-DG-4351-01-F0101. Maintenance of a high level of welding quality was promoted by a conservative approach to radiographic examination and acceptance. The team concluded that the status of these welds indicated the uniform application of the licensee's overall QA program during the fabrication and nondestructive examination of pipe welds at Seabrook Station.

Table 3 - 107-Weld Sample - Weld History

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CS-357-04-F0406-R-1 RESHOT 100% 4" Diameter 0.297" Thk ASME - CLASS 2 Ref. NCR-6311 for complete cutout of original weld	10-3-84	10-3-84	II M.D.	Rej. STA 0-1 for lack of Penetration & STA 3-0 for Low Area	*STARTED 10-3-84 COMPLETED 10-5-84	10-19-84 S.V.	4-26-85 J.C.R.
1-CS-357-04-F0406-R-2 STA 0-1 & 3-0	10-5-84	10-5-84	II L.L.	Rej. STA 0-1 crater crack	*STARTED 10-5-84 COMPLETED 10-17-84	4-26-85 J.S.	4-26-85 J.C.R.
1-CS-357-04-F0406-R-3 RESHOT of STA 0-1 & 3-0	10-17-84	10-17-84	II M.D.	ACC Film reshot 100% because STA markers removed by mistake	None Required	10-12-84 S.V.	4-26-85 J.C.R.
1-CS-357-04-F0406-R-3* RESHOT 100% per NCR 7966B *Identified on RIR as R-4	4-16-85	4-16-85	II L.L.	ACC	None Required	4-26-85 J.S.	4-26-85 J.C.R.
1-DG-4363-01-F0112 R-1 ANSI B31.1 12" Diameter 0.435" Thk 1ST RIR INDICATES 1ST REPAIR	10-13-83	10-13-83	III J.W.	Rej. STA 0-1 for porosity with linears and STA 3-0 for slag incl.	*STARTED 10-14-83 COMPLETED 11-8-83	3-13-85 J.S.	3-13-85 J.C.R.
1-DG-4363-01-F0112-R-1 RESHOT 100%	11-8-83	11-8-83	II M.D.	Rej. STA 1-2 Transverse Linears	*STARTED 11-18-83 COMPLETED 11-21-83	3-13-85 J.S.	3-13-85 J.C.R.
1-DG-4363-01-F0112-R-3 RESHOT of STA 1-2	11-16-83	11-16-83	II M.D.	ACC	None Required	3-13-85 J.S.	3-13-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-DG-4363-01-F0112-R-3 RESHOT 100%	3-11-85	3-12-85	II L.L.	ACC	None Required	3-13-85 J.S.	3-13-85 J.C.R.
1-RC-11-01-F0102 31" Diameter 2.75" Thk ASME - CLASS 1	6-1-83	11-3-83	II M.D.	ACC	None Required	11-14-83 J.W.	11-16-83 J.C.R.
1-RC-11-01-F0103 31" Diameter 2.7 " Thk ASME - CLASS 1	6-14-83	11-5-83	II M.D.	ACC	None Required	11-14-83 J.W.	11-16-83 R.C.J.
1-RC-11-01-F0104 31" Diameter 3.15" Thk ASME - CLASS 1	7-27-83	11-5-83	II M.D.	Rej. STA 3-4 DENSITY	None Required	11-16-83 J.W.	11-22-83 R.C.J.
1-RC-11-01-F0104 RESHOT of STA 3-4 ASME - CLASS 1	11-15-83	11-16-83	II M.D.	ACC	None Required	11-16-83 J.W.	11-22-83 R.C.J.
1-RC-8-01-F0101 31" Diameter 3.58" Thk ASME - CLASS 1	11-3-83	11-3-83	II E.B.	ACC Reshoot STA 5-6 FILM MISSING	None Required	11-2-83 J.W.	11-21-83 R.C.J.
1-RC-8-01-F0101 RESHOT of STA 5-6	11-3-83	11-3-83	II M.D.	ACC	None Required	11-3-83 J.W.	11-21-83 R.C.J.
1-RC-8-01-F0102 31" Diameter 2.81" Thk ASME - CLASS 1	7-30-83	7-30-83	II R.B.	ACC	None Required	9-29-83 J.W.	11-9-83 R.C.J.
1-RC-8-01-F0103 31" Diameter 2.81" Thk ASME - CLASS 1	7-31-83	7-31-83	II R.B.	ACC	None Required	9-29-83 J.W.	11-9-83 R.C.J.
1-RC-5-01-F0101 31" Diameter 3.25" Thk ASME - CLASS 1	4-19-83	4-19-83	II R.B.	ACC	None Required	9-22-83 J.W.	11-9-83 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-5-01-F0102 31" Diameter 2.75" Thk ASME CL.1	4-11-83	4-11-83	II R.B.	ACC	None Required	9-22-83 J.W.	11-9-83 R.C.J.
1-RC-5-01-F0103 31" Diameter 2.75" Thk ASME - CLASS 1	5-31-83	5-31-83	II R.B.	ACC	None Required	9-22-83 J.W.	11-9-83 R.C.J.
1-RC-2-01-F0101 31" Diameter 3.48" Thk ASME - CLASS 1	4-5-83	4-5-83	II R.B.	ACC	None Required	11-14-83 J.W.	11-16-83 R.C.J.
1-RC-2-01-F0102 31" Diameter 2.75" Thk ASME - CLASS 1	3-22-83	3-22-83	II R.B.	ACC	None Required	11-14-83 J.W.	11-16-83 R.C.J.
1-RC-2-01-F0103 31" Diameter 2.75" Thk ASME - CLASS 1	3-23-83	3-23-83	II R.B.	ACC	None Required	11-14-83 J.W.	11-16-83 R.C.J.
1-DG-4351-01-F0102 26" Diameter 0.465" Thk ANSI B31.1 NCR-1948R/1 & WRO-1982	**N/A **Original RIRs & Film was discarded. See WRO-1982.	**N/A	**N/A	Rej. STA A-B, D-E & E-F for Slag & Lack of Fusion	*STARTED 9-7-83 COMPLETED 9-12-83	**N/A	**N/A
1-DG-4351-01-F0102 R-1	9-12-83	9-12-83	II R.B.	Reshot due to incorrect Penetrameters	None Required	3-13-84 J.S.	YAEC Did Not sign RIR Film Discarded
1-DG-4351-01-F0102 R-1 1ST REPAIR RESHOT 100%	3-12-85	3-12-85	II L.L.	ACC	None Required	3-13-85 J.S.	3-13-85 J.C.R.
1-RC-7-01-F0101 31" Diameter 3.58" Thk ASME - CLASS 1	8-4-83	11-10-83	II M.D.	ACC, STA 5-6 Reshot due to Film artifacts	None Required	11-10-83 J.W.	11-16-83 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-7-01-F0101 RESHOT of STA 5-6 31" Diameter 3.58" Thk ASME - CLASS 1	12-1-83	12-1-83	II M.D.	ACC	None Required	1-20-89 J.S.	2-8-84 R.C.J.
1-RC-6-01-F0101 27.5" Diameter 2.85" Thk ASME - CLASS 1	8-24-82 Note: Original Film & RIR for First exposure were discarded.	8-24-82	III M.M.	Rej. STA 3-4 & 6-7 for Slag & Lack of Fusion	STARTED 8-30-82 COMPLETED 11-9-82	Information Taken From Weld Package	
1-RC-6-01-F0101-R-1 RESHOT 100%	8-19-83	11-1-83	III J.W.	ACC	None Required	11-1-83 J.W. 2-23-84 J.S.	11-4-83 R.J.
1-RC-13-02-F0202 12"Diameter 0.406" Thk ASME - CLASS 2	2-3-81	2-4-81	III M.M.	Rej. STA 0-1 Low area at weld to base metal	*STARTED 2-10-81 COMPLETED 3-5-81	No Level III P-H Review	5-1-81 R.C.J.
1-RC-13-02-F0202 RESHOT of STA 0-1	4-20-81	4-20-81	III M.M.	ACC	None Required	No Level III P-H Review	5-1-81 R.C.J.
1-RC-13-07-F0704 12" Diameter 1.275" Thk ASME - CLASS 1	9-29-82	9-29-82	III M.M.	Rej. STA 0-1 & 2-3 For Slag	*STARTED 9-29-82 COMPLETED 1-7-83	No Level III P-H Review	8-21-84 B.J.M.
1-RC-13-07-F0704 R-1 RESHOT of STA 0-1 & 2-3	1-7-83	1-7-83	II R.B.	ACC	None Required	NONE	NONE
1-RC-13-07-F0704 R-1 RESHOT 100%	8-7-84	8-8-84	II K.J.B.	Reshot due to Browning & Artifacts	None Required	8-14-84 S.V.	8-21-84 B.J.M.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-13-04-F0403 12" Diameter 0.525" Thk ASME - CLASS 2	2-16-82	2-17-82	II M.B.	Rej. STA 1-2 Slag 1/2"	*STARTED 2-17-82 COMPLETED 2-22-82	NONE	4-2-82 R.C.J.
1-RC-13-04-F0403 R-1 RESHOT of STA 1-2	2-24-82	2-24-82	III M.M.	ACC	None Required	NONE	4-2-82 R.C.J.
1-CBS-1216-06-F0607 8" Diameter 0.412" Thk ASME - CLASS 2	10-31-83	10-31-83	II E.B.	Rej. STA 0-1 & 2-3 Incomplete Fusion	*STARTED 11-01-83 COMPLETED 12-12-83	12-28-83 J.W.	7-16-84 R.C.J.
1-CBS-1216-06-F0607 R-1 RESHOT of STA 0-1 & 2-3	12-17-83	12-19-83	II M.D.	ACC	None Required	12-28-83 J.W.	7-16-84 J.C.R.
1-CS-365-01-F0111-R-2 2" Diameter 0.344" Thk ASME - CLASS 1	8-20-84	8-21-84	II M.D.	ACC	None Required	8-21-84 S.V.	8-23-84 B.J.M.
R-1 completely cut out and only RIR retained for original and 1ST repair							
1-FW-4628-02-F0201 3" Diameter 0.390" Thk ANSI B31.1	1-9-83	1-10-83	II R.B.	ACC	None Required	No Signature	**N/A
**Weld was reshot due to UG and rejected for Base Metal indications. Film discarded on 1-29-85.							
1-FW-4628-02-F0201	10-21-83	10-22-83	II E.B.	Rej. STA 2-3 due to Base Metal Defects	**STARTED 10-25-83 COMPLETED 11-7-83	11-20-83 J.W.	**N/A
**No film on this date due to cut out and replacement of spoolpiece. Repair per FTR-P2-507A.							

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-FW-4628-02-F0201-R-1 NEW WELD	11-7-83	11-7-83	II M.D.	Rej. STA 0-1 Incomplete insert melt 1-2 Porosity with tails	*STARTED 11-8-83 COMPLETED 11-20-83	11-20-83 J.W.	No Signature
1-FW-4628-02-F0201-R-2 RESHOT of STA 0-1 & 1-2	11-16-83	11-16-83	II M.D.	ACC	None Required	11-20-83 J.W.	2-20-85 J.C.R.
1-FW-2628-02-F0201-R-2 RESHOT of STA 2-3	1-19-85	2-20-85	II L.J.K.	ACC	None Required	2-20-85 J.S.	2-20-85 J.C.R.
1-FW-2628-02-F0201-R-2 RESHOT of STA 3-0	1-29-85	1-29-85	II C.L.	ACC	None Required	2-11-85 J.S.	2-20-85 J.C.R.
1-RH-158-04-F0411 6" Diameter 0.809" Thk ASME - CLASS 2	11-6-83	11-7-83	II M.D.	Rej. STA 0-1 for porosity with tails	*STARTED 11-8-83 COMPLETED 11-28-83	3-31-84 S.V.	4-17-84 J.C.R.
1-RH-158-04-F0411-R-1 RESHOT of STA 0-1	11-30-83	11-30-83	II M.D.	ACC	None Required	12-1-83 J.W.	4-17-84 J.C.R.
1-CS-374-10-F001 4" Diameter 0.651" Thk ASME - CLASS 2	11-15-83	11-16-83	II M.D.	Rej. STA 3-0 for incomplete fusion	*STARTED 11-16-83 COMPLETED 12-20-83	12-28-83 J.W.	6-27-84 J.C.R.
1-CS-374-10-F001-R-1 RESHOT of STA 3-0	12-20-83	12-20-83	II M.D.	ACC	None Required	12-28-83 J.W.	6-27-84 J.R.
1-SI-275-01-F0104 Film discarded, weld completely cut out per NCR-7967	12-21-84	12-21-84	II R.H.M.	Rej. STA 3 for root concavity with linears	*STARTED 12-21-84 COMPLETED 12-21-84	No Signature	No Signature

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-SI-275-01-F0104-R-1 1.5" Diameter 0.341" Thk ASME - CLASS 1	12-26-84	12-26-84	II R.H.M.	ACC	None Required	No Level III P-H review	12-26-84 B.J.M.
1-SB-1310-06-F0605 3" Diameter 0.390" Thk ASME - CLASS 2	11-8-83	11-8-83	II M.D.	Rej. STA 3-0 for porosity with Linears	*STARTED 11-8-83 COMPLETED 10-9-84	10-17-84 S.V.	10-18-84 J.S.V.
1-SB-1310-06-F0605-R-1 RESHOT of STA 3-0 & 0-1	10-9-84	10-9-84	II L.L.	ACC	None Required	10-17-84 S.V.	10-18-84 J.S.V.
1-RC-7-01-F0102 & BMR103 31" Diameter 2.94" Thk	10-11-83	11-15-83	II M.D.	Rej. STA 2-3 & 3-4 for Incomplete	*STARTED 11-15-83 COMPLETED 12-23-84	11-15-83 J.W.	2-8-84 R.C.J.
1-RC-7-01-F0102-R-1 & BMR103 RESHOT of STA 2-3 & 3-4	12-23-83	12-23-83	II M.D.	ACC	None Required	12-23-83 J.W.	2-8-84 R.C.J.
1-RC-44-05-F0501 3" Diameter 0.558" Thk ASME - CLASS 1	10-19-83	10-19-83	II E.B.	Rej. STA 0-1 for Incomplete Fusion	*STARTED 10-14-83 COMPLETED 2-6-84	2-15-84 J.S.	3-13-84 R.C.J.
1-RC-44-05-F0501 R-1 RESHOT 100%	2-5-84	2-6-84	II M.D.	ACC	None Required	2-15-84 J.S.	3-13-84 R.C.J.
1-RC-91-F410005-F002 1" Diameter 0.295" Thk ASME - CLASS 1	9-24-84	9-24-84	II M.D.	Rej. STA 0, 1, 2 & 3 for Incomplete Penetration	*STARTED 9-24-84 COMPLETED 10-22-84	NONE	NONE

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-91-F410005-F002-R-1	10-17-84	10-17-84	II L.L.	Rej. STA 0 ID Mismatch	*STARTED 10-17-84 COMPLETED 11-01-84	NONE	NONE
1-RC-91-F410005-F002-R-1 RESHOT to Properly Classify Defect	10-19-84	10-18-84	II L.L.	Rej. STA 0 Incomplete Fusion	*STARTED 10-17-84 COMPLETED 11-01-84	10-26-84 S.V.	11-30-84 B.J.M.
1-RC-91-F410005-F002-R-2 RESHOT of STA 0 & 1	11-7-84	11-7-84	II L.L.	ACC	None Required	NONE	11-30-84 B.J.M.
1-RC-91-F410005-F002-R-2 RESHOT of STA 2 & 3	11-9-84	11-9-84	II M.D.	Rej. STA 2 & 3 Porosity with Tails	*STARTED 11-1-84 COMPLETED 11-14-84	NONE	11-30-84 B.J.M.
1-RC-91-F410005-F002-R-3 RESHOT 100%	11-14-84	11-14-84	II M.D.	Rej. STA 3 Incomplete Fusion	*STARTED 11-14-84 COMPLETED 11-21-84	NONE	11-30-84 B.J.M.
1-RC-91-F410005-F002-R-4 RESHOT 100%	11-21-84	11-21-84	II R.H.M.	ACC	None Required	11-26-84 S.V.	11-30-84 B.J.M.
1-RC-4-01-F0101 31" Diameter 0.357" Thk ASME - CLASS 1	10-12-83	10-12-83	III J.W.	ACC	None Required	11-8-83 J.W.	11-14-84 R.C.J.
1-RC-4-01-F0101 RESHOT of STA 4-5 For Info Only	10-27-83	10-27-83	II E.B.	ACC	None Required	11-5-83 J.W.	11-14-83 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-MS-4001-01-F0102 30" Diameter 1.250" Thk ANSI B31.1	8-25-82	8-26-83	III M.M.	ACC	None Required	3-1-83 W.R.H.	2-15-84 R.C.J.
1-MS-4001-01-F0102 RESHOT STA 2-3 Due to Film Artifact	3-17-83	3-17-83	II R.B.	ACC	None Required	3-21-83 W.R.H.	2-15-84 R.C.J.
1-MS-4001-01-F0102-R-1 RESHOT STA 5-6 To Re-examine grinding repair	2-15-84	2-15-84	II M.D.	ACC (Repaired by grinding reinforcement)	None Required	2-13-84 J.S.	**2-15-84 R.C.J.
**8" Lack of fusion discovered during YAEC overview (DR-544 & NCR-5773)							
1-RC-3-01-F0101 27.5" Diameter 2.85" Thk ASME - CLASS 1	8-23-83	11-1-83	III J.W.	ACC	None Required	11-1-83 J.W.	11-4-83 R.C.J.
1-RC-97-02-F0203 3" Diameter 0.528" Thk ASME - CLASS 1	7-1-85	7-1-85	II M.D.	Rej. STA 3-4 for Porosity	Started 7-11-85 Completed 7-12-85	Not Dated D.W.C.	7-18-85 R.C.J.
1-RC-97-02-F0203-R-1 RESHOT STA 3-4	7-13-85	7-13-85	II M.D.	Rej. STA 3-4 for Slag	*STARTED 7-16-85 COMPLETED 7-16-85	NONE	NONE
1-RC-97-02-F0203-R-2 RESHOT STA 3-4 & 4-0	7-18-85	7-18-85	II M.D.	ACC	None Required	2-19-85 D.W.C.	7-18-85 R.C.J.
1-CS-523-01-F0101 3" Diameter 0.276" Thk ASME - CLASS 2 Original Reshot due to UNSAT UG	7-14-85	7-15-85	II M.D.	Rej. STA 1-2 for Incomplete Fusion	Started 7-18-85 Completed 7-18-85	7-19-85 D.W.C.	7-19-85 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CS-525-01-F0101-R-1 RESHOT STA 1-2 & 2-3	7-19-85	7-19-85	II M.D.	ACC	None Required	7-19-85 D.W.C.	7-19-85 R.C.J.
1-CS-431-02-F0203 3" Diameter 0.558" Thk ASME - CLASS 2 RESHOT 100% due to UNSAT UG (DN-090)	7-15-85	7-15-85	II M.D.	Rej. STA 1-2 & 2-3 Linear Porosity	Started 7-19-85 Completed 7-20-85	7-22-85 D.W.C.	7-22-85 R.C.J.
1-CS-431-02-F0203-R-1 RESHOT STA 1-2 & 2-3	7-22-85	7-22-85	II M.D.	ACC	None Required	7-22-85 D.W.C.	7-23-85 R.C.J.
1-SI-201-02-F0201-R-2 10" Diameter 1.375" Thk ASME - CLASS 2 RESHOT of 1ST exposure of 2ND Repair (NCR-82-637A)	9-4-85	9-6-85	II M.D.	Rej. STA 2-3 for Slag	Started 7-19-85 Completed 7-20-85	9-16-85 D.W.C.	9-24-85 J.C.R.
1-SI-201-02-F0201-R-3 RESHOT STA 2-3 & 3-4	9-16-85	9-16-85	II M.D.	ACC	None Required	9-16-85 D.W.C.	9-24-85 J.C.R.
1-RH-158-04-F0406 8" Diameter 0.996" Thk ASME - CLASS 2	8-8-83	8-8-83	II R.B.	Rej. STA 0-1 & 1-2 Incomplete Fusion	*STARTED 8-9-83 COMPLETED 10-24-83	9-17-83 J.W.	4-15-84 J.C.R.
1-RH-158-04-F0406-R-1 RESHOT STA 0-1 & 1-2	10-19-83	10-19-83	II R.B.	ACC	None Required	10-21-83 J.W.	4-15-84 J.C.R.
1-CS-365-01-F0101 2" Diameter 0.344" Thk ASME - CLASS 2	3-22-83	3-22-83	II R.B.	Rej. STA 0, 1 & 2 for Incomplete insert Melt & fusion	*STARTED 3-22-83 COMPLETED 4-20-83	3-22-83 W.R.H.	7-2-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CS- 365-01-F0101-R-1 RESHOT 100%	5-26-83	5-27-83	II R.B.	Rej. STA 0 1 & 2 Incomplete Fusion	*STARTED 5-27-83 COMPLETED 9-8-83	5-27-83 W.R.H.	7-2-84 J.C.R.
1-CS-365-01-F0101-R-2	9-8-83	9-8-83	II R.B.	ACC	None Required	9-17-83 J.W.	No Signature
All previous film was discarded and weld reshot 100% on 4-26-84							
1-CS-365-01-F0101-R-2 RESHOT 100%	4-26-84	5-1-84	II K.J.B.	ACC	None Required	5-25-84 S.V.	7-2-84 J.C.R.
1-RC-91-F41005-F005 1" Diameter 0.295" Thk ASME - CLASS 1	9-24-84	9-24-84	II M.D.	Rej. STA 0 & 3 ID Abrupt Density Change	*STARTED 9-24-84 COMPLETED 10-18-84	NONE	NONE
1-RC-91-F41005-F005-R-1 RESHOT 100%	10-3-84	10-3-84	II M.D.	ACC	None Required	10-15-84 S.V.	10-18-84 D.D.P.
1-RC-45-01-F0107 2" Diameter 0.404" Thk ASME - CLASS 1	10-12-83	10-12-83	III J.W.	Rej. STA 0 Incomplete Fusion	*STARTED 10-12-83 COMPLETED 10-31-83	11-22-83 J.W.	NONE
1-RC-45-01-F0107 RESHOT 100% Grinding Repair, no welding performed	10-31-83	10-31-83	II M.D.	Rej. STA 1 Incomplete Fusion	*STARTED 11-1-83 COMPLETED 11-17-83	11-22-83 J.W.	10-19-84 J.C.R.
1-RC-45-01-F0107-R-1 RESHOT 100%	11-21-83	11-21-83	II E.B.	ACC	None Required	11-22-83 J.W.	10-19-84 J.C.R.
1-DG-4355-01-F0112-R-2 12" Diameter 1.250" Thk ANSI B31.1 RESHOT 100& No RIR's For Previous RT	11-18-83	11-18-83	II M.D.	Rej. STA 11-12 Transverse Linears	*STARTED 11-18-83 COMPLETED 11-21-83	3-13-84 J.S.	8-1-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-DG-4355-01-F0112-R-3 RESHOT STA 11-12	11-21-83	11-21-83	II M.D.	ACC	None Required	3-13-84 J.S.	8-1-85 J.C.R.
1-DG-4355-01-F0112-R-2 RESHOT of R-2	6-26-85	6-27-85	II M.D.	ACC	None Required	8-1-85 W.C.	8-1-85 J.C.R.
1-DG-4355-01-F0112-R-3 RESHOT STA 8-9 & 9-10	8-1-85	8-1-85	II D.P.	ACC	None Required	NONE	8-1-85 J.C.R.
1-RH-155-06-F0605 6" Diameter 0.809" Thk ASME - CLASS 2	11-3-83	11-3-83	II M.D.	Rej. STA 1-2 & 4-0 Incomplete Fusion	*STARTED 11-3-83 COMPLETED 11-29-83	4-7-84 S.V.	4-10-84 J.C.R.
1-RH-155-06-F0605-R-1 RESHOT STA 1-2, 3-4 & 4-0	12-2-83	12-2-83	II M.D.	ACC	None Required	4-7-84 S.V.	4-10-84 J.C.R.
1-RC-6-01-F0101 27.5" Diameter 2.36" Thk ASME - CLASS 1	8-19-83	11-1-83	III J.W.	ACC	None Required	Not Dated J.W.	11-4-83 J.C.R.
1-RH-158-01-F0101 12" Diameter 0.468" Thk ASME - CLASS 2	10-19-81	10-20-81	III M.M.	Rej. ALL STA Incomplete Penetration & Unacceptable Penetrameter	*STARTED 10-20-81 COMPLETED 10-28-81	NONE	4-28-82 R.C.J.
1-RH-158-01-F0101-R-1 For Info SHOT of Excavations	10-30-81	11-2-81	III M.M.	Rej. STA 0-1 for Incomplete Fusion	To evaluate Excavation	NONE	4-28-82 R.C.J.
1-RH-158-01-F0101-R-1 2ND for Info SHOT STA 0-1 & 3-0	11-2-81	11-3-81	III M.M.	Rej. STA 3-0 for Incomplete Fusion	STARTED 11-2-81 COMPLETED 11-2-81	NONE	4-28-82 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RH-158-01-F0101-R-1 RESHOT 100%	3-18-82	3-19-82	III M.M.	Rej. ALL STA Incomplete Coverage (film discarded)	RESHOT COMPLETED 4-1-82	NONE	4-28-82 R.C.J.
1-RH-158-01-F0101-R-2 2ND 100% RESHOT	4-1-82	4-1-82	III M.M.	ACC	None Required	NONE	4-28-82 R.C.J.
1-RC-30-03-F0303 3" Diameter 0.500" Thk ASME - CLASS 1	8-22-83	8-31-83	II R.B.	ACC	None Required	11-3-83 J.W.	12-16-83 R.C.J.
1-DG-4363-01-F0102 40" Diameter 0.495" Thk ANSI B31.1	9-21-83	9-21-83	II R.B.	ACC	None Required	3-13-84 J.S.	4-5-84 J.C.R.
1-DG-4351-01-F0103 26" Diameter 0.465" Thk ANSI B31.1	8-18-83	See Note	II See Note	REJECT See Note	*STARTED 9-7-83 COMPLETED 9-12-83	NONE	NONE
	Note: No RIR - J.C. Sylvester vendor film For Info RT						
1-DG-4351-01-F0103-R-1 RESHOT 100%	9-12-83	9-12-83	II R.B.	ACC	None Required	3-13-84 J.S.	3-23-84 J.C.R.
1-DG-4351-01-F0101 26" Diameter 0.465" Thk ANSI B31.1	8-22-83	See Note	II See Note	REJECT See Note	*STARTED 9-7-83 COMPLETED 9-12-83	NONE	NONE
	Note: No RIR - J.C. Sylvester vendor film						
1-DG-4351-01-F0101-R-1 RESHOT 100%	9-12-83	9-12-83	II R.B.	ACC	None Required	3-13-84 J.S.	3-26-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-FW-4600-06-F0602 24" Diameter 1.593" Thk ASME - CLASS 2	12-23-81	12-28-81	III M.M.	Rej. STA 1-2 & 2-3 for undercut & concavity	*STARTED 12-28-81 COMPLETED 1-25-82	NONE	4-2-82 R.C.J.
1-FW-4600-06-F0602-R-1 RESHOT STA 1-2 2-3 & 4-0 (No Weld Repair)	2-18-82	2-19-82	II M.B.	ACC	None Required	NONE	4-2-82 R.C.J.
1-DG-4363-01-F0101 40" Diameter 0.400" Thk ANSI B31.1	8-18-83	9-12-83	II See Note	REJECT See Note	*STARTED 9-12-83 COMPLETED 9-19-83	NONE	NONE
	Note: No RIR in film package. For Info Only RT Performed per disposition to UE&C NCR-74-2064						
1-DG-4363-01-F0101-R-1 RESHOT 100%	9-19-83	9-19-83	II R.B.	ACC	None Required	3-12-84 J.S.	3-23-84 R.C.J.
1-FW-4634-03-F0303 6" Diameter 0.522" Thk ANSI B31.1	12-12-83	12-12-83	II M.D.	Rej. STA 0-1 & 3-0 for Slag	*STARTED 12-12-83 COMPLETED 12-29-83	1-28-84 J.S.	8-22-84 J.C.R.
1-FW-4634-03-F0303-R-1	12-29-83	12-29-83	II M.D.	ACC	None Required	1-28-84 J.S.	8-22-84 J.C.R.
1-CBS-1201-05-F0507 14" Diameter 0.375" Thk ASME - CLASS 2	12-22-81	12-22-81	III M.M.	Rej. STA 1-2 2-3 & 3-0 centerline shrink incomplete fusion Incomplete insert melt	*STARTED 12-22-81 COMPLETED 12-29-81	NONE	5-18-82 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CBS-1201-05-F0507-R-1	2-22-82	2-23-82	III M.M.	Rej. STA 0-1 & 2-3 for Incomplete insert melt & STA 3-0 for Drop Thru	*STARTED 2-23-82 COMPLETED 3-8-82	NONE	5-18-82 R.C.J.
1-CBS-1201-05-F0507-R-2 RESHOT STA 0-1 & 2-3	3-22-82	3-22-82	III M.M.	Rej. STA 2-3 for Incomplete Penetration & Fusion	*STARTED 3-22-82 COMPLETED 3-31-82	NONE	5-18-82 R.C.J.
1-CBS-1201-05-F0507-R-3 RESHOT STA 0-1, 2-3 & 3-0	3-31-82	3-31-82	III M.M.	ACC	None Required	NONE	5-18-82 R.C.J.
1-SI-204-02-F0205 10" Diameter 1.120" Thk ASME - CLASS 1	8-24-84	8-27-84	II M.D.	Rej STA 4-0 for Slag	*STARTED 8-27-84 COMPLETED 9-18-84	9-18-84 S.V.	9-20-84 B.J.M.
1-SI-204-02-F0205-R-1 RESHOT STA 3-4 & 4-0	8-31-84	9-4-84	II M.D.	Rej STA 3-4 for Slag	*STARTED 9-4-84 COMPLETED 10-22-84	9-18-84 S.V.	9-20-84 B.J.M.
1-SI-204-02-F0205-R-2 RESHOT STA 3-4	9-10-84	9-10-84	II R.M.	ACC	None Required	9-18-84 S.V.	9-20-84 B.J.M.
1-CS-366-02-F0203 3" Diameter 0.600" Thk ASME - CLASS 2	8-13-82	8-13-82	III M.M.	Rej. STA 1 Incomplete insert melt	*STARTED 8-13-82 COMPLETED 8-26-82	NONE	10-10-84 R.C.J.
1-CS-366-02-F0203-R-1 RESHOT STA 1	9-16-82	9-16-82	III M.M.	ACC	None Required	NONE	10-10-84 R.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CS-366-02-F0203-R-1 RESHOT 100% due to UG **Info from weld process sheets	12-9-83	7-3-84	II K.B.	Rej. STA 1-2 & 2-3 for Porosity	**STARTED 7-13-84 COMPLETED 9-5-84	NONE	10-10-84 R.C.J.
1-CS-366-02-F0203-R-2 RESHOT STA 1-2 & 2-3 **Info from weld process sheets	9-5-84	9-6-84	II M.D.	Rej. STA 2-3 for Linears	**STARTED 9-7-84 COMPLETED 9-12-84	NONE	10-10-84 R.C.J.
1-CS-366-02-F0203-R-3 For Info RESHOT **Info from weld process sheets	9-11-84	9-12-84	II R.M.	Rej. STA 2-3 & 3-0 Incomplete Penetration	**STARTED 9-14-84 COMPLETED 9-28-84	NONE	10-10-84 R.C.J.
1-CS-366-02-F0203-R-4 RESHOT 100% NCR 7038	9-28-84	9-28-84	II M.D.	ACC	None Required	10-2-84 S.V.	10-4-84 J.S.V.
1-SI-273-02-F0203 1.5" Diameter 0.341" Thk ASME - CLASS 1 Weld cut out 100%	8-23-84	8-24-84	II M.D.	Rej. STA 0 Incomplete Fusion	STARTED 10-3-84 COMPLETED 10-4-84 Control No. 3026	NONE	NONE
1-SI-273-02-F0203-R-1 **Info from weld process sheets	10-5-84	10-5-84	II M.D.	Rej. STA 0 Tungsten Inclusion	**STARTED 10-5-84 Completed 10-9-84	10-17-84 S.V.	10-18-84 J.S.V.
1-SI-273-02-F0203-R-2	10-10-84	10-10-84	II L.L.	ACC	None Required	10-18-84 S.V.	10-18-84 J.S.V.
1-RC-30-01-F0101 3" Diameter 0.618" Thk ASME - CLASS I For Info Shot	7-12-83	7-12-83	II R.B.	ACC	See Note	7-13-83 J.W.	11-10-83 R.C.J.
	Note: Weld cut out per NCR-5293						

