

New Hampshire Yankee

Ted C. Feigenbaum
President and
Chief Executive Officer

NYN-91002

January 11, 1991

Mr. Leo J. Norton
Assistant Inspector General for Investigations
Office of Inspector General
United States Nuclear Regulatory Commission
Washington, D.C. 20555

References: NRC Letter dated November 6, 1990; Leo J. Norton to Ted Feigenbaum

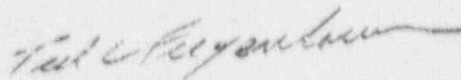
Subject: Response to Request for Information

Dear Mr. Norton:

The referenced letter indicates a desire on the part of your office to more clearly understand the Yankee Atomic Electric Company's review of the Pullman-Higgins weld radiographs and requested associated documentation. The enclosed material is submitted in response to that request. Enclosure 1 is an attempt to place the Pullman-Higgins weld issue, particularly the weld rejection rate issue, into proper perspective and into the context of the overall quality program at Seabrook. We believe a true understanding of the facts will lead to the conclusion that Pullman-Higgins welding was closely monitored by Public Service Company of New Hampshire, YAEC and United Engineers and Constructors; that Pullman-Higgins welding was held to conservative standards that met or exceeded ASME Code and regulatory requirements; and that the rigorous implementation of a multi-layered quality program ensured the technical acceptability of the final product. Enclosures 2 through 20 provide the specific documents requested in your letter as well as other material that may be relevant to your investigation.

If you have any questions on this material or this issue in general, please do not hesitate to call Mr. Neal Pillsbury at (603) 474-9521 extension 3341.

Very truly yours,



Ted C. Feigenbaum

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United States Nuclear Regulatory Commission
Attention: Mr. Leo J. Norton

January 11, 1991
Page two

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LIST OF ENCLOSURES

1. Summary of Oversight of Pullman-Higgins Welding and Radiographic Film Testing.
2. YAEC Memorandum dated June 21, 1983; J. W. Singleton to All, Subject: Controlled Speed Letters.

YAEC Controlled Speed Letter #089 dated November 30, 1983.
3. YAEC Surveillance Reports (78) related to radiography.
4. Five Typical Audit Reports Dealing With Radiography. 1980 through 1984.
5. Data Request by Theodore Barry and Associates (TBA) for The Seabrook Prudence Audit performed for the State of Connecticut Department of Public Utility Control. History of Weld Reject Rates.
6. Extract from Management Performance Evaluation for Wolf Creek Generating Station, Cover Sheet and p. 253.
7. Extract from Seabrook Project Management Prudence Audit (PLG-0447) by Pickard Lowe and Garrick, Inc. dated July, 1986. Backup Document, Section 3.6.
8. Letter from Stephen B. Comley, Executive Director, We The People of The United States, Inc. to Samuel Chilk, Secretary, USNRC dated May 8, 1989.
9. Extracts from Official Transcript of Proceedings Before the U.S. Department of Labor, Case No. 84-ERA-13: Joseph D. Wampler vs - Pullman Higgins Company, March 19, 1984.
10. Portsmouth Herald Clippings, March 18, 1984 and March 21, 1984.
11. Pullman Power Products, R. T. Status Sheet.
12. Memorandum dated January 10, 1984: W. J. Taylor (UE&C) to J. J. Corcoran (P-H).
13. R. T. Reject Rates, December 29, 1982.
14. Extracts from Transcript of Department of Labor Proceeding: Richard Cram vs - Pullman Higgins, May 8, 1984.
15. Brand Examination Service and Testing Co. (Bestco) Report #58023 for NHY.
16. UE&C Inc. Handwritten Report on Review of Radiographs.

LIST OF ENCLOSURES

(continued)

17. W. Hinz Memo and draft dated May 10, 1983.
18. YAEC Memorandum dated July 14, 1981, W. J. Gagnon to R. E. Guillette and YAEC Memorandum dated August 7, 1981 J. Nay, Jr. to R. E. Guillette.
19. Construction Appraisal Team Inspection 84-07 dated August 29, 1984.
20. Attachment 2 to Chairman Carr's December 19 response to Kostmayer et al.

