

August 4, 1982

Daniel D. Wilt, Esq.
P.O. Box 08159
Cleveland, Ohio 44108

In the Matter of
CLEVELAND ELECTRIC ILLUMINATING COMPANY, ET AL.,
(Perry Nuclear Power Plant, Units 1 and 2)
Docket Nos. 50-440 OL & 50-441 OL

Dear Mr. Wilt;

In accordance with the Staff's response to Sunflower Alliance's interrogatories, dated August 2, 1982, specifically regarding interrogatories 66 and 68, enclosed are the documents referred to.

Sincerely,

Michael N. Wilcove
Counsel for NRC Staff

Enclosures: As stated
cc w/enclosure:
Peter B. Bloch, Esq.
Dr. Jerry R. Kline
Mr. Frederick J. Shon
Jay Silberg, Esq.
Donald T. Ezzone, Esq.
Susan Hiatt
Jeff Alexander
Terry Lodge, Esq.
Robert Alexander
John G. Cardinal, Esq.
Atomic Safety and Licensing Board
Atomic Safety and Licensing Appeal Board
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NAME	: MWilcove:am	: JRutberg	:	:	:	:
DATE	: 8/4/82	: 8/4/82	:	:	:	:

April 2, 1980

MEMORANDUM FOR: Harold D. Thornburg, DRCI, IE

FROM: G. Fiorelli, Chief, RC&ES Branch, RIII

SUBJECT: TI 2512/4 - INTERVIEWS WITH CRAFTSMEN AT CONSTRUCTION SITES

In accordance with the requirements of TI 2512/4, Perry was selected as the Region III site for trial implementation of the Temporary Instruction. The licensee, the Cleveland Electric Illuminating Company, was so notified on October 16, 1979. Interviews with thirty craftsmen, foremen, and QC inspectors were then conducted during unannounced inspections on October 17-18, 1979, November 14-15, 1979, and February 27-29, 1980.

The interviews were conducted by two RIII inspectors (one being the Perry project inspector), and one RIII Section Chief. Interviewees were selected by two methods. Eight personnel were randomly selected during plant walkthroughs and 22 persons were randomly selected from personnel rosters and timekeepers' records. The attempt was made in all cases to obtain interviewees who were of journeyman or equivalent level and who had been at the site at least three months, although several of the individuals varied from those requirements.

Each interviewee was informed of the reasons for the interview and the fact that a random selection technique was being used, and was told that any concerns which he expressed would remain strictly confidential. All contractor managements had previously been informed by the licensee that the interviewees were not to be questioned regarding the content of the interviews and that no discriminatory or personnel actions were to be taken against those interviewed.

Interviewees were asked whether they had any concerns regarding the quality of construction at the site, whether they were aware of any instances where construction did not meet prescribed requirements and corrective actions were not taken, and whether they were aware of any day-to-day problems or irregularities affecting quality which the NRC should know.

All of the licensee and contractor personnel contacted during this effort were fully cooperative. The craftsmen who were interviewed exhibited pride in their work and in general were positively impressed with the level of quality involved in the site construction activities.

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The breakdown by discipline of the personnel interviewed is as follows:

two ironworkers, four carpenters, one laborer, five pipefitters, (of which three are also welders), one storekeeper, one electrician, one cement finisher, four welders, six boilermakers, one technician, one material receipt inspector, and three QC inspectors. Included in the above were three foremen and two union stewards. Among the craftsmen interviewed, the amount of site time at Perry varied from three months to several years. Only three or four of the interviewees had previous nuclear construction experience.

No formal allegations were made during the interviews; however, one concern was raised which was considered to warrant a followup inspection. The concern involved the amount of grinding required on the weld end preparations for the reactor vessel recirculation nozzle modifications and the fact that the acceptance criteria for the weld end preps had been changed. Two Region III inspectors returned to the site on March 4, 1980 and performed an inspection in this area. The results of that inspection are contained in RIII Inspection Report (50-440/80-03; 50-441/80-03). No noncompliances were identified during the followup inspection.

The remainder of the comments elicited from the interviewees were grouped into several categories for discussion with the licensee and for future routine followup by RIII. The general categories are as follows:

- a. Housekeeping/industrial-safety concerns. A list of specific concerns in the areas of housekeeping and industrial safety was compiled by the interviewers and was discussed with the licensee.
- b. Training and indoctrination of workers. The inspectors noted that although most of the interviewees take part in regularly scheduled safety meetings, the interviews indicated a general lack of QA indoctrination meetings for the contractor craftsmen.
- c. Qualifications and availability of QC inspectors. The inspectors received a number of comments pertaining to the lack of knowledge of some contractor QC inspectors, as well as the frequent unavailability of the QC inspectors when required to witness examinations or to signoff hold points.