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-30-01-F0101-R-1 NCR-5293 **Info from weld process sheets	3-22-84	3-22-84	II M.D.	Rej. STA 3-6 & 6-9 Incomplete Penetration & insert melt	**STARTED 3-22-84 COMPLETED 4-16-84	NONE	7-30-85 J.C.R.
1-RC-30-01-F0101-R-2 RESHOT 100% (STAs renumbered) **Info from weld process sheets	4-16-84	4-16-84	II M.D.	Rej. STA 1-2 for Slag & 2-3 for Incomplete Penetration	**STARTED 8-8-84 COMPLETED 8-16-84	10-1-84 S.V.	7-30-85 J.C.R.
1-RC-30-01-F0101-R-3 NCR-7461 **Info from weld process sheets	8-15-84	8-16-84	II M.D.	Rej. STA 1-2 for Slag & 2-3 for Incomplete Penetration	**STARTED 9-11-84 COMPLETED 9-25-84	NONE	7-30-85 J.C.R.
1-RC-30-01-F0101-R-4	9-25-84	9-25-84	II M.D.	ACC	None Required	10-1-84 S.V.	10-5-85 R.C.J.
1-SLX-43-01-F0114 12.75"Diameter 0.750"Thk ASME III CLASS 2 **Info from weld process sheets	1-2-85	1-4-85	II R.M.	Rej. STA 1-2 2-3 & 3-4 for Incomplete Fusion	**STARTED 1-4-85 COMPLETED 2-20-85	4-26-85 J.S.	4-30-85 J.C.R.
1-SLX-43-01-F0114-R-1 RESHOT 100% **Info from weld process sheets	1-24-85	2-23-85	II M.D.	Rej. STA 2-3 & 4-0 Incomplete Fusion	**STARTED 2-25-85 COMPLETED 4-17-85	4-26-85 J.S.	4-30-85 J.C.R.
1-SLX-43-01-F0114-R-2 RESHOT STA 1-2 2-3 & 4-0	4-19-85	4-19-85	II M.D.	Rej. STA 4-0 Incomplete Fusion	*STARTED 4-19-85 COMPLETED 4-23-85	4-26-85 J.S.	4-30-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-SLX-43-01-F0114-R-3	4-23-85	4-23-85	II R.M.	ACC	None Required	4-26-85 J.S.	4-30-85 J.C.R.
1-RC-59-05-F0502 3" Diameter 0.618" Thk ASME - CLASS 1	11-8-83	11-8-83	II M.D.	Rej. STA 4-0	*STARTED 11-8-83 COMPLETED 12-28-83	2-10-84 J.S.	7-25-84 J.C.R.
1-RC-59-05-F0502-R-1 Info Only Shot	12-30-83	12-30-83	II E.B.	ACC	NONE	1-26-84 J.S.	NONE
1-RC-59-05-F0502-R-1 RESHOT STA 4-0	4-27-84	5-4-84	II M.D.	Rej. Due To UNACC Density	NONE	7-19-84 S.V.	7-25-84 J.C.R.
1-RC-59-05-F0502-R-1	5-1-84	5-4-84	II M.D.	ACC	None Required	7-19-84 S.V.	7-25-84 J.C.R.
1-SB-1301-05-F0515-R-1 2" Diameter 0.360" Thk ASME - CLASS 2 RESHOT 100%	2-15-85	2-15-85	II M.D.	Rej. STA 2-3 Incomplete Fusion	**STARTED 2-15-85 COMPLETED 2-21-85	NONE	3-6-85 B.J.M.
Note: original weld cut out per ECA 19/103122A **Info from weld process sheets							
1-SB-1301-05-F0515-R-2 **Info from weld process sheets	2-22-85	2-22-85	II M.D.	Rej. STA 1-2 & 3-0 for Incomplete Fusion	**STARTED 2-22-85 COMPLETED 2-25-85	NONE	3-6-85 B.J.M.
1-SB-1301-05-F0515-R-3	2-26-85	2-26-85	II M.D.	ACC	None Required	3-5-85 J.S.	3-6-85 B.J.M.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-FW-4609-03-F0305 16" Diameter 1.151" Thk ASME III CLASS 2	12-21-84	12-21-84	II R.M.	Rej. STA 0-1 Crater Crack & 2-3 & 4-0 for Slag	*STARTED 12-21-84 COMPLETED 2-26-85	1-12-85 S.V.	1-28-85 B.J.M.
1-FW-4609-03-F0305 RESHOT STA 0-1, 2-3 & 4-0	1-11-85	1-11-85	II R.M.	ACC	None Required	1-12-85 S.V.	1-28-85 B.J.M.
1-RC-74-1-F012 6" Diameter 0.899" Thk ASME - CLASS 1	1-7-84	1-9-84	II M.D.	Rej. STA 0-1, 2-3 & 3-4 for Slag	*STARTED 1-9-84 COMPLETED 3-10-84	2-14-84 J.S.	5-7-84 J.C.R.
1-RC-74-1-F012-R-1 RESHOT 100%	2-12-84	2-13-84	II M.D.	ACC	None Required	2-14-84 J.S.	5-7-84 J.C.R.
1-RC-15-04-F0403 2" Diameter 0.404" Thk ASME - CLASS 1 For Info Shot - Film Discarded grinding repair recommended. See Reshot on 8-9-84. **Info from weld process sheets	1-24-84	1-24-84	II M.D.	Rej. STA 1 Incomplete Fusion	**STARTED 1-25-84 COMPLETED 3-9-84 OD ground	3-5-84 J.S.	NONE
1-RC-15-04-F0403-R-1 No Welding Performed	2-27-84	2-27-84	II M.D.	ACC	None Required	3-5-84 J.S.	NONE
1-RC-15-04-F0403-R-1 RESHOT OF R-1	8-9-84	8-13-84	II M.D.	ACC	None Required	8-13-84 S.V.	8-16-84 J.C.R.
1-RC-15-07-F0702-R-1 3" Diameter 0.558" Thk ASME - CLASS 1 Original weld cut out per ECA 19-0974E (film discarded).	1-8-84	1-18-84	II M.D.	Rej. STA 1-2 for Slag	*STARTED 1-18-84 COMPLETED 7-20-84	6-27-84 S.V.	7-9-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-15-07-F0702-R-2 RESHOT STA 0-1, 1-2 & 2-3	5-25-84	5-31-84	II M.D.	ACC	None Required	6-27-84 S.V.	7-9-84 J.C.R.
1-CS-374-1-F037 4" Diameter 0.621" Thk ASME - CLASS 2	10-18-83	10-18-83	II E.B.	ACC	None Required	6-26-84 S.V.	6-26-84 J.C.R.
1-RC-15-05-F0504 3" Diameter 0.688" Thk ASME - CLASS 1	2-10-84	2-11-84	II M.D.	Rej. STA 1-2 Crater Pit	*STARTED 2-13-84 COMPLETED 5-9-85	4-12-84 J.S.	4-17-84 B.J.M.
1-RC-15-05-F0504-R-1 RESHOT STA 1-2	3-30-84	3-30-84	II M.D.	ACC	None Required	4-12-84 J.S.	4-17-84 B.J.M.
1-RC-59-06-F0602 3" Diameter 0.498" Thk ASME - CLASS 1	10-17-83	10-17-83	III J.W.	ACC	None Required	7-25-84 S.V.	7-27-84 J.C.R.
1-RC-62-01-F0106 2" Diameter 0.404" Thk ASME - CLASS 1 Film rejected by K.J.B. on 6-7-84 for UNACC UG & DENSITY.	2-5-84	2-6-84	II M.D.	Rej. STA 0 Incomplete Fusion	*STARTED 2-7-84 COMPLETED 2-21-84	2-14-84 J.S.	11-7-84 J.C.R.
1-RC-62-01-F0106-R-1 RESHOT STA 0 (for UG & DENSITY) For Info Only - RESHOT of original exposure & repair discarded.	2-14-84	2-14-84	II M.D.	ACC	NONE	Not Dated J.S.	NONE
1-RC-62-01-F0106-R-1 RESHOT 100% (RIR indicates this to be Reshot of Original.)	9-14-84	10-19-84	II M.D.	ACC	NONE	11-5-84 S.V.	11-7-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-62-01-F0106-R-1 RESHOT STA 4-0 (RIR indicates this to be Reshot of Original.)	9-18-84	10-19-84	II M.D.	ACC	None Required	11-5-84 S.V.	11-7-84 J.C.R.
1-CS-377-01-F0103 3" Diameter 0.276" Thk ASME - CLASS 2	1-16-84	1-16-84	II M.D.	Rej. STA 0-1, 2-3 & 3-0 for Root Concavity	*STARTED 1-17-84 COMPLETED 2-9-84	2-14-84 J.S.	3-13-84 R.C.J.
1-CS-377-01-F0103-R-1 RESHOT STA 0-1, 2-3 & 3-0	2-13-84	2-13-84	II M.D.	ACC	None Required	2-14-84 J.S.	3-13-84 R.C.J.
1-SI-256-04-F0411 2" Diameter 0.434" Thk ASME - CLASS 2	1-26-84	1-30-84	II M.D.	Rej. STA 1 Incomplete Fusion	*STARTED 1-31-84 COMPLETED 2-9-84	2-14-84 J.S.	5-7-84 J.C.R.
1-SI-256-04-F0411-R-1 RESHOT STA 0, 1 & 2	2-7-84	2-7-84	II M.D.	Rej. STA 1	*STARTED 2-7-84 COMPLETED 2-25-84	2-19-84 J.S.	5-7-84 J.C.R.
1-SI-256-04-F0411-R-2 RESHOT 100% due to UG	4-5-84	4-6-84	II M.D.	ACC	None Required	4-12-84 J.S.	5-7-84 J.C.R.
1-RH-158-04-F0408 8" Diameter 0.996" Thk ASME - CLASS 2	8-8-83	8-8-83	II R.B.	Rej. STA 3-4 & 4-0 Root Concavity	*STARTED 8-9-83 COMPLETED 10-19-83	9-17-83 J.W. 4-4-84 S.V.	4-5-84 J.C.R.
1-RH-158-04-F0408-R-1 RESHOT STA 2-3, 3-4 & 4-0	10-19-83	10-19-83	II E.B.	ACC	None Required	10-21-83 J.W. 4-4-84	4-5-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-[illegible]-1307-15-F1503 2" Diameter 0.300" Thk ASME - CLASS 2	7-15-83	7-15-83	II R.B.	Rej. STA 1 & 2 Mismatch	*STARTED 7-15-83 COMPLETED 6-5-84**	9-17-83 J.W.	NONE
**Weld repair log in error - see R-1 below. Weld cut out and film discarded.							
1-[illegible]-1307-15-F1503-R-1 RESHOT 100%	4-19-84	4-19-84	II M.D.	Rej. STA 2 Incomplete Fusion	*STARTED 5-29-84 COMPLETED 2-5-85	NONE	2-21-85 B.J.M.
1-[illegible]-1307-15-F1503-R-2 RESHOT 100%	2-5-85	2-5-85	II M.D.	Rej. STA 2-3 for Porosity	*STARTED 2-5-85 COMPLETED 2-8-85	2-18-85 S.V.	2-21-85 B.J.M.
1-[illegible]-1307-15-F1503-R-3 RESHOT STA 2-3	2-8-85	2-8-85	II M.D.	Rej. STA 2-3 for Porosity	STARTED 2-13-85 COMPLETED 2-13-85	NONE	2-21-85 B.J.M.
1-[illegible]-1307-15-F1503-R-4 NCR-8939	2-15-85	2-15-85	II M.D.	ACC	None Required	2-18-85 S.V.	2-21-85 B.J.M.
1-RC-30-01-F0103 3" Diameter 0.648" Thk ASME - CLASS 1	11-22-82	11-22-82	II R.B. II K.B. 6-6-84	Rej. STA 0 & 1 Incomplete Fusion	*STARTED 11-22-82 COMPLETED 1-5-83	NONE	8-2-84 J.C.R.
1-RC-30-01-F0103-R-1 RESHOT 100% NCR-3983	10-24-83	10-24-83	II E.B. II K.B. 6-6-84	ACC	None Required	10-28-83 J.W. 7-24-84 S.V.	8-2-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-MS-4005-10-F1001 12" Diameter 0.778" Thk ANSI B31.1	5-4-82	5-4-82	III M.M.	Rej. STA 1-2 & 2-3 for Slag 0-1 & 3-0 melt thru	*STARTED 5-4-82 COMPLETED 7-2-82	11-16-83 J.W.	3-21-84 R.C.J.
1-MS-4005-10-F1001-R-1 RESHOT 100%	8-3-82	8-3-82	III M.M.	ACC	None Required	11-16-83 J.W.	3-21-84 R.C.J.
1-CO-4068-08-F0807 20" Diameter 0.684" Thk ANSI B31.1 Note: Original Film Discarded 9-18-84.	11-19-83	11-19-83	II M.D.	ACC	None Required	11-20-83 J.W.	NONE
1-CO-4068-08-F0807 RESHOT OF 1ST EXPOSURE	9-14-84	9-18-84	II L.L.	ACC	None Required	2-18-85 J.S.	2-19-85 J.C.R.
1-SI-257-01-F0104 4" Diameter 0.360" Thk ASME - CLASS 2 NCR-2193	6-17-82	6-17-82	III M.M.	ACC	None Required	11-5-83 J.W.	12-16-83 R.C.J.
1-SI-257-01-F0105 R-1 4" Diameter 0.400" Thk ASME - CLASS 2 Note: P-H weld performed to Dravo Spool Pc E2936-650. Dravo original weld cut out per NCR-2193	6-24-82	6-24-82	III M.M.	ACC	None Required	11-5-83 J.W.	12-20-83 R.C.J.
1-SI-256-01-F0107 4" Diameter 0.440" Thk ASME - CLASS 2 NCR-2193	8-21-82	8-27-82	III M.M.	ACC Pending reshot of STA 2-3 (penetrameter in Weld)	NONE	11-5-83 J.W.	12-20-83 R.C.J.
1-SI-256-01-F0107 RESHOT STA 2-3	8-30-82	8-30-82	III M.M.	ACC	None Required	11-5-83 J.W.	12-20-83 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-SI-261-04-F0402 6" Diameter 0.839" Thk ASME - CLASS 1	8-22-82	8-22-82	III M.M.	ACC	None Required	11-5-83 J.W.	NONE
Note: Film Discarded 7-17-84 (Reshot due to UG per K.B. on 7-20-84).							
1-SI-261-04-F0402 RESHOT 100%	7-17-84	7-20-84	II K.B.	ACC	None Required	7-20-84 S.V.	7-24-84 J.C.R.
1-RC-59-04-F0405 3" Diameter 0.688" Thk ASME - CLASS 1	2-5-84	2-6-84	II M.D.	ACC	None Required	2-15-84 J.S.	5-7-84 J.C.R.
1-RC-11-01-F0101 31" Diameter 3.35" Thk ASME III CLASS 1	12-3-82	12-3-82	II R.B.	Rej. STA 4-5 Incomplete Fusion	*STARTED 12-13-82 COMPLETED 12-21-82	NONE	NONE
Note: Weld Repair Log incorrectly identifies this weld as R-2 Note: Film shot with penetrameter on film side (Code Nonconformance). Reshot 10-11-83 & reviewed by M.D. on 7-30-84.							
1-RC-11-01-F0101 R-1 RESHOT STA 4-5 For Info Only - Film Discarded.	12-27-82	12-27-82	II R.B.	Rej. Due To Film Side Penetrameter	None Required	2-29-84 S.S. 7-20-84 S.V.	NONE
1-RC-11-01-F0101 R-1 RESHOT OF R-1 (See Note)	10-11-83	10-12-83	III J.W.	Rej. STA 3-4 Penetrameter in Weld	None Required	10-13-83 J.W. 7-19-84 S.V.	11-21-83 R.C.J.
1-RC-11-01-F0101 RESHOT STA 1-2 Per YAEC request (DR-603).	3-9-84	5-29-84	II M.D.	ACC	None Required	3-9-84 J.S. 7-20-84 S.V.	7-25-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-RC-11-01-F0101-R-1 RESHOT STA 3-4	3-16-84	5-29-84	II M.D.	ACC	NONE	7-20-84 S.V.	7-25-84 J.C.R.
1-SLX-66-01-F0101 8" Diameter 0.625" Thk ASME - CLASS 2 For Info Shot	10-25-82	10-26-82	II R.B.	Rej. STA 0-1, 2-3 & 3-0 Incomplete Fusion	*STARTED 10-26-82 Completed 11-04-82	NONE	NONE
1-SLX-66-01-F0101-R-1 RESHOT 100%	12-15-82	12-15-82	II R.B.	Rej. For UG	NONE	12-15-82 W.R.H.	NONE
1-SLX-66-01-F0101-R-1 RESHOT OF R-1	1-29-85	1-29-85	II S.R.	ACC	None Required	2-5-85 S.V.	2-6-85 J.C.R.
1-RH-155-06-F0608 (SHOP WELD "E") 8" Diameter 0.625" Thk ASME - CLASS 2 NCR-1296	11-6-83 & 11-7-83	11-7-83	II M.D.	Rej. STA 3-0 Transverse Linear	*STARTED 11-9-83 Completed 11-19-83	2-14-84 J.S.	3-13-84 R.C.J.
1-RH-155-06-F0101-R-1 (Renumbered as Field Weld) RESHOT STA 3-0	1-28-84	1-28-84	II M.D.	Rej. STA 3-0 due to Slag	*STARTED 1-21-84 COMPLETED 2-24-84	2-14-84 J.S.	3-13-84 R.C.J.
1-RH-155-06-F0101-R-2 RESHOT STA 3-0	2-9-84	2-9-84	II M.D.	ACC	None Required	2-14-84 J.S.	3-13-84 R.C.J.
1-FW-4630-01-F0114 8" Diameter 0.894" Thk ANSI B31.1	1-24-84	1-26-84	II M.D.	Rej. Due To Film Side Penetrameter	NONE	3-5-84 J.S.	5-7-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-FW-4630-01-F0114 RESHOT 1ST EXPOSURE	1-26-84	1-26-84	II M.D.	Rej. STA 2-3 Incomplete Fusion	*STARTED 1-27-84 COMPLETED 3-5-84	3-5-84 J.S.	5-7-84 J.C.R.
1-FW-4630-01-F0114-R-1 RESHOT STA 2-3	2-27-84	2-27-84	II M.D.	ACC	None Required	3-5-84 J.S.	5-7-84 J.C.R.
1-SB-1307-02-F0206 3" Diameter 0.360" Thk ASME - CLASS 1	1-23-84	1-24-84	II M.D.	Rej. STA 1-2 Incomplete Fusion	*STARTED 1-27-84 COMPLETED 2-15-85	1-31-85 S.V.	2-1-85 B.J.M.
1-SB-1307-02-F0206-R-1 RESHOT STA 1-2	1-30-85	1-30-85	II M.D.	ACC	None Required	1-31-85 S.V.	2-1-85 B.J.M.
1-RC-96-01-F001 2" Diameter 0.404" Thk ASME - CLASS 1	2-16-84	2-16-84	II M.D.	ACC	None Required	2-21-84 J.S.	NONE
	Note: P-H audit required 360 degree reshot due to UG.						
1-RC-96-01-F001 RESHOT 100%	7-3-84	10-20-84	II R.M.	ACC	None Required	10-26-84 S.V.	10-31-84 J.C.R.
1-RC-96-01-F004 2" Diameter 0.374" Thk ASME - CLASS 1 For Info SHOT	2-5-84	2-7-84	II M.D.	ACC	None Required	2-14-84 J.S.	NONE
1-RC-96-01-F004 RESHOT 100%	9-6-84	9-11-84	II L.L.	ACC	None Required	10-1-84 S.V.	10-5-84 B.J.M.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CC-821-01-F001 6" Diameter 0.378" Thk ASME - CLASS 2	4-5-84	4-5-84	II M.D.	Rej. STA 1-2 for Slag	*STARTED 4-6-84 COMPLETED 11-13-84	11-15-84 S.V.	11-30-84 B.J.M.
1-CC-821-01-F001-R-1 RESHOT STA 0-1 & 1-2	11-3-84	11-3-84	II M.D.	ACC	None Required	11-15-84 S.V.	11-30-84 B.J.M.
1-CC-821-01-F002 6" Diameter 0.370" Thk ASME - CLASS 2	4-9-84	4-9-84	II M.D.	ACC	None Required	4-16-84 J.S.	4-18-84 B.J.M.
1-CC-821-01-F003 6" Diameter 0.400" Thk ASME - CLASS 2	11-21-84	11-21-84	II R.M.	ACC	None Required	11-26-84 S.V.	11-30-84 B.J.M.
1-CC-821-01-F004 6" Diameter 0.340" Thk ASME - CLASS 2	12-3-84	12-3-84	II R.M.	ACC	None Required	12-21-84 S.V.	12-27-84 B.J.M.
1-CC-821-01-F019 6" Diameter 0.370" Thk ASME - CLASS 2	4-9-84	4-9-84	II M.D.	ACC	None Required	4-12-84 J.S.	4-17-84 B.J.M.
1-RC-13-07-F0703 12" Diameter 1.245" Thk ASME - CLASS 1	5-16-83	5-16-83	II R.B.	Rej. STA 0-1 & 1-2 Incomplete Fusion	*STARTED 5-16-83 COMPLETED 9-19-84	5-23-83 W.R.H.	9-5-84 B.J.M.
1-RC-13-07-F0703-R-1 RESHOT STA 0-1 & 1-2	8-28-84	8-29-84	II M.D.	ACC	None Required	8-31-84 S.V.	9-5-84 B.J.M.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-SI-201-02-F0208 10" Diameter 1.10" Thk ASME - CLASS 1	2-4-83	2-4-83	II R.B.	Rej. STA 1-2 For Porosity	*STARTED 2-8-83 COMPLETED 6-6-83	2-7-83 W.R.H. 8-14-84 S.V.	8-16-84 J.C.R.
1-SI-201-02-F0208 RESHOT STA 1-2	6-6-83	6-6-83	II R.B.	ACC	None Required	6-13-83 T.D. 8-14-84 S.V.	8-16-84 J.C.R.
1-FW-4607-03-F0309 16" Diameter 1.1" Thk ASME - CLASS 2	2-7-83	2-9-83	II R.B.	ACC	None Required	3-17-83 S.V.	3-21-84 R.C.J.
1-CO-4053-30-F3001 12" Diameter 0.585" Thk ANSI B31.1	3-29-83	3-29-83	II R.B.	Rej. STA 0-1 Incomplete Insert Melt	*STARTED 3-29-83 COMPLETED 5-4-83	3-29-83 W.R.H.	2-27-85 J.C.R.
1-CO-4053-30-F3001-R-1 RESHOT STA 0-1	5-4-83	5-4-83	II R.B.	ACC	None Required	5-4-83 W.R.H.	2-22-85 J.C.R.
1-CO-4053-30-F3001-R-1 RESHOT 100%	1-30-84	1-30-84	II M.D.	ACC	None Required	2-3-84 J.S.	2-27-85 J.C.R.
1-CO-4053-30-F3001-R-1 RESHOT STA 0 (Reshot per YEAC request)	1-30-84	2-2-84	II M.D.	ACC	None Required	2-3-84 J.S.	2-27-85 J.C.R.
1-CO-4053-30-F3001-R-1 RESHOT STA 0	2-25-85	2-26-85	II R.S.	ACC	None Required	2-26-85 J.S.	2-27-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CS-432-03-F0301 4" Diameter 0.330" Thk ASME - CLASS 2	1-28-83	1-28-83	II R.B.	Rej. STA 0-1 Incomplete Insert Melt	*STARTED 1-31-83 COMPLETED 4-1-83	4-5-83 W.R.H.	9-5-83 R.C.J.
1-CS-432-03-F0301-R-1 RESHOT STA 0-1	4-1-83	4-1-83	II R.B.	ACC	None Required	4-5-83 W.R.H.	9-25-83 R.C.J.
1-RC-6-01-F0102 27" Diameter 2.63" Thk ASME - CLASS 1	12-30-82	12-30-82	II R.B.	Rej. STA 1-2 & 2-3 Incomplete Fusion	*STARTED 12-30-82 COMPLETED 1-3-83	11-1-83 J.W.	12-15-83 R.C.J.
1-RC-6-01-F0102-R-1 RESHOT STA 1-2 & 2-3	10-1-83	10-5-83	III J.W.	ACC	None Required	10-5-83 J.W.	11-21-85 R.C.J.
1-RC-6-01-F0102 RESHOT STA 6-7	12-7-83	12-8-83	II M.D.	ACC	None Required	12-1-83 J.W.	12-15-83 R.C.J.
1-RH-152-01-F0102 8" Diameter 0.382" Thk ASME - CLASS 2 NCR-4172 & NCR-5542	8-12-83	8-12-83	II R.B.	Rej. STA 1-2 & 2-3 Incomplete Fusion	*STARTED 8-17-83 COMPLETED 11-16-83	12-1-83 J.W.	4-10-84 J.C.R.
1-RH-152-01-F0102-R-1 RESHOT STA 1-2 & 2-3 NCR-5542	11-29-83	11-29-83	II M.D.	ACC	None Required	12-1-83 J.W.	4-10-84 J.C.R.
1-CBS-1214-05-F0512 8" Diameter 0.412" Thk ASME - CLASS 2	10-25-83	10-25-83	II M.D.	Rej. STA 2-3 & 3-0 Incomplete Fusion	*STARTED 10-25-83 COMPLETED 1-12-84	1-25-84 J.S.	7-16-84 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CBS-1214-05-F0512-R-1 RESHOT STA 2-3 & 3-0	1-12-84	1-12-84	II M.D.	ACC	None Required	1-29-84 J.S. 7-12-84 S.V.	7-6-84 J.C.R.
1-CBS-1214-05-F0503 8" Diameter 0.412" Thk ASME - CLASS 2	10-25-83	10-25-83	II E.B.	Rej. STA 0-1 & 3-0 Root Concavity 1-2 & 2-3 Incomplete Fusion	*STARTED 10-25-83 COMPLETED 2-2-84	1-29-84 J.S.	8-27-84 J.C.R.
1-CBS-1214-05-F0503-R-1 RESHOT 100%	1-12-84	1-12-84	II M.D.	Rej. STA 0-1 & 3-0 Density UNACC	NONE	1-28-84 J.S.	8-27-84 J.C.R.
1-CBS-1214-05-F0503-R-1 RESHOT STA 0-1 & 3-0 For Info Reshot (Film Discarded)	1-17-84	1-17-84	II M.D.	ACC	None Required	1-28-84 J.S.	NONE
1-CBS-1214-05-F0503-R-1 RESHOT 100%	8-1-84	8-20-84	II L.L.	ACC	None Required	8-22-84 S.V.	8-27-84 J.C.R.
1-CBS-1216-04-F0403 8" Diameter 0.417" Thk ASME - CLASS 2	10-25-83	10-25-83	II E.B.	Rej. STA 0-1 & 3-0 Incomplete Insert Melt Incomplete Fusion	*STARTED 10-25-83 COMPLETED 1-21-84	10-25-83 D.C.	5-15-85 J.C.R.
1-CBS-1216-04-F0403-R-1 RESHOT 100%	1-12-84	1-12-84	II M.D.	Rej. STA 1-2 for Incomplete Fusion & STA 2-3 for Crater Pit	*STARTED 1-12-84 COMPLETED 5-3-85	5-14-85 D.C.	5-15-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CBS-1216-04-F0403-R-2 RESHOT STA 1-2 & 2-3	5-3-85	5-3-85	II M.D.	Rej. STA 1-2 & 2-3 Incomplete Fusion	*STARTED 5-3-85 COMPLETED 5-14-85	5-14-85 D.C.	5-15-85 J.C.R.
1-CBS-1216-04-F0403-R-3 RESHOT STA 1-2 & 2-3	5-13-85	5-14-85	II R.M.	ACC	None Required	5-14-85 D.C.	5-15-85 J.C.R.
1-RH-158-08-F0803 6" Diameter 0.779" Thk ASME - CLASS 2	8-29-83	8-30-83	II R.B.	Rej. STA 0-1, 1-2, 2-3 & 3-4 for Slag	*STARTED 8-31-83 COMPLETED 10-19-83	9-17-83 J.W.	4-15-84 J.C.R.
1-RH-158-08-F0803-R-1 RESHOT 100%	10-31-83	10-31-83	II E.B.	ACC	None Required	11-2-83 J.W.	4-15-84 J.C.R.
1-FW-4607-17-F1704 4" Diameter 0.400" Thk ASME - CLASS 2	9-29-83	9-29-83	II R.B.	Rej. STA 3-0 Porosity with Linears	*STARTED 10-5-83 COMPLETED 10-12-83	10-28-83 J.W.	11-27-83 R.C.J.
1-FW-4607-17-F1704-R-1 RESHOT STA 3-0	10-17-83	10-17-83	III J.W.	Rej. STA 3-0 Porosity with Tails	*STARTED 10-18-83 COMPLETED 11-15-83	10-28-83 J.W.	11-27-83 R.C.J.
1-FW-4607-17-F1704-R-2 RESHOT STA 3-0	10-26-83	10-26-83	II E.B.	ACC	None Required	10-28-83 J.W.	11-27-83 R.C.J.
1-CBS-1225-08-F0805 4" Diameter 0.297" Thk ASME - CLASS 2	10-25-83	10-25-83	II E.B.	Rej. STA 0-1 Incomplete Insert Melt & STA 3-0 Root Concavity	*STARTED 10-25-83 COMPLETED 1-12-84	5-8-85 J.S.	5-15-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 3 - (continued)

107 WELD SAMPLE Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CBS-1225-08-F0805-R-1 RESHOT STA 0-1 & 3-0	1-12-84	1-12-84	II M.D.	Rej. STA 3-0 Incomplete Fusion	*STARTED 1-12-84 COMPLETED 5-7-85	5-8-85 J.S.	5-15-85 J.C.R.
1-CBS-1225-08-F0805-R-2 RESHOT STA 2-3 & 3-0	5-7-85	5-7-85	II M.D.	ACC	None Required	5-8-85 J.S.	5-15-85 J.C.R.
1-FW-4626-01-F0103 3" Diameter 0.360" Thk ANSI B31.1	10-26-83	10-26-83	II E.B.	Rej. STA 2-3 Incomplete Fusion	*STARTED 10-26-83 COMPLETED 11-4-83	10-28-83 J.W.	2-15-85 J.C.R.
1-FW-4626-01-F0103-R-1 RESHOT STA 2-3	11-4-83	11-4-83	II M.D.	ACC	None Required	11-14-83 J.W.	2-15-85 J.C.R.
1-RC-33-04-F0401 2" Diameter 0.434" Thk ASME - CLASS 1	6-4-84	6-5-84	II M.D.	ACC	None Required	6-22-84 S.V.	7-3-84 J.C.R.
1-DG-4355-01-F0113 12" Diameter 0.495" Thk ANSI B31.1	9-12-83	9-12-83	II R.B.	Rej. STA 1-2 for Lack of Penetration	Repairs Made by UE & C	3-13-84 J.S.	6-4-85 R.C.J.
Note: P-H partially completed original welding as identified by RIR dated 9-12-83. Original weld's completion and repairs was done by UE & C per new RIR dated 9-12-83 .							
1-DG-4355-01-F0113 Note: Re-reviewed and evaluated by UE & C	9-12-83	6-4-85	II C.R.S.	Rej. STA 1-2 Re-evaluated Incomplete Fusion	STARTED 5-31-85 COMPLETED 6-3-85	N/A	6-4-85 R.C.J.
1-DG-4355-01-F0113-R-1 RESHOT STA 1-2	6-4-85	6-4-85	II C.R.S.	ACC	None Required	N/A	6-4-85 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 4 107-Weld Sample - Film Quality

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-CS-357-01-F0406 NRC Review: SAT NCR's Referenced: 6311 & 7966 Plus DR-716	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-DG-4363-04-F0112-R-3 NRC Review: SAT NCR's Referenced: None Plus DR-626	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-5-01-F0101 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45/50 SAT	SAT
1-RC-05-01-F0102 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45 SAT	SAT
1-RC-5-01-F0103 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	40 SAT	SAT
1-RC-2-01-F0101-R-1 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-2-01-F0102 NRC Reviews: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45 SAT	SAT
1-RC-2-01-F0103 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45 SAT	SAT
1-RC-11-01-F0104 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45/50 SAT	SAT
1-RC-11-01-F0102 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	40 SAT	SAT
1-RC-11-01-F0103 NRC REVIEW: SAT NCR's REFERNCED: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45 SAT	SAT
1-RC-44-05-F0501 R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-8-01-F0101 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	45 SAT	SAT
1-RC-8-01-F0102 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	40/45 SAT	SAT
1-RC-8-01-F0103 NRC Review: SAT NCR's Referenced: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	40/45 SAT	SAT
1-DG-4351-01-F0102-R-1 NRC REVIEW: SAT NCR's REFERENCED: NCR-1948 was written on original weld.	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-7-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-1T SAT	45/50 SAT	SAT
1-RC-13-02-F0202 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-13-04-F0403 & R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-13-07-F0704-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-1T SAT	25 SAT	SAT
1-CBS-1216-06-F0607 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CBS-1216-06-F0607 and R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-CS-365-01-F0111 R-2 NRC REVIEW:SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-FW-4628-01-FW-201 Through R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RH-158-04-F0411 and R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-2T SAT	15 SAT	SAT
1-CS-374-10-F001 and R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-SI-275-01-F0104-R-1 NRC REVEIW: SAT NCR's REFERENCED: NCR-7967	NO	SAT	SAT M	Double Wall Offset SAT	2-4T SAT	10 SAT	SAT
1-SB-1310-06-F0605 and R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-7-01-F0102 & BMR-103 and R-1 NRC REVIEW:SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-1T SAT	35/40/45 SAT	SAT
1-RC-44-05-F501-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-4-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	45 SAT	SAT
1-MS-4001-01-F0102 and R-1 NRC REVIEW: SAT NCR's REFERENCED: 5773 Plus DR-544	NO	SAT	SAT M	Panoramic SAT R-1 was Double Wall	2-4T SAT	17/20/25 SAT	SAT
1-RC-3-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	40/45 SAT	SAT
1-RC-91-F410005-F002-R-4 NRC REVIEW: SAT NCR's REFERENCED: 7869A & 7869C	NO	SAT	SAT M	Double Wall Offset SAT	2-4T SAT	10 SAT	SAT
1-RC-97-02-F0203 Through R-2 NRC REVIEW: SAT NCR's REFERENCED: 73-11065A Plus DN-090 (reshot for UG)	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-CS-523-01-F0101 and R-1 NRC REVIEW: SAT NCR's REFERENCED: DN-090 (reshot for UG)	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-CS-431-02-F0203 and R-1 NRC REVIEW: SAT NCR's REFERENCED: 73/11252A	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-SI-201-02-F0201 R-2 & R-3 NRC REVIEW: SAT NCR's REFERENCED: 4548 & 82-637A	NO	SAT	SAT M	Double Wall SAT	2-2T SAT	17/25 SAT	SAT
1-RH-158-04-F0406 and R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-CS-365-01-101-R-2 Reshot of R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall Offset SAT	2-4T SAT	10 SAT	SAT
1-RC-91-F41005-F005-R-1 ASME III - CLASS 1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-4501-1-F0107-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-DG-4355-01-F0112-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	4-T SAT	20/25 SAT	SAT
DR-633 Note: RIRs and Film for original exposures and repair were discarded.							
1-DG-4355-01-F0112-R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	20/25 SAT	SAT
1-DG-4355-01-F0112 RESHOT REPAIR R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	20 SAT	SAT
1-DG-4355-01-F0112 RESHOT R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	20 SAT	SAT
1-RH-155-06-F0605 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 SAT	SAT
1-RH-155-06-F0605-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-6-01-F0101-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-1T 2-2T SAT	40/45 SAT	SAT
1-RH-158-01-F0101-R-2 Reshot 100% NRC REVIEW:SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-30-03-F0303 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12/15 SAT	SAT
1-DG-4363-01-F0102 exp. after info only NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	10/12 SAT	SAT
1-DG-4351-01-F0103 NRC REVIEW: SAT NCR's REFERENCED: NCR-2706 NOTE: J.G. Sylvestor film; no reader sheet in film package	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	10 SAT	SAT
1-DG-4351-01-F0103-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-2T 2-4T SAT	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-DG-4351-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: None NOTE: J.G. Sylvestor film; no reader sheet in film package	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	10 SAT	SAT
1-DG-4551-01-F0101-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	10 SAT	SAT
1-FW-4600-06-F0602 NRC REVIEW: SAT NCR's REFERENCED: NCR-1788	NO	SAT	SAT AA	Double Wall SAT	2-4T SAT	30 SAT	SAT
1-FW-4600-06-F0602-R-1 RESHOT NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT T	Panoramic SAT	2-4T SAT	20/25 SAT	SAT
1-DG-4363-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: For Info RT per UE & C NCR-74-2064 NOTE: J.G. Sylvestor film; no reader sheet in film package	NO	SAT		Panoramic SAT	4-T SAT	10 SAT	SAT
1-DG-4363-01-F0101-R-1 exp. after info NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-FW-4634-03-F0303 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-FW-4634-03-F0303-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CBS-1201-05-F0507 Partial weld NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	NA SAT	NA SAT	SAT
1-CBS-1201-05-F0507-R-1 Reshot 100% Finished weld NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CBS-1201-05-F0507-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-CBS-1201-05-F0507-R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-SI-204-02-F0205 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-SI-204-02-F0205-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-SI-204-02-F0205-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-CS-366-02-F0203 NRC REVIEW: SAT NCR's REFERENCED: None	N/A film discarded	NA	SAT M	Double Wall SAT OFFSET ZERO	2-4T UNSAT	12 SAT	SAT
1-CS-366-02-F0203-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	N/A film discarded	UNSAT POOR TECHNIQUES	UNSAT M	Double Wall SAT OFFSET ZERO	2-4T SAT	12 SAT	SAT
1-CS-366-02-F0203-R-1 SHOT FOR INFO ONLY NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-CS-366-02-F0203-R-2 NRC REVIEW: SAT NCR's REFERENCED: NCR-7308 R/2	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-CS-366-02-F0203-R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-CS-366-02-F0203-R-4 NRC REVIEW: SAT NCR's REFERENCED: NCR 7308	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-SI-273-02-F0203 NRC REVIEW: SAT NCR's REFERENCED: None	NO (shot for info only - film discarded)	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SI-273-02-F0203-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SI-273-02-F0203-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-30-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: NCR-5293	FOR INFO ONLY (weld cut out per NCR 5293 - film discarded)		SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-30-01-F0101-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	UNSAT TO LIGHT	UNSAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-30-01-F0101-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-30-01-F0101-R-3 NRC REVIEW: SAT NCR's REFERENCED: NCR-7461	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-30-01-F0101-R-4 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-SLX-43-01-F0114 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-SLX-43-01-F0114-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	10/12 SAT	SAT
1-SLX-43-01-F0114-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	10/12 SAT	SAT
1-SLX-43-01-F0114-R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Single Wall SAT	2-4T SAT	10/12 SAT	SAT
1-RC-59-05-F0502 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-59-05-F0502-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	N/A (info only - film discarded due to density)	DENSITY UNACC	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-RC-59-05-F0502-R-1 RESHOT STA 4-0 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-59-05-F0502-R-1 RESHOT 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-SB-1301-05-F0515-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SB-1301-05-F0515-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SB-1301-05-F0515-R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/15 SAT	SAT
1-FW-4609-03-F0305 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-FW-4609-03-F0305-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-74-01-F012 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 SAT	SAT
1-RC-74-1-F012 R/1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 SAT	SAT
1-RC-15-04-F0403 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-RC-15-04-F0403-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAt	2-4T SAT	10/12 SAT	SAT
1-RC-15-04-F0403-R-1 RESHOT 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-15-07-F0702-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-15-07-F0702-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-CS-374-1-F037 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-15-05-F0504 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-15-05-F0504-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-59-06-F0602 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-RC-62-01-F0106 NRC REVIEW: SAT NCR's REFERENCED: None	NO	UNSAT UG/DENSITY	UNSAT M	Double Wall UNSAT	2-4T NA	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-62-01-F0106-R-1 Reshot 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO FILM VIEWED	UNSAT DENSITY PER RIR SHEET	UNSAT M	Double Wall UNSAT	2-4T	10/12 SAT	SAT
1-RC-62-01-F0106-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-62-01-F0106-R-1 RESHOT STA 4-0 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CS-377-01-F0103 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CS-377-01-F0103-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-SI-256-04-F0411 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SI-256-04-F0411-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall UNSAT	2-4T SAT	10/12 SAT	SAT
1-SI-256-04-F0411-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RH-158-04-F0408 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-RH-158-04-F0408-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-SB-1307-15-F1503 NRC REVIEW: SAT NCR's REFERENCED: None	INFO ONLY cut out completely	N/A	SAT M	Double Wall SAT	2-4T	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-SB-1307-15-F1503-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SB-1307-15-F1503-R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SB-1307-15-F1503-R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SB-1307-15-F1503-R-4 NRC REVIEW: SAT NCR's REFERENCED: NCR-8939	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-30-01-F0103 NRC REVIEW: SAT NCR's REFERENCED: NCR-3983	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12/15 SAT	SAT
1-RC-30-01-F0103-R-1 NRC REVIEW: SAT NCR's REFERENCED: NCR-3983	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-MS-4005-10-F1001 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT AX	Double Wall SAT	2-4T SAT	15 SAT	SAT
1-MS-4005-10-F1001-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-2T SAT	15 SAT	SAT
1-CD-4068-08-F0807 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	12 SAT	SAT
1-CD-4068-08-F0807 RESHOT OF 1ST EXPOSURE NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	12	SAT
1-SI-257-01-F0104 NRC REVIEW: SAT NCR's REFERENCED: NCR 2193	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SI-257-01-F0105-R-1 NRC REVIEW: SAT NCR's REFERENCED: NCR 2193	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-SI-256-01-F0107 NRC REVIEW: SAT NCR's REFERENCED: NCR 2193	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-SI-256-01-F0107 RESHOT NRC REVIEW: SAT NCR's REFERENCED: NCR-2193	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-SI-261-04-F0402 NRC REVIEW: SAT NCR's REFERENCED: None	*N/A *INFO ONLY, RESHOOT - UG UNSAT, FILM DISCARDED 7/17/84 PER K.B. 7/20/84	UNSAT	UNSAT M	Double Wall SAT	2-4T SAT	17/15 SAT	SAT
1-SI-261-04-F0402 RESHOT 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 SAT	SAT
1-RC-59-04-F0405 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-11-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-2T NA	40 UNSAT Film Side Penetrameters	SAT
1-RC-11-01-F0101 R/1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	40 UNSAT Film Side Penetrameters	SAT
	STA 4-5, FILM DISCARD, SEE RIR 10/11/83 FOR FINAL ACCEPTANCE (M.D.						
1-RC-11-01-F0101 R/1 RERSHOT 100% NRC REVIEW: SAT NCR's REFERENCE: None	NO	SAT	SAT M	Panoramic SAT	2-1T, 2-2T, 2-4T	45 UNSAT Penetrameter in toe of weld Reshoot	SAT
1-RC-11-01-F0101 R/1 *RESHOT OF STA 1-2 NRC REVIEW: SAT NCR's REFERENCED: NONE	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	40/45 SAT	SAT
	*Per YAEC & NRC Request						
1-RC-11-01-F0101 R/1 RESHOT OF STA. 3-4 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-2T SAT	40 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RH-155-06-F0608 (SHOP WELD "e") NRC REVIEW: SAT NCR's REFERENCED: NCR-1296	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-RH-155-06-F0608 R/1 NRC REVIEW: SAT NCR's REFERENCED: NCR-1296	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
1-RH-155-06-F0608 R/2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	17 SAT	SAT
	UT - THICKKNESS TAKEN 3/8/89 ON STA. 3-0 MIM. TK=.798" PRO.SPEC. IX-UT3-77						
1-FW-4630-01-F0114 NRC REVIEW: SAT NCR's REFERENCED: None	NO	UNSAT	SAT	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-FW-4630-01-F0114 RESHOT OF 1ST EXPOSURE NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT
1-FW-4630-01-F0114 R/1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-SB-1307-02-F0206 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SB-1307-02-F0206 R/1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-SLX-66-01-F0101 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-4T SAT	12	SAT
1-SLX-66-01-F0101 R/1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	UNSAT UG-FACTOR FILM UNACC.	UNSAT M	Panoramic SAT	2-4T SAT	10/12 SAT	SAT
1-SLX-66-01-F0101 R/1 Reshot 100% NRC REVIEW: SAT NCR's REFERENCED: None Plus DR-626	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-RC-96-01-F001 NRC REVIEW: SAT NCR's REFERENCED: None	NO	UNSAT UG	UNSAT M	Double Wall SAT	2-4T SAT	10/12 SAT	UNSAT HAZ Not Covered
1-RC-96-01-F001 RESHOT 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-96-01-F004 RESHOT 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CC-821-01-F001 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CC-821-01-F001-R-1 STA 0-1 & 1-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CC-821-01-F002 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-CC-821-01-F003 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CC-821-01-F004 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CC-821-01-F019 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-13-07-F0703+R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-2T SAT	25 SAT	SAT
1-SI-201-02-F0208+R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-2T SAT	17/25 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-FW-4607-03-F0309 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-2T SAT	15/17 SAT	SAT
1-CO-4055-30-F3001 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CO-4055-30-F3001-R-1 RESHOT STA 0-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CO-4055-30-F3001-R-1 RESHOT 100% NRC REVIEW: SAT NCR's REFERENCED: None Per YAEC request (DR-716)	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CO-4055-30-F3001-R-1 RESHOT STA 0 NRC REVIEW: SAT NCR's REFERENCED: None Per YAEC request (DR-716)	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 Penetrameter in Weld Zone	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-CO-4055-30-F3001-R-1 RESHOT STA 0 NRC REVIEW: SAT NCR's REFERENCED: None Per YAEC request (DR-716)	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 SAT	SAT
1-CS-432-03-F0301 NRC REVIEW: SAT NCR's REFERENCED: NCR-1698	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CS-432-03-F0301-R-1 NRC REVIEW: SAT NCR's REFERENCED: NCR-1698	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-6-01-F0102-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Panoramic SAT	2-1T SAT	30/35/45 SAT	SAT
1-RH-152-01-F0102-R-1 NRC REVIEW: SAT NCR's REFERENCED: NCRs 4172 & 5542	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-CBS-1214-05-F0512+R-1 NRC REVIEW: SAT NCR's REFERENCED: NCR-4741	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CBS-1214-05-F0503-R-1 Reshot 100% NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-CBS-1216-04-F0403,R-1+R-3 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT
1-RH-158-08-F0803-R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	15 SAT	SAT
1-FW-4607-17-F1704+R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-CBS-1225-08-F0805,R-1+R-2 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT

Table 4 - (continued)

107 WELD SAMPLE Weld Number	Has Aging Affected Film Quality	Density & Geometric Unsharpness	Technique and Film Type	Source Positioned Correctly	Sensitivity	Penetrameter Size number & Location	Weld Coverage
NOTE: ALL FILMS WERE REVIEWED FOR WELD DISCONTINUITIES. HOWEVER, ONLY FINAL WELD RADIOGRAPHS WERE VERIFIED TO BE CODE ACCEPTABLE.							
1-FW-4626-01-F0103+R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-RC-33-04-F0401 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10 SAT	SAT
1-DG-4355-01-F0113+R-1 NRC REVIEW: SAT NCR's REFERENCED: None	NO	SAT	SAT M	Double Wall SAT	2-4T SAT	10/12 SAT	SAT

III. EVALUATION OF REJECTED WELDS FROM JOSEPH WAMPLER'S LOGBOOK

The team reviewed radiographs of all 27 backlog welds that Wampler's logbook indicated he had rejected for weld defects. The team reviewed these radiographs to determine if (1) his rejection of the film was valid, (2) subsequent review revealed any valid discrepancies, and (3) corrective actions were adequate. The team's ultimate goal was to establish whether the overview programs conducted by P-H and YAEC were sufficiently effective to identify known discrepancies seeded into the program through lack of previous documentation. This review also was expected to provide an acceptable level of confidence to enable an accurate evaluation of the "missing" NCRs, that is, those which Wampler had not issued before he left Seabrook. The review also was to determine whether the licensee had properly addressed these discrepancies, that is, whether any NCRs were actually missing.

The team also reviewed the radiographs and associated documentation for weld 1-CO-4059-04-F0403 because Wampler raised a specific concern about it during his interview with the team. Each weld reviewed is listed in Table 5, which is set up in a format similar to that of Tables 1 and 3.

On the basis of its review as discussed below, the team considered all 27 welds (from Wampler's logbook) as welds for which Wampler should have initiated corrective action in accordance with Paragraphs 2.3 and 4.1 of P-H Procedure JS-IX-14. The team considered the 27 welds to be the total population about which Wampler expressed concern during his interview with the team. The team also concluded that Wampler apparently had not formally documented his rejection of the 27 welds before he left Seabrook.

Another conclusion reached during the radiographic reviews of the welds listed in Senator Kennedy's letter and the other welds selected by the team was that Wampler's apparent lack of formal communication regarding his rejection of backlog film often contributed to the delay in correcting the deficiencies involved. This conclusion was supported by the examination of the Weld Repair Log. When the P-H Level II reviewer or Level III examiner rejected a weld during its first radiographic review or when Wampler rejected a production weld, the necessary rework was usually scheduled immediately. However, when Wampler rejected a backlog weld, as identified in his logbook, a subsequent separate review was required to reidentify the discrepancy and initiate appropriate corrective action. The result was often a year's delay before corrective action began.

The team's assessment of Wampler's rejections is provided in the paragraphs that follow. Details of the licensee's subsequent corrective action regarding each weld are provided as they relate to the quality of the final radiographs and the soundness of the welds.

Weld 1-CO-4065-01-F0103

This 0.375-inch-thick weld was in a 12-inch-diameter carbon steel pipe in the condensate system located in the turbine building. The weld was considered non-nuclear and was fabricated in accordance with the American National Standards Institute (ANSI) B31.1 Code. It was first radiographed on December 21,

1981, and evaluated by a P-H Level II reviewer on December 22, 1981. The Level II reviewer rejected the weld for the following reasons: Film station 0-1 had incomplete insert melt and incomplete penetration, film station 1-2 had incomplete insert melt and incomplete fusion, and film station 3-4 had incomplete insert melt and mismatch. The Weld Repair Log indicated that the weld was scheduled for repair on December 22, 1981, and that the repair was completed on May 25, 1982. It was reradiographed and evaluated as acceptable on December 29, 1982. On April 19, 1983, a P-H Level III examiner (W.R.H.) reviewed the film and signed the RIR for the radiographs taken on December 21, 1981. However, the P-H Level III examiner had not signed the RIR for the radiographs taken on December 29, 1982, at that time. Wampler's logbook entry of November 21, 1983, indicated that he had reviewed the radiographs of this weld and had rejected film station 0-1 for porosity with tails. The radiographic film for station 0-1 had a crayon mark under a small spot of porosity, indicating his area of concern. On January 22, 1985, a P-H Level II reviewer reviewed it again and accepted it as part of the P-H overview program; on February 18, 1985, a P-H Level III examiner (J.S.) reviewed and accepted the weld on the basis of his radiographic review. YAEC's review was performed on February 23, 1985, and the weld was evaluated as acceptable.

During its review of radiographs for this weld, the team noted that the indication between station 0-1 had been highlighted and was evaluated as a small spot of acceptable porosity. However, the team observed a very faint indication between film station 1-2 that was considered to be rejectable unless a reshot with better contrast could be provided to enable a more accurate re-evaluation of the discontinuity. This indication had not been identified during any of the P-H or YAEC reviews.

YAEC's Level III examiner did not agree with the team's conclusion. To resolve this issue, the licensee drained the condensate line and reshot the area in question. The issue remained unresolved because the sensitivity of the reshot film was less than that of the original film. However, the reshot clearly confirmed that the indication was present.

The team's consensus was that the indications were porosity with microfissures caused by too rapid a pullout of the weld electrode when starting or stopping a weld bead. The licensee considered the indications to be unconnected pockets of porosity that the code allowed. The licensee planned to digitize the original radiographs in order to resolve the difference in technical opinions. The team noted that although acceptable porosity was present between station 0-1, none of the subsequent reviews (including the team's review) supported Wampler's identification of porosity with tails. The final radiographs were of good quality and demonstrated better sensitivity (the 2-2T penetrameter hole was distinguishable) than the 2-4T code minimum.

When the team returned to the Seabrook site on May 14, 1990, the licensee had contracted with Dupont to perform image digitization on the subject radiographs (the originals and the reshots). The digitized-image process improves contrast and resolution. This computer-aided process is able to distinguish among a much wider range of "grays" than what is visible to the human eye. The digitized image was then transferred to magnetic tape, which enabled the examination of a particular section or area by transferring it back to hard-copy film in a number of image formats. In the case of weld 1-CO-4065-01-F0103, an exposure

was taken at 2x and 4x magnification. The team reviewed the image formats of the digitized film and agreed that the areas that had initially appeared to be microfissures originating from the porosity were in fact lightly defined areas of the porosity indications, which when magnified and digitized could be identified as separate indications of acceptable porosity. This evaluation agreed with the licensee's Level III examiner's initial evaluation.

Weld 1-MS-4003-10-F1003

This 1.445-inch-thick weld was in a 30-inch-diameter carbon steel pipe in the main steam system located in the west pipe chase. The weld was considered nuclear and was fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. It was first radiographed on September 30, 1982, and evaluated as acceptable on that date. Wampler's logbook notation for November 16, 1983, indicated that film station 4-5 was rejectable because of lack of fusion. However, there was no documented evidence that Wampler had notified anyone of his rejection. On March 23, 1984, another P-H Level III examiner (J.S.) reported in NCR-6661 that weld 1-MS-4003-F1003 was reradiographed on March 18, 1984, because of a questionable indication identified during a re-review of the film by the site Level III examiner (S.V.). The reshot verified Wampler's previous determination of lack of fusion at film station 4-5.

There was no entry in the Weld Repair Log that verified this weld was repaired. However, the weld package did have a process sheet for the repair that was made on December 21, 1984, and successfully reexamined using radiography on January 2, 1985. The team's review of the final weld radiographs revealed that the weld soundness and film quality for this weld exceeded minimum code requirements.

Weld 1-CS-364-03-F0301

This 0.528-inch-thick weld was in a 3-inch-diameter stainless steel pipe in the chemical and volume control system located in the primary auxiliary building. The weld was considered nuclear and was fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. It was first radiographed on July 24, 1982, and evaluated as unacceptable on that date. The rejection was based on slag inclusions in film stations 0 and 2. Film station 2 was repaired on October 12, 1982, and reradiographed on November 4, 1982. During the repair, P-H issued NCR-2583 to document the groundout areas. Wampler's logbook entry on November 30, 1983, indicated that he had reviewed the radiographs of this weld and noted that station 0 had not been repaired. However, there was no documented evidence that Wampler had notified anyone that he had rejected the weld. The entire weld was reshot on April 19, 1984. During a re-review of this weld on May 7, 1984, the rejectable slag indication at film station 0 was identified as an unsatisfactory condition and NCR-7270 was issued. The weld was repaired on September 28, 1984, and the repaired area was radiographed on September 29, 1984, and evaluated as acceptable. The radiographic quality of the final radiographs was excellent. The weld soundness as revealed by radiography also was very good.

Weld 1-FW-4617-01-F0101

This 0.450-inch-thick weld was in a 4-inch-diameter carbon steel pipe in the feedwater system located in the west pipe chase. The weld was fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. The weld was first radiographed on September 22, 1982, and was evaluated as acceptable on that date. Wampler's logbook indicated that he had reviewed this film on November 16, 1983, and rejected film station 1-2 for porosity with linear indications. The team could not verify an initial Level III official examination because this was one of the very few welds without a P-H Level III signature on the RIR. However, the P-H Level II reviewer noted on the RIR that film station 1-2 included acceptable slag. The YAEC overview examiner reviewed the weld on March 21, 1984, and concurred in the P-H Level II evaluation. The team's evaluation of this weld did not support Wampler's interpretation. There were no linear indications associated with the porosity in this weld. The weld and the quality of the radiographic film were very good.

Weld 1-FW-4606-10-F1002

This 1.336-inch-thick weld was in an 18-inch-diameter carbon steel pipe in the feedwater system. The weld was considered nuclear and was fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. Engineering Change Authorization (ECA) 19104281A, dated March 29, 1985, required replacement of this weld because its associated valve and adjacent piping were being removed. Because the film and the RIRs for the weld were discarded, the team was unable to assess Wampler's logbook entry indicating his rejection of the original weld. The new weld was radiographed on July 25, 1985, and was evaluated as acceptable on the same date. The team's examination of the final radiographs verified that they were of very good quality and that the weld exceeded minimum code requirements.

Weld 1-FW-4608-13-F1302

This 1.246-inch-thick weld was in an 18-inch-diameter carbon steel pipe in the feedwater system. The weld was considered nuclear and was fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. It was first radiographed on August 19, 1982, and was evaluated as acceptable by the P-H Level III examiner who performed the initial review.

Wampler's logbook entry for November 16, 1983, indicated that he had reviewed the film and rejected station 1-2 because of slag. Wampler did not sign the RIR or provide any other documentation of his rejection. However, a Level II reviewer identified the same discontinuity during a subsequent P-H review, and NCR-7487 was issued on August 22, 1984. The NCR also noted that the weld joint had been hydrotested.

None of the examiners, however, noted that the wrong radiographic technique had been used (panoramic), causing the film to have unacceptable geometrical unsharpness (Ug). This condition was discovered by another P-H Level II reviewer on January 23, 1985, and the complete weld was reshot using the correct technique (double-wall) on the same date. The old films that had been reviewed by Wampler and the other P-H examiners were discarded since they were

not code acceptable. The evaluation of the new film by the P-H Level II reviewer, the P-H Level III examiner, the YAEC overview reviewer, and the NRC team established that there was no slag in this weld. The radiographic sensitivity of the new film was 2-1T, which exceeded minimum code requirements. Therefore, the NCR that had been issued to repair this weld was also voided on January 23, 1985. The team also visually examined this weld to reverify the proper identification of the associated radiographs.

Weld 1-MS-4007-01-F0106

This 1.281-inch-thick weld was in a 30-inch-diameter carbon steel pipe in the main steam system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. It was first radiographed on August 16, 1982, and was evaluated by a P-H Level III examiner on that date as having unacceptable fusion between film stations 3-4. The weld repair was completed on September 3, 1982, and was reshot on October 1, 1982, when it was evaluated as acceptable. The reshot radiographs of film station 3-4 may have been temporarily mislaid when Wampler reviewed the weld package on November 15, 1983, because his logbook entry of that date listed basically the same conditions noted by the P-H Level III examiner who initially had read the film for acceptance.

A P-H Level III examiner reviewed the film on August 31, 1984, and a YAEC overview reviewer reviewed the film on September 6, 1984. Both reviewers agreed that the reshot film for the weld repair at film station 3-4 was acceptable. The team's review of the radiographic film also confirmed that this weld was acceptable. The film displayed a radiographic sensitivity (2-1T) that was better than code requirements for nearly every penetrameter.

Weld 1-FW-4606-10-F1001 and Base Material Repair (BMR) FW-1009

This 1.336-inch-thick weld was in an 18-inch-diameter carbon steel pipe in the feedwater system. It was considered nuclear and was fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. Wampler's logbook entry on November 16, 1983, indicated that he had reviewed the weld's radiographs and rejected film station 2-3 for lack of fusion and transverse linear indications. The RIRs and film packages that Wampler had reviewed were discarded when the weld was completely cut out in 1985. The original weld was removed in conformance with ECA-19/104281A, which required the valve to be replaced and the pipe to be adjusted to accommodate a new valve with longer dimensions. During installation of the new control closure valve (V-330), the weld end prep of the spool piece was gouged during thermal cutting. The gouged area required a base material repair (FW-1009). The new pipe weld and the base material repair weld were reradiographed on July 11, 1985, and evaluated as acceptable on July 12, 1985. The team concluded that the licensee had taken the appropriate actions.

Weld 1-CO-4059-04-F0403

This 0.840-inch-thick weld was in a 36-inch-diameter carbon steel pipe in the condensate system. It was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. This weld was chosen for evaluation because of

concerns expressed by Wampler during his interview with the team. The weld was first radiographed on September 4, 1981, and evaluated as unacceptable on that date because of slag inclusions between film station 0-1. The Weld Repair Log showed that the repair was begun on September 4, 1981, and completed on February 24, 1982. However, the repair log was incorrect because the weld-out of this cavity was not completed until December 15, 1983.

The RIR indicated that a P-H Level III examiner had reviewed the film and rejected film station 3-4 on February 9, 1982. The RIR also indicated that the same Level III examiner had reevaluated and accepted the indications in film station 0-1 on June 23, 1982. His reevaluation showed that the slag inclusion was 1/4 inch long and therefore ASME Code acceptable. This untimely reevaluation of film station 0-1 was most probably the reason why the repair was delayed until a weld process sheet was issued to close the cavity. Film station 3-4 was radiographed after repair on June 23, 1982, and evaluated as acceptable. A note on the weld process sheet dated June 24, 1982, for film station 3-4 reported that a weld repair cavity still existed on film station 0-1. On November 18, 1983, Wampler reviewed the initial radiographs, disagreed with the previous P-H Level III evaluation, and rejected film station 0-1. He documented his rejection in NCR-5528 because the condensate system had been released for hydrotesting. However, on December 14, 1983, Wampler issued a speed letter to void NCR-5528 because a visual inspection had verified that the weld cavity still existed on station 0-1. The cavity was repair welded on December 15, 1983, radiographed on December 17, 1983, and evaluated as acceptable on December 20, 1983. The team's evaluation of this weld and the radiographic film confirmed that both were of very good quality. The team did not consider this weld to be one for which Wampler would have issued an NCR.

Weld 1-MS-4012-02-F0201

This 0.437-inch-thick weld was in a 24-inch-diameter carbon steel pipe in the main steam system. It was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. This weld was first radiographed on June 22, 1982, and evaluated as acceptable on June 23, 1982. Wampler's logbook entry of November 15, 1983, indicated that the weld should be reradiographed because of questionable indications. On August 22, 1984, a P-H Level II examiner (M.D.) reviewed the film and required that the entire weld be reshot because of inadequate sensitivity of the film. This film was discarded, and the weld was reradiographed on November 21, 1984, and evaluated as acceptable. Although additional actions were needed to address the film discrepancies, this weld was not considered to be one for which Wampler was going to issue an NCR because he had indicated (in his logbook) that he intended to have the weld reshot, although this was not indicated on the RIR. The team concluded that the licensee had taken appropriate actions.

Weld 1-FW-4606-11-F1102

This 1.27-inch-thick weld was in an 18-inch-diameter carbon steel pipe in the feedwater system. It was considered nuclear and was fabricated in accordance with Section III, Division I, Subsection NC, of the ASME Code. Wampler's logbook entry for November 16, 1983, indicated that he had rejected film station 1-2 because of slag and that the films were brown. This indicated that a reshot

was needed in order to ensure the archival quality of the radiographs. This weld was first radiographed on June 22, 1982, and film stations 2-3 and 3-0 were rejected because of unacceptable density. However, neither the initial P-H Level III examiner nor Wampler noted that the geometrical unsharpness (Ug) factor was 0.027 inch and the films were, therefore, unacceptable. A subsequent P-H review uncovered the Ug problem, and on October 25, 1984, the entire weld was reradiographed. The initial films that Wampler reviewed were discarded. The new radiographs were reviewed for acceptance by the P-H Level II reviewer, the P-H Level III examiner, and the YAEC overview reviewer. None of these reviewers detected slag in the final radiographs. The team specifically examined the new film for slag and confirmed that this weld was acceptable and no slag indications were present. The final weld soundness and radiographic film quality for this weld were excellent.

Weld 1-FW-4610-07-F0707

This 0.427-inch-thick weld was in a 4-inch-diameter carbon steel pipe in the feedwater system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on November 11, 1982, and evaluated by the P-H Level II reviewer as acceptable on November 12, 1982. Wampler's logbook entry indicated that he had intended to reject this weld for unacceptable density and porosity with tails. The films that Wampler reviewed were discarded on September 11, 1984, and the entire weld was reradiographed on September 10, 1984. A P-H review after Wampler's examination showed that the film quality was unsatisfactory and the weld had a questionable indication that needed further evaluation. The RIR for the radiograph taken on September 10, 1984, noted that station 1-2 had porosity. However, the examiner evaluated the indication as acceptable and YAEC concurred. The team concluded that the licensee had taken appropriate actions.

Weld 1-FW-4631-10-F1002

This 0.327-inch-thick weld was in a 4-inch-diameter carbon steel pipe in the feedwater system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was radiographed on September 24, 1982, and evaluated as acceptable by a P-H Level III examiner on September 28, 1982. Wampler's logbook entry indicated that he had reviewed these radiographs on November 16, 1983, and that he had rejected station 1-2 because of a linear discontinuity. This weld was never reradiographed or repaired. However, it was evaluated as acceptable by a P-H Level II reviewer on May 17, 1984; another Level II reviewer on January 30, 1985; a P-H Level III examiner on January 31, 1985; and a YAEC overview reviewer on January 31, 1985. The P-H Level III examiner who reviewed the film on May 17, 1984, added a note on the RIR indicating that station 1-2 had acceptable inside-diameter (ID) undercut. This note was clarified by another P-H Level III examiner on January 23, 1985, to ensure that a check mark on the RIR between two discontinuity disposition areas was not confused with the ID undercut. The team's review indicated that code requirements had been met.

Weld 1-FW-4610-09-F0914

This 0.340-inch-thick weld was in a 4-inch-diameter carbon steel pipe in the feedwater system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was radiographed on October 26,

1982, and evaluated by the P-H Level II reviewer as acceptable. Wampler's logbook entry for December 2, 1983, indicated that the weld had porosity with tails. However, no film station was given and Wampler did not annotate the RIR or otherwise formally document his rejection. This weld was neither reradiographed nor repaired. However, it was subsequently evaluated as acceptable by a P-H Level II reviewer on August 3, 1984; a P-H Level III examiner on August 13, 1984; and a YAEC overview reviewer on August 16, 1984. The RIR noted porosity in film station 2-3. However, the four subsequent reviews showed that the indication was acceptable. The team's review also determined that the indication was acceptable.

Weld 1-FW-4631-07-F0701

This 0.397-inch-thick weld was in a 4-inch-diameter carbon steel pipe in the feedwater system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on September 3, 1982, and film station 2-3 was evaluated as unacceptable because of porosity. The weld was repaired and reradiographed on January 22, 1983. Radiographs of the repair were evaluated as acceptable on January 24, 1983. Wampler's logbook entry for November 14, 1983, indicated that he had reviewed the radiographs of this weld and had rejected film station 0-1 because of transverse linear indications. This weld was never repaired or reradiographed. However, these radiographs were subsequently reviewed, and the weld was evaluated as acceptable by a P-H Level II reviewer on May 8, 1984; another P-H Level II reviewer on January 30, 1985; a P-H Level III examiner on February 5, 1985; and a YAEC overview reviewer on February 6, 1985. The single correction from the four subsequent reviews was the addition of a note regarding acceptable slag for the disposition of station 0-1 by a P-H Level II reviewer on May 8, 1985. The team's review did not reveal any transverse linear indications.

Weld 1-FW-4632-02-F0204

This 0.552-inch-thick weld was in a 6-inch-diameter carbon steel pipe in the feedwater system. The weld was considered as non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was radiographed on November 3, 1982, and evaluated as acceptable on the same date. Wampler's logbook entry indicated that he had reviewed the radiographs of this weld on November 15, 1983, and rejected film station 3-0 because of lack of fusion. This weld was never repaired or reradiographed. However, these radiographs were subsequently reviewed by a P-H Level III examiner on March 14, 1984, who noted an acceptable surface indication on film station 3-0. The radiographs were also reviewed by a YAEC overview reviewer on March 23, 1984, and evaluated as acceptable. The team's review did not reveal any unacceptable indications in this weld.

Weld 1-FW-4607-03-F0309

This 1.100-inch-thick weld was in a 16-inch-diameter carbon steel pipe in the feedwater system. The weld was considered nuclear and was fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. The weld was radiographed on February 7, 1983, and evaluated by the P-H Level II reviewer as acceptable on February 9, 1983. Wampler's logbook entry indicated that he had reviewed the radiographs for this weld on November 21, 1983, and had rejected it because of porosity with linear indications. This weld was

never repaired or reradiographed. However, these radiographs were subsequently evaluated by a P-H Level III examiner on March 17, 1984, and by a YAEC overview reviewer on March 21, 1984. Acceptable porosity indications were noted on four of the five film stations. The team's review determined that all film stations were acceptable for this weld.

Weld 1-AS-5201-01-F0101

This was a carbon steel base material repair to a 2-inch-diameter nozzle on an auxiliary steam heat exchanger. The maximum weld plus base material thickness was 0.500 inch. The auxiliary steam heat exchanger was considered non-nuclear, and the weld was fabricated in accordance with the ASME Code, Section VIII, Division 1 (nuclear welds must conform to the ASME Code, Section III). The RIR for these base material repairs had incorrectly identified this weld as having been fabricated in accordance with the ANSI B31.1 Code, which would have required radiography. The base material repairs were radiographed on July 1, 1982. Full coverage of the repaired areas could not be obtained because of the location of the nozzle to the surrounding supports. Wampler reviewed the film and the RIR with the incorrect reference to the ANSI B31.1 Code on December 2, 1983. Wampler's logbook indicated without any specific details that the weld was unacceptable. However, NCR-82-595A was issued on June 12, 1985, which identified the limitation experienced during the radiography and confirmed that a 100-percent liquid penetrant examination had been performed on the repaired areas. The NCR stated that the repair was satisfactory without additional radiography because the repair conformed to Section VIII of the ASME Code. However, the RIR had to be corrected to reflect the proper code of record. The team agreed with these actions.

Weld 1-MS-4005-03-F0306

This 1.25-inch-thick weld was in a 24-inch-diameter carbon steel pipe in the main steam system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on June 7, 1982, and evaluated by a P-H Level III examiner as having unacceptable porosity between film station 3-4. The weld was repaired and reradiographed on June 21, 1982. The repair was evaluated as acceptable. Wampler reviewed the film for this weld on November 16, 1983, and his logbook entry noted that film station 1-2 was rejectable because of porosity with linear indications. The weld was not reradiographed after Wampler's review, nor were any subsequent reviews performed by another P-H Level III examiner. However, the team noted that the initial film review had been performed by another P-H Level III examiner who had recorded acceptable porosity in each film station. The radiographs also were reviewed on March 23, 1984, by the YAEC overview reviewer, who evaluated the weld as having acceptable porosity. The team's review determined that the film and weld met code requirements.

Weld 1-CO-4063-05-F0502

This 0.750-inch-thick weld was in a 24-inch-diameter carbon steel pipe in the condensate system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on May 21, 1982, and was evaluated as unacceptable because of slag inclusions between film

stations 2-3 and 4-0. However, the P-H Level III examiner did not note that the films also were unacceptable because of density outside allowable code limits. The weld was repaired, and stations 1-2, 2-3, and 4-0 were reradiographed on July 6, 1982. The repair was again evaluated as unacceptable because of slag inclusions between film stations 2-3 and 4-0. The second repair was radiographed on October 29, 1982, and film station 2-3 was again rejected because of slag inclusion. The weld was repaired a third time, and film station 2-3 was reradiographed on January 5, 1983, and found acceptable. Wampler's review of these radiographs was reported in his logbook entry dated November 21, 1983, which indicated that he had rejected film station 4-0 because of porosity with tails. Wampler did not record his rejection on the RIR or otherwise formally document his rejection of the weld. On March 4, 1985, a P-H level II reviewer discovered that the initial film did not meet code density requirements and, therefore, a 100-percent reshot was required. The reshot identified porosity on film stations 2-3 and 4-0. The porosity was evaluated and found acceptable during subsequent P-H and YAEC reviews. The team's review determined that code requirements had been met.

Weld 1-CO-4063-01-F0101

This 0.719-inch-thick weld was in a 20-inch-diameter carbon steel pipe in the condensate system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on July 17, 1981, and film station 0-1 was rejected because of melt-through. The weld was repaired and film station 0-1 was reradiographed on August 31, 1981. This repair was rejected because of incomplete fusion. The weld was again repaired and film stations 0-1 and 4-0 were reradiographed on May 26, 1982. Both film stations were rejected because of incomplete fusion. The weld was again repaired and radiographed on August 2, 1982. Both film stations were rejected for the fourth time because of incomplete fusion. However, an NCR was not issued by the P-H film reviewer for exceeding the third repair cycle, apparently because the RIR and the weld process sheet had incorrectly identified the fourth repair as the third repair. The weld was repaired and reradiographed on September 3, 1982. These radiographs were evaluated and the weld was found acceptable. On November 20, 1983, Wampler reviewed this film and his logbook entry stated without any specific details that the weld was rejectable.

After Wampler's review, P-H examiners reevaluated the film and discovered that film station 2-3 was unacceptable because of inadequate sensitivity of the penetrameter for this film station. This film station was reradiographed on February 19, 1985, and evaluated as acceptable on February 20, 1985. All radiographs that had been examined to verify acceptance of this weld were reevaluated as acceptable by another P-H Level III examiner and a YAEC overview reviewer after Wampler left Seabrook. Apparently Wampler's rejection, as noted in his logbook, was related to the density problem discovered during the subsequent review.

On January 24, 1985, a film reviewer discovered that four repairs had been made on this weld and corrected the RIR for the September 3, 1982, radiographic exposure to reflect the fourth repair cycle. In addition to the two reviews noted above, all radiographs which had been examined to verify acceptance of

this weld were reevaluated and accepted by another P-H level III examiner and a YAEC overview reviewer. However, none of the film reviewers recognized that four repair cycles had been performed and that an NCR should have been issued in accordance with P-H Procedure XV-2, Paragraph 4.2.2, since the welding procedure being used was JS-IX-14.

The team identified this matter while writing its report and notified the licensee by telephone on July 19, 1990, that an apparent procedure violation had occurred during the fabrication of this weld. After reviewing the issue, the licensee agreed, performed an after-the-fact evaluation of the fourth weld repair (CEM 90-645:IMS #A16.0633), and faxed the evaluation to the team. The evaluation and licensee telephone discussions provided the following information:

- The requirement to report welds as a nonconforming condition, after the third weld repair of ANSI B31.1 Code piping, was a Pullman-Higgins procedure requirement, and not a code or contractual requirement.

- This requirement (stipulated in UE&C Procedure WS-1 and P-H Procedures XV-2 and JS-IX-14) was intended for nuclear components as classified in the ASME Code, Section III, Division 1, "General Requirements," Subsections NB, NC, and ND (Classes 1, 2, and 3). The pipe weld in question was the critical ANSI B31.1 piping, and P-H chose to include ANSI critical piping with nuclear piping as a conservative practice.

- Radiography of the 12-inch nominal diameter and larger condensate butt welds is a conservative site specification requirement and not an ANSI B31.1 (Table 136.4) requirement.

- The dispositioning of the third repair, as if it were a nonconformance during construction, would have allowed the contractor to attempt the fourth repair (Control No. 1102), which in this case produced an acceptable weld.

- This was a carbon steel weld and weld repairs on carbon steel were unlimited provided qualified welding procedures and inspection practices were followed.

- The licensee concluded that this was not a breakdown of the P-H quality program, but an isolated violation of procedure requirements that in this situation had no code, contractual, or safety significance.

The team's review of the radiographs for this weld indicated that the weld was acceptable. The team also concluded that this matter had no safety significance and had no further questions concerning this weld.

Weld 1-CS-302-03-F0304

This weld was in the portion of the chemical and volume control system which was considered nuclear and had been fabricated in accordance with Section III, Division 1, Subsection NC, of the ASME Code. Wampler's logbook entry noted that he had rejected this weld on November 20, 1983, because of a lack of penetration.

This weld was subsequently cut out as part of a system modification in conformance with Drawing 1-CS-302-03, R-2, dated November 4, 1982. The weld number was deleted from the system and all previous documentation including the film and the RIR was discarded.

Weld 1-MS-4005-22-F2204

This 0.427-inch-thick weld was in a 4-inch-diameter carbon steel pipe in the main steam system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was radiographed on June 16, 1982, and evaluated as acceptable on the same date. Wampler's logbook entry of November 15, 1983, indicated that he had intended to reject this weld because of 2 inches of slag between film station 0-1 and 0.25 inch of slag between film station 2-3. This weld was never rejected, repaired, or reshot. However, it was reevaluated by another P-H Level II reviewer on August 24, 1984, and by a P-H Level III examiner on August 31, 1984. YAEC reviewed the film on September 6, 1984. The team also reviewed this film. No reviewers except Wampler identified any slag in this weld. The indications identified by Wampler as slag were subsequently evaluated by all other reviewers as acceptable concavity. The team's review of the radiographs for this weld determined that the indication noted by Wampler was acceptable concavity located at the edge of the root of the weld.

Weld 1-MS-4005-20-F2003

This 0.450-inch-thick weld was in a 4-inch-diameter carbon steel pipe in the main steam system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on August 9, 1982, and film station 0-1 was evaluated on the same date as unacceptable because of incomplete insert melt. The weld was repaired and film stations 0-1 and 1-2 were reradiographed on September 23, 1982. This repair was evaluated as acceptable on September 28, 1982. Wampler's logbook entry dated November 15, 1983, indicated he had reviewed the film and rejected one of the repaired film stations for porosity with tails. Although the exact film station was not identified, Wampler did note that the indications existed in both the original film and the film for the repair. A March 1985 P-H audit of the film package showed that the geometrical unsharpness factor (Ug) was unsatisfactory. This had not been identified in the previous reviews. The complete weld was reshot on March 2, 1985, and was evaluated as acceptable on March 4, 1985. The reshot was also reviewed and accepted by a P-H Level III examiner and a YAEC overview reviewer on the same date. The team concluded that code requirements had been met.