New Hampshire Yankee
January 11, 1991

ENCLOSURE 1 TO NYN-91002

SUMMARY OF OVERSIGHT OF PULLMAN-HIGGINS
WELDING AND RADIOGRAPHIC FILM TESTING

I. Introduction

The purpose of this report is to briefly place the allegations made by Mr. Joseph Wampler regarding the quality and rejection rates of welds performed by the project's piping contractor, Pullman-Higgins (P-H), into the context of the overall program at Seabrook for ensuring a quality final product. Recently, in response to congressional concerns, the NRC published the results of their own comprehensive re-examination of this issue in a report entitled, Welding and Nondestructive Examination Issues at Seabrook Station, July 1990, (NUREG-1425). This assessment was the product of a review performed by an NRC Inspection Review Team led by NRC Senior Management and composed of NRC staff and private sector experts in the field. After a four month investigation, it concluded that the multi-level system of quality assurance imposed on P-H by the Seabrook project ensured that the final products were technically acceptable pipe welds.

Through this report, New Hampshire Yankee (NHY) hopes to provide additional licensee perspective on the issue. It will demonstrate that the managements of Public Service Company of New Hampshire (PSNH), Yankee Atomic Electric Company (YAEC), United Engineers & Constructors (UE&C), and P-H took early actions to discover, understand and to resolve welding program concerns and that, ultimately, the multiple-layered and highly conservative quality procedures and standards adopted by PSNH and YAEC ensured that the piping system welds were all technically acceptable. The report will also specifically discuss

the YAEC practice of reviewing the final weld acceptance P-H radiographic film for ASME Code welds and describe the objective evidence available to substantiate that it was done. The specific information requested by the Office of the Inspector General in his letter of November 6 to New Hampshire Yankee (Reference 1) is provided as Enclosures 2 through 20 and referred to as appropriate in the narrative.

II. Quality Assurance Structure

The Seabrook project was initiated by PSNH in the early 1970's. PSNH initially retained a 50% ownership share in both units and sold the remaining shares to other New England utilities. Under a Joint Ownership Agreement for the project, PSNH had "sole discretion" with respect to all aspects of the design and construction of the plant. Very early on, however, PSNH selected YAEC to assist in project and engineering management because of YAEC's experience gained during the design and construction of four other nuclear power plants. UE & C was selected as the architect/engineer and construction manager. UE & C would be responsible for engineering, procurement, direction of construction contractors, scheduling, cost management and other services. YAEC, in addition to assisting PSNH in managing and overseeing UE & C and all the other contractors, was assigned detailed management of quality assurance and other functions.

Under the construction management approach utilized by PSNH for Seabrook, the construction manager, i.e. UE & C, contracted for the services of established contractors in the various applicable construction disciplines. The contractor selected to install piping and supports at Seabrook was Pullman-Higgins (P-H). PH was an entity formed as a result of a Joint Venture between Pullman Power Products and J. C. Higgins.

As mentioned above, PSNH delegated the establishment and implementation of the quality assurance program to YAEC although PSNH maintained licensee responsibility for the quality of construction. YAEC's policy for quality assurance, as described in the Preliminary Safety Analysis Report (PSAR), involved the following three levels of control.

- Level 1 - Quality control by vendors and constructors on the activities they perform and by UE & C on site receiving inspection and storage. This includes reviews, inspections and tests.
- Level 2 - Surveillance of design, fabrication and construction activities, including Level 1 quality control. Contractors provide this level for the design and procurement phase. UE & C provides a surveillance level on all site activities under this Program. (UE & C provides additional surveillance on site construction of structures).
- Level 3 - Audits by YAEC QCA Department-Westboro of activities performed by Level 1 and 2 organizations.