During the February 29, 1980 exit interview, the licensee agreed to evaluate the need for improvements in the above areas. These three areas were designated in the RIII inspection report as an unresolved item to be reviewed in future inspections. With regard to the housekeeping/industrial-safety concerns, the RIII inspectors informed the licensee that the results of the future NRC inspections will determine whether any of the concerns are referred to OSHA for investigation.

April 2, 1980

The total amount of time required to accomplish the interview program outlined by TI 2512/4, including the time spent in preparation, selection of interviewees, followup on concerns, and documentation was as follows:

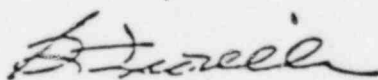
Preparation	12 man-hours
Travel	63 man-hours
On-site Interviews	97 man-hours
On-site Followup	8 man-hours
Documentation	<u>28 man-hours</u>
	208 man-hours

As noted above, the RIII inspectors received full cooperation from the licensee, the contractors' managements, and the interviewees. Many of the craftsmen expressed highly favorable opinions regarding the interviews. The positive aspects of the interview effort appear to be (1) a greater visibility for the NRC inspectors with the site craftsmen, with a resulting increase in communication between the craftsmen and the inspectors, and (2) a greater feeling of participation by the craftsmen in matters relating to the safe construction of the plant, a feeling which should translate into improved workmanship.

On the other hand, the odds of randomly selecting a craftsman who has a substantive allegation to make are so low as to make the interview program an inefficient method for identifying significant safety-related concerns. Experience at this site and at other sites has shown that a craftsman who wishes to make an allegation will find a way to contact the NRC. The item of concern discussed above regarding the reactor vessel recirculation nozzles was initially telephoned to the project inspector at his motel by a site craftsman, who was then "randomly" selected as one of the interviewees. No other significant safety-related concerns were identified during the thirty interviews.

In summary, the results likely to be obtained from a formal interview program do not appear to warrant the amount of inspection time which would have to be diverted to that effort from other areas. However, the positive aspects of discussions between NRC inspectors and site craftsmen, as noted above, do appear to warrant an effort to increase such communication. A logical method for accomplishing that increase would be the inclusion of a requirement for informal discussions with two or more craftsmen in each NRC inspection procedure involving observation of work activities.

If you have any questions regarding the above, or require any additional information, please call.



G. Fiorelli, Chief
Reactor Construction and
Engineering Support Branch

Dalwyn R. Davidson
VICE PRESIDENT
SYSTEM ENGINEERING AND CONSTRUCTION

Serving The Best Interests of the Nation

December 7, 1979

Mr. James G. Keppler
Director of Region III
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

RE: Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
Final Report on
S & M Constructors, Inc.'s
Quality Assurance Program
Breakdown Regarding Control
of S & M Subcontractor:
The Halvorsen Boiler and
Engineering Company

Dear Mr. Keppler:

Pursuant to the Interim Report of February 12, 1979, please find attached the Final Report on S & M Constructors, Inc.'s Quality Assurance Program breakdown regarding control of S & M Constructors, Inc.'s subcontractor: The Halvorsen Boiler and Engineering Company.

The attached Final Report includes a description of the deficiency, an analysis of the safety implications, and the corrective action taken, as required by 10CFR50.55(e).

As a result of this Final Report, the condition described herein is no longer considered a Significant Deficiency.

Very truly yours,

D. R. Davidson

D. R. Davidson
Vice President
System Engineering and Construction

ksz
Attachment

cc: Victor Stello, Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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FINAL REPORT ON SIGNIFICANT DEFICIENCY

S & M CONSTRUCTORS, INC.

QUALITY ASSURANCE PROGRAM BREAKDOWN

REGARDING CONTROL OF

S & M SUBCONTRACTOR,

THE HALVORSEN BOILER AND ENGINEERING CO.

PERRY NUCLEAR POWER PLANT

DOCKET NOS. 50-440; 50-441

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

DECEMBER 7, 1979

INTRODUCTION

In accordance with the requirements of 10CFR50.55(e), this is the Final Report on the Significant Deficiency on S & M Constructors, Inc. Quality Assurance Program breakdown regarding control of S & M Subcontractor, The Halvorsen Boiler and Engineering Company, and includes: (a) A description of the deficiency; (b) An analysis of the safety implications and (c) Sufficient information to permit analysis and evaluation of: (1) the deficiency and (2) Corrective Action.

