

U.S. NUCLEAR REGULATORY COMMISSION
REGION 1

Docket No. 50-443

Report No. 91-12

License No. NPF-86

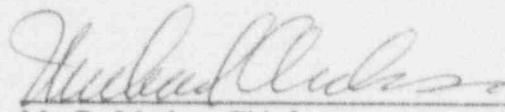
Licensee: Public Service Company of New Hampshire
P. O. Box 300
Seabrook, New Hampshire 03874

Facility Name: Seabrook Generating Station

Inspection At: Seabrook, New Hampshire

Inspection Conducted: May 29 to May 31 and June 20, 21, 1991

Inspector:


M. C. Modes, Chief,
Mobile NDE Laboratory, EB, DRS

6/28/91
date

Inspection Summary and Conclusions: An unannounced inspection was conducted at Seabrook Generating Station Unit 1, on May 29, through May 31, 1991 and an announced inspection on June 20 and 21, 1991 (Report No. 50-443/91-12). The purpose of the inspection was the evaluation of radiographs as part of the NRC inspection of the program undertaken by New Hampshire Yankee (NHY) to verify the completeness of the radiographic records at Seabrook Generating Station Unit 1. For a more detailed explanation of this program, refer to NRC report 50-443/91-09. The welds chosen for radiographic evaluation were based in part on problems already identified by the licensee in their program for radiographic record completeness verification and in part because questions had been raised about other issues relating to the welds or the documentation associated with the welds by either the resident inspector or others. The welds were not chosen at random. A list of 39 welds was generated on this basis. The inspector reviewed the radiographs of 29 of the welds. 6 of the welds contained radiographs that did not meet the minimum sensitivity requirements of the ASME Boiler and Pressure Vessel Code in affect at the time the radiographs were taken. Specifically the radiographs did not have the required 2-4T sensitivity as required in Table T-272 of ASME Section V, Article 2, for the 1977 Edition with the Winter 78 Addenda.

Areas Inspected: The following is the complete list of welds that were chosen for radiographic review. The radiographs that have been reviewed are noted with "*" and the radiographs that are in violation of the requirements are noted with "O".

<u>WELD</u>	<u>WELD</u>
*RH-151-01-F0102	O*CS-355-08-F0801
*CBS-1201-01-F0103	O*CS-355-01-F0102
*CO-4061-03-F0304	*CS-356-01-F0102
O*CS-318-02-F0202	*CS-303-05-F0503
*RC-13-02-F0203	*CS-303-05-F0502
*RC-97-01-F0105	*CS-302-03-F0302
O*CS-355-05-F0501	*CS-303-03-F0301
O*CS-355-01-F0109	*CS-302-04-F0403
*RC-98-01-F006	*CS-302-03-F0305
*CS-357-03-F0305	*CS-302-04-F0404
*CS-355-12-F1203	*CS-302-01-F0104
*CS-366-02-F0204	*CS-355-03-F0304
*RC-21-02-F0201	CS-302-01-F0102
*CS-432-02-F0203	CS-355-06-F0601
O*CS-360-02-F0206	CS-355-07-F0703
*CS-360-02-F0204	CS-360-02-F0205
*CS-318-02-F0204	CS-355-09-F0905
*CS-432-03-F0304	CS-355-08-F0802
CS-355-09-F0903	CS-355-02-F0202
*CS-355-01-F0104	

Results: One violation was identified, relating to the failure to comply with code requirements for penetrameter sensitivity for 6 of the welds.

DETAILS

1.0 Persons Contacted:

Persons Representing the NRC:

Wayne Hodges		Director, Reactor Safety
David C. Wiggins		TET, Inc. NDE Level III
Ebe C. McCabe		Chief, RPS-3B
Tony Cerne	○*	SRI - Construction
Ed Martindale		Consultant
George Georgiev		Senior Engineer
Noel Dudley		SRI - OPS
Dick Wessman		Director, PDI-3
Ken Brockman		Regional Coordinator
Philip Joukoff		Investigator
Kent Walker		Special Agent
Frank Forgione		Special Agent

Persons Representing the Licensee:

Helmut Thielsch		Thielsch Engrg. Assoc.
Gerald F. McDonald		QA Manager
Philip A. Oikle	*	NDE Level III
Terry Harpster	*	Director of Licensing Services
Neal A. Pillsbury	○*	Director of Quality Programs
Bruce L. Dranbridge		Exec. Dir. of Nuclear Production
Don Moody		Station Manager
Richard C. Julian	*	QAE/NDE
Bill Weseman		Thielsch Engrg. Assoc.
E. W. Desmarais	○	IRT Manager
G. F. Sesler		Sr. Project Engr.
W. A. Graeme, Jr.		E. I. Dupont Business Manager
W. J. Gagnon	○*	EAR Program Manager
J. M. Grillo		Operations Manager
R. J. Faix		Sr. Engineer
J. E. Sobotica	○	Reg. Compliance Engineer
R. K. Gadky		Ropes & Gray
J. Warnok	○	Nuclear Quality Manager
F. King	○	RMD Supervisor
J. J. West	○	Archival Section Leader
J. M. Peschel	○	Regulatory Compliance Manager
T. R. Frolo	*	Lead Process Analyst

○ Indicates individuals present at the entrance meeting
conducted on May 29, 1991.

* Indicates individuals present at the briefing held on May 31, 1991.

The inspector also contacted other administrative and technical personnel during this inspection.

2.0 Radiographic Review

In the discussion below all italicized statements represent the written statements the inspector gave the licensee on May 30, 1991. This information was given the licensee since the Level III examiners working for NHY had misunderstood the concerns verbalized by the inspector, on the 29th, and had spent a considerable amount of time on the evening of the 29th doing an analysis of the wrong area of a radiographic set.

Weld CBS-1201-01-F0103 *This weld had internal undercut of some severity with a possible lack of penetration and/or severe root concavity (suck-back). Although this weld package had been reviewed upto and including the YAEC Level III none of the above indications were noted on the report. The indications were not evaluated or disposed of.* There are two concerns with this radiographic package. The first is that a valid indication has not been recorded on the radiographic inspection report. Unless the indication is recorded on the radiographic inspection report there is no evidence that the film was properly interpreted and the indication disposed of. This is especially important in the case of root concavity since there are only two methods of evaluating the indication. The first is to gain access to the internal area of the system and do a visual evaluation of the concavity. The second is to prepare a workmanship sample of the same type as being evaluated if the inside diameter of the pipe and therefore the area of root concavity is not available. In any case, the method used for the final determination should be included in the record for the weld. The indication should be noted on the radiographic report with an appropriate disposition as to its acceptability. The licensee presented to the inspector the archival record of the weld. On the process sheet was evidence that an internal visual inspection had been performed and no indications were noted.

Weld CS-318-02-F0202 *The radiographic reader sheet calls for the use of a composite view of the weld and a single view for the base material. There were three exposures taken for this weld. In the first view, one of the two films used for composite viewing, has film artifacts in the weld. Thus when looking at the weld in composite, one can not be sure if a defect is being viewed or if it is a film artifact. In addition there is no 4T sensitivity in the penetrometer. The second exposure can be evaluated by composite, but again there is no 4T sensitivity. Although the reader sheet records a double wall eccentric exposure and the first two sections are shot in this manner, the last view has been shot as an elliptical and can not be viewed composite. The density of the 3rd exposure is around 3.2 H&D single film. The radiograph of the weld contains two welds. Upon rereview of the radiographs it was determined that the*

weld referred to in the statement was at the other end of the film and not the weld being evaluated for this series of exposures. In addition the licensee determined that the artifacts in the film were the result of felt tip marking of the film. They have since cleaned the film to a degree that precludes the artifacts interfering with the interpretation of the film. As indicated in the statement above the film for exposures one and two do not have sufficient sensitivity in the penetrameter and are therefore not in conformance with the code requirements.

Weld CS-355-05-F0501 *The 0° exposure was rejected by a YAEF quality audit for lack of sensitivity in the penetrameter. There is no signature of concurrence on the QA report and it appears that YAEF accepted the weld radiography before the 0° section was reshot for compliance with the QA finding. This appears to be the case as there is no clear YAEF signature on the 0° reader sheet. Since this statement was generated the staff of NHY submitted a copy of a written report from the original QA auditor for a date that indicated the correct review by YAEF was performed. However, when a rereview of the radiographs was performed on June 20, 1991 it was determined that the radiographs did not have sufficient 4T sensitivity.*

Weld CS-355-01-F0109 *The final repair exposure lacks the required penetrameter sensitivity since the penetrameter and its shim was projected under the radiographic isotope fixture. This obscures the penetrameter to a degree that the required 4T sensitivity is not there. This is an elliptical radiograph. The penetrameter has been projected under the radiographic attachment, in the radiograph. This obscures the penetrameter and its 4T hole to such a degree that no 4T sensitivity has been obtained.*