YAEC will provide the third level for all activities. At each level, the individual or group responsible for reviewing, inspecting, auditing or otherwise verifying that an activity has been correctly performed will be independent of the individual or group responsible for performing the specific activity. The degree of control at each level will reflect the importance of the activity to plant safety and reliability. (Reference 2)

Pullman-Higgins had their own QA/QC organization under the local direction of the P-H Field QA Manager (FQAM). The P-H FQAM's programmatic and procedural authority

flowed from Pullman Power Products. In this structure, P-H had the responsibility to provide the Level 1 controls for its welding processes. Under the ASME Code, this meant, in part, that they were required to provide ASNT Level II¹ review of film for weld quality. If the P-H ASNT Level II accepted a weld, it could be presented to the Authorized Nuclear Inspector (ANI). If rejected, P-H could either repair the defects or write a Nonconformance Report (NCR) as applicable. UE & C, as the engineer of record, had the responsibility to disposition the NCR. It could either direct the necessary repairs, order a retest, or after evaluation determine that the weld in question was acceptable "as is." YAEC Quality Assurance was only committed in the PSAR to provide control Levels 2 and 3 over this process, i.e. surveillances and audits, and not another one-hundred percent complete layer of reinspections or re-examinations.

III P-H Weld Quality Improvement Initiatives

YAEC QA and UE&C closely monitored the quality of welds and rejection rates on welds performed by P-H from the beginning of their service on the project. In June, 1980, the rejection rate for radiographed safety-related welds performed by Pullman-Higgins was identified as 38% for new welds and 50% for weld repairs (Reference 3). Because the

¹American Society for Nondestructive Testing Recommended Practice (ASNT-TC-1A) sets forth the minimum capabilities that qualify personnel to perform non-destructive inspections, examinations and tests as well as the education and experience requirements. There are three ASNT levels of qualification: Level I, Level II and Level III with Level III being the highest. Level II is the minimum required to review and interpret radiographic film.

population of safety-related welds (ie. ASME Code) was still small, YAEC QA had some non-safety related (NNS) welds, performed by various P-H welders, radiographed and evaluated as part of its assessment of overall welding program adequacy. NNS welds would normally only require visual and hydrostatic examination to determine acceptability. The results identified areas where welding and radiography techniques and/or controls could be improved.

These factors prompted the PSNH Site Manager to write UE & C (Reference 3) to suggest steps that could be taken to improve P-H welding. It is important to note here that the PSNH Site Manager's expression of concern was not that there was a potential for the end product quality to be compromised.² He understood that the strict, conservative standards of the quality assurance program would not allow that to happen. He also knew that YAEC had already moved beyond their PSAR commitment - - that required only surveillances and audits of P-H - - to a 100% review of radiographic film and documentation (see Section VII). His concern was over the impact that high rejection rates and rework would have on cost and schedule. As he states in Reference 3:

"We recognize that the end product will be top quality. This is our acceptance standard for quality assurance and nothing less will be tolerated. However with the amount of rework required to achieve acceptable quality based on the welding performance, we have experienced to date, we are really facing a major cost factor which is forcing the welding costs to increase.

²Mr. Wampler himself stated, under oath, at a Department of Labor proceeding, that he was not aware of any film review violations. See transcript pages 219-220 of Enclosure 9.

Furthermore with the limited manpower situation, particularly welders, this will also have a negative impact on schedule performance."

UE & C's reply in July, 1980, (Reference 4) indicated they were aware of the need for improvement and, in fact, had already been having discussions with P-H on how best to make them. UE & C then outlined a plan to improve weld quality. The plan emphasized a significant upgrade of the training and supervision of welders. An offsite school was established at which P-H welders could improve their technique. The instructors at this school were given feedback from P-H welding supervisors on the most frequently occurring welding technique difficulties being experienced at Seabrook so new welders could be trained to avoid them and the proficiencies of current welders could be improved.

IV NRC Assessments

The NRC noted their concerns with the piping contractor in the Systematic Assessment of Licensee Performance (SALP) report for the period 1/1/80 through 12/31/80. In their report, the NRC concluded that performance in the category "Piping and Hangers" was below average. The corrective actions that PSNH had undertaken with respect to the "unusually high radiographic reject rates", were specifically cited although, because of their recent implementation, the NRC deferred judgement on their effectiveness. By the end of 1981, P-H had completed about one-quarter of the total welds that they would ultimately perform and the rejection rates for both new and repair welds had come down substantially to about

the generally accepted industry norm of about 25 percent. This improvement was reflected in the SALP for the period 7/1/80 through 6/30/81 which cited licensee and contractor attention to quality and the overall improvement in quality emphasis and placed Seabrook's Piping Hanger Program in SALP Category 2.