DESCRIPTION OF DEFICIENCY

A. INTRODUCTION

The Interim Report regarding this Significant Deficiency was transmitted to the NRC on February 12, 1979. Although the transmittal to this Interim Report states in the last paragraph that the Final Report is scheduled to be in your office by June 1, 1979, there were two (2) letters written extending this date. One (1) letter dated May 29, 1979, requested an extension to August 31, 1979, and the other letter, dated August 29, 1979, requested an extension to December 15, 1979.

B. PROGRAM DEFICIENCIES

Numerous hardware deficiencies identified on various Nonconformance Reports and audit reports led Project Organization personnel to determine that major deficiencies were present in S & M Constructors, Inc. Quality Assurance Program.

The Interim Report details the specific program deficiencies known at the time of that writing. However, two (2) program review audits, Audit Numbers 214 and 249, revealed deficiencies in S & M Constructors, Inc. Quality Assurance Program in other areas of 10CFR50, Appendix B, and resulted in S & M Constructors, Inc. revising in total their Quality Assurance Manual. This revised Quality Assurance Manual, along with the Corrective Action section of this report is sufficient action to assure repetition in this area does not occur.

DESCRIPTION OF DEFICIENCY (CONT'D.)C. HARDWARE DEFICIENCIES

A detail of the hardware deficiencies existent in the work performed by Halvorsen Boiler and Engineering Company were identified on Non-conformance Report CQA 035 and was limited to the welds on the two (2) Intake Structures. A summary of the specific deficiencies on the two (2) Intake Structures is provided in the Interim Report.

Since the issuance of the Interim Report, a detailed study was made in regards to other welds made by The Halvorsen Boiler and Engineering Company. These other welds are limited to certain areas of the Discharge Structure. A summary of the fabrication of the Discharge Structure is as follows:

1. The Discharge Structure consists of three (3) components:
 - a. The Discharge Nozzle
 - b. The Outer Shell
 - c. Associated Connections (Interior Bracing)
2. The Discharge Nozzle including the six (6) foot diameter discharge shaft was fabricated by others than The Halvorsen Boiler and Engineering Company.
3. The outer shell and associated connections were fabricated by The Halvorsen Boiler and Engineering Company. The latter consists of non-safety related material which is attached to the outer shell, and was for the purpose of assisting in installing the Discharge Structure in the lake. The outer shell is attached to the Discharge Structure via this interior bracing.

Since the issuance of the Interim Report, Engineering has re-analyzed this structure to determine the requirement for the outer shell as a load carrying member.

4. In addition to the above, there is a cover plate with an assortment of valves bolted to the discharge nozzle. This cover plate is non-safety related, and is used to seal the Discharge Tunnel from the intrusion of water.

ANALYSIS OF SAFETY IMPLICATIONS

As stated in the Interim Report, "The safety implications of the effects of the Quality Assurance Program breakdown will be identical to the safety implications of the hardware deficiencies."

A. INTAKE STRUCTURES

The results of the analysis of the two (2) Intake Structures have revealed them to be unsuitable for licensing. As a result of this decision, the two (2) Intake Structures fabricated by The Halvorsen Boiler and Engineering Company have been dispositioned scrap, and two (2) additional Intake Structures are to be fabricated by Chicago Bridge and Iron Company.

B. DISCHARGE STRUCTURE

Since the submittal of the Interim Report, Engineering has re-analyzed the Discharge Structure to determine the requirement for the outer shell as a load carrying member. These evaluations have shown that the outer shell was required only as a form for the concrete and is not required as a load carrying member. This permits the declassification of all steel parts of the structure except the nozzle itself and the six (6) foot diameter discharge shaft.

Engineering's opinion is that the quality of welds attaching brackets (supporting internal braces) to the nozzle and that attach the nozzle to the outer liner have no affect on the ability of the structure to perform its intended function. No credit is taken for the strength of these welds.

Therefore, the questions concerning the S & M's QA Program do not affect the acceptability of the Discharge Structure.

CORRECTIVE ACTION TAKEN

In order that the significant conditions adverse to quality as detailed herein do not re-occur, the following corrective actions have been taken:

1. The two (2) Intake Structures fabricated by The Halvorsen Boiler and Engineering Company have had the numerous defects defined on nonconformance reports with the disposition being "scrap".
2. Two program audits have been performed on S & M Constructors, Inc., resulting in S & M Constructors, Inc. revising their Quality Assurance Manual.
3. Chicago Bridge and Iron Company has been awarded a contract to fabricate two (2) additional Intake Structures.

CORRECTIVE ACTION TAKEN (CONT'D.)