Weld CS-355-01-F0104 *The flash identification has been eliminated by exposing it without appropriate blocking. The identification was hand written in grease pencil. This is not a permanent identification of the film. The licensee was able to obtain the permanent identification from the film itself since it was captured by the emulsion. This was placed on the film with a permanent marker. This satisfies this concern.*

Weld CS-360-020-F0206 *After a series of film rejections for lack of sensitivity and unsharpness an acceptable radiographic series was generated. This allowed the determination of rejectable slag indications. The repair radiographs were not taken consistent with the technique stated on the radiographic reader sheet since the tangent wall of the pipe and weld is clearly visible. The stated technique was double wall eccentric from the O.D. The only way that the wall can be revealed in a radiograph is if the source is positioned away from the pipe wall. Although it is the opinion of the licensee that the radiograph can show the tangent wall when shooting a pipe as stated on the technique form they have agreed to support that opinion in some form. This is considered to be an open item (443/91-12-01).*

Weld CS-432-02-F0203 The radiographic sections 1-2 and 0-4 show a lightened area typical of insufficient back scatter protection. In the 0-4 section the area of back scatter is impinging on the area of interest in the weld. It appears that the backscatter shield for the radiographic cassette either was misplaced originally or broke loose during the exposure. This shows up as a well defined lighter area where the shield was in place. In the area where the scatter may have occurred, the presence of a lead letter B, placed behind the cassette, would indicate that the backscatter protection was insufficient. The lead letter B is not showing in the backscatter area. The original concern was that the penetrometer density did not comply with the +30% -15% rule for the light area. The licensee has determined that this is not the case as confirmed by NRC's analysis.

Weld CS-355-08-F0801 The penetrameters have been placed on a code tag. The 4T of the 12 penetrometer can not be seen. What clearly can be seen is the "N" stamp on the code tag. The alternate 12 penetrometer shows no sensitivity as does the 15 penetrometer on the opposite side of the weld. On exposures 1 and 2, the light 12 penetrometer shows no sensitivity as the tag rolls around the series and blocks various shots. There is inadequate sensitivity on the penetrameters for each of the three radiographic stations in this series.

Weld CS-355-01-F0102 The reader sheet has a statement: "the source could not be lined up exactly over 0° due to the location of the joint." This would be an acceptable variation from the code if other exposures had been made to obtain 100% coverage. Of the three film for the 0° location, two have the flash ID placed directly over the penetrometer identification numbers. Thus, these film are not in code compliance and can not be used for interpretation of the weld acceptability. The third film does not have this problem. It does not have the required sensitivity for the penetrameters. Exposure 1 (next one in sequence), is too dark to show any sensitivity in the penetrameters. The shim on the 12 penetrometer was staggered in such a manner as to obliterate the outline of the penetrometer. The last exposure (#2) has marginal but acceptable sensitivity in the penetrometer representing the base metal but no sensitivity in the penetrometer representing the weld metal. Further analysis by the NRC and the licensee have determined that adequate coverage of the weld was obtained utilizing the exposures as stated in the note on the radiographic inspection report. The penetrometer sensitivity for the 0 and 1 shots are not sufficient to meet the code requirements. The base material penetrometer for the number 2 shot covers the required density spread thus obviating the second penetrometer.

Weld CS-303-03-F0301 This is another example of a code tag being directly in the way of the penetrometer placement. The penetrameters do have acceptable but marginal sensitivity despite the obstruction. This is a comment for the record indicating poor workmanship and not a concern about the code acceptability of the radiographs or the weld.

Weld CS-302-04-F0404 Another example of a code tag being directly in the way of the penetrometer placement. In this case however the sensitivity was not obtained for the #10 penetrameters representing the weld metal on any of the exposures. This statement does not require amplification.

The failure to obtain the proper image sensitivity in the penetrameters for weld numbers CS-318-02-F0202, CS-355-05-F0501, CS-355-01-F0109, CS-360-02-F0206, CS-355-08-F0801, CS-355-01-F0102 is a violation of 10 CFR 50, Appendix B, Criterion IX (50-443/91-12-02).

3.0 Management Meetings

Licensee management was informed of the scope and purpose of the inspection at the entrance interview on May 20, 1991. The findings of the inspection were discussed with the licensee representatives during the course of the inspection and presented to licensee management at the exit interview (see paragraph 1.0 for those who attended). The licensee responses, made at the exit meeting of June 21, 1991 are attached to this report as attachment one.

ATTACHMENT ONE

New Hampshire Yankee's Response
to the
NRC's Concerns.