Weld 1-MS-4013-02-F0201

This 0.465-inch-thick weld was in a 24-inch-diameter carbon steel pipe in the main steam system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on August 2, 1982, and on that date film stations 1-2, 2-3, and 3-4 were evaluated as unacceptable because of porosity. The weld was repaired and reradiographed on September 24, 1982, and all film stations were evaluated as acceptable on September 28, 1982. Wampler's logbook entry dated November 14, 1983, indicated that he had reviewed this film and rejected film station 4-5 for lack of

fusion. Wampler did not indicate his rejection on the RIR or on any other quality document before he left Seabrook. On February 8, 1985, the film was audited by a P-H Level II reviewer who found that film stations 3-4 and 4-5 were rejectable because of incomplete fusion. The reviewer issued NCR-82-463A to document his findings, and the weld was repaired and reradiographed on March 21, 1985. The repair was evaluated as acceptable by another P-H Level II reviewer and by a YAEC overview reviewer on March 22, 1985. The team concluded that code requirements had been met.

Weld 1-MS-4009-01-F0109

This 1.276-inch-thick weld was in a 30-inch-diameter carbon steel pipe in the main steam system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on July 28, 1982, and on the same date film station 2-3 was evaluated as rejectable because of incomplete fusion. Film stations 0-1 and 4-5 also had to be reshot because of failure of the penetrameter to qualify all the film densities in the area of interest. The weld was repaired and reradiographed on August 9, 1982. The radiograph and the repaired area were evaluated as acceptable on August 11, 1982. However, the RIR noted that another reshot was necessary because improper penetrameters had been used. This note was added to the RIR on February 19, 1985. Wampler reviewed all these radiographs, which were made using the panoramic method of exposure. Wampler's logbook entry of November 15, 1983, indicated that he had intended to reject film stations 0-1 and 3-4 because of lack of fusion. Wampler did not indicate his rejection on the RIR or on any other quality document before he left Seabrook. On October 10, 1984, a YAEC audit identified the same rejection and NCR-82-333A was issued to correct the deficiency. Film stations 1-2, 5-6, and 6-0 were reshot and evaluated as acceptable on March 21, 1985. Film stations 0-1, 2-3, and 3-4 were repaired, and the repair radiographs were also evaluated as acceptable on March 21, 1985. The team concluded that code requirements had been met.

Weld 1-FW-4610-05-F0502

This 0.390-inch-thick weld was in a 3-inch-diameter carbon steel pipe in the feedwater system. The weld was considered non-nuclear and was fabricated in accordance with the ANSI B31.1 Code. The weld was first radiographed on November 3, 1982, and evaluated as acceptable, pending a reshot of station 1 because of the placement of the penetrameter (over stamping on the pipe), which resulted in inadequate sensitivity. The reshot of station 1 was evaluated as acceptable on November 16, 1982. Wampler's logbook entry dated December 2, 1983, indicated that he had rejected the weld because of porosity with tails. The weld was never reradiographed or repaired. However, it was reviewed by a P-H Level II reviewer on August 7, 1984; a P-H Level III examiner on August 13, 1984; and a YAEC overview reviewer on August 16, 1984. All subsequent reviews found the weld was acceptable. This weld was cut out and deleted from the system in accordance with ECA-19/113221B, dated February 6, 1986.

Weld 1-MS-4016-02-F0204

This 0.450-inch-thick weld was in a 24-inch-diameter carbon steel pipe in the main steam system. The weld was considered non-nuclear and was fabricated in

accordance with the ANSI B31.1 Code. The weld was radiographed on September 16, 1982, and on that date all film stations were evaluated as acceptable. Wampler's logbook entry for November 15, 1983, indicated that he had reviewed this weld and had rejected film station 4-5 because of porosity with tails. He did not document his rejection on the RIR, and the weld was never reradiographed or repaired. However, the radiographs were subsequently reviewed by a P-H Level II reviewer on August 23, 1984; a P-H Level III examiner on August 22, 1984; a YAEC overview reviewer on August 28, 1984; and the NRC team in April 1990. None of the subsequent reviews detected any linear indications associated with porosity. An acceptable crater pit was noted during the initial evaluation on September 16, 1982.

Summary

The 27 welds selected for this review constituted the complete population of backlog welds reported as rejected (for weld defects) in Wampler's logbook. These included 9 ASME Class 2 welds, 17 ANSI B31.1 welds, and 1 ASME Section VIII base material repair. The ANSI welds were considered particularly relevant because even though they are not safety related, they had been reviewed and accepted by the licensee under the same overview programmatic controls as the ASME welds. They also were considered to represent an adequate sample for review in response to previous congressional concerns expressed for non-nuclear welds. Weld 1-CO-4059-04-F0403 was added to the 27-weld sample as a result of the interview with Wampler because he indicated it to be an example of the level of confusion that existed during his attempt to organize backlog radiographic film packages. (However, Wampler did not indicate that it was a backlog weld.)

The team examined all 28 welds to determine whether appropriate action had been taken to ensure that the welds were repaired or other appropriate disposition had been taken. In the case of weld 1-CO-4059-04-F0403, Wampler and the licensee had taken appropriate actions to correct the weld condition and to obtain the final radiographs. Actions taken by the licensee on the 27 welds (from Wampler's logbook) were as follows:

Nine ASME Welds

Three of Wampler's rejected welds were identified by the P-H or YAEC overview process and NCRs were issued to correct the discrepant condition. The P-H and YAEC overview process also detected that radiographs for two welds rejected by Wampler were inadequate because of incorrect technique, which caused the film to exhibit geometrical unsharpness beyond the limits allowed by the ASME Code (one of these also required a reshot to satisfy a previous rejection through one of the NCRs referenced above). These two welds were reradiographed using the correct technique, and the indications noted by Wampler were not present. These two welds were reevaluated as acceptable. The radiographic films for the reexamined welds were excellent in quality and demonstrated sensitivities that exceeded minimum code requirements. The team's evaluation of these radiographs agreed with the overview results in that no rejectable indications were observed in the final radiographs. Two other welds were also accepted during reevaluation of their radiographs, and the team agreed with these evaluations.

The final three ASME welds were subsequently removed as a result of engineering change authorizations which authorized the replacement of the valves associated with the weld joints and modification of the piping. The licensee and the team reviewed the radiographs for the new welds and found them acceptable.

- Seventeen ANSI B31.1 Welds

  The final status for the 17 ANSI B31.1 welds rejected by Wampler was as follows. NCRs were issued for two of the welds. One weld was removed as a result of a system design change. Three welds not meeting density or geometrical unsharpness requirements were reshot and accepted. Eleven other welds rejected by Wampler were reviewed and accepted by P-H and YAEC. The team agreed with the actions taken for these 17 welds.

- ASME Section VIII Repair

  One NCR was issued on the ASME Section VIII repair, stating that radiography was not required.

After reviewing the radiographs and related quality documentation for the welds discussed above, the team verified that the licensee had taken adequate corrective actions or had performed subsequent reviews for all 28 welds and concluded that there were no missing NCRs associated with weld discrepancies discovered by Wampler while he was employed at Seabrook Station. However, the team found that P-H had not issued an NCR to address the fourth repair to a non-safety-related ANSI B31.1 weld as required by procedures established by P-H. Furthermore, the licensee's activities associated with these welds demonstrated a uniform application of the licensee's overall quality assurance program during the fabrication and nondestructive examination of pipe welds at Seabrook Station.

Table 5 Welds from Joseph Wampler's Logbook - Weld History

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CO-4065-01-F0103 12" Dia. - 0.555" Thk ANSI B31.1	12-22-81	12-22-81	II M.M.	Rej. STA 0-1 1-2 & 3-0 Incomplete insert melt, fusion & penetration	*STARTED 12-22-81 COMPLETED 5-25-82	4-19-83 W.R.H.	2-23-85 J.C.R.
1-CO-4065-01-F0103-R-1 J.W.REJECTED 0-1 FOR P/T NO WELD REPAIR/NO P/T ON 0-1	12-29-82	12-29-82	II R.B.	ACC	None Required	2-2-85 J.S.	2-23-85 J.C.R.
1-MS-4003-10-F1003 30" Dia. - 1.445" Thk ASME - CLASS 2	9-30-82	9-30-82	III M.M.	ACC	None Required	1-7-85 S.V.	1-8-85 B.J.M.
Note: J.W. log entry of 11-6-83 rejects STA 4-5 but no NCR issued. P-H L-III J.S. rejected STA 4-5 and issued NCR-6611 on 3-23-84.							
1-MS-4003-10-F1003 RESHOT STA 4-5 NCR-6661	3-18-84	3-21-84	II J.W.H.	Rej. STA 4-5 for Incomplete Fusion	*(12-21-84)	No Signature	No Signature
Note: Repair date not listed in Weld Repair Log. *Repair date taken from weld package.							
1-MS-4003-10-F1003-R-1 RESHOT STA 4-5	1-2-85	1-2-85	II R.H.M.	ACC	None Required	1-7-85 S.V.	1-8-85 B.J.M.
1-CS-364-03-F0301 3" Dia. - 0.528" Thk ASME - CLASS 2	7-24-82	7-24-82	III M.M.	Rej. STA 0 & 2 for Slag	*STARTED 7-24-82 COMPLETED 11-04-82	No Signature	10-10-84 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CS-364-03-F0301-R-1	11-4-82	11-4-82	II K.J.B.	ACC	None Required	No Signature	10-10-84 R.C.J.
Note; STA 2 repaired via NCR-2583. No repair made to STA 0 J.W. personal log entry indicates rejection. However he did not issue an NCR. NCR-7270 issued during subsequent P-H re-review.							
1-CS-364-03-F0301 & R-1 RESHOT STA 0-1 thru 4-0	4-19-84	5-7-84	II K.J.B.	Rej STA 0-1 For Slag	*STARTED 6-26-84 COMPLETED 9-29-84	10-2-84 S.V.	10-3-84 J.V.
1-CS-364-03-F0301-R-2 RESHOT STA 0-1 & 4-0	9-29-84	9-29-84	II M.D.	ACC	None Required	10-2-84 S. V.	10-3-84 J. V.
1-FW-4617-01-F0101 4" Dia. - 0.450" Thk ASME - CLASS 2	9-22-83	9-22-82	III M.M.	ACC	None Required	No Signature i.e. No P-H Level III review after J.W. personnal log entry	3-24-84 R.C.J.
Note: J.W. log entry of 11-16-83 rejected STA 1-2 for P/Ts and no repair was made. However YAEC & NRC agreed indication is acceptable.							
1-FW-4606-10FW-1002 18" Dia. - 1.336" Thk ASME - CLASS 2	7-12-85	7-12-85	II M.D.	ACC	None Required	7-12-85 D.W.C.	7-15-85 J.C.R.
J.W. log entry reject of STA 1-2 was discovered during subsequent P-H review. Weld was cut out and valve replaced. See ECA 14-10428A. Previous film and attendant RIR discarded.					Note: No repair was made. Weld package indicates that weld reinforcement was conditioned for ISI on 8-30-83 and 100% radiography was performed on 9-26-83. These radiographs were maintained in the weld package.		

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-FW-4608-13-F1302 18" Dia. - 1.216" Thk ASME - CLASS 2	8-19-82	8-19-82	III M.M.	ACC	None Required	No Formal Review Documented (J.W. personal log entry rejects STA 1-2 for Slag)	No Signature
Re-review by P-H level II K.B. who rejected STA 1-2 for Slag (NCR-7487 issued 8-22-84). This weld had been hydrotested. However, neither J.W. nor K.B. detected that the incorrect radiographic technique had been used resulting in UNSAT UG. Reshot clarified that no repair was necessary.							
1-FW-4608-13-F1302 RESHOT 100%	1-23-85	1-23-85	II M. D.	ACC	None Required	1-24-85 S.V.	1-31-85 J.C.R.
1st radiography used panoramic technique (ug-unsat) reshots were double wall and provided 1-T sensitivity. Subsequent film evaluation clarified that no slag was in the weld.							
1-MS-4007-01-F0106 30" Dia. - 1.281" Thk ANSI B31.1	8-16-82	8-16-82	III M.M.	Rej. STA 3-4 Incomplete Fusion	*STARTED 8-16-82 COMPLETED 9-3-82	8-31-84 S.V.	9-6-84 J.C.R.
Note: Reshot of STA 3-4 apparently not in weld package during J.W.'s review. J.W. also notes transverse linears in his personnel log. RE-EXAMINATION BY P-H, YAEC & NRC DETECTED NO LINEARS IN WELD							
1-MS-4007-01-F0106-R-1 RESHOT STA 3-4	10-1-82	10-2-82	III M.M.	ACC	None Required	8-31-84 S.V.	9-6-84 J.C.R.
1-FW-4606-10-F1001-R-1 & BMR FW-1009 18" Dia. - 1.336" Thk ASME - CLASS 2	7-11-85	7-12-85	II M.D.	ACC	See ECA 19/104281A	4-12-85 D.W.C.	7-15-85 J.C.R.
NOTE: RIR's and film that J.W. examined were discarded when weld was 100% reshot after subsequent P-H review.							

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CO-4059-04-F0403 36" Dia. - 0.840" Thk ANSI B31.1	9-4-81	9-4-81	II M.B.	Rej. STA 0-1 for Slag & STA 3-4 for Crater Pit	*STARTED 9-4-81 COMPLETED 2-24-82	4-11-83 W.R.H.	1-11-85 J.C.R.
NCR issued by J.W. due to lack of STA 0-1 repair film after weld turned over to hydrotest group.							
1-CO-4059-04-F0403-R-1 RESHOT STA 0-1	6-24-82	6-24-82	III M.M.	ACC	None Required	11-27-84 S.V.	1-11-85 J.C.R.
NCR cancelled acceptance because cavity existed on STA 0-1.							
1-CO-4059-04-F0403-R-2 RESHOT STA 0-1	12-17-83	12-20-83	II M.D.	ACC	None Required	12-28-83 J.W.	1-11-85 J.C.R.
1-MS-4012-02-F0201 24"Dia. - 0.437" Thk ASME - CLASS 2	6-22-82	6-23-82	III M.M.	ACC	None Required	NONE However P-H L-II M.D. required 100% reshot on 8-22-84	NONE
1-MS-4012-02-F0201 RESHOT 100%	11-21-84	11-21-84	II L.L.	ACC	None Required	2-1-85 S.V.	2-4-85 J.C.R.
1-FW-4606-11-F1102 18" Dia. - 1.27" Thk ASME - CLASS 2	6-22-82	6-22-82	III M.M.	Rej. STA 2-3 & 3-0 for Density	None Required	No Signature	No Signature

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-FW-4606-11-F1102 RESHOT STA 2-3 & 3-0	6-23-82	6-23-82	III M.M.	ACC	None Required	No Signature	No Signature
1-FW-4606-11-F1102 RESHOT 100%	10-25-84	10-31-84	II R.M.	ACC	None Required	11-27-84 S.V.	12-4-84 J.C.R.
Prior film had unacceptable UG and was discarded							
1-FW-4610-07-F0707 4" Dia. - 0.427" Thk ANSI B31.1	11-11-82	11-11-82	II R.B.	ACC	None Required	NONE	NONE
1-FW-4610-07-F0707 RESHOT 100%	9-10-84	9-10-84	II L.L.	ACC	None Required	9-19-84 S.V.	9-24-84 J.C.R.
No reshot explanation provided. However, J.W.'s log indicated unacceptabile density and porosity with tails.							
1-FW-4610-09-F0914 4" Dia. - 0.340" Thk ANSI B31.1	10-26-82	10-28-82	II R.B. II K.B.	ACC	None Required	8-13-84 S.V.	8-16-84 B.J.M.
1-FW-4607-03-F0309 16" Dia. - 1.10" Thk ASME - CLASS 2	2-7-83	2-9-83	II R.B.	ACC	None Required	3-17-84 S.V.	3-21-84 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-FW-4631-10-F1002 4" Dia. - 0.327" Thk ANSI B31.1	9-24-82	9-28-82	III M.M. II L.K. K.B. C.G.	ACC	None Required	1-31-85 S.V.	1-31-85 J.C.R.
1-FW-4631-07-F0701 4" Dia. - 0.397" Thk ANSI B31.1	9-3-82	9-3-82	III M.M. II R.S. M.D.	Rej. STA 2-3 for Porosity	*STARTED 9-3-82 COMPLETED 1-24-83	2-5-85 S.V.	2-6-85 J.C.R.
1-FW-4631-07-F0701-R-1 RESHOT STA 1-2 & 2-3	1-22-83	1-24-83	II R.B. R.S.	ACC	None Required	2-5-85 S.V.	2-6-85 J.C.R.
1-FW-4632-02-F0204 6" Dia. - 0.552" Thk ANSI B31.1	11-3-82	11-3-82	II R.B.	ACC	None Required	3-19-84 J.S.	3-23-84 R.C.J.
1-CO-4063-05-F0502 24" Dia. - 0.778" Thk ANSI B31.1	5-21-82	5-24-82	III M.M.	Rej. STA 2-3 & 4-0 for Slag	*STARTED 5-24-82 COMPLETED 6-7-82	4-14-83 W.R.H.	3-5-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CO-4063-05-F0502-R-1 RESHOT STA 1-2 2-3 & 4-0	7-6-82	7-7-82	III M.M.	Rej. STA 2-3 & 4-0 for Slag	*STARTED 7-7-82 COMPLETED 10-8-82	3-5-85 J.S.	3-5-85 J.C.R.
1-CO-4063-05-F0502-R-2 RESHOT STA 2-3 & 4-0	10-29-82	10-29-82	II R.B.	Rej. STA 2-3 for Slag	*STARTED 11-1-82 COMPLETED 12-16-82	4-14-83 W.R.H. 3-5-85 J.S.	3-5-85 J.C.R.
1-CO-4063-05-F0502-R-3 RESHOT STA 2-3	1-5-83	1-5-83	II R.B.	ACC	None Required	4-14-83 W.R.H. 3-5-85 J.S.	3-5-85 J.C.R.
1-CO-4063-05-F0502-R-3 RESHOT 100% Density of previous film unacceptable.	3-4-85	3-5-85	II L.L.	ACC	None Required	3-5-85 J.S.	3-5-85 J.C.R.
1-CO-4063-01-F0101 20" Dia. - 0.719" Thk ANSI B31.1	7-17-81	7-17-81	III M.M.	Rej. STA 0-1 for Melt-thru	*STARTED 7-21-81 COMPLETED 8-18-81	4-12-83 W.R.H.	2-25-85 J.C.R.
1-CO-4063-01-F0101-R-1 RESHOT STA 0-1	8-31-81	8-31-81	III M.M.	Rej. STA 0-1 Incomplete Penetration	*STARTED 8-31-81 COMPLETED 5-5-82	4-12-83 W.R.H.	2-25-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-CO-4063-01-F0101-R-2 RESHOT STA 0-1 & 4-0	5-26-82	5-27-82	III M.M.	Rej. STA 0-1 & 4-0 Incomplete Fusion	*STARTED 5-27-82 COMPLETED 7-20-82	4-12-83 W.R.H.	2-25-85 J.C.R.
1-CO-4063-01-F0101-R-3 RESHOT STA 0-1 & 4-0	8-2-82	8-2-82	III M.M.	Rej. STA 0-1 & 4-0 Incomplete Fusion	*STARTED 8-2-82 COMPLETED 8-20-82	4-12-83 W.R.H.	2-25-85 J.C.R.
1-CO-4063-01-F0101-R-4 RESHOT STA 0-1 & 4-0	9-3-82	9-3-82	III M.M.	ACC	None Required	2-22-85 J.S.	2-25-85 J.C.R.
1-CO-4063-01-F0101 RESHOT STA 2-3 Reshot due to density & sensitivity	2-19-85	2-20-85	II L.K.	ACC	None Required	2-21-85 J.S.	2-25-85 J.C.R.
1-MS-4005-03-F0306 24" Dia. - 1.250" Thk ANSI B31.1	6-7-82	6-7-82	III M.M.	Rej. STA 3-4 For Porosity	*STARTED 6-7-82 COMPLETED 6-14-82	NONE	NONE
1-MS-4005-03-F0306-R-1 RESHOT STA 3-4	6-21-82	6-21-82	III M.M.	ACC	None Required	NONE	3-23-84 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-AS-5201-01-F0101 Base Material Repair of 2" Nozzle 0.500" Thk ASME - Section VIII	7-1-82	7-6-82	III M.M.	ACC	**None Required	None Required	None Required
	**Radiography was performed but not required for this ASME-VIII weld (see NCR-82-595A). RIR for weld initially mis-stated that weld conformed to ANSI B31.1.						
1-CS-302-03-F0304 ASME - CLASS 2	Piping modifications caused this weld to be cut out and the weld number deleted from the system. However, it is included since Mr. Wampler's personal log book indicated that he had rejected this weld and no NCR was issued.						
1-MS-4016-02-F0204 24" Dia. - 0.465" Thk ANSI B31.1	7-28-82	9-16-82	III M.M.	ACC	None Required	8-22-84 S.V.	8-28-84 J.C.R.
1-MS-4009-01-F0109 30" Dia. - 1.276" Thk ANSI B31.1	7-28-82	7-28-82	III M.M.	Rej. STA 2-3 Incomplete Fusion & STA 0-1 & 4-5 for Density	STARTED 7-28-82 COMPLETED 8-2-82 (Per WRO-1089)	3-22-85 J.S.	3-22-85 R.C.J.
1-MS-4009-01-F0109-R-1 RESHOT STA 0-1 & 3-4 Per YAEC NCR-82-333A Dated 10-10-84	8-9-82	8-11-82	III M.M.	ACC Pending Reshot of STA 1-2, 3-4, 5-6 & 6-0	None Required	3-22-85 J.S.	3-22-85 R.C.J.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-MS-4009-01-F0109-R-1 RESHOT STA 1-2, 5-6 & 6-0	3-11-85	3-21-85	II R.S.	ACC 1-2, 5-6 & 6-0 (3-4 missing)	STARTED 1-2-83 COMPLETED 3-25-85 (Repaired on YAEC Work Request MS-306)	3-22-85 J.S.	3-22-85 R.C.J.
1-MS-4009-01-F0109-R-2 RESHOT STA 0-1, 2-3 & 3-4 NCR-82-333A	3-21-85	3-21-85	II D.P.	ACC	None Required	NONE	3-21-85 J.C.R.
1-MS-4005-22-F2204 4" Dia. - 0.427" Thk ANSI B31.1	6-16-82	6-16-82	III M.M.	ACC	None Required	8-31-84 S.V.	9-6-84 J.C.R.
1-MS-4005-20-F2003 4" Dia. - 0.450" Thk ANSI B31.1	8-9-82	8-9-82	III M.M.	Rej. STA 0-1 Incomplete Insert Melt	*STARTED 8-10-82 COMPLETED 8-18-82	NONE	3-4-85 J.C.R.
1-MS-4005-20-F2003-R-1 RESHOT STA 0-1 & 1-2	9-23-82	9-28-82	III M.M.	ACC	None Required	NONE	NONE
1-MS-4005-20-F2003-R-1 RESHOT 100% for UG	3-2-85	3-4-85	II L.L.	ACC	None Required	3-4-85 J.S.	3-4-85 J.C.R.

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

Table 5 - (continued)

RE: Missing NCRs Weld Number	DATE Film 1st Exposed	DATE Film Reviewed	Examiner Level	Disposition of Review	Record Repair Date & Basis	P-H Level III Overview Date	YAEC Overview Date
1-MS-4013-02-F0201 24" Dia. - 0.465" Thk ANSI B31.1	8-2-82	8-2-82	III M.M.	Rej. STA 1-2, 2-3, 3-4 & 4-5 Porosity & Incomplete Fusion	*STARTED 8-3-82 COMPLETED 8-18-82	NONE	NONE
1-MS-4013-02-F0201-R-1 RESHOT STA 1-2, 2-3 & 3-4	9-24-82	9-28-82	III M.M.	ACC	None Required	NONE	3-22-85 B.J.M.
1-MS-4013-02-F0201-R-1 RESHOT STA 3-4 & 4-5 NCR-82-4638	3-21-85	3-21-85	II D.P.	ACC	None Required	NONE	3-22-85 B.J.M.
1-FW-4610-05-F0502 3" Dia. - 0.390" Thk ANSI B31.1	11-3-82	11-3-82	II R.B.	ACC Pending reshot of STA 1 for mislocation of Penetrameter	NONE	8-13-84 S.V.	8-16-84 J.C.R.
1-FW-4610-05-F0502 RESHOT STA 1	11-16-82	11-16-82	II R.B.	ACC	None Required	8-13-84 S.V.	8-16-84 J.C.R.
1-FW-4610-05-F0502	Weld cut out and deleted from system on 2-6-86 per ECA-19/113221B.						

*Start and completion dates per Weld Repair Log. Actual welding completed within timeframe listed.

APPENDIX 6

DETAILED REVIEW OF WELD CONTROL PACKAGES

The team reviewed the process sheets and associated records for 21 welds to determine if the welds were properly fabricated to the standards established in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) or the American National Standards Institute (ANSI) B31.1 Code and the Preliminary/Final Safety Analysis Report (P/FSAR). The radiographs and associated radiographic inspection reports for these welds were also reviewed as discussed in Appendix 5 to this report. Each weld review in this appendix ends with a summary describing the contractor's and utility's problems associated with fabricating each weld and stating the team's findings (conclusion) relative to any conditions and/or discrepancies found. The team assessed the effectiveness of the Pullman-Higgins (P-H) quality assurance (QA) program and determined if any negative conditions indicated a breakdown in the welding program at Seabrook. The team also interviewed the engineering and QA personnel who presently work at Seabrook and were involved with the pipe welding activities during construction.

The major steps of the fabrication sequence and the dates on which these activities were performed are shown for each weld. The summary section for each weld provides the pertinent information relative to the team's findings and conclusions regarding compliance with the fabrication rules.

Early in the pipe fabrication program (September through November 1980), NRC inspections resulted in NRC Region I issuing an immediate action letter (IAL) to the licensee because P-H controls in the performance of welding and making repairs to welds were deficient. In response to that IAL, P-H established a dual repair process sheet system that prescribed more controls during the excavation and welding process. The first few pages in the front of the package document contained the weld fabrication history, followed by the required inspection documents. Unacceptable conditions found during the fabrication sequence were recorded on these process sheets by referencing the control number assigned sequentially when the deficiency was identified. A second process sheet referenced the control number and established the method to remove, chart the excavation, and determine if repair welding was needed. A third process sheet was used if repair welding was needed. It referenced the same control number and established the method of repair. The second and third process sheets were used each time a deficiency was discovered.

The team's radiographic film review of these welds is addressed separately in Section 8 and Appendix 5 to this report.

(1) <u>Weld Control Package 1-RC-49-F0101</u>

The team reviewed the weld control package for weld 1-RC-49-F0101. The weld is on the Unit 1 reactor coolant surge line, and is 14 inches in diameter,

1.406 inches in nominal wall thickness, and made of stainless steel material. The applicable code is the ASME Code, Section III, Class 1. The weld is circumferential, connects the "C" hot leg to the pressurizer, and is located in the containment building.

The spool pieces were fit up and tack welded on 5-13-82 (for a discussion of discrepancy in fitup date, see weld 1-RC-49-F0103), and the root pass was welded on 5-13-82 and inspected on 5-14-82. The weld was completed to 1/2-fill (the half-filled stage) and was visually inspected on 5-18-82. An in-process radiograph (informational) was made on 5-17-82, at the 1/2-fill stage. This test is used to help determine weld quality in the early stages of welding. It is not required by the ASME Code or the P/FSAR, and it is not possible to obtain the required sensitivity. A 1/4-inch-long unconsumed insert and a 1/2-inch-long oxidation defect were rejected at radiographic testing (RT) station 0-1. A 3/4-inch-long unconsumed insert was rejected at RT station 2-3. The inside surface was ground smooth and visually inspected on 5-18-82, and liquid penetrant (LP) inspected on 5-20-82. No welding was necessary to correct the reject. On 5-18-82, stations 0-1 and 2-3 were re-radiographed (weld still at 1/2-fill) and found acceptable. The LP examination initially rejected the root condition on 5-18-82, but after additional grinding, a reinspection on 5-20-82 found the repaired area acceptable.

The date was not recorded for the 3/4-fill and complete-fill stages; however, the final weld (complete fill) was examined visually and accepted on 5-25-82. A radiograph was performed and accepted by a nondestructive examination (NDE) Level III examiner on 5-25-82. Some porosity, root concavity, and film artifacts were noted as acceptable by the film examiner.

On 11-18-82, a visual examination was performed to verify suitability of the surface for Section XI (inservice examination).

A P-H NDE Level III examiner reviewed the film again and found it acceptable on 12-27-83.

A Yankee Atomic Electric Company (YAEC) reviewer reviewed the film on 2-14-84 and found it acceptable.

Two nonconformance reports, NCR-1967 and NCR-1789, were issued and completed as part of this work package. NCR-1789, dated 1-11-82, required the weld to be counterbored deeper than supplied from the vendor to accommodate inservice inspection. The specified requirement is a depth of two times the wall thickness so that inside reflectors (transition at edge of counterbore) would not void the ultrasonic Section XI examination. The work was completed, the end preps were visually inspected on 5-4-82, and the results were acceptable. The LP examination was performed on 5-4-82 and the results were acceptable. The NCR was verified as being complete and was closed on 5-24-83. The second NCR (NCR-1967) was issued on 3-8-82 to remove surface rust on the underside of the pipe bend and other isolated areas. The disposition was to buff the area and LP inspect the areas buffed. The areas were visually and LP inspected on 5-5-82. The tests were found acceptable and the NCR was verified as being complete and was closed on 5-7-82. These NCRs did not affect the weld quality and were completed before the final NDEs were performed.

After the weld fabrication was completed, an arc strike in the vicinity of this weld was removed.

Summary and Conclusions

The welding started on 5-13-82 and was finished and NDE inspected in May 1982.

Welding defects were successfully removed before weld completion. The defects appear to be normal fabrication-type defects.

The P-H NDE Level III examiner's review was performed approximately 19 months after the weld was completed. The YAEC review was completed approximately 21 months after the weld was completed. The P-H and YAEC overviews found the film and weld acceptable.

The team concluded the weld was fabricated in accordance with the requirements. The documentation was also acceptable.

(2) Weld Control Package 1-RC-49-F0103

The team reviewed the weld control package for weld 1-RC-49-F0103. The weld is on the reactor coolant surge line (same line as welds F0101 and F0102). The weld is circumferential, 14 inches in diameter, 1.406 inches in nominal wall thickness, and made of stainless steel material. The applicable code is ASME Code, Section III, Class 1.

Issues about cold pull and about if this weld (F0103) was the closure weld (last weld for the surge line) were investigated within the framework of the licensee's employee concerns program. The employee allegation resolution (EAR) investigation of these issues concluded that the fitup for three welds, RC-49-F0101, RC-49-F0102, and RC-49-0103, were signed off on 5-14-82. However, the team concluded that this date was wrong and should have been 5-12-82, for the following reasons.

Two of the welds, F0101 and F0103, were signed off by day-shift welders "1b" and "1e." The last weld, F0102, was signed off on the night shift on 5-14-82, by the night-shift welders "eg" and "sf." Therefore, the licensee had concluded that this weld was not the closure weld. Also, the night-shift P-H welding supervisor (during the fitup period) documented that field weld F0102 was the closure weld. The process sheet showed the fitup and tack weld were done on 5-12-82. Also, NCR-5781, Attachment 1, Item 2, indicated that the weld fitup inspection was performed on 5-12/13-82. A second process sheet, found in the package, referenced NCR-5781, Rev. 1, and showed that the fitup and tack weld were completed on 5-14-82. However, the process sheet indicated the signature and date were based on another process sheet with the entry accompanying the signature and date stating "per attached process sheet." The team found no other process sheets in the package that recorded a different date than 5-12-82. The licensee acknowledged this discrepancy and was to evaluate how to resolve the date discrepancy.

The process sheet indicated the weld was started on 5-10-82 and was finished and found radiographically acceptable by the Level II examiner on 8-17-84, some

2 years and 3 months later. The weld was fabricated in the following sequence of events:

- 3-13-82 - Before starting the fitup and welding of the pipe joint, a thickness check of the pipe wall was taken to ensure that work done on the counterbore (to provide a weld geometry suitable for inservice examinations) did not reduce the base material wall thickness below the allowable thickness. The wall thickness was accepted on the basis of the allowable thickness given in the process sheet (1.203 inches, see page 59 of process sheet).

- 5-12-82 - Fitup and tack weld of the two pipes together were completed on this date (see page 55 of process sheet).

- 5-13-82 - The weld root was completed to a thickness of 0.176 inch maximum (see page 59 of process sheet).

- 5-15-82 - The weld was completed to the 1/2-fill stage and was visually inspected (see page 64 of process sheet).

- 5-17-82 - A radiographic examination was performed to assess the weld quality at the 1/2-fill stage. The process sheet recorded indications of burnthrough at station 0-1 and weld oxidation and lack of fusion at station 1-2.

  Note: The radiographic film (1/2-fill) was not saved. Thus, the team could not review this film (see page 69 of process sheet). Process Sheet Control No. 856 was issued on 5-17-82 to remove the indications.

- 5-20-82 - A visual inspection was required before grinding out the defects to ensure the defect had been located correctly on the pipe surface. This step was initialed and dated as complete on a process sheet (see page 69 of process sheet). However, the licensee reported this signature was apparently forged. The forgery was not discovered until some 19 months later, and an NCR was issued then (see NCR-5847, issued on 1-6-84). The NCR was dispositioned "accept as is" based on these conclusions: (a) It was not possible to determine who had initialed the sequence as complete and (b) the inspection and signoff are not a code requirement and their purpose was to aid in removal of the defects, that is, to verify the defects were properly laid out on the pipe surface with a marking device to facilitate grinding out the defects discussed above. Note: This issue (falsification) was investigated and found true as discussed in the licensee's employee concerns program; the team did not reinvestigate the issue during this review.

  The grinding process used to remove the defects appeared to have caused a through-wall cavity in the weld; the weld could not be rewelded without access to the inside surface. On 8-30-83 (15 months after the defect layout was supposedly completed), a process sheet (see page 73 of process sheet) was issued per NCR-3726 to grind and reweld a window (through-wall cavity) 180 degrees away from the through-wall cavity at RT station 0-1.

The window would give access to the inside surface of the weld so the imperfections could be ground out. This process sheet included the rewelding of the cavities at RT station 0-1, and rewelding the window.

- 9-27-83 - An on-the-spot engineering change authorization, ECA-192212A, was issued to repair the defects found at the 1/2-fill stage by the informational radiograph. The ECA was issued to change the welding process to 24-III-8-K1-12 (automatic weld process to manual welding for repair of the through-wall cavities).

- 10-24-83 - NCR-5414 was issued because of radial shrinkage of the base material adjacent to the weld. Ultrasonic thickness checks found the minimum wall thickness was violated in this area. A process sheet (page 94 of process sheet) dated 11-28-83 was issued to restore the minimum wall condition. The base material repair was finished and visually inspected on 12-30-83 (see page 94 of process sheet). The repair weld was identified as weld F0104. Note: The radial shrinkage problem is addressed separately in Section 12 of this report.

- 10-28-83 - A visual inspection was performed and a cavity was rejected beause of an excessive root opening at station 0-1 (see page 69 of process sheet). NCR-3726 was then issued for the excessive root opening. The team found the cavity chart was not included in the process sheet as required (see page 69 of process sheet). NCR-5781 addressed this matter.

  A process sheet (page 73) dated 8-30-83 was issued, as stated above, to repair RT station 3 (4 inches from station 3). The records indicated the cavity was welded on 10-14-83. Also, at inspection step 14 (visual inspection), an asterisk was inserted referencing a note on the back of the process sheet which read: "process sheet used for repair & half T weldout per on-the-spot ECA JT, 11-23-83." NCR-5781, Rev. 0, was issued to document that the repair sheet was erroneously used to weld out the weld. The NCR was "accepted as is" and closed on 1-26-84. It was later determined the ECA allowed the weld to be completed.

- 12-30-83 - The finished weld was radiographed and was rejected because of porosity and lack of fusion (see page 73 of process sheet).

- 12-30-83 - Final ultrasonic examination of weld F0104 (base material repair adjacent to weld F0103) resulted in a minimum wall violation (see page 96 of process sheet). The lowest area found was 1.229 inches. The condition was "accepted as is" and dispositioned in NCR-5414 on the basis that the undersize area was very small and the wall-thickness violation was very minimal (0.002 inch). The defective area found by radiography was repaired and the final weld was accepted on 2-27-84 (see page 86 of process sheet).

  NCR-5781, Rev. 1, dated 1-20-84, stated that as a result of the documentation package review, it was noted the end prep sketch issued for rework of the end prep(s) per NCR-1789 (see the 3-13-82 entry above) had referenced a minimum wall dimension of 1.203 inches, instead of the correct wall-thickness dimension of 1.231 inches. This resulted in a minimum-wall violation not being reported at that time. Although apparently not known at that time, the area of the minimum-wall violation was rewelded in

conjunction with the welding for the radial shrinkage that occurred in the base material adjacent to the weld (NCR-5414). As noted above, an area was accepted that remained below minimum wall thickness. (See the 10-24-83 entry above.)

- 4-12-84 - Station 1-2 was reshot for film density violations (-15% to +30% density requirement) and read by a Level II reviewer on 7-25-84 and accepted.