4. Chicago Bridge and Iron Company will fabricate these two (2) Intake Structures in accordance with the applicable requirements of SP-29-4549-00, Rev. 3, (i.e., Engineering Change Notice 2940-29-61) and utilizing the Chicago Bridge and Iron Company Quality Assurance program.
5. The licensee, jointly with S & M Constructors, Inc., will review the Chicago Bridge and Iron Company Quality Assurance program, including applicable procedures. Approval of these documents from the licensee will be required prior to the start of fabrication.
6. The licensee shall have a representative from the Construction Quality Control Element closely monitoring the initial fabrication by Chicago Bridge and Iron Company. This activity will continue until a satisfactory level of confidence has been established.
7. Periodic audits and/or surveillances will be performed on Chicago Bridge and Iron Company during various stages of fabrication. These audits and/or surveillances will be performed by S & M Constructors, Inc. Quality Assurance Element personnel, together with representatives from the licensee's Construction Quality Engineering Element.



Dalwyn R. Davidson
VICE PRESIDENT
SYSTEM ENGINEERING AND CONSTRUCTION

February 12, 1979

Mr. James G. Keppler
Director of Region III
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

RE: Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
Interim Report on
S & M Constructors, Inc.'s
Quality Assurance Program
Breakdown Regarding Control
of S & M Subcontractor:
The Halvorsen Boiler and
Engineering Company

Dear Mr. Keppler:

Pursuant to the telephone conversation on January 12, 1979, between Messrs. J. M. Lastovka of CEI and K. Naidu and J. Konklin of your office, please find attached the Interim Report on S & M Constructors, Inc.'s Quality Assurance Program Breakdown regarding control of S & M Constructors, Inc.'s subcontractor, The Halvorsen Boiler and Engineering Company.

The attached Interim Report includes a description of the deficiency, an analysis of the safety implications and the corrective action taken, as required by 10CFR50.55(e).

In addition, the Final Report is scheduled to be in your office by June 1, 1979.

Very truly yours,

D. R. Davidson,
Vice President - System Engineering
and Construction

ksz
Attachment

cc: John G. Davis, Director (Acting)
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

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FEB 15 1979

INTERIM REPORT ON SIGNIFICANT DEFICIENCY

S & M CONSTRUCTORS, INC.

QUALITY ASSURANCE PROGRAM BREAKDOWN

REGARDING CONTROL OF

S & M SUBCONTRACTOR,

THE HALVORSEN BOILER & ENGINEERING CO.

PERRY NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 50-440; 50-441
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

February 8, 1979

INTERIM REPORT ON SIGNIFICANT DEFICIENCY

DESCRIPTION OF DEFICIENCY

A. PROGRAM DEFICIENCIES

Introduction

Documented evidence is available which is indicative of a breakdown in the S & M Constructors, Inc.'s (S & M) Quality Assurance Program in the areas of: Criterion II, Quality Assurance Program; Criterion IV, Procurement Document Control; Criterion V, Instructions, Procedures, and Drawings; Criterion VII, Control of Purchased Material, Equipment, and Services; Criterion IX, Control of Special Processes; and Criterion X, Inspection.

A brief chronology of events concerning S & M Constructors' QA Program and Site Organization's related activities is as follows:

Chronology

August 22, 1977 - Audit No. 10 - This audit of S & M was performed to evaluate their QA Program in regards to Criterion VII, Control of Purchased Material, Equipment, and Services. Nine findings were issued as a result of this audit.

October 10 and 11, 1977 - Audit No. 20 - Audit No. 20 was performed on S & M Constructors, Inc. and their subcontractor, The Paterson-Leitch Co. covering Criterion VII. Four findings were issued as a result of this audit.

November 15, 1977 - Stop Work Notification (SWN) 77-4 and Nonconformance Report (NR) CQA 014 - SWN and accompanying NR were issued due to problems with welding and radiography at Paterson-Leitch.

December 13, 1977 - Audit No. 35 - This audit consisted of a review of the S & M QA Program as it related to The Halvorsen Boiler & Engineering Co. (HB&E). The following 10CFR50, Appendix B Criteria were covered by this audit: I, II, IV, V, VII, IX, X, XVII, and XVIII. Eight findings were issued as a result of this audit.

January 11, 1978 - Release for Stop Work Notification 77-4 was issued.

February 10, 1978 - Stop Work Notification CQA 78-4 and Corrective Action Request (CAR) 0436 - SWN and associated CAR were written concerning subcontractor control, but were not issued due to adequate documentation of the cited condition in an audit report and an acceptable response to audit finding.