In the next SALP report, which covered the period from 8/1/81 until 7/31/82 (Reference 5), the NRC lowered the project's grade in the category of Piping Systems and Support from a 2 to a 3. It reiterated some of the violations noted by the Construction Appraisal Team's (CAT) June, 1982 report. The rejection rate of welds during this period also increased slightly. Significantly, however, the SALP report did recognize that in spite of the in-process problems in this area, which were well documented in the CAT report, the YAEC QA program continued to ensure the adequacy of the final product.

Through the next three SALP periods, the NRC remained critical of the Piping Systems and Support program at Seabrook, awarding the project a '3' in the two reports covering the period through 1983 (References 6 and 7), and a '2' in 1984 (Reference 8). In each case, however, the NRC also cited the licensee's QA program as a strength. In the report for 1984 the NRC specifically cited the non-mandatory YAEC film review, which by April 1984 had been formally proceduralized.

V Weld Rejection Rates

Table 1 provides a summary of the rejection rates reported by P-H to UE&C for new and repaired welds from 1979 through the end of 1983. The P-H rejection rates are sometimes referred to as "unadjusted" rates. They were subject to adjustment by UE&C either after a UE&C inspection of the film and/or the actual weld determined the weld to be acceptable or by application of UE&C's own criteria for determining rejection rates (see Enclosure 11). The P-H unadjusted rejection rates therefore are higher. The data in this table depicts the P-H unadjusted rates covering the period through July, 1983 and is extracted from an August 1983 memorandum from the UE & C welding engineer to the UE & C project manager (Reference 9); the remaining data comes from a recent review of the records.

The weld rejection rates came down in 1981 as PSNH, YAEC and P-H all took steps to increase the effectiveness of training and supervision. The overall annual weld rejection rate for new welds and weld repairs in that year was right at the industry norm of 25 percent. In 1982, the rate increased to about 28% for new welds and 36% for repairs. The industry-wide shortage of pipefitters and welders and the resultant difficulties it encountered in attracting and retaining skilled craft labor were the largest contributors to this increase. The rejection rate was still near the industry norm, however, because of aggressive management actions to improve welder performance and weld quality. These actions included the establishment of an offsite welding school which resulted in an increased pool

of skilled welders, and an on-site training facility that enabled welders already working on the project to improve their technique, enhance their qualifications and thus be able to work to code requirements and acceptance criteria on all aspects of the project's piping. By the beginning of 1983, the rejection rates were significantly reduced and consistently held below the industry norm. In fact during the four months of Mr. Wampler's employment at Seabrook from the end of August 1983 until January 3, 1984, the rejection rate for new welds never exceeded 15%, and for repairs, never exceeded 25%.

VI Other Assessments

In addition to the NRC's SALP reports, the Construction Appraisal Team Inspection, and the project's own self-initiated studies, there are three prudence audit reports that documented close examinations of the construction project as a whole and provide relevant comments on the quality of final construction. They are the Pickard, Lowe and Garrick Inc. (PLG), Management Prudence Audit (Reference 10) performed in 1985 for counsel to PSNH, the Challenge Consultants Inc. Study of the Seabrook Project (Reference 11) published in 1986 for several of Seabrook's minority owners, and the Theodore Barry and Associates' (TBA) Retrospective Audit of the Seabrook Nuclear Project (Reference 12) for the State of Connecticut Department of Public Utility Control in 1987.

The PLG Audit was performed for PSNH counsel as part of a rate case proceeding. In it, PLG evaluated the management actions of PSNH and its principal contractors for the period from 1972 to mid-1984. This was an extremely comprehensive audit, covering most aspects of the project and the decisions and actions of management. Its report includes more than 40 volumes of narrative and backup material. In the report's Executive Summary, PLG made these comments about Quality Assurance Management:

By all indicators to PLG and, more importantly, to the Nuclear Regulatory Commission, the end result of the Seabrook project quality assurance program...the quality of the project itself...is excellent. (Page 1.1-20 of Reference 10)

Among the strengths identified by PLG in the YAEC quality assurance program were its direct surveillance over site activities and its extensive audits of project activities, which contributed to the excellent quality results achieved. (Page 1.1-21 of Reference 10)

The Challenge study was also a comprehensive evaluation of management performance at Seabrook. With respect to the pipefitter shortage during the period when P-H was active, it found:

Challenge has reviewed the history of the pipefitter shortage and has concluded that Seabrook management took a number of actions to minimize the potential for manpower shortages. While these actions did not solve the shortage entirely, they greatly reduced the problem. As soon as piping installation began, the Project Management Group made plans for an off-site welding school to train welders. The welding school resulted in a significantly increased pool of qualified welders and an improvement in weld rejection rates. Furthermore, the Project Management Group established an on-site training facility to upgrade welders already working on the project to enable them to work to code and quality assurance levels on all aspects of the project's piping. The training effort at Seabrook was timely and extensive. These programs were very effective in producing a large number of qualified welders and in upgrading the welders already on site. We concluded that the establishment of the welding school and other training programs was a noteworthy response to a difficult problem. (Page 210 of Reference 11)

Its conclusion on the overall quality of the final project were similar to those of the PLG audit:

The quality assurance program throughout the duration of the Seabrook Project has been exceptionally strong. The quality program was well-defined and the enforcement of its provisions has been strong. (Page 10 of Reference 11)

The TBA audit was commissioned by the Connecticut Department of Public Utility Control to determine the extent to which costs of participation by The United Illuminating Company and, later, the Connecticut Light & Power Company in the construction of Seabrook Unit 1 and 2 should be included in the rate base. TBA leveled criticism at the project over what they believed were inefficiencies in the performance of the QA function, and felt that cost expenditures in support of the project's philosophy of QA conservatism were excessive. Yet TBA conceded that the QA philosophy was one of "high conservatism highlighted by Yankee's layered QA oversight approach." (Page V-112 of Reference 12) Their overall conclusion on Quality Assurance was that Seabrook was a quality built plant.

VII YAEC 100% Review

As discussed above, YAEC surveillance programs identified shortcomings in the P-H radiographic process relative to techniques employed in performing radiography, film processing, and radiograph interpretation early in the piping installation process. The YAEC QA surveillance and audit process originally only required and contemplated a sample review

of documentation and radiographs. Because of the small population of radiographs and associated documentation being provided to them by P-H during late 1979 and early 1980, 100% "sampling" was easily attainable and considered to be prudent during the initial stages. YAEC QA, therefore, reviewed every film package (radiographs and documentation) as it was delivered. This early review, however, identified shortcomings in the P-H radiograph process prompting YAEC QA to continue to review each and every film package through the 1980 and 1981 time frame. Although corrective actions to improve the welding quality and radiographic process were implemented and produced some positive results during this period, YAEC decided to maintain its 100% review policy.

The 100% review continued as a prudent practice without a written procedure until 1984, when a formal written procedure (Procedure 5, NDE Review Group) was instituted. This YAEC procedure required P-H's submittal of all radiographic film packages to YAEC for examination prior to transmittal to the records vault.

In its review of the radiographic film, the strict tolerances and guidelines contained in the UE & C design specification continued to be interpreted and enforced in a sometimes contested but consistently conservative manner by YAEC QA. Some of these conservative demands were considered to be excessive requirements by P-H and were the source of much discussion, particularly after restart of the project in 1984, as P-H struggled to maintain the newly committed completion schedule. One requirement considered potentially excessive by

P-H and New Hampshire Yankee management was the 100 percent Level III film review by both P-H and YAEC. The new project management team considered a recommendation that P-H only review a percentage of the film. That recommendation was rejected (Reference 13).

Early in 1985, an additional effort was initiated by YAEC which entailed a re-inventory of all radiographic film packages in the records vault. Its purpose was to provide additional assurance that all welds requiring radiography had in fact been reviewed by YAEC including the radiographic film packages submitted prior to the 1984 establishment of a formal procedure. This inventory practice continued until all radiographic packages were filed as final acceptable QA records. Its completion is documented in a memorandum from the YAEC Assistant QA Manager to the QA Manager (Reference 14).

Objective evidence that YAEC QA personnel did in fact review all film packages, over and above the P-H and Code inspector review, includes the signatures and/or initials of the YAEC reviewers on the Radiographic Inspection Reports indicating concurrence of film package acceptability (documentation and film). The YAEC reviewers also signed or initialed the outside envelope of each film package. This evidence of review is stored as a final QA record in the Seabrook records vault.