- 7-24-84 - The P-H Level III examiner looked at the film.

- 8-21-84 - The P-H Level III examiner looked at the film.

- 8-23-84, YAEC read all of the film on this weld (including the reshot area) and found it acceptable.

Summary and Conclusions

The team found the following problems had occurred during the preparation, welding, and inspection of this weld. These problems were identified and addressed within the framework of the contractor's program.

(a) The engineer entered an incorrect material thickness on the process sheet. As a result of this error a minimum-wall violation remained undetected until it was identified during the documentation review and addressed.

(b) Radial shrinkage occurred adjacent to the weld and the weld had to be built up to restore the wall. The condition results from the type of material used, wall thickness involved, and heat input while welding; generally, radial shrinkage is more prevalent when repairs are involved. In this case, several repairs were involved. This was recognized and addressed by the process, and the shrinkage areas were repaired.

(c) The weld material was not properly accounted for, in that the process sheet was changed by striking over the entries without giving any explanation for the changes made. Also, weld rod was apparently used on a mockup to qualify the weld repair and checked out against the weld proper. The licensee discovered this during a surveillance.

(d) The documentation was apparently falsified for an in-process visual inspection. The piping contractor recognized the problem and addressed it.

(e) At least one page of the process sheet was missing. The cavity chart for some of the cavities was missing. The contractor recognized this, and addressed the resolution in NCR-5781.

The team analyzed these five conditions (above) to determine the technical adequacy of the weld and base material repair. The team found the following deficiencies relative to the fabrication of this weld:

(a) Review of the employee allegation resolution regarding cold pull noted that this weld was fit up and tack welded on 5-14-82. The team determined this weld was actually fit up and tack welded on a different date, 5-12-82. The

resolution for the cold pull concern was not affected by the date error because the conclusion would be the same; that is, the available records indicated this weld was not the closure weld. Therefore, this date discrepancy was not a safety concern.

(b) The required cavity chart for certain cavities was missing in the weld process sheet. The team determined that documentation required by the licensee's program apparently was not provided for at least one cavity. However, the location of the defect was documented on a chart taken from the radiograph interpretation and an NCR had been issued. The defects were confined to the weld and were repaired as shown by the radiographs taken of the weld after the repairs were completed. The team concluded this issue was not a safety concern.

(c) A YAEC report for a surveillance conducted on 4-16-84 noted that a review of weld rod issue requisitions showed an inordinately large amount of weld rod consumed. Also, the heat numbers were crossed out, initialed, and dated, raising a question of traceability. Note: This surveillance was of P-H NCR-5414 Supplement. It appeared that the deposit of this material had not been accounted for. From an interview with an engineer who presently worked on site for New Hampshire Yankee (NHY), but who previously worked for United Engineers and Constructors (UE&C) and was responsible for dispositioning the work activities, the team was advised that the weld rod had been consumed by qualifying the weld configuration (through-wall cavity) on a test mockup per the requirements of ECA-100104A, issued on 10-29-82. This document, which supported the engineer's statement, contained the following:

> Question: Does UE&C require the use of technique sheets and/or workmanship samples for unique weld joints?
>
> Answer: The site contractor shall indoctrinate the personnel involved in the details of the instructions. Mockups, if deemed necessary, shall be made to demonstrate the proficiency of the technique involved in the instruction as well as the welder's ability to perform the technique.

The team accepted this additional information and concluded the weld rod had been consumed, as described. Thus, this matter was not a safety concern.

(d) The NRC subjected this weld to several tests during an onsite inspection in July 1985; the testing was documented in Inspection Report 50-443/85-19. The tests were conducted using the NRC Mobile Nondestructive Examination Laboratory. The tests performed were: alloy analysis to verify chemical analysis and material type, ferrite check to determine delta ferrite of the weld composition, ultrasonic thickness measurements to verify minimum wall thickness, LP and visual examinations on the outside surface to assure weld contour and surface quality, and radiographs of the weld to verify volumetric quality of the weld. The report indicated that all tests were found acceptable.

A reconstruction of the records for this weld showed that the contractor had experienced some difficulties fabricating the weld and the records were not complete; however, the team's review, as well as a previous NRC analysis, found the weld and adjacent base material met the requirements, and the various discrepancies discussed above were not a safety concern. The significant issues were identified and corrected through the licensee's various check-and-balance reviews and surveillance overviews, combined with the 100-percent radiographic film overview performed by the licensee's agent.

(3) Weld Control Package 2-CBS-1214-F015

The team reviewed the weld control package for weld 2-CBS-1214-F015. The weld is circumferential and located on the Unit 2 containment building spray piping. It is 6 inches in diameter, 0.280 inch in nominal wall thickness, and made of stainless steel material. The weld is classified as ASME Code, Section III, Class 2. The welding requirements for preheat temperature (50°F minimum), interpass temperature (350°F maximum), and post-weld heat-treatment (PWHT) (not required) were specified on the process sheet.

On 7-7-83, the spool pieces were fit up and tack welded. They were visually inspected and found acceptable on 7-8-83. The root pass was completed and found visually acceptable on 7-8-83. The weld was finished and found visually acceptable on 8-9-83. An LP test was performed and found acceptable on 8-11-83. The weld was radiographed on 8-17-83 and was rejected for incomplete fusion of insert at stations 0-1, 1-2, and 3-0. A process sheet, Control No. 1953, was issued on the basis of an on-the-spot (OTS) engineering change authorization (ECA-19/1953A). The grindout resulted in three through-wall cavities that were rewelded commencing 11-7-83. The weld was again visually inspected and found acceptable on 11-9-83. The area was LP tested on 11-14-83 and found acceptable. The weld was radiographed and found acceptable by a P-H Level II reviewer on 11-17-83. It was read by a P-H Level III examiner on 11-20-83 and found acceptable. It was read again by a P-H Level II examiner on 2-27-85 and found acceptable. It was reviewed by the authorized nuclear inspector (ANI) on 11-21-85. It was read by the YAEC reviewer on 3-17-86 without comment.

Summary and Conclusions

This weld was fabricated and required one repair to meet the radiographic acceptance standards.

The weld was noted to have some weld shrinkage that was ultrasonically inspected on 8-9-83 and found acceptable.

All fabrication defects were repaired and properly inspected. The team had no concerns regarding the fabrication of this weld.

(4) Weld Control Package 1-MS-4012-F0201

The team reviewed the weld control package for weld 1-MS-4012-F0201. The weld is circumferential and located on the Unit 1 main steam piping in the turbine building. It is 24 inches in diameter, 0.375 inch in nominal wall thickness, and made of carbon steel. The weld is classified as not safety related and fabricated to ANSI B31.1 Code.

On 6-15-82, this weld was fit up and tack welded. The welding requirements for preheat and interpass temperature controls were specified on the process sheet by referencing the procedure that specified the requirement. Preheat and interpass temperature requirements were also specified on the process sheet. PWHT was specified on the process sheet as not required. The root was welded and visually found acceptable on 6-16-82. The weld was finished and visually inspected on 6-19-82. Radiography was performed on 6-23-82 and found acceptable by one Level III NDE examiner (no Level II reviewer was involved). The weld was reradiographed on 11-21-84 (sensitivity was questioned by a P-H Level III examiner on 11-21-84), and was declared acceptable by a Level II reviewer. A second reviewer from P-H (level not noted) reviewed and accepted the film on 1-25-85. A P-H Level III examiner accepted the film on 2-1-85, and the YAEC reviewer looked at the film on 2-4-85. There was no entry on the process sheet indicating the ANI reviewed the film. However, the ANI reviews film at his own discretion.

Summary and Conclusions

The records indicated that the weld was fabricated without any repair. The weld was radiographed a second time because the Level III examiner questioned the sensitivity of the film. The weld was reviewed again and found acceptable.

The team had no questions regarding the fabrication of this weld.

(5) Weld Control Package 1-RC-9-01-F0102

The team reviewed the weld control package for weld 1-RC-9-01-F0102. The weld is circumferential, 27.5 inches in inside diameter, 2.36 inches in nominal wall thickness, made of stainless steel, and located on reactor coolant loop piping in the containment building. The fabrication standard is ASME Code, Section III, Class 1. The welding procedure was specified on the process sheet, as well as requirements for preheat temperature (60°F minimum), interpass temperature (350°F maximum) and PWHT (not required).

On 8-10-81, the process sheet was issued (see page 76 of process sheet). The fitup and backing ring were completed on 9-1-81. The root was welded and found visually acceptable on 9-9-81. Intermediate stages of radiography were performed on 9-10-81 and 9-12-81, which were at different stages of the welding process. The radiography at the two intermediate stages was acceptable.

At a weld thickness of 2.36 inches, another radiograph was taken for information (weld not complete). The weld was rejected for lack of fusion between stations 5-6 and 6-7. The grindout cavities, performed on a process sheet issued on 9-17-81 (page 95 of process sheet), Control No. 327, resulted in two cavities between stations 5, 6, and 7. One cavity was 29 inches long, 1 inch wide, and 3/4 inch deep. The second cavity was 37 inches long, 1 inch wide, and 1 inch deep. The cavities were LP tested on 9-28-81 and found acceptable. A process sheet (page 100 of process sheet), Control No. 327, was issued on 9-29-81 to repair the cavities.

Note: The process sheet was originally marked "R1"; then by notation entered 11-16-84, the R1 was crossed out and "In Process" was entered.

The repairs were visually accepted on 10-6-81. The repairs were radiographed on 10-7-81 (signed off on process sheet on 10-9-81) and rejected. Process sheet (page 110), Control No. 358, was issued on 10-19-81, to grind and repair cavities. "R2" was crossed out and marked "In Process." The repairs were completed and visually accepted on 11-6-81. Radiography was performed and accepted on 11-4-81.

The weld was finished, as recorded on page 80 of the process sheet; it was visually inspected and found acceptable (inside surface on 8-18-82 and outside surface on 8-24-82). The weld was considered finished at this stage.

Note: This inspection sequence was performed by P-H Inspector A, an individual who did not always do his job. The licensee issued a 10 CFR 50.55(e) report stating that the area was reinspected, and NCR-4490 discussed the reinspection of this weld.

On 8-31-82, radiography was performed on the final weld and accepted.

On 7-20-83 (see NCR-4490 and process sheet page 93, Inspector A issue), an LP reinspection of the outside surface rejected the weld for a 3/32-inch linear indication in the weld. Process sheet (page 114), Control No. P1895, was issued and marked "R1." The grindout resulted in a cavity 3 inches long, 1 inch wide, and 3/32 inch deep between RT stations 4 and 5. The repair was LP tested and accepted on 8-16-83, process sheet (page 117) R2. A radiograph of the finished weld was rejected on 12-9-83, between station 5-6 for porosity with tails. The cavity chart (page 127) showed the cavity was 7-1/4 inches long, 1-7/8 inches wide, and 7/8 inch deep. A process sheet (page 123) R3, Control No. 2245, was issued on 12-16-83 to repair the cavity. The repair area was completed, visually and LP inspected, and found acceptable on 12-28-83. The radiography was completed and found acceptable on 1-5-84.

On 1-30-84, the P-H NDE Level III examiner reviewed the film of the repaired area. On 6-13-84, the YAEC reviewer completed the film review. The reviewers found the film acceptable.

Summary and Conclusions

The fabrication of this weld resulted in several repairs to the weld in process and three repairs to the finished weld. Two of the repairs were attributed to activities associated with P-H Inspector A who failed to perform an inspection sequence; this was found after the final inspections had been completed and accepted. After repairs were completed, P-H performed new radiographic, visual, and liquid penetrant inspections and found the weld acceptable.

The team had no questions regarding the fabrication of this weld.

(6) Weld Control Package 1-RC-3-01-F0102

The team reviewed the weld control package for weld 1-RC-3-01-F0102. The weld is circumferential, 27.5 in inches inside diameter, 2.36 inches in nominal wall thickness, made of stainless steel material, and located on the reactor coolant loop piping inside the containment building. The weld was fabricated to ASME Code Section III, Class 1. The welding process was specified on the process

sheet along with the requirements for preheat temperature (60°F minimum), interpass temperature (350°F maximum), and PWHT (not required).

On 8-28-81, the weld was fit up and tack welded. An in-process radiography at approximately 3/8-fill was done on 9-21-81, and found acceptable. An in-process radiograph at approximately 1/2-fill was taken on 9-23-81, and found acceptable. An in-process radiograph at approximately 3/4-fill was taken on 9-24-81. The film interpreter noted possible lack of fusion at station 2; however, the interpreter conferred with another inspector and accepted the area based on a more thorough and adequate review of the final weld (see reverse side of page 40 of process sheet).

On 9-29-81 (records were not complete enough to determine exactly what happened), it appeared that the weld was finished and, concurrent with that, the 3/4-fill information radiography was rejected (see page 56 of process sheet). A process sheet (page 56), Control No. 348, was issued on 9-29-81, to grind defects and weld cavities. The cavity chart showed a cavity 25 inches long, 1-3/4 inches wide, and 2-1/4 inches deep at station 1-2; a cavity 8 inches long, 3/4 inch wide, and 3/4 inch deep at station 7-0; and a cavity 13 inches long, 1-3/4 inches wide, and 2 inches deep at station 0-1. On 10-30-81, the repaired areas were completed (see page 62 of process sheet), visually inspected, radiographed, and found acceptable.

On 4-28-82, the inside surface was visually inspected and rejected (see page 40 of process sheet). A process sheet (page 66), Control No. 814, was issued on 5-7-82 to grind and repair defects. The repair order (see page 68 of process sheet) recorded that 100 percent of the inside surface had intermittent areas below flush. Note: Page 66 had a notation that the weld repair process sheet was lost and NCR-5029 was issued on 8-19-83. The reconstructed process sheet (page 72) indicated that the repaired weld was radiographed on 10-11-83 and accepted. The visual inspection was done on 12-16-83 and accepted.

The P-H NDE Level III examiner reviewed the film on 11-1-83. The YAEC reviewer reviewed the film on 11-4-83. The reviewers found the film acceptable.

Summary and Conclusions

Some significant repairs were required during the "in process" sequence of welding. After the weld was completed, some repairs were required on the inside surface of the pipe. A process sheet was lost during the fabrication process, and a new one was prepared using other records. This condition was properly documented on an NCR.

The team determined that the records supported the satisfactory fabrication of this weld.

(7) Weld Control Package 1-RC-10-01-F0101

The team reviewed the weld control package for weld 1-RC-10-01-F0101. The weld is circumferential, 29 inches on the inside diameter, 2.45 inches in nominal wall thickness, made of stainless steel material, and located on the Unit 1 reactor coolant loop piping in the containment building. The fabrication code was the ASME Code, Section III, Class 1. The process sheet specified the weld

procedure and requirements for preheat temperature (60°F minimum), interpass temperature (350°F maximum), and PWHT (not required).

The weld was fit up and tack welded on 6-26-81. Informational radiography was performed on 7-8-81, at approximately 3/8-fill and found acceptable.

An LP test, performed on 7-6-81, of the block (alignment tabs) removal area on the inside surface, found unacceptable defects. A process sheet (page 25), Control No. 228, was issued to grind and repair defects. The cavity size after the defect was removed was 2 inches long, 1 inch wide, and 3/32 inch deep. The area did not require weld repair.

At the 3/4-fill stage, an informational radiograph was taken on 7-14-81 (page 12 of process sheet). The weld was rejected for lack of fusion at station 1-2. The two cavities were (1) 3-1/8 inches long, 1/4 inch wide, and 3/16 inch deep and (2) 2 inches long, 1/4 inch wide, and 1/16 inch deep. A process sheet (page 32), Control No. 235, was issued on 7-14-81 to grind and repair the defects. Note: NCR-8016 was issued because a process sheet which accompanied the cavity chart (page 31A) was lost. The repair was completed on 7-14-81.

An in-process inspection on 7-15-81 (presumed to be radiography) rejected the weld for lack of fusion at station 2-3. On 7-15-81, a process sheet (page 35), Control No. 239, was issued to grind and repair defects. The cavity was charted (page 37 of process sheet) as 3-1/2 inches long, 1/2 inch wide, and 5/8 inch deep. The defects were removed and repaired (page 39 of process sheet) on 7-15-81.

The weld was finished (page 12 of process sheet) on 7-16-81, then visually inspected on 4-23-82, on the inside and outside surfaces, after the backing ring was removed. An LP test performed on the outside surface on 5-25-82 rejected the weld. A process sheet (page 43), Control No. 883, was issued on 5-27-82 to grind and repair the defects. The resultant cavity was 1 inch long, 5/16 inch wide, and 1/16 inch deep at station 3-4 (see page 45 of process sheet). Note: NCR-3832 which stated: "Stainless steel weld ran into Inconel band [Inconel by Westinghouse]." The repair welding was changed from F0101 to weld F0105 (see page 43 of process sheet), which was the base material on the reactor vessel side where the LP indications were located. It was later determined to also be at a location where Westinghouse had shop welded an Inconel band at the carbon steel to stainless steel junction. Supplements to the NCR identified other indications at this juncture. The NCR was closed on 3-12-84.

On 4-23-82, the inside surface was LP tested and the weld was rejected (see page 12 of process sheet). A process sheet (page 51), Control No. 771, was issued on 11-5-82 to repair defects designated "R1" (see page 50 of process sheet). The repaired area was rejected on 12-20-82 (see page 51 of process sheet) because of arc strikes. A change notice (page 56 of process sheet, Control No. 1543) was issued on 12-21-82 to remove the arc strikes. An LP test of the area after removal of the arc strikes rejected the weld on 12-27-82 (see page 56 of process sheet). NCR-3954 was issued on 10-31-83 acknowledging this was the third repair in the area. Acid etch identified an unmapped Inconel band (by Westinghouse) on the inside surface.

On 1-7-83, a process sheet (page 63), "Interim Action to NCR-3954," was issued to grind and repair defects. This sheet indicated that the repairs to the base material were reassigned to weld F0108. Note: This repair was originally designated weld F0107, which had been removed because wrong filler material had been deposited. The F0107 weld was removed and redesignated F0108 (see page 72 of process sheet). This matter was documented in NCR-3954, Rev. 1. Weld F0108 was visually inspected on 1-3-84, LP-tested on 1-3-84, and radiographed on 2-13-84. All tests were acceptable.

On 11-19-83, the weld proper (F0101) was found acceptable on the basis of review of the final radiographs (see page 12 of process sheet). The P-H NDE Level III examiner completed his review on 11-8-83, and YAEC completed its review on 11-22-83. The reviews found the film acceptable.

Summary and Conclusions

This weld experienced some fusion problems during the fabrication process that were found before weld completion, and they were successfully repaired.

The missing grind sheet was not a safety concern.

The LP tests performed at 58°F rather than at 60°F constituted a procedure violation; however, the team concluded the temperature variation was too small to affect the test results. Additionally, a new procedure using the 58°F temperature had been written and qualified to the satisfaction of the ANI.

The team found that, although numerous problems were encountered during the fabrication of this weld, it was properly fabricated. The team had no further questions about the weld.

References

Documents reviewed in conjunction with this weld package included:

- NCR-3832 - During LP testing per Control No. 883, hairline cracks were found. Cause - welding into Inconel
- NCR-3832 Supplement - Nonconformance Review Board Response Forms. Dated 2-17-83, "Instructions for Repairs"
- NCR-3832 Supplement - Nonconformance Review Board Response Forms. Dated 12-23-82, "Instructions for Repairs"
- NCR-3832 - Nonconformance Review Board Response Forms. Dated 12-8-82, "Instructions for Repairs"
- NCR-3954 - Repair of cavity using Inconel
- NCR-3954 Supplement - Repair of stainless safe-ends. Dated 2-17-83
- NCR-3954 Supplement - Etching of stainless steel safe-ends. Dated 2-8-83

- NCR-3954 Interim Action - Grinding on inside surfaces. Dated 1-17-83
- NCR-5082 - Remove indications by grinding
- NCR-5756 - Remove indications by grinding
- NCR-8016 - Grind sheet required to accompany control 235 missing
- NCR-7192 - LP tests were performed at 58°F; 60°F is required or the dwell time must be increased

Defect Removal and Repair Sequence

(a) Base material repair, page 25, Control No. 228, dated 7-7-81 and 7-8-81

(b) In-process repair, page 32, Control No. 235, dated 7-14-81

(c) In-process repair, page 35, Control No. 239, dated 7-15-81

(d) Base material repair, page 43, Control No. 883, dated 10-21-82 (1st repair)

(e) Weld repair (ID), page 47, Control No. 771, dated 5-5-82 (2nd repair)

(f) Base material (ID) repair, page 56, Control No. 1543, dated 12-21-82 (3rd repair)

(g) Base material (ID) defect removal, page 63, NCR-3954 Interim Action, dated 1-10-83

(h) Weld repair removal (wrong material) designated F0108, page 72, NCR-3954, dated 12-19-83

(i) Weld grinding (ID), page 79, NCR-5082 Supplement, dated 10-12-83

(j) Weld grinding (ID), page 82, NCR-5756, dated 1-9-84

(k) Weld grinding (ID), page unnumbered, NCR-3954, dated 12-19-83

(l) Weld repair F0108, page unnumbered, NCR-3954, dated 12-30-83 (4th repair)

(8) Weld Control Package 1-RC-10-01-F0102

The team reviewed the weld control package for weld 1-RC-10-01-F0102. The weld is circumferential and connects a Unit 1 steam generator nozzle to a 31-inch inside diameter, 3.15-inch nominal wall thickness, stainless steel, reactor coolant loop hot-leg pipe in the containment building. The fabrication code was the ASME Code, Section III, Class 1. The welding procedure was specified on the process sheet. Also, the requirements for preheat temperature (60°F minimum), interpass temperature (350°F maximum), and PWHT (not required) were specified on the process sheet.

The fitup and tack welding were done on 6-27-81.

On 7-2-81, process sheet (page 105), Control No. 220, was issued to remove arc strikes. Grinding and LP testing were started on 10-5-82, and completed on 10-7-82.

On 7-6-81, the root pass weld was visually inspected and found acceptable.

On 7-7-81, process sheet (page 108), Control No. 229, was issued to remove surface defects by grinding. No repairs were required.

On 7-8-81, an informational radiography was performed at approximately 3/8-fill. The test was acceptable.

On 7-10-81, an informational radiography was performed at approximately 1/2-fill. A defect between station 0-1 resulted in a cavity 3-3/8 inches long, 5/8-inch wide, and 1/4-inch deep. A process sheet (page 114), Control No. 232, was issued on 7-10-81 to remove and chart cavities. Also, a second process sheet (page 121), Control No. 234, was issued on 7-10-81 to remove and chart cavities. This resulted in a cavity 7 inches long, 1/2 inch wide, and 1/4 inch deep. Note: There was no apparent explanation of why two process sheets were issued on the same day for the same activity. The two areas were repaired together (see page 126 of process sheet) on 7-10-81.

On 7-14-81, a process sheet (page 133), Control No. 236, was issued for rejectable defects between stations 0-1, 1-2, and 6-7. A process sheet (page 139), Control No. 236, was issued on 7-15-81 to grind and excavate defects at stations 0-1 and 1-2 which was completed on 7-15-81. Station 6-7 was reported on process sheet (page 143), Control No. 238. Of the above defects, only station 6-7 required repair; the repair was made on 7-15-81, as reported on page 149 of the process sheet.

On 7-17-81, with the weld less than 3/4-fill, informational radiography found defects (lack of fusion) at station 4-5, as reported on page 153 of the process sheet, Control No. 242. The area was repaired, as reported on page 158 of the process sheet and completed on 7-17-81. On 7-20-81, a process sheet (page 162), Control No. 245, was issued to remove defects at stations 4-5, 5-6, and 6-7. A process sheet (page 168), Control No. 245, was issued on 7-24-81 to repair the cavities and was completed on 7-28-81.

On 7-30-81, informational radiography found defects at stations 6-7 and 7-0. A process sheet (page 172), Control No. 257, was issued on 7-30-81 to remove and chart the cavities. The two cavities were (1) 11 inches long, 1 inch wide, and 3/4 inch deep and (2) 9-1/2 inches long, 1-1/2 inches wide, and 1 inch deep. A process sheet (page 176), Control No. 257, was issued on 8-5-81, to repair the cavities. The repair was completed on 8-7-81.

The weld was finished on 8-14-81.

On 7-15-82, a process sheet (page 180), Control No. 1046, was issued to grind surface imperfections on the inside surface of the pipe. A process sheet (page 187), Control No. 1046, was issued on 8-26-82 to repair weld the area.

However, repairs were not necessary. LP inspection rejected the area on 12-7-82.

On 12-15-82, a process sheet (page 191), Control No. 1511, was issued to grind and chart the cavities. The chart showed cavities 2-3/4 inches long, 1 inch wide, and 7/16 inch deep at station 1-0; 3-7/8 inches long, 1 inch wide, and 7/16 inch deep at station 1-2; 6 inches long, 1 inch wide, and 3/16 inch deep at station 3-4; and 12 inches long, 2 inches wide, and 1/16 inch deep at station 6-7. The areas were repaired, as reported on the process sheet (page 199), Control No. 1511, dated 12-15-82. A radiograph taken on 12-31-82 rejected the weld for lack of fusion at stations 2-3, 4-5, and 6-7. A process sheet (page 205), Control No. 1566, was issued on 1-3-83, to grind out the defects. The combined measurements of the cavities were approximately 40 inches long, 1-7/8 inches wide, and 2-3/4 inches deep. A process sheet (page 209), Control No. 1566, was issued on 5-31-83 to repair the cavities. The cavities were completed and LP examined on 7-15-83. The area was rejected with linear indications in the base material. NCR-4789 was issued on 10-19-83 indicating the defects were in an Inconel weld. A process sheet (page 214), Control No. NCR-4789 was issued on 8-11-83, to grind out the defects. Some rejectable indications still remained. A process sheet (page 217), Control No. NCR-4789, was issued on 8-22-83 to perform further grinding to remove the indications.

The cavity charts for the process sheet (page 217), Control No. NCR-4789, identified that between station 6-7 (see page 225 of process sheet) a cavity was ground 2 inches long, 7/8 inch wide, and 1/8 inch deep in the Inconel to carbon steel base material of the steam generator nozzle. The licensee issued NCR-5224 on 9-22-83 reporting that field weld RC-10-01-F0102 was ground into during excavation of base material indications, per NCR-4789, between station 4-5, which had been repaired three times. The NCR specified the repair of the field weld by welding with stainless steel and the repair of the base material (P-3 carbon steel) by welding with Inconel. A memorandum dated 10-4-83 stated it was not known who did the actual grinding of the cavity. The repair area was designated F0106. The area was weld repaired in conjunction with repairs to F0102 and documented on a process sheet, Control No. NCR-5224. After welding, the area was post-weld heat treated using a modified process (allowed by the ASME Code for repaired areas contained within certain parameters). The area was post-weld heat treated for 2 hours at 450°F ± 50°F. The weld was made using the shielded metal arc and an Inconel electrode, with a 350°F minimum preheat temperature, and a 450°F maximum interpass temperature. The repairs were completed on 10-13-83, and an LP examination rejected the area on 10-18-83. A process sheet (unnumbered), Control No. NCR-4789, was issued on 10-19-83 to grind, LP examine, and map the cavities.

A process sheet (unnumbered), Control No. NCR-4789, was issued on 10-26-83 to weld and post-weld heat treat the areas. This was also done with an Inconel electrode. The modified PWHT, after the repairs, was performed at 450°F ± 50°F for 2 hours and was completed on 11-1-83. An LP examination performed on 11-4-83 rejected the repairs. A process sheet (unnumbered) was issued on 12-13-83 to grind, etch, and chart cavities. The cavity chart, dated 12-27-83, indicated that some cavities existed on the Inconel to carbon steel fusion line between RT stations 3, 4, and 5. On 1-19-84, a process sheet (unnumbered) (see NCR-4789) was issued to perform grinding to the stainless steel band, the weld joint, and the Inconel band at the steam generator nozzle. A note stated that

the length of cavity shall be 1/2 inch to 1 inch longer than the repair area and as deep as necessary. Step 6 required the inspector to measure, map, and report cavity size to ensure proper location of the Inconel band. This step was signed off as complete on 2-10-84. The team had some additional questions regarding these repairs that are discussed in Section 10 and Appendix 7 to this report.

The cavities were welded with Inconel using 350°F minimum preheat temperature, 450°F maximum interpass temperature, and a PWHT temperature of 450°F for 2 hours. The weld repairs were completed, LP examined on 2-21-84, and were accepted. The areas were radiographed on 2-22-84, and found acceptable.

A process sheet (page 228), Control No. A2354, was issued on 2-3-84 to repair the cavities resulting from radiography performed on 2-2-84 (see page 232 of process sheet). The cavities were repaired and the weld was accepted by radiography on 2-22-84 (see page 228 of process sheet). This outside repair was performed in conjunction with the process sheet issued 2-8-84 (page 236), Control No. NCR-4789. A reradiograph performed on 3-26-84 was reviewed by a P-H Level III examiner on 5-31-84. YAEC examined the film on 6-14-84.

Summary and Conclusions

Numerous repairs were made during the welding process and were indicative of problems with the automatic welding process; however, all areas were repaired successfully and passed all required nondestructive examinations after the repairs were finished. The records indicated that the welds were checked for radial shrinkage and no abnormal conditions were noted.

Upon completion of the welding, numerous problems were encountered on the surfaces adjacent to the weld. These problems were associated with an Inconel weld made at the factory. The contractor either was unaware that an Inconel weld existed nearby or inadvertently applied stainless steel onto the Inconel, causing cracks to occur. Extensive repairs were required to correct the cracking in the vicinity of the carbon steel to Inconel/stainless steel juncture (where P-8 joined P-3). The P-8 to P-3 weld repair was completed successfully after many attempts; however, the records initially available did not provide sufficient documentation to ensure that the repairs had been so confined that the repaired area did not need PWHT to meet the requirements of the ASME Code, Section III.

The team was aware of the problems associated with welding stainless steel onto Inconel that had occurred, for example, at Beaver Valley Unit 2; however, the team considered that welding on the P-3 material, after the final PWHT of the vessel had been completed, to be unusual. The licensee believed that this probably occurred when a nozzle cover was welded onto the steam generator nozzle opening in preparation for shipment from the factory.

The team was concerned about whether the P-8 to P-3 weld repairs had been accomplished in accordance with the size and depth limitations of the code when repairs were made to final post-weld heat-treated P-3 material. The records initially provided to the team were insufficient, without a chart or other record documenting the size and location of the repaired area, to provide assurance of compliance with the ASME Code.

Repairs to the adjacent weld surface were controlled with an NCR and, therefore, the team found they were being properly controlled to determine when the three-repair limit had been reached. Also, in-process repairs did not require an NCR, as specified by the procedures.

Except for the questions (that were later resolved) about welding on the P-3 material, the team found the weld was acceptable after the repairs had been finished and no damage had occurred to the weld or base material, as determined by the volumetric examination, surface examination, and weld shrinkage check. The issue regarding repairs to the carbon steel (P-3) material was subsequently resolved, as addressed in Section 10 and Appendix 7 to this report.

(9) Weld Control Package 1-RC-49-F0102

The team reviewed the weld control package for weld 1-RC-49-F0102. The weld is circumferential, located on the Unit 1 reactor coolant surge line in the containment building, and connects the "C" hot leg to the pressurizer. It is 14 inches in diameter, 1.406 inches in nominal wall thickness, and made of stainless steel material. The fabrication code was the ASME Code, Section III, Class 1. The welding procedure (24-III-K1-12) was specified on the process sheet. Also, the requirements for preheat temperature (50°F minimum), interpass temperature (350°F maximum), and PWHT (not required) were specified.

The spool pieces were fit up and tack welded on 5-12-82. The root pass was completed, visually inspected, and found acceptable on 5-14-82. The weld was completed to 1/2-fill, visually inspected and found acceptable on 5-15-82. The weld was completed to 3/4-fill, visually inspected, and found acceptable on 5-17-82. The weld was finished, visually inspected, and found acceptable on 10-20-82.

The LP inspection of the outside surface (ID was inaccessible) was completed and found acceptable on 10-20-82.

The radiography was performed on 10-25-82. Station 3-0 required reradiography because of film processing artifacts. The reshoot was taken on 1-26-83 and found acceptable.

The P-H Level III examiner reviewed the film on 11-17-83.

On 3-5-84, the entire weld was reradiographed and the P-H Level II reviewer accepted it on 3-21-84.

The P-H Level III examined the film on 3-21-84.

The YAEC reviewer examined the film on 11-5-84.

On 2-24-84, NCR-6171 was written because the quality control (QC) inspector was unable to verify that the balloon purge dam put in for welding had been removed (inaccessible). The NCR was verified as complete on 7-11-84 and closed.

Also, NCR-1789, issued on 12-22-81, was applicable to this weld. (See weld RC-49-F0101 discussed above, which had the same problem.)

Summary and Conclusions

The team found that this weld had been fabricated without any significant nonconforming conditions and was in compliance with the requirements. NCR-6171 and NCR-1789 were properly issued and dispositioned.

(10) Weld Control Package 1-RC-9-01-F0101

The team reviewed the weld control package for weld 1-RC-9-01-F0101. The weld is 31 inches in inside diameter, 3.15 inches in nominal wall thickness, made of stainless steel material, and connects the primary piping to the steam generator. The weld was finished on 9-11-81. Final LP examination on the outside surface was performed and found acceptable on 6-8-82. The inside surface was LP accepted on 5-5-82 and again on 6-8-82.

Radiography performed on 11-23-82 rejected the weld for lack of fusion between station 1-2 that was repaired on a process sheet, Control No. 1488, dated 1-7-83. After repair, radiography rejected the weld (1-12-83) with an indication between 8:00 and 9:00 o'clock. A repair order, Control No. 1596, was issued to grind the inside surface because the surface had been altered when the repair per Control No. 1488 was made. Also, a process sheet, Control No. 1610, was issued on 1-12-83, to remove and repair the weld at RT station 0-1. The cavity overlapped into station 1-2. The repaired area was radiographed on 8-18-83 and rejected. NCR-4114 was issued in conjunction with a process sheet, Control No. 1958, to remove and repair defects at RT stations 0-1, 1-2, 2-3, 5-6, 6-7, and 7-0. This process sheet showed "R3," indicating a third repair. The repairs were completed and radiography was completed and accepted on 8-20-83. The process sheet indicated the final radiography was done on 11-14-83.

Summary and Conclusions

The team found that the contractor had experienced some problems with defect repairs on this weld; however, all areas were successfully repaired and the proper nondestructive examinations were performed.

(11) Weld Control Package 1-RC-3-F0101

The team reviewed the weld control package for weld 1-RC-3-F0101. The weld is 27.5 inches in inside diameter, 2.36 inches in nominal wall thickness, made of stainless steel material, and connects the reactor coolant loop pipe to the pump. The weld procedure was 251-III-8-BR-A1 with 60°F minimum preheat temperature and 350°F maximum interpass temperature.

The weld was started on 8-31-81, and finished, examined, and accepted on 3-8-84. In-process radiography was performed at various stages during the weld process and found acceptable. After welding, at step 49, visual inspection on the outside surface rejected the weld. The defect was ground to 0.075 inch deep, reinspected, and rejected on the basis of the visual examination. NCR-3561 Supplement documented two indications: (1) 1/16 inch long and (2) 3/16 inch long

located 1/2 inch above the weld on the pump nozzle base material (6:00 o'clock). After grinding, a cavity 3/4 inch wide, 2 inches long, and 1/4 inch deep resulted. Repair was necessary because the cavity would interfere with in-service inspections. The cavity was LP inspected before welding. The weld repair was completed, LP examined, and found acceptable on 1-26-83.

An LP exam (inside repair) was signed off as acceptable on 7-14-82 by a P-H inspector, referred to in this report as Inspector A. (See NCR-4490 dated 11-22-83, page 30.) It was reinspected on 8-13-83, and accepted by another P-H technician.

Also, NCR-3718, issued on 10-29-82, noted that unauthorized grinding was performed on the pipe side of the weld, that is, grinding was done without documentation. The NCR identified a cavity 1/8 inch deep, 11/16 inch long, and 1-1/2 inches wide. The repair weld was identified as F0104. The repair was recorded on a process sheet, Control No. NCR-3718, and LP accepted on 1-26-83.

Summary and Conclusions

When the weld was fabricated, some out-of-the-ordinary things happended; that is, unauthorized grinding was performed on the base material and LP examination of a repair cavity was performed by an individual suspected of not always doing his job. The suspect areas were properly handled in that reinspections were performed. The team concluded the weld was properly fabricated, inspected, and documented.

(12) Weld Control Package 1-RC-91-F002

The team reviewed the weld control package for weld 1-RC-91-F002. The weld is 1 inch in diameter, 0.250 inch in nominal wall thickness, and made of stainless steel material. The weld procedure was 27-III-8-OB-12 12-1, and required a minimum preheat temperature of 50°F and maximum interpass temperature of 350°F.