February 14, 1978 - Audit No. 53 - This audit was performed to evaluate S & M Constructors' QA Program in the area of Criterion VII as applied to Peabody Testing Services. Four deficiencies were noted during this audit.

February 15, 1978 - Stop Work Notification CQA 78-5 and Corrective Action Request 0437 - This SWN and associated CAR were issued due to deficiencies noted in Audit No. 53.

February 20 and 21, 1978 - Audit No. 55 - This audit consisted of a review of S & M Constructors' QA Program against the requirements of all eighteen criteria of 10CFR50, Appendix B. Fifteen findings were issued involving twelve of the eighteen criteria. This audit was performed utilizing the Standard Review Plan as a checklist.

March 10, 1978 - Release for Stop Work Notification CQA 78-5 was issued.

April 6, 1978 - Audit No. 70 - This audit was performed to evaluate the effectiveness and implementation of the S & M QA Program in the area of Criterion VII as it applied to Halvorsen Boiler & Engineering. Three findings were issued as a result of this audit.

April 17, 1978 - Audit No. 74 - This audit was performed as a follow-up to Audit No. 70. One finding and one Nonconformance Report were issued as a result of this audit. The NR was issued to GAI Engineering.

September 27 and 28, 1978 - Audit No. 162 - This audit was performed as a follow-up to Audit No. 55.

November 16, 1978 - CQC inspection trip was made to HB&E's shop. Deficiencies were noted. (Surveillance Inspection Report C-627).

November 17, 1978 - Trend analysis of S & M Nonconformance Reports was completed. A negative trend at HB&E was identified.

November 28, 1978 - An unannounced visit to HB&E's facility was made by representatives of Contract Administration, Nuclear Engineering Department (NED), Resident Design Engineering, and Construction Quality Engineering (CQE). Result of this visit was consensus agreement by all representatives of the Site Organization that significant problems existed at Halvorsen's shop.

November 29, 1978 - As a result of the previous day's visit to Halvorsen, Nonconformance Report CQA 035 was issued. This NR identified numerous welding deficiencies on the Intake Structure. Stop Work Notification CQA 78-12 was issued concurrently with NR CQA 035.

December 13, 1978 - PNPP Review Board reviewed S & M's response to NR CQA 035. Response was rejected since S & M refuted the existence of majority of deficiencies identified by Site Organization personnel.

December 14, 1978 - S & M submitted revised response to NR CQA 035, Rev. 1. S & M stated in this response: "Items 1, 2, 3, 4, 5, 6, 7, and 9 (of NR CQA 035) are not identified as deficiencies by the S & M QA Element . . ."

December 19, 1978 - A meeting was held between the Site Organization and S & M, including their subcontractors. The purpose of this meeting was twofold: (a) to discuss in detail each deficiency noted in NR CQA 035, and (b) to discuss the six conditions imposed by the Site Organization for release of Stop Work Notification CQA 78-12.

The six conditions are as follows:

1. Satisfactory resolution of NR CQA 035.
2. Satisfactory resolution of NR 29-18.
3. Date Certain for ECN 1359-29-45 (ECN modifies welding and NDE requirements for SP-29).
4. Agree to additional radiographic testing of Intake Structure welds.
5. All welding and NDE procedures used on Intake Structure shall be submitted to Site Organization for approval.
6. Agreement per provisions of SP-708 for a Site Organization Resident QC Inspector at Halvorsen.

Subsequent to this meeting, NR CQA 035, Rev. 1, was rejected by the Site Organization.

December 20, 1978 - Continuation of meeting of December 19, 1978 was held at Halvorsen's shop. Purpose of this continuation was to demonstrate the presence of deficiencies noted by the Site Organization and refuted by S & M. Mr. S. Hopkins, consultant to S & M, concurred that deficiencies noted by the Site Organization did, in fact, exist and were generic in nature, and not limited to a few specific welds.

December 21, 1978 - S & M submitted Revision 2 to NR CQA 035. S & M also submitted welding and NDE procedures which were in use by their subcontractors. This submittal for Site Organization review was one of the previously identified conditions for release of Stop Work Notification 78-12.

January 4, 1979 - CQE completed review of all NDE and Inspection procedures submitted by S & M. All procedures were totally inadequate for work and were dispositioned "Not Acceptable."

January 5, 1979 - PNPP Review Board rejected NR CQA 035, Rev. 2; NR 29-18, Rev. 2; NR 29-39; NR 29-40; NR 29-41; and NR 29-42. The last four NR's were issued to document additional deficiencies at Halvorsen. Deviation Analysis Report (DAR) initiated this date. This date is Date Certain for ECN 1359-29-45 (see Item 3 under December 19, 1978).