Other significant objective evidence, that attests to the fact that YAEC was performing a 100% review of radiographic film before the establishment of the formal procedure in 1984, is in the form of a memorandum from the P-H Level III examiner (Enclosure 17) who preceded Mr. Wampler. That May, 1983 document, which deals with an investigation of an NCR, cites the YAEC film review as a standard part of the radiography program and has, as an attachment, a handwritten flow chart of the entire process, including the YAEC review.

It is also of interest to note that in sworn testimony during the Department of Labor proceedings, Mr. Wampler himself appears to repeatedly demonstrate his awareness of the inevitability of the YAEC 100% review of radiographic test film. Pertinent portions of that testimony are cited in Enclosure 9.

An August 1984 report of an NRC Construction Appraisal Team inspection (cover sheet and relevant page provided as Enclosure 19) that occurred in April and May of that year contains a statement that warrants explanation. It said that "... the applicant's program does not provide for a review of radiographs by the applicant's NDE organization prior to their storage in the vault ..." This statement was generated by the fact that when construction of Seabrook was temporarily halted in April, 1984, both reviewed and unreviewed radiographic film were stored separately in the records vault for safekeeping pending the project's restart. The CAT inspectors therefore found the YAEC backlog, i.e. film reviewed by P-H but not yet by YAEC, in the vault and apparently understood that to mean that there was not a

program for YAEC review of all film. As discussed above, there was, in fact, such a program in existence. The NRC has already provided a succinct discussion of their awareness of the YAEC 100% review which is included in Attachment 2 of Chairman Carr's December 19, 1990 response to a Congressional inquiry. (Cover sheet and Attachment 2 provided a Enclosure 20)

VIII Conclusion

The issue of the quality and rejection rates of P-H radiographed welds can be summarized as follows. PSNH, YAEC, UE & C and the NRC all had concerns about the rejection rates and these concerns were identified before P-H had done any substantial amount of ASME Code work. Important actions were taken early to improve the situation, including the extensively proactive measures taken in onsite and offsite welder training. These actions were ultimately effective and by the end of the project, even when subjected to the conservative acceptance standards insisted upon by YAEC, the overall rejection rates were well within the industry norms for a project such as Seabrook. Because of licensee and NRC early identification of these potential problems, YAEC began and continued a policy of reviewing all P-H radiographic film. This step was consistent with the licensee's conservative,

defense-in-depth philosophy of quality assurance, a quality that was consistently cited by the NRC and other entities who had cause to review the project. It is interesting to note that

even the criticism leveled at the project by TBA endorsed this view. They charged that the multiple layers of quality assurance were excessive and not cost-effective but echoed the NRC in their conclusion that Seabrook was a quality built plant.

REFERENCES

1. Letter dated November 6, 1990; Nuclear Regulatory Commission (Leo J. Norton) to New Hampshire Yankee (Ted Feigenbaum)
2. Seabrook 1 and 2 Preliminary Safety Analysis Report, Section 17.1
3. Letter dated June 20, 1980; Public Service Company of New Hampshire (J. H. Herrin) to United Engineers & Constructors Inc. (J. F. Vought)
4. Letter dated July 8, 1990; United Engineers and Constructors Inc. (J. F. Vought) to Public Service Company of New Hampshire (J. H. Herrin)
5. NRC letter to PSNH dated December 28, 1982; Subject: Systematic Assessment of Licensee Performance
6. NRC letter to PSNH dated August 17, 1983; Subject: Systematic Assessment of Licensee Performance
7. NRC letter to PSNH dated May 17, 1984; Subject: Systematic Assessment of Licensee Performance (SALP) and Public Service Company of New Hampshire Response dated April 25, 1984
8. NRC letter to PSNH dated May 28, 1985; Subject: Systematic Assessment of Licensee Performance (SALP)
9. Memorandum dated August 1, 1983; R. A. Kountz (UE & C) to W. J. Taylor (UE & C), Subject: Seabrook Station Units 1 and 2 Radiographic Reject Rates
10. Seabrook Project Management Prudence Audit (PLG-0447) by Pickard, Lowe and Garrick, Inc., dated July 1986.
11. Study of the Seabrook Project, Conducted by Challenge Consultants, Inc., November 1986
12. Retrospective Audit of the Seabrook Nuclear Project For The State of Connecticut Department of Public Utility Control, September 1987
13. Memorandum dated December 10, 1984; G. R. Gram to Distribution; Subject: P-H and QA Construction Procedures (see Item 41).
14. Memorandum dated June 27, 1985; R. P. Grippardi to G. F. McDonald; Subject: Unacceptable Radiography Status