The radiography performed on 9-24-84 rejected the weld 360 degrees for incomplete penetration. The weld was then cut out and rewelded. The team reviewed the documentation commencing with the rewelding. The new weld, identified as F002 R1, was fit up and tack welded on 10-15-84. After weld completion on 10-17-84, radiography rejected the weld. A process sheet, Control No. A3072, was issued to grind out the defect, reinspect, and if RT failed, remove (cut out) the weld. The weld did fail the RT on 10-31-84. The RT was reviewed again and accepted (see NCR-7869) by P-H Level II, P-H Level III, and ANI reviewer. The YAEC reviewer then rejected the weld for lack of fusion at station 0. A note had been added on the process sheet (11-29-84) indicating that the weld was not cut out as stated. Instead, another process sheet was issued on 11-1-84, Control No. NCR-7869, weld F002 R2. (Note: Actually, this is the first repair, since the original weld (R1) was removed to grind, reweld, and reinspect the weld. The radiograph of the weld was also rejected. The weld was again evaluated and accepted by P-H Level II, P-H Level III, and ANI review on 11-8-84. The YAEC reviewer rejected the weld for incomplete film coverage of the weld. A reshot was rejected for porosity with tails at stations 3 and 2.

On 11-9-84, a process sheet (NCR-7869A) was issued to grind, weld, and inspect the weld now identified as F002 R3. RT rejected the weld at station 3 with incomplete fusion (station numbers were moved one station to the right).

On 11-16-84, another process sheet (Control No. 7869C) was issued to grind, repair, and reinspect the weld now identified as F002 R4. The RT performed on 11-21-84 found the weld acceptable and was examined by a P-H Level III examiner on 11-26-84, the ANI on 11-27-84, and by YAEC on 11-30-84. The visual, LP, and visual test (VT) thickness examinations were performed on 11-20-84 and found acceptable.

Summary and Conclusions

The radiographic films for this weld were improperly interpreted by P-H Level II and III reviewers on two occasions. However, in both cases, the YAEC review identified the problem and required appropriate corrective action to be taken.

The records indicated the repair sequence was R4, that is, the fourth repair. If this were correct, then an NCR documenting this condition would be required before commencing the fourth repair. However, the R1 cycle was a complete weld removal, and after weld removal, only three repairs were made on the weld, so an NCR was not required.

The team concluded that the fabrication of this weld was acceptable.

(13) Weld Control Package 1-RC-45-F0107

The team reviewed the weld control package for weld 1-RC-45-F0107. The weld is 2 inches in diameter, 0.344 inch in nominal wall thickness, and made of stainless steel material. The welding procedure used was 27-III-8-OB-12 and contained requirements of 50°F minimum for preheat temperature and 350°F maximum for interpass temperature.

The weld was cut out and replaced because of radiographic indications found on 10-31-83. The team's review commenced with the replacement welding. The original weld was cut out and tack welded again on 11-15-83. The weld was finished and radiographed on 11-21-83, and found acceptable. The P-H Level III examiner reviewed the film on 11-22-83, and the YAEC review was performed on 10-19-84.

Summary and Conclusions

The team found that the new replacement weld was properly fabricated.

(14) Weld Control Package 1-RC-7-F0102

The team reviewed the weld control package for weld 1-RC-7-F0102. The weld is 29 inches in inside diameter, 2.45 inches in nominal wall thickness, and made of stainless steel material. The welding procedure was 25-III-8-BR-A1 and required a 60°F minimum preheat temperature and a 350°F maximum interpass temperature.

On 8-13-81, the weld was fit up and tack welded. In-process radiography performed at various stages of welding found the weld acceptable. The weld was finished and LP examined on the inside surface on 5-19-82 and on the outside surface on 5-20-82 and found acceptable. The radiographic examination performed on 10-11-83 rejected the weld for incomplete fusion at stations 2-3 and 3-4. A process sheet, Control No. 2181, was issued on 11-15-83 to grind and reweld the defective areas. The weld was finished and reradiographed on 12-23-83 and found acceptable.

The P-H Level III examiner reviewed the film on 12-23-83. The YAEC review was done on 2-8-84.

Summary and Conclusins

The team concluded that the weld was properly fabricated.

(15) Weld Control Package 1-RC-7-F0103

The team reviewed the weld control package for weld 1-RC-7-F0103. This weld was a base material repair of the reactor pressure vessel nozzle in the vicinity of weld 1-RC-7-F0102. The defects were discovered when the weld F0102 was inspected.

A process sheet supplement, Control No. 2282, was issued on 8-18-83 to grind out the identified defects. After grinding to 1/8 inch, a second process sheet, dated 9-24-83, was issued to grind, LP examine the cavity, and map the cavity. The resultant cavity chart, dated 9-28-83, showed one cavity 3-3/4 inches long, 1 inch wide, and 1/2 inch deep.

A repair process sheet was issued on 9-24-83 to weld the cavity. This process sheet identified the repair as P-3/P-8 material which indicated that the reactor vessel carbon steel (P-3) material probably was exposed and rewelding was necessary on the post-weld heat-treated material. The repair weld was made with an Inconel electrode using Weld Procedure 655-III-3/8-CL2. This procedure was qualified for limited repair on P-3 to P-8 surfaces. It was also qualified for welding on both Inconel and stainless steel materials. The minimum preheat temperature specified was 350°F, and the maximum interpass temperature specified was 450°F. After welding was finished, the temperature was held at 450°F ± 50°F for a minimum of 2 hours. The material was allowed to remain at room temperature for 48 hours before nondestructive examinations were performed. The LP test was completed on 10-4-83 (after the material had stayed 48 hours at room temperature), and the results were acceptable. The process described above is mandatory when welding on P-3 material that has had a final PWHT (like the carbon steel base material on the reactor vessel).

ASME Code Section III also limits the repair area to a maximum depth of 3/8 inch and the surface area to 10 square inches. As noted above, the cavity depth was 1/2 inch and, thus, appeared to violate the requirements specified in the ASME Code.

The radiography was performed on 10-11-83 in conjunction with the weld joint. The area was accepted.

Summary and Conclusions

The cavity chart indicated that the repair depth was 1/2 inch. The process sheet indicated the repair was a base material repair in carbon steel P-3 material. Also, the welding procedure used was qualified for P-3 to P-8 materials. Therefore, the team initially believed that the repair involved the P-3, final post-weld heat-treated reactor pressure vessel nozzle and possibly violated the 3/8-inch depth criterion of the ASME Code.

On the basis of the data provided in the process sheet, the team was unable to conclude that the requirements specified in ASME Code Section III had been met. The team advised the licensee of this concern and asked the licensee to reevaluate all repairs made on the welds that connect P-3 to P-8 material (reactor vessel and steam generators) and provide sufficient records to show that the repairs had been made properly.

The licensee provided this information via express mail which the team received on 5-23-90. A review of these data disclosed that the repairs were confined to the stainless steel/Inconel material, and thus the requirements of the ASME Code were not violated. The team's evaluation of the additional information received from the licensee concerning base material repairs is discussed in Section 10 and Appendix 7 to of this report.

The team found the rest of the weld fabrication acceptable.

(16) Review of Other Weld Control Packages

The team reviewed the weld control packages listed below to evaluate the adequacy of the weld fabrication. These welds were either fabricated to ANSI Code B31.1 (not safety related) or on Unit 2 (not active).

- 1-MS-4013-02-F0201 B31.1
- 1-MS-4005-20-F2003 B31.1
- 1-MS-4005-22-F2204 B31.1
- 1-MS-4009-01-F0109 B31.1
- 1-MS-4016-02-F0204 B31.1
- 2-CBS-1214-F011 Unit 2

(a) Weld 1-MS-4013-02-F0201

The weld is 24 inches in diameter, 0.375 inch in nominal wall thickness, made of carbon steel material, and part of the main steam system located in the turbine building. The weld was started on 7-19-82, and the finished weld was nondestructively examined and found acceptable on 9-28-82.

Surface examination (i.e., magnetic particle) was not performed or required. Visual examinations were performed.

On 7-19-82, a base material repair was made near weld F0201. A review of the film on 2-4-85 rejected film stations 3-4 and 4-5. The areas were reshot on 3-21-85 and accepted. The P-H Level III examiner did not review the film re-reviews performed on 2-4-85, or the film of the reshot on 3-21-85. YAEC reviewed the film on 3-22-85.

(b) Weld 1-MS-4005-20-F2003

The weld is 4 inches in diameter, 0.337 inch in nominal wall thickness, made of carbon steel material, and part of the main steam system located in the turbine building. The weld was started on 7-15-82 and found acceptable on 9-28-82. The weld was repaired because defects were discovered at station 0-1.

Surface examinations were not performed or required. The cavity for the repair was LP examined and found acceptable.

A review of the film on 3-2-85, by a P-H Level II reviewer required all stations to be reradiographed. A reshot taken on 3-2-85 was accepted by P-H Level II and III reviewers on 3-4-85. YAEC reviewed the film on 3-4-85.

(c) Weld 1-MS-4005-22-F2204

The weld is 4 inches in diameter, 0.337 inch in nominal wall thickness, made of carbon steel material, and part of the main steam system located in the turbine building. The weld was started on 6-9-82 and finished on 6-16-82.

The weld was radiographed on 6-16-82 and accepted by a P-H Level III examiner on the same day.

The weld radiograph was re-reviewed by a P-H Level II reviewer on 8-24-84 and a P-H Level III examiner on 8-31-84 and found acceptable.

YAEC reviewed the film on 9-6-84.

(d) Weld 1-MS-4009-01-F0109

The weld is 30 inches in diameter, 1.156 inches nominal wall thickness, made of carbon steel material, and part of the main steam system located in the turbine building. The weld was started on 7-23-82 and was finished on 4-11-83. The weld was radiographed and rejected on 7-28-82. The weld was repaired and radiographed on 8-9-82 and found acceptable on 8-11-82. The weld was post-weld heat-treated at 1150°F for 1-1/4 hours on 4-11-83.

During a P-H re-review of the radiograph, lack of fusion at RT stations 0-1 and 3-4 were noted, and NCR-82-333 was issued on 10-10-84. UE&C issued a work request (WR-MS-0306) on 11-2-84, to repair the rejectable indications. The repaired weld was again post-weld heat-treated on 3-25-85. The repaired area was magnetic particle examined on 3-23-85 and found acceptable.

On 3-11-85, reshots of stations 1-2, 5-6, and 6-0 were taken to show the penetrameter.

On 3-21-85, reshots of stations 0-1, 2-3, and 3-4 were taken to show the penetrameter. A P-H Level III examiner reviewed the film on 3-22-85. YAEC reviewed the film on 3-22-85.

(e) Weld 1-MS-4016-02-F0204

The weld is 24 inches in diameter, 0.375 inch in nominal wall thickness, made of carbon steel material, and part of the main steam system located in the turbine building. Before this weld was started, an LP examination was performed on the weld preps and signed off as acceptable on 8-19-82. This examination was performed by an individual who did not always do his job. The contractor recognized this and issued NCR-BO-683 and NCR-4490 to address the examination which was inaccessible when discovered after the weld was complete. The weld was started on 8-19-82, radiographed on 9-16-82, and found acceptable by the P-H Level II reviewer. The weld was reviewed on 9-16-82 and found acceptable by a P-H Level III examiner (first review). A P-H Level III examiner (overview) reviewed the film on 8-27-84. YAEC reviewed the film on 8-28-84.

(f) Weld 2-CBS-1214-F011

The weld is 6 inches in diameter, 0.280 inch in nominal wall thickness, made of stainless steel material, and part of the Unit 2 containment building spray system located in the containment building. The fabrication code was the ASME Code, Section III, Class 2.

The weld was started on 6-14-83 and finished on 12-14-83.

The first radiograph of the finished weld was rejected because of a 7/8-inch-long linear indication at RT station 1-2. The area was repaired and reradiographed and found acceptable on 12-14-83.

Weld shrinkage was noted 360 degrees on the base material adjacent to the weld. Ultrasonic thickness measurements revealed a wall thickness of 0.258 inch. The design minimum wall is 0.221 inch. The condition was accepted without repair and was documented on NCR-5519 and closed on 12-1-83.

A P-H Level III examiner reviewed the film on 12-16-83. It was re-reviewed by a P-H Level II reviewer on 2-27-85. YAEC reviewed the film on 3-18-86.

Summary and Conclusions

The team found that these welds had been fabricated in compliance with the applicable code, either ANSI Code B31.1 or ASME Code, Section III, and no abnormal fabrication problems occurred.

APPENDIX 7

DETAILED REVIEW OF BASE MATERIAL REPAIRS TO REACTOR PRESSURE VESSEL AND STEAM GENERATOR NOZZLES

The team reviewed documentation associated with 13 welds that the licensee submitted by express mail. The team had asked for this information because the records that the licensee had initially provided did not have cavity charts with the process sheets, or other records documenting the size and location of the repaired area, to show that the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) was met when repairs were made that could have exposed carbon steel base material.

(1) Weld RC-7-F103

This weld was a repair made adjacent to field weld RC-7-F0102. The team reviewed the following documentation, as the licensee reconstructed the repair. Westinghouse supplied additional information supporting the data.

- Westinghouse Field Deficiency Report (FDR) NAHM-10051
- Westinghouse FDR NAHM-10122
- Pullman-Higgins (P-H) NCR-2282 and Supplement 1
- P-H Field Process Sheet, Control No. NCR-2282 Supplement
- P-H Field Process Sheet, Control No. NCR-2282, FW-103 BMR. The team also reviewd this document at the site.
- Yankee Atomic Electric Company Deficiency Report 705
- New Hampshire Yankee memorandum, "NRC Independent Evaluation Team Concern Relative to RPV and SG Safe End Weld Repairs, May 18, 1990
- Certificate of compliance for weld repairs on reactor vessel nozzle (to hot leg "C") of Nonconformance Report (NCR) 2282

The documentation showed this weld repair was 1/2 inch deep. The licensee provided a sketch, which was prepared on May 18, 1990, that showed the cavity was located in the stainless steel buttering to Inconel weld deposit and not in the carbon steel base material. Further, the certificate of compliance, dated November 7, 1984, certified the repairs conformed to ASME Code Section III, Division 1, 1977 Edition with Winter 1977 Addenda (77W77).

With regard to its reevaluation of this issue, the licensee stated that (a) the repairs and associated examinations were performed in accordance with the ASME Code of record during construction and (b) the repairs did not result in any

adverse conditions relative to the quality and integrity of the safe-end welds or base material repairs.

The team concluded the repairs were restricted to either stainless steel or Inconel and, therefore, was satisfied that the requirements of the ASME Code were met. The team had no further questions regarding this repair.

(2) Weld RC-7-F0101

The records indicated this weld was repaired once because of the results of liquid penetrant (LP) testing (Control No. 1072). The repair was confined to the weld and no repairs were made on the base material. The team had no further questions regarding this repair.

(3) Weld RC-9-F0101

The records indicated no repairs were made on the carbon steel base material. The team had no further questions regarding the repairs made to this weld.

(4) Weld RC-12-F0102

The records indicated repairs were made in base material adjacent to the weld. The repaired areas were designated RC-12-F0103.

This repair was made to restore the inside surface to an acceptable configuration after defects were removed. The repairs were limited to the stainless steel material, and none were made on the carbon steel. The team had no further questions regarding these repairs.

(5) Weld RC-3-F0102

The records indicated repairs were made on the inside weld surface, but did not extend into adjacent base material. The team had no further questions regarding these repairs.

(6) Weld RC-4-F0101

The records indicated the following repairs were made. During removal of the temporary shipping cap on the primary inlet nozzle, excessive grinding caused one gouge approximately 1/4 inch deep and 8 inches long and a second gouge approximately 1/16 inch deep, and 5 inches long. The areas were repaired without encroaching on the carbon steel base material.

On October 3, 1981, Westinghouse issued FDR-10037, which stated that during an attempt to remove a radiographic indication, carbon steel was exposed on the steam generator nozzle. Westinghouse required the contractor to verify the exposed base material did not exceed a depth of 3/8 inch or an area of more than 10 square inches. The repair area was designated FW-4-F0103 (BMR), a base material repair adjacent to pipe weld RC-4-F0101.

The records indicated the following repairs were made exposing carbon steel (P-3) post-weld heat-treated material. The repairs were identified on NCR-3833 and affected base material that was 2-1/4 inches long, 7/8 inch wide, and 5/32

inch deep. The area was repaired using the weld procedure qualified for P-3/P-8 material. Thus, the area of repair was less than 3/8 inch deep and less than 10 square inches in surface area. The contractor certified on a certificate of compliance that the repair conformed to ASME Code Section III, Division 1, 77W77.

The team concluded the carbon steel base material repair areas were controlled in accordance with the ASME Code and had no further questions regarding these repairs.

(7) Weld RC-2-F0104

The records indicated one repair, identified on NCR-3865 as involving surface grinding on the outside surface to remove defects (arc strike), was made. The defects were removed without any repair welding required. Since welding was not needed (or used) on the carbon steel base material, the team had no further questions regarding this repair.

(8) Weld RC-8-F0104

The records indicated two repairs were made on the adjacent base material. The repairs did not result in the exposure of carbon steel base material because they were made on stainless steel or Inconel material. The team had no further questions regarding these repairs.

(9) Weld RC-1-F0101

The records indicated repairs were made after the weld was completed; however, none of the repairs involved the carbon steel base material.

The team noted the LP test was signed off as having been performed and found acceptable. A subsequent LP test revealed rejectable indications were present on the surface that had been previously accepted. P-H later determined that the original test had been performed by an individual who did not always do his work. This affected area was repaired, and the condition was reported on NCR-4490 and reported to the NRC as a 10 CFR 50.55(e) reportable deficiency.

The team had no further questions regarding these repairs.

(10) Weld RC-10-F0105

The records indicated this weld number was for a repair area adjacent to weld RC-10-F0101. Westinghouse had issued FDR NAHM-10056 to remove the defect in the affected area by grinding, performing an LP test to ensure crack removal, acid etching to locate the Inconel band, and weld repairing the area using a procedure specified for Inconel. The team determined none of the repairs resulted in the exposure of carbon steel base material and had no further questions regarding these repairs.

(11) Weld RC-6-F0102

The records indicated this weld number was for a repair area adjacent to weld RC-6-F0101. These repairs were located immediately adjacent to the field weld

and did not encroach on the carbon steel base material. The team had no further questions regarding these repairs.

(12) Weld RC-11-F0109

The records indicated this weld number was for a repair area adjacent to weld RC-11-F0101. Westinghouse had issued FDR NAHM-10049 to remove defects discovered by radiography. The FDR required the contractor to verify exposed base material (carbon steel) did not exceed an area of 10 square inches and a depth of 3/8 inch.

NCR-3874 stated that the repair area was at the stainless-steel-to-Inconel juncture and did not encroach on the carbon steel base material. The contractor certified on a certificate of compliance the repair conformed to ASME Code Section III, Division 1, 77W77.

The team had no further questions regarding these repairs.

(13) Weld RC-10-F0106

The records indicated the weld number was for a repair area adjacent to weld RC-10-F0102. The team reviewed NCRs-4789 and 5224 to determine if the carbon steel base material was exposed when the defects were ground out. The records indicated all repairs were confined to either the stainless steel or Inconel material and carbon steel base material was not exposed during the repair process.

The team had no further questions regarding these repairs.

APPENDIX 8

DETAILED REVIEW OF
YANKEE ATOMIC ELECTRIC COMPANY (YAEC) AUDITS AND SURVEILLANCES
AND PULLMAN-HIGGINS (P-H) INTERNAL AUDITS

(1) YAEC AUDITS REVIEWED

Audit No.	Date*	Subject
SA145CS18	10/19/79	Nondestructive Examination (NDE) Procedures and Quality Assurance (QA) Program
SA246CS051	10/12/79	QA Program and Procedures
SA323CS084	02/21/80	Indoctrination and Training
SA325CS086	05/01/80	Verification of Corrective Action
SA358CS092	06/30/80	Verification of Corrective Action
SA363CS095+	06/06/80	Special Processes
SA368CS097	07/10/80	Verification of Corrective Action
SA400CS108+	09/23/80	QA Program
SA508CS158+	06/29/81	QA Program
SA565CS184+	12/10/81	Welding and NDE
SA573CS188+	01/19/82	Nonconformance Reports (NCRs), Corrective Action Reports (CARs), and Trend Analysis
SA593CS200	03/17/82	Verification of Corrective Action
SA594CS201	04/08/82	Verification of Corrective Action
SA598CS203+	04/22/82	Welding and Special Processes
SA628CS219	07/22/82	Organization, QA Program, Design Control, and QA Audits
SA633CS222	07/30/82	Verification of Corrective Action
SA634CS223	08/06/82	Verification of Corrective Action
SA635CS224+	08/20/82	Control of Purchased Material and Special Processes
SA639CS226	09/02/82	Verification of Corrective Action
SA647CS232	09/23/82	As-Builts
SA648CS233	09/16/82	Verification of Corrective Action
SA649CS234+	10/01/82	Inspection/Weld Monitoring
SA669CS239+	11/08/82	Special Processes
SA666CS242+	12/01/82	Hanger Stop Work Order
SA670CS245	12/30/82	Inspection, Tests, and NCRs
SA676CS246	01/05/83	Verification of Corrective Action
SA682CS250	01/25/83	Procurement and QA Records
SA688CS253	02/02/83	Verification of Corrective Action
SA691CS254	02/10/83	Document Control
SA700CS262	03/03/83	Special Processes and NCRs
SA707CS267	03/08/83	Verification of Corrective Action
SA719CS272	03/25/83	Design Control, Procedures and Drawings
SA738CS284+	06/28/83	QA Program and Special Processes

See footnotes at end of list.

SA747CS290	05/07/83	Verification of Corrective Action
SA751CS292+	08/02/83	QA Program
SA751CS293	09/26/83	Materials, NCRs, and Corrective Action
SA764CS303	09/16/83	Welder Qualification
SA772CS309	10/03/83	Special Processes
SA784CS319	11/08/83	QA, Document Control and Corrective Action
SA796CS329+	01/26/84	Document Control and Special Processes
SA809CS340	03/14/84	QA Program
SA851CS376	07/10/84	QA Program
SA862CS385+	10/31/84	QA Program
SA882CS399	12/20/84	QA Program

* Ending date of audit.

+ "Microfilm" files were used for a general review of the audit reports listed above. If a more detailed review was needed, the report or parts of the report were copied. Reports or parts of reports copied are identified with a "+" and are on file with the NRC.

In addition to the general review of these audits, the team reviewed in more detail the following audits and audit findings, which typify the findings identified by the program:

Radiographic Findings

- Audit SA363CS095/Audit Finding SSCA 0310, dated 06/08/80 - For weld 1-SI-250-01-F0103, film density was less than 2.0 in the area of interest. Film for weld CBS-1202-01-F0101, had indications that were rejectable in accordance with the code.

- Audit SA565CS184/Audit Finding SSCA 0484, dated 12/10/81 - The essential hole was not present in one shot for weld SC-355-05-F0501, R1.

- Audit SA738CS284/Audit Finding SSCA 0851, dated 06/28/83 - The RT film for weld 1-CBS-1202-04-F0404, R1, was incorrectly identified as 1-CBS-1208-02-F0302.

- Audit SA738CS284/Audit Finding SSCA 0854, dated 06/28/83 - The radiographic reader sheet for weld 1-CBS-1201-07-F0702, indicated that two No. 10 penetrameters were used. The radiographic film showed that a No. 10 penetrameter was used on the base metal and a No. 12 on a shim.

The corrective action for each finding appeared to have been appropriate. Although these isolated findings, scattered throughout the construction period, do not of themselves indicate major problems, they do indicate that P-H experienced continuing problems in managing the radiographic testing (RT) program.

Nonconformance Reports (NCRs)

Audit SA573CS188 dated 01/19/82 - This audit, conducted in December 1981 and January 1982, covered the corrective action and NCR process. The audit was very detailed and identified 14 deficiencies. The deficiencies ranged from failure to use black ink (Audit Finding SSCA 0508) to failure to issue NCRs as

required (Audit Finding SSCA 0500). Most of the findings were attributed to failure to follow applicable requirements or ineffective implementation of requirements. However, three were the result of system inadequacies. The licensee made programmatic changes, where needed.

Audit SA809CS340 dated 03/21/84 - This audit identified minor problems with voiding (CARs) and NCRs. The reasons for voiding these reports were not stated or were not clear. The corrective action appeared to have been appropriate.

Nondestructive Examination (NDE) Personnel Certifications

- Audit SA246CS051/Audit Finding SSCA 0238, dated 10/12/79 - P-H's present certificate of certification did not indicate the basis for the certification of NDE personnel (i.e., examination, continuing performance, etc.).

- Audit SA246CS051/Audit Finding SSCA 0234, dated 10/12/79 - The practical examination to support the qualification and certification of one Level III examiner consisted of performing an actual NDE, contrary to SNT-TC-1A and P-H written practice.

- Audit SA508CS158/Audit Finding SSCA 0420, dated 06/29/81 - Records of qualification for certain Level II reviewers did not contain documentation of certain training and experience as required by procedure.

- Audit SA598CS203/Audit Finding SSCA 0565, dated 04/23/82 - Personnel certified to take thickness measurements by ultrasonic testing were not certified by a Level III examiner.

- Audit SA796CS329/Audit Finding SSCA 1068, dated 02/03/84 - Many NDE personnel files lacked objective evidence of previous certifications.

- Audit SA796CS329/Audit Finding SSCA 1069, dated 02/03/84 - Eye examination records of NDE personnel contained comments reflecting possible limitations of individuals.

The corrective action for each finding appears to have been appropriate. The findings indicate that problems with personnel certification records existed throughout the construction period. The findings are similar to those noted by the team in Section 5 of this report; the problem appeared to be a records problem and not a question of the qualification of individuals performing NDEs.

(2) YAEC SURVEILLANCES REVIEWED

Surveillance No.	Date*	Subject
0231+	06/25/79	Weld Repair
0330+#	12/31/79	RT Review

See footnotes at end of list.

Surveillance No.	Date*	Subject
0403+	05/02/80	Procedures/Nonconformances
0431	06/05/80	Examination of Completed Weld
0445+	06/18/80	RT Review
0455+	07/03/80	Nonconformance Reports
0489+	08/04/80	RT Review
0562+	10/17/80	RT Review
0580+	10/30/80	RT Review
0616+	11/28/80	RT Review
0670+	01/21/81	RT Review
0680+	01/29/81	Pipe Welding
0763+	03/27/81	Personnel Qualifications
0814+	04/22/81	Repair Welding
0832+	05/01/81	RT Review
0937+	06/12/81	NCRs and CARs
0978+	07/02/81	Repair Welding
1001+	07/08/81	RT Review
1002+	07/09/81	RT Review
1005	07/09/81	Pipe Welding per NCR
1009+	07/10/81	RT Review
1018+	07/08/81	Pipe Welding
1020+	07/13/81	RT Review
1024+	07/16/81	RT Review
1038+	07/20/81	RT Review
1039+	07/02/81	P-H Pipe Welding
1042	07/20/81	Welding Repair
1047+	07/22/81	RT Review
1061+	07/27/81	RT Review
1093+	08/11/81	RT Review
1108+	08/31/81	RT Review
1113+	08/10/81	RT Review
1116+	08/18/81	RT Review
1117+	08/20/81	RT Review
1127+	08/17/81	RT Review
1133+	08/10/81	RT Review
1154+	08/26/81	RT Review
1155+	08/31/81	RT Review
1156+	08/25/81	RT Review
1164	09/01/81	RT Review
1166+	09/03/81	RT Review
1175+	09/08/81	RT Review
1177+	09/09/81	RT Review
1190+	09/16/81	RT Review
1193+	09/15/81	RT Review
1198+	09/17/81	RT Review
1216+	09/21/81	RT Review
1217+	09/23/81	RT Review
1270+	10/06/81	RT Review

See footnotes at end of list.

Surveillance No.	Date*	Subject
1272+	10/07/81	RT Review
1320+	10/27/81	RT Review
1331+	10/13/81	NCRs
1337+	11/04/81	RT Review
1364+	11/13/81	RT Review
1427+	12/07/81	RT Review
1543+	01/18/82	RT Review
1590+	02/01/82	RT Review
1749	03/20/82	Welding Process Pipe
1751	03/20/82	Defect Removal
1759+	03/25/82	In-Process Welding
1796+	03/02/82	RT Review
1797+	04/03/82	In-Process Welding
1824+	04/08/82	In-Process Welding
1838+	04/14/82	In-Process Welding
1903+	04/12/82	RT Review
1918+	04/28/82	RT Review
1933	04/29/82	Welding Process Piping
1953+	05/03/82	RT Review
2067+	05/19/82	RT Review
2106+	05/18/82	RT Review
2299+	06/14/82	RT Review
2339+	06/26/82	RT Review
2442+	07/12/82	RT Review
2531	08/02/82	In-Process Welding
2553	08/06/82	Repair Welding
2754	09/03/82	Welding
2832+	09/15/82	RT Review
2943	09/30/82	Repair by Welding
3276	11/12/82	Welding Process Piping
3383+	11/15/82	RT Review
3519+	12/07/82	RT Review
3599	12/21/82	Automatic Welding
3744	01/07/83	In-Process Welding
3867+	01/21/83	RT Review
3879	01/24/83	Welding Pipe
3952	02/04/83	In-Process Welding
3960+	02/03/83	RT Review
4067+	02/14/83	RT Review
4113+	02/21/83	RT Review
4132+	02/28/83	RT Review
4134+	03/01/83	RT Review
4207	03/09/83	Field Process Sheets
4212+	03/07/83	RT Review
4266	03/15/83	Welding Process Piping
4298+	03/16/83	RT Review
4316+	03/21/83	NDE

See footnotes at end of list.

Surveillance No.	Date*	Subject
4345+	03/21/83	RT Review
4476+	04/14/83	Welding Process Piping
4477+	04/13/83	Welding Process Piping
4497	04/15/83	P-H NDE
4564	04/27/83	Control of Special Processes
4648+	05/02/83	RT Review
4649+	05/04/83	RT Review
4658	05/09/83	NDE (PT)
4741+	05/16/83	RT Review
4956	06/22/83	Welding (Piping)
4964+	06/22/83	RT Review
5088+	07/11/83	RT Review
5097+	07/16/83	RT Review
5237	08/01/83	Welding
5323+	08/15/83	RT Review
5345+	08/19/83	Welding Repair
5364+	08/20/83	RT Review
5519+	09/07/83	RT Review
5607+	09/17/83	RT Review
5610+	09/23/83	RT Review
5611+	09/25/83	RT Review
5718+	10/06/83	Welding
6095	12/08/83	Control of Special Processes
6205+	12/28/83	RT Review
6402+	01/25/84	Control of Special Processes
6700+	03/05/84	Control of Special Processes
6780	03/14/84	Control of Special Processes
7035	04/13/84	Inspection
7107	04/17/84	Document Control
7250	08/17/84	Control of Special Processes
7379+	09/20/84	Inspection
7409+	10/03/84	Control of Special Processes
7461+	10/22/84	Control of Special Processes
7560+	11/13/84	Corrective Action
7631+	12/01/84	Inspection (VT)
7683	12/14/84	Inspection
7744	01/07/85	Control of Special Processes
7772	01/14/85	Document Control
7827	01/21/85	Inspection
7912	02/04/85	Control of Special Processes
8093	03/06/85	Inspection
8351+	04/10/85	Control of Special Processes
8447	04/26/85	Control of Special Processes
8516	05/10/85	Control of Special Processes
8615	05/24/85	Inspection
8724+	06/07/85	Document Control
8822	06/21/85	Inspection

See footnotes at end of list.

Surveillance No.	Date*	Subject
8955+	07/11/85	Control of Special Processes
9181	08/09/85	Control of Special Processes
9391	09/11/85	Inspection

* Beginning date of audit.

\+ "Microfilm" files were used for a general review of the surveillance reports listed above. If a more detailed review was needed, the report or parts of the report were copied. Reports or parts of reports copied are identified with a "+" and are on file with the NRC.

\# The team did not originally review this surveillance report. The report was identified by the licensee in its search for records to answer questions from the congressional staff. Since it pertained to areas of interest to the NRC team, the licensee provided the surveillance report to the team on June 22, 1990. The surveillance covered a review of radiographs for 14 welds as well as deficiencies and observations, such as unacceptable RT technique, and over-development, for welds CBS-1201-01-F0101, CBS-1207-01-F0101, CBS-1210-01-F0104, RC-13-01-F0101, and RC-58-01-F0102. The deficiencies were reported on YAEC Deficiency Report (DR) 037. The DR documents that YAEC required no followup action because "all film is reviewed 100%." This information supports information received by the team from cognizant personnel that YAEC reviewed 100 percent of the P-H film from the beginning of construction.

The list of surveillances whose subject is "RT Review" does not present a complete picture of the YAEC RT review over time in that later surveillances, starting at about No. 6000, whose subject is "Control of Special Processes" could have covered RT review.

In addition to a general review of the surveillances listed above, the team reviewed the following surveillances in more detail:

Radiography

The team reviewed all of the surveillances listed above whose subject is "RT Review" to determine the nature of the overview of RT film performed by YAEC. This review revealed a continuing YAEC involvement in the review and acceptance of film. In the early phase (before 1982), the film review appeared to include in-process reviews, that is, those performed before the films were accepted by P-H. For example, Surveillance 1020, dated 07/13/81, states:

> Surveillance performed third shift (0500 hours started) for review of "information" radiography on 1-RC-10-01 field weld F0101 and F0102 weld material thickness is 2". It was determined F0102 at the 0 to 1 position and 1 to 2 position has rejectable indications, this is weld repair number two. Also F0101 has rejectable indications at the 0 to 2 position, Pullman-Higgins has generated the weld repair order and

the process sheet, the indication will be ground out and a visual and liquid penetrant inspection will be performed.

It was not clear if the indications were identified by P-H or YAEC. Discussions with YAEC personnel involved with the film review indicated that if the deficiencies listed on the surveillance report were identified by YAEC as part of a final review of film accepted by P-H, this fact would be clearly stated in the surveillance report. Otherwise, the deficiencies noted were in-process deficiencies identified by P-H as part of the film review process. The description was typical of the way surveillance reports were written before 1982. However, some early surveillances did indicate that YAEC identifed unacceptable conditions. Examples are

- Surveillance 489, dated 08/04/80 - For weld 1-CBS-1226-01-F0102, the station markers for repair radiographs were not the same as those for the original weld, thus leaving a question about weld coverage. Reference was made to NCR-217.

- Surveillance 580, dated 11/28/80 - "Review of radiographs on 1-CBS-1201-05 Rev. 0, F0503; station markers 1-2 indicate a linear indication, or which is interpreted as incomplete fusion. Please re-evaluate your interpretation and respond in writing to YAEC."

Also, some early surveillances did indicate that YAEC reviewed the final film. An example is

- Surveillance 832, dated 05/01/81 - This surveillance covered the review of film for the CBS, CS, RH, RC, and CO plant systems.

Although documentation for the early surveillances did not always indicate whether P-H or YAEC identified the discrepancies listed or whether the films reviewed were in process or final, practically all surveillance reports identified the film being reviewed by weld number.

Some of the early surveillance reports were not clear if film was being reviewed for weld quality as well as film quality. Discussions with YAEC personnel involved in the review of film indicated that their reviews of final film always included a review for weld defects and film quality. The team's film review (see Section 8 of this report) supported this statement.

In 1982, documentation of the film reviews became more formalized and what was being reviewed was clearer. In addition, unacceptable conditions were documented on deficiency reports (DRs) or deviation notices (DNs). Examples are

- Surveillance 1590, dated 02/01/82 - "Performed RT review on following systems submitted by P-H. 34 film packages submitted (CS, SI, CBS, SB, CO, FW, MS, RC, RH)."

- Surveillance 1953, dated 05/03/82 - "Reviewed P-H radiographs for acceptance to turnover to YAEC IMS/DCC. The following systems were found to be

acceptable for content, completeness and legibility of sequential check list #9549." The systems and number of packages for each system followed.

- Surveillance 2067, dated 05/19/82 - "The following radiographs were reviewed in accordance with ASME Sect. V, no discrepancies noted." A list of welds followed.

- Surveillance 6205, dated 12/28/83 - "(09-6705-82) Review of radiograph package for 1-MS-4001-01-F0102 (field weld), STA 5-6, rejectable linear indications (crack, lack of fusion) in an accumulated length of approximately 8" was noted. Package had been reviewed by 2 Level II's and 1 Level III. Reader sheets address acceptable, and film artifacts, indications are clearly interpretable on both film, are unquestionably rejectable. P-H was requested to identify and document what corrective action to be taken, and what activity to preclude any further re-occurrences. DR #544 [was] written to document and track deficient item."

The team's review indicated that YAEC was involved, on almost a daily basis, in the review of P-H film. YAEC routinely reviewed in-process and completed film. Starting in 1982, documentation of the review process was more formal, clearly indicating that final film packages were being reviewed and accepted on a systematic basis. In the early phase (before 1982), the return of unacceptable conditions to P-H appeared to be on an informal basis. Later, the process became more formal, and unacceptable conditions were documented on a DR or DN. On the basis of a review of the surveillances for 1982 and 1983 (the team believes that essentially all surveillances for RT review for these years were identified and reviewed), it appears that, starting with DN-211 in July 1982, weld defects or deficiencies in film quality identified by YAEC resulted in DRs or DNs (individual DRs or DNs covered a number of welds).