January 12, 1979 - Telephone call between J. M. Lastovka (CEI) and K. Naidu and J. Konklin (NRC Region III) to discuss potential Significant Deficiency in S & M's QA Program.

January 16, 1979 - S & M submitted response to NR 29-18, Rev. 3, and NR 29-40, Rev. 1, without required weld procedures. Review pending receipt and review of weld procedures.

January 17, 1979 - Selection of audit team and audit date for Program Review audit of S & M Constructors. Received revised NDE procedures.

January 18, 1979 - Site Organization received qualification documentation for Quality Testing NDE personnel (subcontractor performing NDE at Halvorsen shop) from S & M.

January 19, 1979 - Site Organization received Quality Testing's ultrasonic, radiography, and magnetic particle procedures from S & M.

January 26, 1979 - Site Organization completed review of resubmitted Quality Testing NDE procedures which were previously dispositioned as not acceptable. Current dispositions range from "Conditional Accept" to "Accept."

Detailed Summary of Program Deficiencies

Initial concerns over quality of work at Halvorsen Boiler & Engineering Co. were stimulated by hardware deficiencies identified on various Nonconformance Reports and audit reports referenced in Chronology, above. Further investigation by Site Organization personnel led to the conclusion that major deficiencies were present in the S & M Constructors' Quality Assurance Program. In fact, the number of hardware deficiencies, and the magnitude thereof, were directly related to the program deficiencies in that the hardware problems were either not identified or were not recognized as deficiencies by the contractor.

Specific program deficiencies identified are as follows:

1. 10CFR50, Appendix B, Criterion II, Quality Assurance Program, states in part, "... the Quality Assurance Program shall provide control over activities affecting the quality of the identified (as safety-related) structures, systems, and components ..." and "... management of other (than applicant) organizations participating in the

Quality Assurance Program shall regularly review the status and adequacy of that part of the Quality Assurance Program which they are executing."

Contrary to the above, S & M Constructors' Quality Assurance Program was deficient in that: (a) S & M's Quality Assurance personnel failed to identify numerous significant noncompliances with specification and code requirements in the areas of welding and weld inspection prior to identification by Site Organization personnel, and; (b) S & M QA personnel failed to recognize the above-referenced noncompliances as deficiencies after identification by the Site Organization. The latter deficiency is substantiated by the S & M responses to Nonconformance Report OQA 035, Rev. 0 and Rev. 1, and statements made in the December 19, 1978 meeting (reference Minutes of Meeting).

2. 10CFR50, Appendix B, Criterion II, Quality Assurance Program, states in part, "... the program shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained ..." and "... Management ... shall regularly review the status and adequacy ... of the Quality Assurance Program ..."

Contrary to the above, S & M Constructors' QA Program is deficient in the area of personnel qualification and certification in that: (a) S & M's QA Program does not address qualification and certification of welding inspectors; and (b) Site Organization has verified that certain data utilized in the certification of S & M's welding inspector was erroneous.

3. 10CFR50, Appendix B, Criterion IV, Procurement Document Control, states in part, "measures shall be established to assure that applicable regulatory requirements, design bases, and other requirements which are necessary to assure adequate quality are suitably included or referenced in the documents for procurement of material ..."

Contrary to the above, S & M Constructors did not include or reference all applicable requirements of Specification SP-29-4549-00 on a purchase order for ASTM A-441 steel to be used in the Intake Structure.

4. 10CFR50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, states in part, "activities affecting quality shall be prescribed by documented instructions, procedures, or drawings ... (which) shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."

Contrary to the above, S & M Constructors' Visual Welding Inspection procedure (QCP-107, Rev. 0) was deficient as it lacked sufficient detail and guidance for performing required inspections, did not contain acceptance criteria for all inspections, and did not provide adequate documentation of inspection results.

5. 10CFR50, Appendix B, Criterion VII, Control of Purchased Material, Equipment, and Services, states in part, "measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents . . . Documentary evidence that material and equipment conform to the procurement requirements shall be available . . . and shall be sufficient to identify the specific requirements . . . met by the purchased material and equipment."

Contrary to the above, S & M Constructors' QA Program was deficient in the area of subcontractor control. This deficiency is substantiated by the Site Organization review of in-place procedures belonging to S & M's subcontractors. Each of these procedures reviewed was found to be inadequate and was dispositioned "Not Acceptable." This review and disposition was considered to be evidence of inadequate review by S & M.

6. 10CFR50, Appendix B, Criterion IX, states, "measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements."