TABLE 1

PULLMAN-HIGGINS RADIOGRAPHIC TESTING REJECT RATES

MONTHLY RATES AND YEARLY RECAPS

<u>1979</u>	<u>NEW WELDS</u>	<u>REPAIRS</u>	<u>TOTALS</u>
	18/ 7 = 38.9%	5/ 1 = 20.0%	23/ 8 = 34.8%
<u>1980</u>			
01-01-80 to 01-31-80	15/ 6 = 40.0%	5/ 3 = 60.0%	20/ 9 = 45.0%
02-01-80 to 02-28-80	11/ 2 = 18.2%	2/ 1 = 50.0%	13/ 3 = 23.1%
03-01-80 to 03-31-80	13/ 9 = 69.2%	6/ 3 = 50.0%	19/ 12 = 63.2%
04-01-80 to 04-30-80	17/ 2 = 11.8%	2/ 2 = 100%	19/ 4 = 21.1%
05-01-80 to 05-31-80	14/ 10 = 71.4%	6/ 3 = 50.0%	20/ 13 = 65.0%
06-01-80 to 06-30-80	8/ 1 = 12.5%	13/ 5 = 38.5%	21/ 6 = 28.6%
07-01-80 to 07-31-80	20/ 7 = 30.0%	10/ 3 = 30.0%	30/ 9 = 30.0%
08-01-80 to 08-31-80	23/ 1 = 4.3%	1/ 0 = 0%	24/ 1 = 4.2%
09-01-80 to 09-30-80	15/ 6 = 40.0%	6/ 2 = 33.3%	21/ 8 = 38.1%
10-01-80 to 10-31-80	20/ 4 = 20.0%	11/ 2 = 18.2%	31/ 6 = 19.4%
11-01-80 to 11-30-80	25/ 9 = 36.0%	8/ 5 = 62.5%	33/ 14 = 42.4%
12-01-80 to 12-31-80	12/ 3 = 25.0%	3/ 2 = 66.7%	15/ 5 = 33.3%
1980 RECAP	193/ 59 = 30.6%	73/ 31 = 42.5%	266/ 90 = 33.8%