In-Process Welding

The team selected the following surveillances, covering in-process welding, for review to determine the degree to which quality assurance (QA) surveillances were used to review P-H welding:

- Surveillance 1018, dated 07/08/81 - In-process welding of weld 1-RH-154-01-F0102 - The surveillance showed that an incorrect revision of a welding procedure specification was listed on the process sheet and that a hold-point had been crossed out and initialed without a date.

- Surveillance 1759, dated 03/25/82 - Automatic welding of RC loop welds

- Surveillance 1797, dated 04/03/82 - Automatic welding of RC loop welds

- Surveillance 1824, dated 04/08/82 - Automatic welding of RC loop welds

- Surveillance 4476, dated 04/14/83 - In-process welding - Weld process sheet did not indicate joint classification.

- Surveillance 4477, dated 04/13/83 - In-process welding - Weld 1-CS-369-07-F0704

- Surveillance 6402, dated 01/25/84 - In-process welding - Weld 1-FW-4610-11-F1106 - NCR-5949 was written pertaining to a process sheet that had been destroyed in a fire.

The team found that YAEC was involved in the overview of the welding process.

Repair Welding

The team reviewed the following surveillances to determine the degree of YEAC overview of repair welding:

- Surveillance 814, dated 04/22/81 - Weld repair

- Surveillance 978, dated 07/02/81 - Cutout and repair of weld

- Surveillance 1838, dated 04/14/82 - Repair welding of weld 1-RC-13-04-F0402

- Surveillance 5345, dated 08/19/83 - Repair welding of weld 1-RC-9-01-F0101

- Surveillance 1042, dated 07/20/81 - Weld repair of weld 1-RC-10-01-F0102

- Surveillance 6700, dated 03/05/84 - Weld repair of weld 1-DK-TK-26B-FI-374 - Welder's portable rod oven was left open, and the welder did not have means to verify interpass temperature.

- Surveillance 7461, dated 10/22/84 - NDE of repair weld

The team found that YAEC was involved throughout the construction period in the evaluation of repair welding.

Nonconformance Reports

The team reviewed the following surveillances to determine if YAEC's QA organization reviewed the NCR process:

- Surveillance 403, dated 05/02/80 - Surveillance of NCRs

- Surveillance 455, dated 07/03/80 - Surveillance of NCRs

- Surveillance 937, dated 06/12/81 - Surveillance indicated that P-H had been reviewing all NCRs as required by procedure.

- Surveillance 1331, dated 10/13/81 - Surveillance of NCRs - Surveillance indicated that one NCR identified only one spool when, in fact, two spools were involved.

The team found that, in addition to audits of the NCR and corrective action process, YAEC regularly performed surveillances of the process.

(3) P-H INTERNAL AUDITS REVIEWED

Audit No.	Date*	Subject
7035-A02+	04/82	NDE and Welding
7035-A05	07/82	Tagging and NCRs
7035-A06+	08/82	Document Control
7035-A07	09/82	Procurement
7035-A08+	10/82	Weld Monitoring
7035-A09+	10/82	Interpass Temperature and Post-Weld Heat Treatment (PWHT)
7035-A104	08/83	Procedures, Drawing, and NCRs
7035-A105	08/83	Records Review, Included NCRs
7035-A110+	11/83	Calibration and Corrective Action
7035-A203+	03/84	NDE and Personnel Certifications
7035-A204	04/84	Mechanical
7035-A207+	08/84	NCRs, Trending, Training, Procedures
7035-A208+	11/84	QA Program
7035-1-81+	05/81	Welding and NDE
7035-1-82+	05/82	NDE and Welding - PWHT
7035-1-84+	09/84	Complete 18-Criteria Audit
7035-1-85+	05/85	QA Program
7035-2-80+	11/80	NDE and Welding
7035-2-82+	09/82	Weld Monitoring
7035-2-83+	04/83	QA Program (also covered Base Material Repairs)
7035-3-83+	05/83	NDE, Personnel Certifications, and Repair Welding
7035-4-83+	11/83	Personnel Certifications

* Month and year audit was performed.

+ "Microfilm" files were used for a general review of the audit reports listed above. If a more detailed review was needed, the report or parts of the report were copied. Reports or parts of reports copied are identified with a "+" and are on file with the NRC.

In addition to the general review of these audits, the team reviewed in more detail the following audits, which are typical in detail and nature of findings for the total population of P-H audits listed above:

- Audit 7035-2-80 conducted in November 1980 was a very comprehensive audit of P-H field activities. Detailed checklists were used, and the 18 criteria of 10 CFR Part 50, Appendix B were addressed. Nineteen findings (audit action requests (AARs)) were issued. The following ARRs were typical of the findings and were reviewed in detail:

  - AAR No. 2 - The process sheet and the welding procedure specification (WPS) differed with regard to the required interpass temperature, and the welder was using a "tempstik" to comply with the process sheet. Because the "tempstik" was conservative, the process sheet was revised to agree with the welding procedure specification.

  - AAR No. 3 - The eye test for the NDE examiner was scheduled after the date of certification, leading to the possibility that NDEs might be performed before visual capability was verified. A change was made

to ensure eye tests were performed before certification and all personnel records were reviewed to ensure compliance with the eye test cycle.

- AAR No. 11 - Problems were identified with weld monitoring records in that interpass temperature was not recorded for one welder and a discrepancy existed with regard to the use of a pyrometer or pocket thermometer to measure temperatures. Also, there was no place on the form to record the preheat temperature. These problems were corrected.

- Audit 7035-1-82 conducted in May 1982 was a comprehensive audit covering NDE and welding, post-weld heat treatment (PWHT), personnel certifications, NCRs, and reaudit of previous findings. Twenty-three AARs were issued. The following AARs were typical of the findings and were reviewed in detail:

  - AAR No. 3 - A Level III eye test was overdue by six working days. A complete review of all eye test records showed two instances of missed eye tests. Corrective actions were taken and the training officer was to implement a program to ensure that eye tests were performed within the required time. On the basis of the team's review of records (see Section 7), the corrective actions appeared effective.

  - AAR No. 17 - PWHT hold time was 1 hour instead of the required 1.5 hours. The licensee reviewed the records for all welds requiring PWHT and made corrections as necessary. Personnel were reinstructed in the requirements.

- Audit 7035-A08 conducted in October 1982 showed that a number of problems existed with the weld monitoring program. Corrective actions appeared appropriate.

- Audit 7035-A02 conducted in April 1982 included welding and NDE personnel certification records. AAR No. 02 indicated that Level II examiners had not demonstrated their familiarity with and operation of NDE equipment to the Level III examiner as required by procedure. The licensee revised the procedure to allow this function to be delegated by the Level III examiner. For weld RH-154-02-F0201, the process sheet did not have R1 listed for the repair and the cut sheet did not have the required QA and authorized nuclear inspection approval. The process sheets were corrected.

- Audit 7035-A09 conducted in October and November 1982 covered preheat, interpass temperature, and PWHT. Five AARs were issued covering various problems with PWHT. The following AARs typify the problems identified:

  - AAR No. 1 - Engineering personnel used piping isometric drawings (ISOs) to determine PWHT requirements, and an ISO for a specific weld did not specify the base material so that PWHT requirements could be specified.

  - AAR No. 2 - Documentation of PWHT did not include (1) sketches of the location and size of thermocouples (TCs), (2) 15-minute markup on recording, (3) date of evaluation by the craft superintendent, and (4) field process sheets for attaching and removing TCs.

- AAR No. 3 - Field process sheets for attaching and removing TCs did not accompany the PWHT record, making it impossible to verify the material used. Process sheets for removing TCs were backlogged. All documents were not provided with the record for quality assurance engineer review (QAER).

The licensee implemented appropriate corrective actions including programmatic changes for all findings.

- Audit 7035-2-83 conducted in April 1983 included an audit of repair weld activities. The following AAR was typical of the findings:

  AAR No. 6 - This AAR questioned whether base metal repairs not in the vicinity of the weld were being shown on drawings. The licensee determined that base metal repairs outside the weld area had not been made and made programmatic changes to ensure that such repairs were properly documented.

- Audit 7035-3-83 was conducted in May 1983. AAR No. 1 showed that records for NDE Level II reviewers who had been certified by another employer did not contain proof of prior certification. The licensee reviewed all records for similar problems and where proof did not exist, contacted previous employers to obtain the required proof. The corrective action appeared appropriate. On the basis of its inspection of Level II records (see Section 7), the team found that Level II reviewer records were acceptable.

- Audit 7035-4-83 conducted in November 1983 included a followup of previous audit findings in the area of NDE personnel certifications. The team's review of this audit showed a very thorough followup of previous audit findings using detailed checklists.

In general, the P-H internal audits were very comprehensive and covered all aspects of welding and NDE. Detailed checklists were used. All audits reviewed identified problems. On the basis of the team's experience, the types and numbers of problems appeared to be typical for a construction project such as Seabrook. Although individual findings were not indicative of major problems, collectively the audit findings supported the team's conclusion that continuing problems were experienced with the P-H program. However, the audits and findings indicate that YAEC and P-H had active QA audit programs throughout the construction period, under which corrective actions for the construction problems were identified and implemented.

(4) CONTROLLED SPEED LETTERS

The team reviewed the 21 controlled speed letters (CSLs) listed below. The team's analysis and conclusion are discussed in Section 3.

No.	Date	Comment
264	06-12-85	YAEC rejected 10 welds because of geometric unsharpness (Ug). YAEC issued DN-090.
247	04-18-85	Film packages removed from the records vault are overdue.

239	02-14-85	YAEC rejected panoramic shot because of inadequate coverage.
223	12-05-84	YAEC rejected the film on weld 1-FW-4625-01-F0113 because the penetrameter did not cover the weld thickness.
219	11-26-84	YAEC issued CSL-219 to clarify the use of letter "F" on the film required density.
214	11-01-84	YAEC rejected weld 1-RC-F4100005-F0002 (same as 1-RC-91-F002). P-H issued NCR-7869.
193	08-17-84	YAEC Rejected weld 1-RC-44-01-F0107 because sensitivity on the light penetrameter at view No. 3 was inadequate. (08/17/84); (reshot 08/23/84).
187	07-17-84	Missing radiographs for welds SI-251-13-F1301, CC-752-02-F0205, CBS-1221-10-F0201, CC-712-04, CC-752-01, CC-752-06, CC-781-02, and CC-798-08.
183	05-30-84	Eight CSLs were not responded to in the time periods allowed.
181	05-22-84	YAEC rejected weld 1-RC-48-01-F0106, view No. 3-4 reveals unacceptable slag line, added to P-H backlog report; awaiting reradiography (on hold status 9).
179	05-10-84	YAEC requested a reshot of three views on weld 1-CS-331-F045.
178	05-07-84	YAEC review of weld 1-CS-432-02-F0201 revealed final view 3-0 does not reflect the final weld condition. Same disposition as for CSL-181.
176	04-27-84	Class 1 plate-type support weld. Same disposition as for CSL-178.
175	04-26-84	YAEC asked P-H to evaluate view 3-4 on weld 1-RC-30-04-F0401.
171	04-13-84	YAEC rejected P-H's response to DR-626.
146	03-12-84	YAEC questioned weld thickness.
144	03-06-84	YAEC requested a reshot of welds 1-RC-7-0-F0101 & 1-RC-11-1-F0101 to allow closure of NRC inspection findings.
136	02-27-84	Identify and evaluate the indication in base metal next to the BMR as marked on film 1-CO-4053-30-F3001(A) and F3001, same as for CSL-181.
105	01-05-84	YAEC rejected the radiographs on four welds because of insufficient weld coverage.
095	12-12-83	YAEC DR-527 was identified as a potential 10 CFR 50-55(e) reportable condition.
089	11-30-83	NRC Region I rejected weld 1-RC-7-1; YAEC requested a reshot.

APPENDIX 9

DETAILED REVIEW OF EMPLOYEE CONCERNS

The overall summary of the team's review of employee concerns appears in Section 18 of this report. This appendix details the employee allegation resolutions (EARS) reviewed by the team. The letter preceding the number of the concern indicates where the concern originated; that is, E denotes exit interview; M, mail-in; P, phone/hot line; S, survey; and W, walk-in.

E-85-002-1: Received 3/1/85, closed 4/22/85; classified as a safety-related/quality concern (SR/Q); not substantiated - An employee questioned a failure to repair a root concavity rejected by radiographic testing (RT) on Seabrook line 1301, weld F0514. The licensee's investigation revealed that the employee was a magnetic particle test (MT) inspector who did not understand that the weld would be inspected by radiograph after repair. The weld was repaired, radiographed again, and reinspected.

E-85-002-2: Received 3/1/85, closed 4/30/85; classified as SR/Q; substantiated - An employee questioned the process for removing arc strikes. He was asked to perform a nondestructive examination (NDE) penetrant test/magnetic particle test (PT/MT) after the arc strike was removed, but he could not perform the inspection because the arc strike had not been removed. The licensee's investigation revealed a need to revise the procedures for removing arc strikes so the inspection would not be scheduled until the arc strike had been removed. Applicable procedures were revised for better coordination by placing a mandatory hold point for visual inspection after the arc strike had been removed.

E-85-007-3: Received 3/11/85, closed 5/13/85; classified as SR/Q; substantiated - An employee questioned the certification of personnel performing preoperational flushing inspections. The licensee's investigation revealed that the certification program for personnel involved in flushing inspections needed strengthening. Allegation Resolution Correction Request (ARCR) 85-004 was issued and applicable procedures were clarified. This allegation did not relate to P-H welding.

E-85-018: Received 5/2/85, closed 6/25/85; classified as SR/Q; not substantiated - An employee alleged that the damaged end of a main steam pipe was repaired without proper authorization. The employee stated that a welder was asked to perform an unauthorized repair and refused, but that someone else apparently repaired the damage. The licensee interviewed other employees and reviewed records. Although the investigation identified a number of properly documented repairs that fit the employee's description, the licensee could not locate a repair that had been made without proper authorization.

E-85-026: Received 5/15/85, closed 5/30/85; classified as not safety related (NSR); not substantiated - This concern, too, related to lack of authorization to perform weld repairs. Although the craftsman did not want to start grindout

for the repair until a repair procedure was written, the foreman told him to go ahead. The licensee reviewed applicable procedures and determined that the employee was allowed to grind out the material before written procedures were issued. The welding could not be done until the instructions were written.

E-85-027: Received 5/15/85, closed 5/30/85; classified as NSR; not substantiated - An employee expressed the same concern as E-85-026, but listed weld CO-611-CO-M-2, FW4041-F0103, and referred to Nonconformance Report (NCR) 82-500 for the repair.

E-85-32: Received 6/7/85, closed 10/28/85; classified as SR/Q; substantiated - An employee was concerned about timely review to determine the validity of P-H disposition of NCRs, in particular NCRs relative to material heat number traceability where heat numbers had been transferred. The employee also questioned whether these NCRs were correctly designated as minor. The employee provided a list of 20 NCRs. These were given to QA and using the 20 NCRs listed, QA audited NCRs relative to material traceability and timeliness of NCR review. The audit substantiated problems with timeliness of review. Two of the 20 required additional work to support appropriate and explainable dispositions. However, no safety problems were identified.

E-85-38: Received 6/28/85, closed 7/2/85; classified as SR/Q; not substantiated - An employee was concerned that a Level III reviewer had used a speedy memo to clarify weld preparation dimensions. The licensee's investigation found that procedures were followed in providing such clarification.

E-85-041: Received 7/18/85, closed 7/24/85; classified as SR/Q; substantiated - An employee stated that he was told by his foreman to repair a damaged Class II valve (1MSV23) without written authorization. The licensee's investigation, including interviews with other employees and visual observations, revealed that the employee was a party to causing the arc strikes because he carelessly allowed the valve to come in contact with live welding leads, and had attempted to cover up the arc strikes with spray paint. The employee was suspended for 30 days. NCR-73/11336 was issued to correct the problem.

E-85-042: Received 7/18/85, closed 7/24/85; classified as SR/Q; substantiated - An employee expressed the same concern as another employee had in E-85-041.

E-85-065: Received 10/11/85, closed 10/23/85; classified as SR/Q; not substantiated - This was another concern relative to cold pull of surge line (see concern M-85-002). This employee questioned cold pull on weld F0101. The investigation file indicated that both individuals (E-85-065 and E-85-002) heard about fitup problems and cold pull on the surge line from other people. The licensee interviewed all personnel directly involved in installing the line and determined that a major problem was encountered in vertical alignment of the line requiring mitering the lands on the surge line to pressurizer weld. The weld in question was not the last weld in the fabrication sequence. F0102 was the closure weld. There was no allegation of cold pull for this weld. The allegation was for weld F0101, surge line to RC hot leg. Since F0101 was welded first, there should have been no reason to cold pull it. Investigation could not substantiate the allegation.

E-85-069: Received 10/25/85, closed 2/4/86; classified as SR/Q; not substantiated - This concern relates to disposition of an NCR (73/011336-C) for removing arc strikes on valve 1MSV23 (see concern E-85-041). The employee questioned the disposition of the NCR, specifically the NDE method used (PT) after removal of the arc strike. The investigation, which included review of all documentation, determined that the NDE method was correct and that the concern could not be substantiated.

E-85-081: Received 12/13/85, closed 2/24/86; classified as SR/Q; not substantiated - An employee questioned UE&C disposition on an NCR for an unauthorized repair. The employee did not have a safety concern, only that the repair was made. Suspecting an unauthorized repair, the employee had placed a hold tag on the job before going on vacation. Upon his return, he found that the hold tag had been removed. Ten days later he issued an NCR. UE&C had dispositioned the NCR stating that the problem appeared to involve a petty squabble between QC and construction personnel and no proof of unauthorized repair could be determined. The investigation could not definitely rule out that an unauthorized repair had been made, but concluded, on the basis of a review of records and interviews with personnel involved, that there was no hardware or safety concern even if the repair had been made.

E-86-12: Received 1/30/86, closed 2/13/86; classified as SR/Q; not substantiated - An employee stated that some piping may not have been properly welded. The employee gave no specific information. He had heard that an inspector had accepted welds without inspecting them. The file referenced a previous investigation by the NRC (Case 1-83-008), which related to the Padovano issue (records falsification).

E-86-019: Received 2/7/86, closed 3/6/86; classified as SR/Q; not substantiated - A welder was concerned that his foreman had eliminated a gas tungsten arc (GTA) root on a pipe to flat plate weld. The licensee reviewed applicable requirements and found that for dual processes, the supervisor or his designee could delete one process. The concern could not be substantiated.

E-86-020-1: Received 2/13/86, closed 5/2/86; classified as SR/Q; not substantiated - An employee questioned the disposition of NCR-73/010845A relative to lack of preheat or postheat for attaching a lightweight ASME Class NF support to a heavier AWS member embedded in concrete. The licensee's investigation determined that, if NF rules were used for both members, based on the thickness of the thicker (AWS) member, preheat or postheat would be required. However, the licensee determined that AWS would not require preheat. The normal practice was to use the more stringent requirements (ASME). When impractical, such as for the case in question, engineering review on a case-by-case basis was required for resolution. The weld in question received UE&C evaluation on an NCR. No code violation or safety concern could be substantiated.

E-86-056-2: Received 5/22/86, closed 8/1/86; classified as SR/Q; not substantiated - An employee claimed the wrong weld wire (came from foreman) was used on the root of 10-inch feedwater (FW) welds for valves 1-FW-V-004 and 1-FW-V-015. By interviewing personnel and reviewing records, the licensee found that the proper weld wire has been used. It was stored overnight in a locked cabinet.

E-86-060: Received 5/29/86, closed 6/13/86; classified as SR/Q; not substantiated - An employee stated that all welds in safety-related systems were suspect and he wanted spot RT performed. He specifically mentioned the containment spray piping that is part of valve encapsulation outside the containment. The licensee reinspected the quality documentation which validated the VT (visual) and RT (radiographic) inspections on the containment piping mentioned. The licensee also visually inspected the outside surface of these welds. No reason was found to suspect the welds.

E-86-109-1: Received 8/7/86, closed 8/26/86; classified as SR/Q; not substantiated - An employee questioned the licensee's intergranular molecular corrosion controls. There was nothing specific about the employee's concern. The investigator pointed out to the employee all the controls in place to control sensitization of stainless steel materials, including procedure and welder qualification, interpass temperature controls, and number of repairs. The licensee determined that there was nothing specific enough about the concern to investigate.

E-86-117-1: Received 10/2/86, closed 11/14/86; classified as SR/Q; not substantiated - An employee questioned the number of repairs on reactor coolant (RC) loop welds, specifically weld packages RC-1-01 and RC-12-01. The licensee evaluated records for RC-1-01, 2-01, 4-01 and 01A, 5-10, 6-01, 7-01, 8-01 and 01A, 9-10, 10-01 and 01A, 11-01 and 01A, and 12-01. The licensee reviewed every weld-related document to investigate repair of completed welds. The licensee assigned a unique control number to each special process for each weld. The documentation index listed every control number and NCR number related to each weld. The licensee concluded that a repair cycle does not begin until the weld is completed. The licensee found that several in-process repairs used more than one control number for continuing grinding on the same cavity. This could be construed as several in-process repairs instead of continuation of the same repair. In addition, control numbers were assigned to minor grinding of PT indications, although no repairs were welded. The licensee noted that the project specification clearly allows in-process testing and repair before the weld is completed, and in-process repairs need not be documented as part of the final record. The licensee determined repair records met Project Specifications 9763-006-248-51 and 9763-WS-1.

M-85-001: Received 12/19/84, closed 3/15/85; classified as SR/Q; not substantiated - NRC Region I staff submitted this concern to the inspection team by letter dated December 19, 1984. It raised the subject of employee concerns about unauthorized repairs to supports in the west pipe chase. On October 25, 1985, NRC sent the licensee a letter requesting additional information. The licensee responded to this request and to previous requests with letters dated January 18, March 4, July 25, and November 21, 1985. After performing an in-depth review of records and hardware, and interviewing 15 welder/fitters and some quality control (QC) inspectors who worked in the west pipe chase, the licensee could not find any supports in the west pipe chase that had been repaired without proper authorization. However, in the course of the investigation, interviews with personnel indicated the possibility of a practice of repairing certain structural weld profile conditions without going through a formal weld repair process. Although there was nothing wrong with this practice for such in-process repairs, procedures were not clear about allowing this practice. As added assurance in the area in question, the licensee

reinspected approximately 170 feedwater, main steam, and steam generator blowdown support welds. No deficiencies were identified. In addition, P-H Procedure SS-IX-6 was revised to clarify weld profile requirements. This concern was not related to Pullman-Higgins (P-H) pipe welding.

M-85-002: Received 12/84, closed 4/3/85; classified as SR/Q; not substantiated - This item concerns cold pulling of weld 1-RC-01, F0103 (surge line closure). The licensee investigated this allegation and could not substantiate it. Cold pulling was discussed in Construction Deficiency Report (CDR) 82-00-13. In addition to interviewing all personnel involved in the surge line installation and visual observations extensively, the licensee referenced the CDR and NRC inspection activities documented in Inspection Report 50-443/84-17 as further evidence of its activities regarding this concern. (See item E-85-065 for a similar concern - different weld number). This EAR was also reviewed in the process of reviewing weld control packages (see discussion in Appendix 6).

M-85-003: Received 2/15/85, closed 4/18/85; classified as SR/Q; substantiated - This concern related to welder's ID being mismarked on hanger welds (hanger M/S-1808-RG-02). Welds were reinspected. This concern was not related to P-H welding.

M-87-002: Received 2/13/87, closed 6/5/87; classified as SR/Q; not substantiated - An employee suggested that P-H weld inspections be reviewed because of sloppy work practices. The employee also alleged that Padovano was not the only inspector who had falsified records. The licensee reviewed the Padovano investigation again and went over the actions taken as a result of determining that Padovano had falsified inspection records. In summary, as a result of the Padovano issue, the licensee

(1) Reviewed all inspections performed by Padovano and performed reinspection or justified not inspecting on a case-by-case basis. For inaccessible welds or inspections (e.g., covered-over roots), in no case would omitting the inspection compromise code requirements. In many cases, inspections required by UE&C specification that had become inaccessible were for information purposes.

(2) Sampled work for all NDE examiners for all NDE processes.

(3) Contracted with an independent NDE laboratory to provide an overview of randomly selected welds.

S-85-034: Received 4/2/85, closed 8/15/85; classified as SR/Q; substantiated - An employee was concerned that observed hot pull on pipe spool E2936-749 during fitup to pump 1-SF-P-10 was not covered by the NCR process. The licensee's investigation included review of the job and applicable requirements. Although the investigation substantiated that hot pull occurred, the hot pull was covered by the NCR process. Fitup problems were encountered and the pipe was heated (less than 400°F) to pull into place for fitup. Work was covered under NCR-5017 and NRC-7035.

S-85-062-1: Received 5/2/85, closed 5/29/85; classified as SR/Q; not substantiated - An employee indicated that another employee knew about several occasions

where hold points were ignored and work proceeded. Licensee's investigation, including interview with second party, could not substantiate the concern.

S-85-062-4: Received 5/2/85, closed 6/10/85; Classified as NSR; substantiated - An employee was concerned about weld rod control "cash and fill" (form used to hold, reissue, and return electrodes) practices that required having to return electrodes daily. The licensee's investigation revealed that determining the frequency was a management prerogative and did not violate any quality requirements.

S-85-062-6: Received 5/2/85, closed 5/24/85; classified as SR/Q; not substantiated - An employee expressed the same concern as another employee had alleged in S-85-062-1.

S-85-064-3: Received 5/21/85, closed 9/13/85; classified as SR/Q; not substantiated - An employee alleged that there was no assurance that welder qualifications were being verified, since QA records personnel were told unofficially not to review the records for unqualified welders. The employee also stated that most NCRs generated for unqualified welders were found from QA reviews. The licensee's investigation included a review of requirements and a records search to determine the total number of NCRs written for unqualified welders and the percentage of the total found by QA review. The review revealed that the procedure to verify welder qualification had been revised to delete this requirement since welder qualification was being verified by the rod room and again during in-process welding. The investigation further noted that a total of 38 NCRs had been generated for unqualified welders, of which 18 had been identified by QA review. The conclusion was that 18 was an insignificant number when compared with the total number of NCRs issued to date (approximately 12,000) for the project. The team questioned this conclusion and believed that a more thorough analysis should have been made to determine the types of qualification problems, that is, did the problems involve paper work on qualifications or were the welders truly unqualified. In response to the team's questions, the licensee researched NCR records and identified 16 NCRs for unqualified welders that were apparently identified by QA review. The team reviewed these 16 NCRs: 492, 1417, 1842, 4563, 4582, 4713, 4895, 5223, 5259, 5260, 5295, 5394, 5480, 8120, 8347, and 12082. For two of the NCRs (492 and 8347), the welders were found to be qualified; for two other NCRs (8120 and 12082), the welders were qualified for thicknesses slightly less than actual thicknesses welded - although not technically qualified to code, there is no safety concern; 11 of the NCRs were for welding small-bore pipe (less than 2.5-inch diameter) when welder was not qualified to weld diameters less than 2.5 inches - again, although not technically qualified to code, the welders were qualified for the materials and processes. Because the welders were qualified welders and the welds were all small-diameter welds, there was little safety significance for the cases noted. The other NCR (1471) did not contain sufficient detail to determine why the welder was considered not qualified. All of the deficiencies were resolved by either cutting out the weld and replacing it or by proving the welder qualification on a coupon. On the basis of this review of the NCRs and the type of welder qualification deficiencies identified by the QA review, the team concluded that the licensee's decision to discontinue the QA verification of welder qualification during acceptance of welding records did not present a safety concern.

W-85-005: Received 5/16/85, closed 5/20/85; classified as SR/Q; substantiated - A welder stated he was asked to perform welding without paper work. He was afraid of losing his job if he did not weld and went to an EAR program representative for help. The job was to fill drilled anchor bolt holes in a service water system pipe support base plate and did not relate to the P-H pipe welding program. The EAR representative intervened and ARCR-85-0017 was issued to resolve questions about welding and re-drilling holes in base plates.

W-85-009: Received 7/9/85, closed 9/11/85; classified as SR/Q; substantiated - All ASME Class III pipe supports were being reinspected by QC. The employee was concerned that the data being provided by P-H were not complete for the reinspection and validation before 2/20/84. The licensee's investigation, which included review of the program and procedures, confirmed that the information was not complete. However, P-H was aware that the information was incomplete and was taking immediate corrective action to revise procedures and ensure reinspection of all welds completed before 2/20/84. This concern was not related to P-H pipe welding.

W-85-010-1: Received 7/19/85, closed 8/5/85; classified as NSR; substantiated - An employee was concerned about the use of an unqualified welder. The licensee's investigation found that the welder, welding Unistrut, was qualified but was having trouble welding overhead. The supervisor was aware that the welder was having trouble and was monitoring the welder's work. The welder was sent to the test shop for additional training but still had trouble with the overhead welding. He was reassigned to work that did not not involve overhead welding and was to continue being monitored. This problem was not related to P-H pipe welding.

W-85-010-2: Received 7/19/85, closed 8/1/85; classified as NSR; not substantiated - The employee who reported W-85-010-1 was also concerned that welder qualification test requirements were being relaxed on management order. Licensee's investigation included review of the welder qualification program and concluded that the program was consistent with those at other construction sites and met ASME Code requirements.

W-85-014: Received 8/14/85, closed 2/7/86; classified as SR/Q; not substantiated - An employee was concerned about accuracy of information being submitted to support closeout disposition of NCRs, specifically NCRs-73/11070, 11633, 11626, and 11378. The licensee performed a QA audit of closeout of NCRs, and could not substantiate significant problems with closeout documentation. The licensee found that the NCRs in question had been appropriately dispositioned. A corrective action request had been issued earlier to correct problems with NCR-73/11070.

APPENDIX 10

NONCONFORMANCE REPORTS REVIEWED

The team reviewed the nonconformance reports (NCRs) listed below involving Pullman-Higgins (P-H) activities in the areas of pipe welding and nondestructive examination.

NCR	Comment
0160	4th weld repair; weld cut out and replaced. Also, the NCR stated corrective action for allowing 4 repairs without an NCR.
0187	Undocumented weld repair on shop weld. Documentation reviewed and weld radiographed if needed.
0217	3rd weld repair; repaired.
0246	3rd weld repair; repaired.
0263	Undocumented weld repair on shop weld. Documentation examined and weld radiographed if needed.
0264	Undocumented weld repair or shop weld. Documentation reviewed and weld radiographed if needed.
0273	Slag inclusion in shop weld; repaired.
0275	RT sequence was missed on process sheet.
0283	Vendor weld not documented; examine weld radiographically.
0305	Undocumented field weld. Documentation examined and weld radiographed if needed.
0461	3rd weld repair; weld removed and rewelded.
0509	Welder made a weld of a thickness that exceeded range he was qualified for; accepted as is.
0511	Weld was qualified for GTAW to 0.176" thickness and was welded to 0.240" thickness.
0652	NCR was voided; 3rd weld repair exceeded but repairs were in process.
0792	Review of initial radiograph found a crater crack in weld.
0867	Welding burned through weld.

NCR	Comment
0876	Re-review of radiographs of previously accepted weld found defects. Note: YAEC had not reviewed these films.
0891	Possible mixture of 308-16 and 316-16 electrodes were used. Welds cut out and replaced.
0894	Base metal indications on steam generator.
0898	Base metal indications on steam generator. Indication from shipping covers removal.
0899	Base metal indications on steam generator. Indication from shipping covers removal.
0900	Base metal indications on steam generator. Indication from shipping covers removal.
0904	Base metal indications on steam generator. Indication from shipping covers removal.
0932	Welder burned through weld. Field weld cut out, base metal repaired, and weld rewelded.
0951	Base metal indications on steam generator. Indication from shipping covers removal.
0952	Base metal indications on steam generator. Indication from shipping covers removal.
0965	3rd weld repair; repaired.
0971	Weld rod requisition was lost; welds cut out and rewelded.
1095	Repaired LP indication on steam generator A primary inlet nozzle.
1107	Tach welds 1-1/2" long (1" allowed); accepted as is.
1108	Repaired primary inlet nozzle on steam generator C outlet nozzle.
1238	Weld F0102 (RC-12) cracked during welding. Low ferrite in weld. Repaired.
1427	3rd weld repair; weld cut out and replaced.
1671	3rd weld repair; repaired.
1672	Repaired FW-104, steam generator P-8 repair.
1735	P-1 material was welded to P-3 using improper weld procedure.

NCR	Comment
1750	3rd weld repair; (RC-11-F0101); repair on steam generator nozzle
1760	Welds were not monitored during June, July, and August 1981.
1790	3rd weld repair; repaired.
1802	Minimum pipe wall thickness concern; accepted as is.
1816	Weld repaired without a process sheet. Weld was cut out, replaced, and reinspected.
1924	Root inspection holdpoint was bypassed on 3 welds; accepted as is.
1928	3rd weld repair; weld cut out and replaced.
1977	LP indications on base metal. Indications were less than 1/16". Accepted as is.
2058	Alignment problem was due to weld distortion.
2070	Radial shrinkage; accepted as is.
2114	Root inspection holdpoint was bypassed; accepted as is.
2118	3rd weld repair; repaired.
2282	Base metal defect on reactor vessel nozzle in Inconel.
2287	Inconsistent insert noted on completed Class 3 weld; repaired.
2288	Visual holdpoint bypassed; accepted as is.
2383	Radial shrinkage; accepted as is.
2472	Radial shrinkage; weld repaired and built up.
2481	3rd weld repair; weld cut out and replaced.
2491	Radial shrinkage; accepted as is.
2501	Weld preps were mismatched.
2526	NRC inspector questioned radiographic film on final accepted weld; weld cut out and replaced.
2532	Radial shrinkage; 6" of material on either side of weld was replaced.
2580	Radial shrinkage; accepted as is.

NCR	Comment
2700	E308 used instead of E316; accepted as is.
3505	Craft used SMAW instead of GTAW; accepted as is.
3539	3rd weld repair; repaired.
3561	Linear indications located on bottom side of RC pump.
3613	E316 used instead of E308; accepted as is.
3654	3rd weld repair; repaired.
3684	Alignment problems were due to weld distortion.
3705	Low areas on both sides of weld; reworked.
3760	3rd weld repair; repaired.
3804	Minimum wall problems due to counterbore.
3832	Stainless steel ran into Inconel causing cracks.
3833	Repaired P-3 to P-8, steam generator nozzle RC-4-F0103.
3874	Repaired defects in RC-11-F0109 D loop to steam generator.
3924	Unauthorized grinding of cavity.
3924-1	4th weld repair.
3944	3rd weld repair; repaired.
3954	3rd weld repair; repaired.
3962	Repaired defect RC-5-F0101 RC pump to pipe, defect was 2-1/2" wide x 3/32" deep x 48" long.
3983	Inside surface inaccessible for LP testing.
4026	Inside surface inaccessible for LP testing; accepted as is based on RT.
4065	3rd weld repair; repaired.
4066	Radiograph using finer grain film revealed rejectable defects; repaired.
4078	E316 used instead of E308.
4113	Informational RT performed after ISI found rejectable defects on base metal; repaired.

NCR	Comment
4114	After grinding for ISI, RT found rejectable defects on base metal; repaired.
4123	Radial shrinkage; accepted as is.
4158	LP testing of repair cavities revealed rejectable indications.
4158-1	Process sheet lost.
4158-2	Conflicting process sheets for repair.
4232	Excessive ovality, radial shrinkage; weld was cut out and replaced.
4240	3rd weld repair; repaired.
4434	Unconsumed insert on Class 3 weld; repaired.
4435	Unconsumed insert on Class 3 weld. repaired.
4523	Unqualified weld procedure used.
4548	Rejectable indication found in weld SI-201-02-F0201 after ANI and YAEC had accepted film.
4563	Welder welded outside qualified range.
4565	3rd weld repair; 4th weld repair was authorized.
4575	Several discrepant conditions noted by audit.
4612	3rd weld repair; repaired. 4th repair was rejected; 5th repair was authorized and successfully made.
4789	Reviewed as part of Work Package 1-RC-10-F0106.
4789-1	Reviewed as part of Work Package 1-RC-10-F0106.
4806	Radial shrinkage; accepted as is.
4807	Radial shrinkage; accepted as is.
4808	Radial shrinkage; accepted as is.
4809	Radial shrinkage; accepted as is.
4814	Radial shrinkage; accepted as is.
4815	Radial shrinkage; accepted as is.
4832	Radial shrinkage; accepted as is.