Contrary to the above, S & M Constructors' control of special processes is deficient, as demonstrated by the following:

- (a) Joint configurations represented by welding procedures submitted by S & M are not shown on Halvorsen Boiler & Engineering's (HB&E) shop drawings.
 - (b) Joint configurations shown on the HB&E shop drawings are not represented by welding procedures.
7. 10CFR50, Appendix B, Criterion X, Inspection, states in part, "a program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity . . . Examinations, measurements, or test of material or products processed shall be performed for each work operation where necessary to assure quality."

Contrary to the above, S & M Constructors' visual welding inspection was inadequate as demonstrated by the number of obvious deficiencies identified by Site Organization personnel subsequent to S & M's inspection.

B. HARDWARE DEFICIENCIES

Introduction

Hardware deficiencies existent in work performed by Halvorsen Boiler & Engineering were primarily identified in Nonconformance Report CQA 035. Summary of specific deficiencies identified are as follows:

1. Improper weld joint fit-up. Root openings vary from 0" to 3/4" (top to bottom - 48" approximate). Documentation reviewed indicated this problem had been documented and identified by the contractor on two weld joints (for excessive gap once). Subsequent visual examination by Site Organization personnel revealed this condition existed on other welds which were tacked and aligned (both excessive and inadequate gap).
2. No pre-weld cleaning had been performed. Slag and oxidation from flame cutting were present.

This condition also existed on a joint which was in-process of being welded on November 28, 1978. Slag and oxidation evident was not limited to that left from flame cutting. Examination of in-process welding revealed indications of improper precleaning and inadequate cleaning between weld passes. This condition appears to be a generic problem with all welds.

3. Finished weld profiles do not meet the requirements of AWS D1.1. Examination of completed weld profiles revealed that profiles range from below surface of the base material to reinforcement, which exceeds the requirement of AWS D1.1. Previous inspections by Site Organization revealed weld profiles of filler passes, which would indicate improper welding techniques such as high weld metal build-up or rope-type bead. This condition is inherent with all welds.
4. Visual examination of various fillet and full penetration welds revealed: (a) excessive porosity; (b) undercut; (c) slag pockets; (d) incomplete fusion; and (e) poor tie-ins to tacks. Subsequent inspection revealed cracks observed visually on surface of welds. Conditions noted above were observed on completed and in-process welds.

5. Tack welds used for fit-up are not being tapered at their starting and stopping edges prior to incorporating them into the root pass. This problem was originally identified on Nonconformance Report CQA 023 as a result of CQE Audit No. 74, dated April 25, 1978. As documented in the body of the report, this condition would not exist if the tack welds had been removed as explained to the auditors by the subcontractor. To date, satisfactory resolution to Nonconformance Report CQA 023 has not been obtained. However, a meeting on January 30, 1979, between CQE and GAI Engineering resulted in agreement for satisfactory resolution.
6. Where joints have been fit-up and tack welded, and the carbon steel backing strip is welded in place, there is no penetration of the tack weld into the backing strip. On the vertical welds connecting the outer liner of Intake Structure No. 2, the backing strips were placed after the tack welds were made in the weld groove. Further investigation involved cases where the backing strip was tacked in place from the weld groove side. This practice is contrary to normal welding techniques. (NOTE: Back side of weld joint was accessible for proper tacking of the backing strip.) This condition could be identified only for those welds for which root pass had not been made.
7. Weld bead width (weave) is as much as two inches or more. At the request of consultants for S & M Constructors, Inc., this matter was referred to AWS for interpretation. This condition is prevalent in all welding.
8. The approved weld joint design for the top plate welds is not being used. (Reference Halvorsen Shop Drawing G850-1, Rev. 19.) Subsequent investigation has also revealed that joint configurations shown on drawings do not correspond with weld procedures submitted.
9. Visual examination reveals an appearance of copper deposits in the weld metal connecting the outer liner plates to the stiffener. One weld had been completed and one prepared for welding using copper backing bars without Engineering approval.
10. The specification (SP-29-4549-00, Rev. II) required material to be in accordance with ASTM A441-74. The purchase order did not specify the applicable edition of ASTM. The material supplied to a later edition of ASTM (ASTM A441-75) did not contain the mandatory requirement of transverse bends. This should have been added by purchase order as a supplemental requirement. All ASTM A441 material for structures associated with SP-29-4549-00 was affected.
11. Prior to the above hardware deficiencies, other deficiencies, such as lamellar tear between adjacent welds, had been identified by the contractor.