1-CBS-1201-01-F0103

NRC ISSUE

- Weld had internal undercut with possible lack of penetration and/or root concavity.
- Although this weld package had been reviewed up to and including the YAEC Level III, none of the above indications were noted on the report. The indications were not evaluated or disposed of.

NHY RESPONSE

- Puliman-Higgins field weld 1-CBS-1201-01-F0103 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- Radiographic film for Station 1-2 indicates the presence of minor, code allowable root concavity.
- Radiographic film for Station 2-3 indicates the presence of minor, code allowable root concavity and minor, code allowable centerline shrink.
- Radiographic film for Station 3-0 indicates the presence of code allowable tungsten inclusions.
- Rereview of the film for all stations indicates that there is no evidence of lack of penetration or internal undercut in this weld.
- The process sheets for this weld state that a post weld visual examination of the internal weld surfaces was performed for this weld on December 17, 1979. The examination attributes were for oxidation, concavity, convexity, undercut, and unconsumed insert, and in all instances were found to be acceptable for this weld.
- There are no Code provisions which require documentation of, or disposition of weld indications which are allowable by code. This is consistent with Interpretation V-77-06 of ASME Section V, T-292, Evaluation by Manufacturer.
- To facilitate future review of radiographs by contracted RT reviewers, NHY is in the process of preparing a procedure that describes how the review is to be conducted and documented.

1-CS-355-05-F0501

NRC ISSUE

- The 0° exposure was rejected by a YAEC quality audit for lack of sensitivity in the penetrometer. There is no signature of concurrence on the QA report and it appears that YAEC accepted the weld radiography before the 0° section was reshot for compliance with the QA finding. This appears to be the case as there is no clear YAEC signature on the 0° reader sheet.

NH RESPONSE

- Pullman-Higgins field weld 1-CS-355-05-F0501 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- As a result of the YAEC audit report, Station 0 of this weld was re-radiographed on December 1, 1981.
- As stated in the YAEC audit report, the radiograph for this reshot was reviewed and found acceptable by YAEC on February 12, 1982. Based on this, YAEC did not approve the reshot of this station before the radiograph was taken.

1-CS-355-01-F0109

NRC ISSUE

- The final repair exposure lacks the required penetrameter sensitivity since the penetrameter and its shim was projected under the radiographic isotope fixture. This obscures the penetrameter to a degree that the required 4T sensitivity is not there.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-355-01-F0109 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- Irrespective of the placement of the shim and penetrameter under the isotope fixture, the required 4T sensitivity can be discerned on the penetrameter at the edge of the fixture's projection. The density of the penetrameter adequately covers the density of the weld repair area, via the three sides of the penetrameter that extend beyond the isotope fixture.
- Digitized film for the final repair exposure of this weld substantiates that the required 4T sensitivity is present irrespective of the isotope fixture's placement.

1-CS-355-01-F0104

NRC ISSUE

- The flash identification has been eliminated by exposing it without appropriate blocking. The identification was handwritten in grease pencil. This is not a permanent identification of the film.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-355-01-F0104 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- The flash identification block is permanently captured in the film's emulsion, and can be viewed as a reverse image on the back side of the film when it is exposed to reflected light.
- The handwritten grease pencil markings were removed and replaced with permanent ink to facilitate identification of the film.
- NES Procedure 83A5642, Procedure for the Review of Radiographs, has been revised to indicate that any non-permanent identification markings on radiographic film are not acceptable and are to be noted.

1-CS-360-02-F0206

NRC ISSUE

- The repair radiographs were not taken consistent with the technique stated on the radiographic reader sheet since the tangent wall of the pipe and weld are clearly visible. The stated technique was double wall eccentric from the O.D. The only way that the tangent wall can be revealed in a radiograph is if the source is positioned away from the pipe wall.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-360-02-F0206 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- After all repairs were made to this weld, it was radiographed on January 10, 1985. The films for all stations are acceptable.
- The technique used to radiograph this weld was double wall contact, single wall viewing. This is the technique stated on the radiographic inspection report. With this technique, the source is placed on the outside diameter of the pipe wall while the film is wrapped around the lower portion of the pipe extending film coverage to more than 180°. With this technique it is possible for the film to capture the tangent wall of the pipe and the weld.