NCR	Comment
4833	Radial shrinkage; accepted as is.
4834	Radial shrinkage; accepted as is.
4840	Radial shrinkage; accepted as is.
4844	Radial shrinkage; repaired as needed (minimum wall).
4845	Radial shrinkage; accepted as is.
4846	Radial shrinkage; accepted as is.
4847	Radial shrinkage; accepted as is.
4865	Inconsistent insert noted on completed Class 3 weld; repaired.
5001	LP testing of cavity revealed rejectable indications on previously accepted surface. Test performed by individual suspected of not always doing his job (see NCR-4490). Surface was ground.
5026	LP testing revealed a 1/8" linear defect; defect repaired.
5154	"Necking in" of weld; accepted as is.
5160	"Necking in" of weld; accepted as is.
5224	Reviewed as part of Weld Package RC-10-F0102.
5231	Unauthorized weld repair was made.
5257	"Necking in" of weld; accepted as is.
5292	"Necking in" of weld; accepted as is.
5344	"Necking in" of weld; accepted as is.
5345	"Necking in" of weld; accepted as is.
5346	"Necking in" of weld; accepted as is.
5347	"Necking in" of weld; accepted as is.
5351	"Necking in" of weld; accepted as is.
5353	"Necking in" of weld; accepted as is.
5354	"Necking in" of weld; accepted as is.
5364	"Necking in" of weld; accepted as is.

NCR	Comment
5365	"Necking in" of weld; accepted as is.
5366	"Necking in" of weld; accepted as is.
5367	"Necking in" of weld; accepted as is.
5368	"Necking in" of weld; accepted as is.
5380	"Necking in" of weld; accepted as is.
5381	"Necking in" of weld; accepted as is.
5382	"Necking in" of weld; accepted as is.
5383	"Necking in" of weld; accepted as is.
5390	"Necking in" of weld; accepted as is.
5402	"Necking in" of weld; accepted as is.
5403	"Necking in" of weld; accepted as is.
5404	"Necking in" of weld; accepted as is.
5414	"Necking in" of weld; repaired and accepted as is.
5474	"Necking in" of weld; accepted as is.
5487	"Necking in" of weld; accepted as is.
5515	"Necking in" of weld; accepted as is.
5519	"Necking in" of weld; accepted as is.
5522	"Necking in" of weld; accepted as is.
5528	Weld CO-4059-F0403 rejected for slag by P-H Level III overview.
5542	3rd weld repair; repaired.
5609	"Necking in" of weld; upgraded to B31.1; accepted as is.
5660	3rd weld repair; repaired.
5689	Radiography performed out of sequence.
5756	LP testing of cavity revealed rejectable indications in previously accepted surface.
5819	NDE not performed at proper sequence.

NCR	Comment
6073	End prep was rejected. There is no record of repair or reinspection before fitup and weldout. Final weld was LP inspected.
6109	NCR was voided.
6276	Wrong code designation.
6647	Cavity in base metal exceeded 1/3 of nominal wall.
6647-1	Cavity in base metal exceeded 1/3 of nominal wall.
6907	Wrong code designation.
7192	LP testing was performed at 58° F and a temperature of 60° F is required; accepted as is.
7272	YAEC reviewed film and rejected weld.
7300	Re-review of radiograph of previously accepted weld found unacceptable defects. Note: YAEC had not reviewed these films.
7307	Re-review of radiograph of previously accepted weld found unacceptable defects. Note: YAEC had not reviewed these films.
7308	Re-review of radiograph of previously accepted weld found unacceptable defects. Note: YAEC had not reviewed these films.
7318	Re-review of radiograph of previously accepted weld found crater crack. Note: YAEC had not reviewed these films.
7320	Re-review of radiograph after reshot found rejectable lack of fusion. Note: YAEC had not reviewed these films.
7365	Re-review of radiographs of previously accepted weld found defects. Note: YAEC had not reviewed these films.
7366	Unacceptable radiograph on end prep; accepted on basis of final radiograph.
7433	QC holdpoint was not signed by the certified QC inspector as the process sheet indicated (FW-F0508); accepted as is.

In reference to NCR-7433-0 and Rev. 1, P-H took the following corrective actions:

(a) FW-F0508 was completely cut out and replaced.

(b) FW-F0503 - Issued another process sheet and voided out forged signatures on fitup and preheat/interpass. LP tested; if acceptable, accepted as is.

NCR	Comment
	(c) The P-H QA Manager and Resident Construction Manager issued a letter on August 30, 1984, to all P-H employees and stated: "Any person who knowingly records false or misleading information on any document will be immediately terminated, and may face criminal and/or civil prosecution."
7433-1	In addition to NCR-7433 above, a document correction notice was forged on the back side of the field weld process sheet (FW-F0503) and the preheat/interpass was noted to be a bogus entry.
7433-2	NCR-7433-2 was voided because concerns were handled in Rev. 1.
7461	3rd weld repair; repaired.
7506	More than 3 repair cycles; repaired.
7617	Re-review of radiographs of previously accepted weld found defects. Note: YAEC had not reviewed these films.
7765	Weld qualifications.
7838	Missing film; weld accepted on basis of a later radiograph.
7876	Re-review of radiographs of previously accepted weld found defects. Note: YAEC had not reviewed these films.
7911	Surface defects, no welding required.
7941	Nonessential variable; weld procedure violated.
7966	Weld defect identified by YAEC review.
7966A	See NCR-7966.
8093	Three pull weld repairs on shop weld without an NCR.
8120	Material thickness was 0.521 and welder was qualified to 0.436; weld metal removed and weld was rewelded.
8439	Re-review of radiographs of previously accepted weld found defects; NCR was voided because condition was addressed on NCR-7324.
8453	Re-review of radiographs of previously accepted weld found defects. Note: YAEC had not reviewed these films.
11065	Weld RC-97-F0203 has code-rejectable indication; reshot per DN-90.
11251	Weld CS-523-F0101 has code-rejectable indication; reshot per DN-90.
11252	Weld CS-432-F0203 has code-rejectable indication; reshot per DN-90.

APPENDIX 11

REVIEW OF DEFICIENCY REPORTS AND DEVIATION NOTICES ISSUED BY YANKEE ATOMIC ELECTRIC COMPANY

The team reviewed 17 deficiency reports (DRs) and 11 deviation notices (DNs) issued by Yankee Atomic Electric Company (YAEC) against Pullman-Higgins (P-H) during the period of fabrication and nondestructive examination (NDE) of pipe welds that were discovered (for the most part) during the YAEC overview of radiographic film.

The team considered each DR and DN for the following: (1) reportability under the requirements of 10 CFR 50.55(e), (2) how each DR and DN was resolved, (3) actions taken to prevent recurrence of the identified deficiency, and (4) proper closure of the DR or DN. The following DRs and DNs were reviewed:

- DR-037, issued 01-03-80. Finding - Several film quality type discrepancies and film placement prevented full weld coverage.

  Disposition - P-H reshot welds.

- DR-211, issued 07-16-82. Finding - Acceptable film was not provided. Some stations must be reshot.

  Disposition - P-H reshot stations 1-2, 2-3, and 3-0.

- DR-241, issued 09-16-82. Finding - Unacceptable penetrameter was on the weld.

  Disposition - P-H reshot weld.

- DR-527, issued 12-07-83. Finding - 184 film packages were reviewed and 117 discrepancies were identified.

  Disposition - P-H had all packages not in the vault reviewed again by a Level III examiner.

- DR-544, issued 12-28-83. Finding - An 8-inch-long linear defect on weld.

  Disposition - All film not accepted by YAEC reviewed again. NCR-5773 was issued to repair the specific weld.

- DR-562, issued 01-26-84. Finding - Repaired area was not reshot and the film was accepted by a Level III examiner.

  Disposition - P-H reshot weld.

- DR-574, issued 02-09-84. Finding - YAEC reviewed 497 packages and rejected 49.3 percent of them.

  Disposition - Film re-read and re-shot where necessary.

- DR-586, issued 02-17-84. Finding - YAEC rejected film with linear indication that was later determined to be grain structure.

  Disposition - This DR acknowledged P-H did not take effective corrective actions that were apparent.

- DR-593, issued 02-21-84. Finding - No review by an authorized nuclear inspector, incorrect source-to-film distance, and inadequate weld coverage.

  Disposition - P-H corrected paperwork.

- DR-594, issued 02-22-84. Finding - QA surveillance of DRs 527, 544, 562, 574, and 586 questioned the continuing deficiencies noted on DRs.

  Disposition - P-H corrected deficiencies.

- DR-603, issued 03-08-84. Finding - Penetrameter in weld, density out of range, and geometrical unsharpness problems.

  Disposition - P-H reshot area and corrected paperwork.

- DR-609, issued 03-13-84. Finding - Identification on film did not match reader sheet.

  Disposition - P-H reshot one weld and changed the paperwork.

- DR-610, issued 03-15-84. Finding - Eleven films failed to meet the geometrical unsharpness (Ug) requirements.

  Disposition - P-H reshot all 11 welds.

- DR-626, issued 03-27-84. Finding - Penetrameter did not cover the -15 percent to +30 percent range, and the source-to-film distance specified on the reader sheet was wrong.

  Disposition - P-H reshot welds.

- DR-633, issued 04-09-84. Finding - Penetrameter in weld and the density was wrong.

  Disposition - P-H reshot weld and reevaluated film.

- DR-666, issued 07-17-84. Finding - Penetrameter did not cover the -15 percent to +30 percent range and the source-to-film distance was wrong.

  Disposition - P-H reshot weld and corrected data.

- DR-716, issued 11-01-84. Finding - Rejectable linear indications were in one weld and incomplete penetration was in another weld.

  Disposition - NCR-7966 was issued for repair after hydrostatic test was completed.

- DN-009, issued 11-13-84. Finding - Rejectable linear indication was in view 0-1 on weld 1-CS-F410310-F003.

  Disposition - P-H and YAEC visually inspected weld and accepted it on the basis of visual findings.

- DN-013, issued 11-26-84. Finding - Rejectable rounded indications were in view 0-1 on weld 1-CC-810-F020.

  Disposition - P-H and YAEC accepted the re-evaluation of the rounded indications.

- DN-025, issued 12-12-84. Finding - Process sheet for pipe support 771-RG-10 was lost.

  Disposition - NCR-8231 was issued, and P-H produced a new process sheet.

- DN-031, issued 01-14-85. Finding - Final liquid penetrant test was performed before final work was completed.

  Disposition - P-H issued a new process sheet to perform NDEs.

- DN-032, issued 01-14-85. Finding - Surveillance of Document Control was not performed at frequency required.

  Disposition - NCR-8584 was issued to address the problem.

- DN-036, issued 01-21-85. Finding - Welds 1-CS-358-F0501 and F0502 were being welded open butt without proper engineering authority.

  Disposition - NCR-8695 was issued for United Engineers and Constructors (UE&C) evaluation.

- DN-037, issued 01-22-85. Finding - Incomplete work was signed off on as complete.

  Disposition - NCR was initiated and work was completed.

- DN-049, issued 06-10-85. Finding - Weld 1-SI-273-02-F0218 contained a notch/stress riser.

  Disposition - NCR-9137 was issued to cut out the weld and install a pup piece.

- DN-090, issued 05-15-85. Finding - Eighty-five radiographic weld packages transmitted to Document Control did not meet the geometrical unsharpness requirements.

Disposition - All 85 welds were radiographed again. The DN was closed on 07-29-85.

- DN-099, issued 06-10-85. Finding - Weld 1-CC-712-04-F0404 (base material repair) which was reshot for geometrical unsharpness had rejectable indications outside area of interest.

  Disposition - Surface was ground and reinspected.

- DN-107, issued 07-2-85. Finding - A repair order for an unacceptable defect, found by nondestructive examination, was not issued as required by JS-IX-14, Paragraph 3.3.

  Disposition - Repair order was issued.

The 50.55(e) reportability evaluation of DRs and DNs is discussed in Section 17.

The team's evaluation of the 17 DRs and 11 DNs listed above determined: (1) they were handled properly, (2) none appeared to be reportable under 10 CFR 50.55(e), and (3) adequate disposition of the hardware was made. The team interviewed the author of DN-090 to evaluate the extent of the corrective actions taken. Particularly, were all the films in Document Control evaluated for geometrical unsharpness (Ug)? The author stated that all weld packages were evaluated for Ug and that was how the 85 welds were identified that are listed on the DN. Also, defects identified by the retest would have been identified by P-H on NCRs. The team evaluated the NCRs to assess the results of the retest findings. These findings are addressed in Sections 15 and 17, and Appendix 10 to this report.

The team was satisfied with the process of identifying and dispositioning DRs and DNs.

APPENDIX 12

DOCUMENTS ON FILE WITH NRC

In addition to the documents relied upon by the team in arriving at its findings and conclusions as discussed in the report sections and associated appendices, the team also obtained the following documents which are on file with the NRC.

(1) Administrative Organization Diagram; Cadd File NO.HQ010002.DGN; 1 page.

(2) American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section I and Section VIII Documentation (licensee memorandum); dated 3/7/86; from: J. W. Singleton to: Mechanical Documentation; 1 page.

(3) CDR Packet No. 82-00-013; 50-55(e) Report, 41 pages.

(4) Chemical & Volume Control Diagram No. 1-CS-302-2; 1 page.

(5) Combined Inspection 50-443/80-11 and 50-444/80-11 (letter); dated 10/16/80; Docket Nos. 50-443 and 50-444; 2 pages.

(6) Combined Inspection 50-443/80-12 and 50-444/80-12 (letter); dated 12/30/90; Docket Nos. 50-443 and 50-444; 2 pages.

(7) Component Cooling Piping Erection Isometric Drawing No. 9763-F-410701; 1 page.

(8) Component Cooling Piping Erection Isometric Drawing No. 9763-F-410702; 1 page.

(9) Component Cooling Piping Erection Isometric Drawing No. 9763-F-410704; 1 page.

(10) Condensate Repair Drawing No. CO-4065-01; 1 page.

(11) Confirmation of NHY/YAEC 100% Film Review of P-H (memorandum), dated 3/06/90; from: W. J. Gagnon to: N. A. Pillsbury; 1 page.

(12) Containment Building Spray Piping Erection Isometric Line Nos. 1214 and 1216 Drawing No. 9763-F-421201; 1 page.

(13) Contractor Problem Report; Weld No. DG-4355-F0113; 2 pages.

(14) Controller Organization Diagram; Cadd File NO.HQ010022.DGN; 1 page.

(15) [Copies of] Seabrook Station Quality Assurance Manual; No. 32; 37 pages.

(16) Corporate Communications Organization Diagram; Cadd File NO.HQ010003.DGN; 1 page.

(17) Deficiency Report 037, dated 1/3/80; 2 pages.

(18) Deficiency Report 211, dated 7/16/82; 3 pages.

(19) Deficiency Report 241, dated 9/16/82; 1 page.

(20) Deficiency Report 527, dated 12/07/83; 4 pages.

(21) Deficiency Report 544, dated 12/28/83; 6 pages.

(22) Deficiency Report 562, dated 1/26/84; 2 pages.

(23) Deficiency Report 574, dated 2/09/84; 5 pages.

(24) Deficiency Report 586, dated 2/17/84; 8 pages.

(25) Deficiency Report 593, dated 2/21/84; 4 pages.

(26) Deficiency Report 594, dated 2/22/84; 7 pages.

(27) Deficiency Report 603, dated 3/08/84; 4 pages.

(28) Deficiency Report 609, dated 3/13/84; 4 pages.

(29) Deficiency Report 610, dated 3/15/84; 6 pages.

(30) Deficiency Report 626, dated 3/27/84; 9 pages.

(31) Deficiency Report 633, dated 4/09/84; 3 pages.

(32) Deficiency Report 644, dated 4/25/84; 5 pages.

(33) Deficiency Report 666, dated 7/17/84; 5 pages.

(34) Deficiency Report 716, dated 11/01/84; 2 pages.

(35) Design Specification for Nuclear Power Plant Piping Systems (for Seabrook Station); Specification No. 9763-006-248-43; 125 pages.

(36) Deviation Notice 009, dated 11/13/84; 1 page.

(37) Deviation Notice 013, dated 11/26/84; 1 page.

(38) Deviation Notice 025, dated 12/12/84; 3 pages.

(39) Deviation Notice 031, dated 1/14/85; 7 pages.

(40) Deviation Notice 032, dated 1/14/85; 2 pages.

(41) Deviation Notice 035, dated 1/18/85; 3 pages.

(42) Deviation Notice 036, dated 1/21/85; 5 pages.

(43) Deviation Notice 037, dated 1/22/85; 2 pages.

(44) Deviation Notice 048, dated 2/14/85; 10 pages.

(45) Deviation Notice 049, dated 2/21/85; 4 pages.

(46) Deviation Notice 052, dated 3/04/85; 14 pages.

(47) Deviation Notice 081, dated 4/26/85; 6 pages.

(48) Deviation Notice 090, dated 5/15/85; 16 pages.

(49) Deviation Notice 099, dated 6/10/85; 4 pages.

(50) Deviation Notice 104, dated 6/26/85; 14 pages.

(51) Deviation Notice 107, dated 7/02/85; 5 pages.

(52) Deviation Notice 126, dated 8/01/85; 11 pages.

(53) Deviation Notice 150, dated 9/12/85; 5 pages.

(54) Deviation Notice 151, dated 9/23/85; 10 pages.

(55) Deviation Notice 182, dated 10/29/85; 4 pages.

(56) Deviation Notice 183, dated 10/30/85; 9 pages.

(57) Diesel Generator Repair Drawing No. DG4405-01; 7 pages.

(58) Dupont publication, "The First Data Management System To Meet the Image Needs of NDT"; 8 pages.

(59) Dupont publication, "The NDT Scan II Film Digitizer"; 2 pages.

(60) Dupont publication, "NDT ScanPix Digital Film Recorder"; 2 pages.

(61) Dupont publication, "The NDT Video D Video Digitizer/Digital Storage System"; 2 pages.

(62) Dupont publication, "The Scan IV Report"; 4 pages.

(63) EAR Information Packet; 66 pages.

(64) Emergency Preparedness and Community Relations Organization Diagram; Cadd File NO.HQ010020.DGN; 1 page.

(65) Engineering Change Authorization 100104A; 3 pages.

(66) Engineering Change Authorization 100117C; 4 pages.

(67) Engineering Change Authorization 192212A; dated 9/27/83; 103 pages.

(68) Engineering & Licensing Organization Diagram; Cadd File NO.HQ010011.DGN; 1 page.

(69) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-1-01; 53 pages.

(70) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-02-01; 42 pages.

(71) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-3-01; 53 pages.

(72) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-4-1-3; 142 pages.

(73) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-6-01; 115 pages.

(74) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-07-01; 77 pages.

(75) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-8-01; 18 pages.

(76) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-9-01; 66 pages.

(77) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-10-01; 190 pages.

(78) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-11-01; 213 pages.

(79) Evaluation of Base Material Repairs to RV and SG Nozzles; No. RC-12-01; 44 pages.

(80) Evaluation of DG Exhaust Weld Indication (licensee memorandum); dated 5/14/90; from: R. E. White to: W. J. Gagnon; 4 pages.

(81) Field Instruction Package of the Reactor Coolant Loop Piping Installation and Inspection; No. FI-132; 9 pages.

(82) Immediate Action Letter 80-55; dated 1/8/81; No. SBN-147; 3 pages.

(83) Immediate Action Request Log; 1 page.

(84) Information Resources Organization Diagram; Cadd File NO.HQ010014.DGN; 1 page.

(85) Interim Procedure Change, dated 11/4/85; Proc. No. ASP-3; 160 pages.

(86) Interoffice Correspondence; dated 4/5/82; From: S. R. Ellis to: P. Larochelle; 1 page.

(87) Letter in response to SBN-147 letter; dated 1/15/81; Docket No. 50-443; 1 page.

(88) Letter on conversation between W. Johnson (Vice President of Yankee Atomic Electric Company) and L. E. Tripp (NRC); dated 12/22/80; Docket No. 50-443, IAL 80-55; 2 pages.

(89) Letter to Senator Kennedy responding to the 2/27/90 letter; dated 3/15/90; 31 pages.

(90) List of QA/QC Inspector Names and Initials; dated Oct.-Nov. 1984; 15 pages.

(91) Main Steam Welding Requirements Drawing No. MS-4005-20; 1 page.

(92) Main Steam Welding Requirements Drawing No. MS-4005-22; 1 page.

(93) Main Steam Welding Requirements Drawing No. MS-4009-01; 1 page.

(94) Main Steam Welding Requirements Drawing No. MS-4012-02; 1 page.

(95) Main Steam Welding Requirements Drawing No. MS-4013-02; 1 page.

(96) Main Steam Welding Requirements Drawing No. MS-4016-02; 1 page.

(97) Maintenance Organization Diagram; Cadd File NO.HQ010009.DGN; 1 page.

(98) Management Action Request Log; 2 pages.

(99) Management Organization Diagram; Cadd File NO.HQ010001.DGN; 1 page.

(100) NDE Personnel Certifications Packet; 652 pages.

(101) Nonconformance Report 595; Weld No. AS-5201-F0101; 5 pages.

(102) Nonconformance Report 1296; Weld No. RH-155-06; 7 pages.

(103) Nonconformance Report 1698; Weld No. RH-155-02; 16 pages.

(104) Nonconformance Report 1948; Weld No. DG-4351-F0101; 2 pages.

(105) Nonconformance Report 2169; Weld No. AS-5201-01; 25 pages.

(106) Nonconformance Report 2463; Weld No. SW-1815-11; 6 pages.

(107) Nonconformance Report 2487; Weld No. FW-4606-01; 3 pages.

(108) Nonconformance Report 2583; Weld No. CS-364-03; 8 pages.

(109) Nonconformance Report 3726; Weld No. RC-49-F0103; 5 pages.

(110) Nonconformance Report 3983; Weld No. RC-30-F0103; 14 pages.

(111) Nonconformance Report 5290; Weld No. 1821-SH-07; 6 pages.

(112) Nonconformance Report 5293; Weld No. RC-30-02,RC-30-03,RC-30-04; 27 pages.

(113) Nonconformance Report 5689; Weld No. RC-21-F0102; 10 pages.

(114) Nonconformance Report 5773; Weld No. MS-4001-01; 11 pages.

(115) Nonconformance Report 5781; Weld No. RC-49-F0103; 64 pages.

(116) Nonconformance Report 6311; Weld No. CS-357-04; 18 pages.

(117) Nonconformance Report 7038; Weld Nos. RH-158-F0406, RH-158-F0408, and RH-158-F0411; 19 pages.

(118) Nonconformance Report 7461; Weld No. RC-30-F0101; 13 pages.

(119) Nonconformance Report 7487; Weld No. FW-4608-F1302; 9 pages.

(120) Nonconformance Report 7966; Weld No. CS-357-0406; 12 pages.

(121) Nonconformance Report 7967; Weld No. SI-275-01; 29 pages.

(122) Nonconformance Report 82-333; Weld No. MS-4009-F0109; 22 pages.

(123) Nonconformance Report 82-595; Weld No. DM-E-89; 10 pages.

(124) Nonconformance Report-Design Change Documents (A25XX); Group 73; 254 pages.

(125) Nonconformance Report Packet (18 Unqualified Welders); 118 pages.

(126) Nonconformance Report Summary Listing From PHY Computer Run, dated 7/30/85; (lists Nonconformance Reports 0002-1748); 446 pages.

(127) Nonconformance Report Summary Listing From PHY Computer Run, dated 7/30/85; (lists Nonconformance Reports 1749-5723); 442 pages.

(128) Nonconformance Report Summary Listing From PHY Computer Run, dated 7/30/85; (lists Nonconformance Reports 5724-8877); 422 pages.

(129) Nonconformance Report Summary Listing From PHY Computer Run, dated 7/30/85; (lists Nonconformance Reports 8878-10096); 437 pages.

(130) Nonconformance Report Summary Listing From PHY Computer Run, dated 5/01/90; 1186 pages.

(131) Nonconformance Review Board Response Form; dated 2/22/82; NCR 1948; 1 page.

(132) Nonconformance Review Board Response Form; dated 4/29/82; NCR 1948; 1 page.

(133) Nonconformance Review Board Response Form; dated 5/4/82; NCR 1948; 1 page.

(134) Nonconformance Review Board Response Form; dated 5/13/83; NCR 1948; 1 page.

(135) Nonconformance Review Board Response Form; dated 8/29/83; NCR 1948; 2 pages.

(136) Nonconformance Review Board Response Form; dated 9/6/83; NCR 1948; 1 page.

(137) Nonconformances, dated 7/16/86; Proc. No. ASP-3; 93 pages.

(138) Notes of Meeting: YAEC COA, UE&C & Pullman-Higgins, dated 2/10/84; Purpose: Establish Review Method of Site-Generated Radiographs; 1 page.

(139) NQG Evaluation of the Fourth Weld Repair of FW 4063-10101 (memorandum), dated 7/20/90; from: R. E. White and T. R. Frolo to: W. Gagnon; 2 pages.

(140) Nuclear Production Organization Diagram; Cadd File NO.HQ010004.DGN; 1 page.

(141) Operation Organization Diagram; Cadd File NO.HQ010007.DGN; 1 page.

(142) Penetrations Drawing (Piping Erection Isometric) No. 9763-F-410703; 1 page.

(143) Personal Quality Procedures; Job No. 9763011; 23 pages.

(144) P-H Audit Reports from 5/79 to 10/25/85 as designated in Appendix 8 to this report; 211 pages.

(145) Piping Class Designation Packet; File No. CEM-86-485; 10 pages.

(146) Primary Component Cooling Thermal Barrier Loop Detail Drawing No. 1-CC-D20209; 1 page.

(147) Production Services Organization Diagram; Cadd File NO.HQ010008.DGN; 1 page.

(148) Production Services Organization Diagram; Cadd File NO.HQ010012.DGN; 1 page.

(149) QA Organizational Chart; dated 9/26/83; 1 page.

(150) QA Organizational Chart Revision 3, dated 10/11/85; 2 pages.

(151) QAR Log; QAR Report Nos.(0-462); 16 pages.

(152) QEG NDE Review Group; dated 5/14/84; 5 pages.

(153) Quality Programs Diagram; Cadd File NO.HQ010010.DGN; 1 page.

(154) Radiographic Inspection Reports; Weld No. AS-5201-F0101; 4 pages.

(155) Radiographic Inspection Reports; Weld No. CBS-1201-F0507; 4 pages.

(156) Radiographic Inspection Reports; Weld No. CBS-1214-F0512; 18 pages.

(157) Radiographic Inspection Reports; Weld No. CBS-1216-F0403; 6 pages.

(158) Radiographic Inspection Reports; Weld No. CBS-1225-F0805; 3 pages.

(159) Radiographic Inspection Reports; Weld No. CC-821-F001; 8 pages.

(160) Radiographic Inspection Reports; Weld No. CC-821-F002; 4 pages.

(161) Radiographic Inspection Reports; Weld No. CC-821-F003; 4 pages.

(162) Radiographic Inspection Reports; Weld No. CC-821-F004; 4 pages.

(163) Radiographic Inspection Reports; Weld No. CC-821-F019; 4 pages.

(164) Radiographic Inspection Reports; Weld No. CO-4053-F3001; 5 pages.

(165) Radiographic Inspection Reports; Weld No. CO-4063-F0101; 7 pages.

(166) Radiographic Inspection Reports; Weld No. CO-4063-F0502; 5 pages.

(167) Radiographic Inspection Reports; Weld No. CO-4065-F0103; 2 pages.

(168) Radiographic Inspection Reports; Weld No. CO-4068-F0807; 2 pages.

(169) Radiographic Inspection Reports; Weld No. CS-357-F0406; 8 pages.

(170) Radiographic Inspection Reports; Weld No. CS-365-F0101; 8 pages.

(171) Radiographic Inspection Reports; Weld No. CS-365-F0111; 3 pages.

(172) Radiographic Inspection Reports; Weld No. CS-366-F0203; 6 pages.

(173) Radiographic Inspection Reports; Weld No. CS-374-F001; 2 pages.

(174) Radiographic Inspection Report; Weld No. CS-374-F037; 1 page.

(175) Radiographic Inspection Reports; Weld No. CS-377-F0103; 4 pages.

(176) Radiographic Inspection Reports; Weld No. CS-431-F0203; 4 pages.

(177) Radiographic Inspection Reports; Weld No. CS-432-F0301; 2 pages.

(178) Radiographic Inspection Reports; Weld No. CS-523-F0101; 2 pages.

(179) Radiographic Inspection Reports; Weld No. DG-4351-FW101; 5 pages.

(180) Radiographic Inspection Reports; Weld No. DG-4351-F0102; 4 pages.

(181) Radiographic Inspection Report; Weld No. DG-4351-FW103; 1 page.

(182) Radiographic Inspection Reports; Weld No. DG-4355-F0112; 7 pages.

(183) Radiographic Inspection Reports; Weld No. DG-4355-F0113; 12 pages.

(184) Radiographic Inspection Report; Weld No. DG-4363-F0101; 1 page.

(185) Radiographic Inspection Report; Weld No. DG-4363-F0102; 1 page.

(186) Radiographic Inspection Reports; Weld No. DG-4363-F0112; 4 pages.

(187) Radiographic Inspection Report; Weld No. SI-257-F0104; 1 page.

(188) Radiographic Inspection Report; Weld No. SI-257-F0105; 1 page.

(189) Radiographic Inspection Reports; Weld No. FW-4600-F0602; 2 pages.

(190) Radiographic Inspection Reports; Weld No. FW-4606-FW1002; 3 pages.

(191) Radiographic Inspection Reports; Weld No. FW-4606-F1102; 6 pages.

(192) Radiographic Inspection Reports; Weld No. FW-4607-F0309; 2 pages.

(193) Radiographic Inspection Reports; Weld No. FW-4607-F1704; 3 pages.

(194) Radiographic Inspection Reports; Weld No. FW-4608-F1302; 2 pages.

(195) Radiographic Inspection Reports; Weld No. FW-4609-F0305; 2 pages.

(196) Radiographic Inspection Reports; Weld No. FW-4610-F0707; 2 pages.

(197) Radiographic Inspection Report; Weld No. FW-4617-F0101; 1 page.

(198) Radiographic Inspection Reports; Weld No. FW-4626-F0103; 2 pages.

(199) Radiographic Inspection Reports; Weld No. FW-4628-F0201; 8 pages.

(200) Radiographic Inspection Reports; Weld No. FW-4630-F0114; 3 pages.

(201) Radiographic Inspection Reports; Weld No. FW-4631-F1002; 4 pages.

(202) Radiographic Inspection Reports; Weld No. FW-4634-F0303; 2 pages.

(203) Radiographic Inspection Reports; Weld No. MS-4001-F0102; 13 pages.

(204) Radiographic Inspection Reports; Weld No. MS-4005-F1001; 2 pages.

(205) Radiographic Inspection Reports; Weld No. MS-4005-F2003; 3 pages.

(206) Radiographic Inspection Report; Weld No. MS-4005-F2204; 1 page.

(207) Radiographic Inspection Reports; Weld No. MS-4007-F0106; 2 pages.

(208) Radiographic Inspection Reports; Weld No. MS-4009-F0109; 3 pages.

(209) Radiographic Inspection Reports; Weld No. MS-4012-F0201; 7 pages.

(210) Radiographic Inspection Reports; Weld No. MS-4013-F0201; 13 pages.

(211) Radiographic Inspection Reports; Weld No. MS-4016-F0204; 3 pages.

(212) Radiographic Inspection Report; Weld No. RC-2-F0101; 1 page.

(213) Radiographic Inspection Report; Weld No. RC-2-F0103; 1 page.

(214) Radiographic Inspection Report; Weld No. RC-3-F0101; 1 page.

(215) Radiographic Inspection Reports; Weld No. RC-3-F0102; 3 pages.

(216) Radiographic Inspection Reports; Weld No. RC-4-F0101; 2 pages.

(217) Radiographic Inspection Report; Weld No. RC-5-F0101; 1 page.

(218) Radiographic Inspection Report; Weld No. RC-5-F0102; 1 page.

(219) Radiographic Inspection Report; Weld No. RC-5-F0103; 1 page.

(220) Radiographic Inspection Reports; Weld No. RC-6-F0101; 2 pages.

(221) Radiographic Inspection Reports; Weld No. RC-6-F0102; 3 pages.

(222) Radiographic Inspection Reports; Weld No. RC-7-F0101; 2 pages.

(223) Radiographic Inspection Reports; Weld No. RC-7-F0102; 2 pages.

(224) Radiographic Inspection Reports; Weld No. RC-8-F0101; 2 pages.

(225) Radiographic Inspection Report; Weld No. RC-8-F0102; 1 page.

(226) Radiographic Inspection Report; Weld No. RC-8-F0103; 1 page.

(227) Radiographic Inspection Reports; Weld No. RC-9-F0102; 6 pages.

(228) Radiographic Inspection Reports; Weld No. RC-10-F0101; 3 pages.

(229) Radiographic Inspection Reports; Weld No. RC-10-F0102; 9 pages.

(230) Radiographic Inspection Reports; Weld No. RC-11-F0101; 5 pages.

(231) Radiographic Inspection Report; Weld No. RC-11-F0102; 1 page.

(232) Radiographic Inspection Report; Weld No. RC-11-F0103; 1 page.

(233) Radiographic Inspection Reports; Weld No. RC-11-F0104; 2 pages.

(234) Radiographic Inspection Reports; Weld No. RC-13-F0202; 2 pages.

(235) Radiographic Inspection Reports; Weld No. RC-13-F0403; 2 pages.

(236) Radiographic Inspection Reports; Weld No. RC-13-F0703; 2 pages.

(237) Radiographic Inspection Reports; Weld No. RC-13-F0704; 3 pages.

(238) Radiographic Inspection Reports; Weld No. RC-15-F0403; 3 pages.

(239) Radiographic Inspection Reports; Weld No. RC-15-F0504; 2 pages.

(240) Radiographic Inspection Reports; Weld No. RC-15-F0702; 2 pages.

(241) Radiographic Inspection Reports; Weld No. RC-30-F0101; 5 pages.

(242) Radiographic Inspection Reports; Weld No. RC-30-F0103; 2 pages.

(243) Radiographic Inspection Reports; Weld No. RC-30-F0303; 2 pages.

(244) Radiographic Inspection Report; Weld No. RC-33-F0401; 1 page.

(245) Radiographic Inspection Reports; Weld No. RC-49-F0101; 9 pages.

(246) Radiographic Inspection Reports; Weld No. RC-49-F0103; 12 pages.

(247) Radiographic Inspection Reports; Weld No. RC-44-F0501; 2 pages.

(248) Radiographic Inspection Report; Weld No. RC-45-F0107; 3 pages.

(249) Radiographic Inspection Reports; Weld No. RC-49-F0102; 9 pages.

(250) Radiographic Inspection Report; Weld No. RC-59-F0405; 1 page.

(251) Radiographic Inspection Reports; Weld No. RC-59-F0502; 4 pages.

(252) Radiographic Inspection Report; Weld No. RC-59-F0602; 1 page.

(253) Radiographic Inspection Reports; Weld No. RC-62-F0106; 8 pages.

(254) Radiographic Inspection Reports; Weld No. RC-74-F012; 7 pages.

(255) Radiographic Inspection Reports; Weld No. RC-91-F002; 7 pages.

(256) Radiographic Inspection Reports; Weld No. RC-91-F005; 2 pages.

(257) Radiographic Inspection Reports; Weld No. RC-96-F001; 6 pages.

(258) Radiographic Inspection Reports; Weld No. RC-96-F004; 6 pages.

(259) Radiographic Inspection Reports; Weld No. RC-97-F0203; 6 pages.

(260) Radiographic Inspection Reports; Weld No. RH-152-F0102; 2 pages.

(261) Radiographic Inspection Reports; Weld No. RH-155-F0605; 2 pages.

(262) Radiographic Inspection Reports; Weld No. RH-155-F0608; 4 pages.

(263) Radiographic Inspection Reports; Weld No. RH-158-F0101; 5 pages.

(264) Radiographic Inspection Reports; Weld No. RH-158-F0408; 4 pages.

(265) Radiographic Inspection Reports; Weld No. RH-158-F0411; 2 pages.

(266) Radiographic Inspection Reports; Weld No. RH-158-F0803; 2 pages.

(267) Radiographic Inspection Report; Weld No. SB-1301-F0515; 1 page.

(268) Radiographic Inspection Reports; Weld No. SB-1307-F0206; 2 pages.

(269) Radiographic Inspection Reports; Weld No. SB-1307-F1503; 5 pages.

(270) Radiographic Inspection Reports; Weld No. SB-1310-F0605; 2 pages.

(271) Radiographic Inspection Reports; Weld No. SI-201-F0201; 3 pages.

(272) Radiographic Inspection Reports; Weld No. SI-201-F0208; 2 pages.

(273) Radiographic Inspection Reports; Weld No. SI-204-F0295; 3 pages.

(274) Radiographic Inspection Reports; Weld No. SI-256-F0411; 3 pages.

(275) Radiographic Inspection Reports; Weld No. SI-256-F0107; 2 pages.

(276) Radiographic Inspection Reports; Weld No. SI-261-F0402; 2 pages.

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11. ABSTRACT *(200 words or less)*

In response to congressional concerns about the adequacy of the welding and nondestructive examination (NDE) programs at the Seabrook Nuclear Station, NRC senior management established an independent review team (IRT) to conduct an assessment. The IRT focused on the quality of the finished hardware and associated records, as well as on the adequacy of the overall quality assurance program as applied to the fabrication and NDE programs for pipe welds. This report documents the findings of that investigation.

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