TABLE 1

PULLMAN-HIGGINS RADIOGRAPHIC TESTING REJECT RATES

MONTHLY RATE AND YEARLY RECAPS

<u>1981</u>	<u>NEW WELDS</u>	<u>REPAIRS</u>	<u>TOTALS</u>
01-01-81 to 01-31-81	32/ 7 = 21.9%	1/ 0 = 0.0%	33/ 7 = 21.2%
02-01-81 to 02-28-81	22/ 11 = 50.0%	3/ 1 = 33.3%	25/ 12 = 48.0%
03-01-81 to 03-31-81	45/ 15 = 33.3%	11/ 3 = 27.3%	56/ 18 = 32.1%
04-01-81 to 04-30-81	69/ 11 = 15.9%	16/ 6 = 37.5%	85/ 17 = 20.0%
05-01-81 to 05-31-81	34/ 3 = 8.8%	22/ 5 = 22.7%	56/ 8 = 14.3%
06-01-81 to 06-30-81	17/ 1 = 5.9%	10/ 4 = 40.0%	27/ 5 = 18.5%
07-01-81 to 07-31-81	48/ 9 = 18.8%	13/ 2 = 15.4%	61/ 11 = 18.0%
08-01-81 to 08-31-81	63/ 12 = 19.0%	20/ 3 = 15.0%	83/ 15 = 18.1%
09-01-81 to 09-30-81	58/ 13 = 22.4%	16/ 4 = 25.0%	74/ 17 = 23.0%
10-01-81 to 10-31-81	74/ 23 = 31.1%	22/ 7 = 31.9%	96/ 30 = 31.3%
11-01-81 to 11-30-81	56/ 14 = 25.0%	12/ 1 = 8.3%	68/ 15 = 22.1%
12-1-81 to 12-31-81	68/ 27 = 39.7%	7/ 3 = 42.9%	75/ 30 = 40.0%
1981 RECAP	586/146 = 24.9%	153/ 39 = 25.5%	739/185 = 25.0%
<u>1982</u>	<u>NEW WELDS</u>	<u>REPAIRS</u>	<u>TOTALS</u>
01-01-82 to 01-31-82	62/ 25 = 40.3%	19/ 6 = 31.6%	81/ 31 = 38.3%
02-01-82 to 02-28-82	84/ 21 = 25.0%	18/ 12 = 66.7%	102/ 33 = 52.4%
03-01-82 to 03-31-82	78/ 17 = 21.8%	23/ 7 = 30.4%	101/ 24 = 23.8%
04-01-82 to 04-30-82	125/ 27 = 21. %	18/ 7 = 38.9%	143/ 34 = 23.8%
05-01-82 to 05-31-82	111/ 42 = 37.8%	35/ 9 = 25.7%	146/ 51 = 34.9%
06-01-82 to 06-30-82	145/ 37 = 25.5%	52/ 22 = 42.3%	197/ 59 = 29.9%
07-01-82 to 07-31-82	145/ 33 = 22.8%	56/ 22 = 39.3%	201/ 55 = 27.4%
08-01-82 to 08-24-82	107/ 30 = 28.0%	38/ 16 = 42.1%	145/ 46 = 31.8%

TABLE 1

PULLMAN-HIGGINS RADIOGRAPHIC TESTING REJECT RATESMONTHLY RATES AND YEARLY RECAPS

	<u>NEW WELDS</u>	<u>REPAIRS</u>	<u>TOTALS</u>
08-25-82 to 09-25-82	170/ 65 = 38.2%	50/ 15 = 30.0%	220/ 80 = 36.4%
09-26-82 to 10-26-82	108/ 32 = 29.6%	61/ 17 = 27.9%	169/ 49 = 29.0%
10-27-82 to 11-27-82	131/ 28 = 21.4%	55/ 19 = 34.5%	186/ 47 = 25.3%
11-28-82 to 12-28-82	25/ 8 = 32.0%	28/ 12 = 42.9%	53/ 20 = 37.7%
1982 RECAP	1291/365 = 28.3%	453/164 = 36.2%	1744/529 = 30.3%
12-28-83 to 01-31-83	110/ 18 = 16.4%	98/ 24 = 24.5%	208/ 42 = 20.2%
02-01-83 to 02-28-83	97/ 20 = 20.6%	26/ 7 = 27.0%	123/ 27 = 22.0%
03-01-83 to 03-31-83	99/ 21 = 21.2%	23/ 3 = 13.0%	122/ 24 = 19.7%
04-01-83 to 04-30-83	67/ 4 = 6.0%	34/ 10 = 29.4%	101/ 14 = 13.9%
05-01-83 to 05-31-83	138/ 21 = 15.2%	72/ 14 = 19.4%	210/ 35 = 16.7%
06-01-83 to 06-30-83	111/ 15 = 13.5%	27/ 3 = 11.1%	138/ 18 = 13.0%
07-01-83 to 07-31-83	116/ 6 = 5.2%	12/ 2 = 16.7%	128/ 8 = 6.3%
08-01-83 to 08-31-83	129/ 20 = 15.5%	6/ 1 = 16.7%	135/ 21 = 15.6%
09-01-83 to 09-30-83	79/ 11 = 13.9%	8/ 2 = 25.0%	87/ 13 = 14.9%
10-01-81 to 10-31-83	148/ 16 = 10.8%	22/ 2 = 9.0%	170/ 18 = 10.6%
11-01-83 to 11-30-83	120/ 18 = 15.0%	19/ 4 = 21.1%	139/ 22 = 15.8%
12-01-83 to 12-31-83	86/ 9 = 10.5%	23/ 3 = 13.0%	109/ 12 = 11.0%
1983 RECAP	1300/179 = 13.8%	370/ 75 = 20.2%	1670/254 = 15.1%