1-CS-432-02-F0203

NRC ISSUE

- The radiographic sections 1-2 and 0-4 show a lightened area typical of insufficient back scatter protection. In the 0-4 section the area of back scatter is impinging on the area of interest in the weld.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-432-02-F0203 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- The film for station 1-2 had sufficient shielding to protect against backscatter. This is substantiated by the fact that a lead letter "B" is not visible in this view. The film for station 4-0 shows a light area in a small portion of the area of interest, but similarly, this is not caused by backscatter since the lead letter "B" is not visible in this view.
- Comparison of the light portion of the area of interest at station 4 in view 4-0, and the lighter #12 penetrameter was conducted. The films indicate that 4T sensitivity is achieved and the density of the light area, at station 4, is covered by the densities on the lighter #12 penetrameter. The dark penetrameter, which also exhibits 4T sensitivity, covers the other portions of the weld.

1-CS-355-08-F0801

NRC ISSUE

- The penetrameters have been placed on a code tag. This obscures the 4T sensitivity of the #12 penetrameter. The alternate #12 penetrameter shows no sensitivity as does the #15 penetrameter on the opposite side of the weld. On exposures 1 and 2 the light #12 penetrameter shows no sensitivity as the tag rolls around the series and blocks various shots.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-355-08-F0801 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- 4T sensitivity is discernable on the #12 penetrameters for all three stations. The code nameplate does not obscure the penetrameters to the extent that 4T sensitivity cannot be determined.
- The #15 penetrameter achieves the required 4T sensitivity.
- Digitization of the film for this weld confirms that the required 4T sensitivity is present on all films.

1-CS-355-01-F0102

NRC ISSUE

- For this weld, the source could not be lined up exactly over 0 due to the location of the joint. This would be acceptable if other exposures had been made to provide 100% coverage.
- Two of the three films for the 0 location have the flash identification block placed over the penetrameter identification numbers. The third film which does not have this problem does not have the required sensitivity in the penetrameters.
- Exposure 1 is too dark to show any sensitivity in the penetrameter representing the weld metal.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-355-01-F0102 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- The radiographic technique utilized for this weld is acceptable by code since the radiographs provide 100% coverage.
- The third film for station 0 which contains the penetrameter identification numbers, does not have 4T sensitivity for the #15 penetrameter. However, it does have the required 4T sensitivity for the #12 penetrameter. This is adequate for code acceptability. In addition, this film can be used to positively identify the penetrameters on the other two films.
- Rereview of the film for station 1 and 2 indicates that the required sensitivity was achieved, and the image densities cover the weld areas of interest.

1-CS-303-03-F0301

NRC ISSUE

- The code data nameplate is in the way of penetrameter placement.
- The penetrameters have acceptable but marginal sensitivity.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-303-03-F0301 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- A code data nameplate is not discernable at or near the penetrameter.
- The penetrameter identification numbers are discernable and the required 4T sensitivity was achieved.

1-CS-302-04-F0404

NRC ISSUE

- The code data nameplate is in the way of penetrameter placement. This obscured the sensitivity for the #10 penetrameter representing the weld metal.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-302-04-F0404 complies with ASME Section III for weld quality and its radiographs comply with ASME Section V for film quality.
- Irrespective of the location of the code data nameplate, the required 4T sensitivity was obtained and is discernable on the #10 penetrameters for all exposures. The #10 penetrameters adequately represent the weld metal.
- Digitization of this film confirms that the required 4T sensitivity is present on all films.

1-CS-318-02-F0202

NRC ISSUE

- Although this weld's reader sheet records a double wall eccentric exposure and the first two sections are shot in this manner, the last view has been shot as an elliptical and cannot be viewed composite.
- In the first view, one of the two films used for composite viewing, has artifacts in the weld. Thus when looking at the weld in composite one cannot be sure if a defect is being viewed or if it is a film artifact.
- The required 4T sensitivity is not present in the penetrameters for the first view and the second view.

NHY RESPONSE

- Pullman-Higgins field weld 1-CS-318-02-F0202 complies with ASME Section III for weld quality and except for one minor provision of the Code, its radiographs comply with ASME Section V for film quality. Notwithstanding this, it has been determined that this weld does not contain any Code unacceptable indications.
- The technique used to radiograph this weld was double wall superimposed exposure, with two films taken of each of this weld's three stations. All three stations of this weld were taken in this manner; none of the films of this weld were shot as elliptical views.
- Rereview of the film for the first station indicated the presence of artifacts (felt pen ink residue from overlay duplication) on the film. These artifacts have been removed from the film and it has been confirmed that there are no defects or indications in this weld.
- The required 4T sensitivity is exhibited in the penetrameters for the first and second stations.
- Digitization of the film for all stations of this weld verifies that there are no indications or defects in the weld area of interest, and that the required 4T sensitivities were achieved on all films.