ANALYSIS OF SAFETY IMPLICATIONS

A. PROGRAM DEFICIENCIES

The safety implications of a Quality Assurance breakdown are difficult to evaluate as an entity. In the specific case addressed in this report, the Quality Assurance Program deficiencies are directly related to hardware deficiencies identified and discussed in other sections of this report. Because of this correlation, and other evaluations discussed under the "Corrective Action Taken" section, the safety implications of the effects of the Quality Assurance Program breakdown will be identical to the safety implications of the hardware deficiencies. The hardware deficiency analysis is given in the following section of this report.

B. HARDWARE DEFICIENCIES

Safety implications of hardware deficiencies are currently being evaluated by Engineering. Results of this evaluation are not available at this time; however, complete results of the analysis of safety implications of the hardware deficiencies will be included in the Final Report to be submitted by June 1, 1979.

CORRECTIVE ACTION TAKEN

A. PROGRAM DEFICIENCIES

Corrective actions taken or to be taken on identified program deficiencies are presented in the same order and format as in the "Detailed Summary of Program Deficiencies."

Details of corrective action are as follows:

1. S & M Constructors' failure to recognize the identified hardware deficiencies as such has been corrected as demonstrated by S & M's revised response to Nonconformance Report CQA 035, Rev. 2, as well as by additional Nonconformance Reports written by S & M to further document weld deficiencies. This change in the attitude of S & M is further demonstrated by statements made by Mr. S. Hopkins of Industrial Inspection Industries, Inc., a consultant to S & M at a meeting held at Halvorsen Boiler & Engineering's facilities on December 20, 1978, wherein Mr. Hopkins agreed that the deficiencies identified by Site Organization did, in fact, exist and were generic in nature and not limited to a specific weld.

Corrective action taken by Site Organization in this area consists of arrangements for a full-time Site Organization Level II Welding Inspector to be present in Halvorsen's shop when Stop Work Notification CQA 78-12 is released.

2. No corrective action has been taken by S & M Constructors to date. Site Organization corrective action taken in this area consists of written direction to S & M that a re-evaluation of the qualifications/certifications of their (S & M's) welding inspector is to be submitted to the Site Organization for review and evaluation prior to any further utilization of that inspector on safety-related work for the Perry Nuclear Power Plant.
3. This deficiency has also been identified on Nonconformance Reports CQA 035 and 29-42. Corrective actions have been specified on both nonconformance reports. In addition, subsequent purchase orders have been reviewed and written comments provided to S & M to preclude further recurrences of this problem.
4. S & M Constructors' Visual Weld Inspection procedure (QCP-107) has been revised to adequately address the concerns cited. Additionally, Site Organization Review Board comments on Nonconformance Report CQA 035, Rev. 2, require S & M to perform and document additional inspections to compensate for the cited inadequate documentation.
5. In order to preclude recurrence of problems in this area, Site Organization has relieved S & M of the responsibility for review of special process procedures and Site Organization has assumed this responsibility.
6. Two-fold corrective action is necessary for this item. This first action required is a complete re-review of the shop drawings by Gilbert Engineering, and resolution and incorporation of the Engineering comments by S & M/Halvorsen. The Engineering review has been completed and the comments transmitted to S & M.

The second action required is a re-review of the weld procedures by the Site Organization. This re-review will be performed subsequent to S & M revision and resubmittal of the shop drawings and acceptance of the revised drawings by Engineering.
7. S & M Constructors' Visual Welding Inspection procedure, QCP-107, has been revised to provide greater detail and direction for performance of visual inspection.

In addition, a full-time Site Organization Level II Weld Inspector will be placed in Halvorsen's shop at the time of release of Stop Work Notification CQA 78-12.

B. HARDWARE DEFICIENCIES

Corrective actions taken or to be taken on identified hardware deficiencies are presented in the same order and format as in the "Description of Hardware Deficiencies." No physical corrective action has been taken to date due to Stop Work Notification CQA 78-12 being in effect.

Site Organization Review Board comments on Nonconformance Report CQA 035, Rev. 2, placed the additional requirement that all welds, regardless of status (i.e., fit-up, in-process, or complete), either be documented as acceptable or reported on nonconformance reports. A further requirement was the verification of the acceptance status of all welds by the Site Organization.

Details of corrective action are as follows:

1. All nonconforming weld fit-ups will be documented on nonconformance reports and dispositions and corrective actions will be based on specific details of each deficient weld joint.
2. S & M Visual Weld Inspection procedure (QCP-107) has been revised to provide adequate procedural address to prevent recurrence of this problem. Welds will be cleaned prior to any further processing.
3. S & M procedure QCP-107 has been revised to address weld profiles' acceptability. All nonconforming weld profiles will be identified and dispositioned on nonconformance reports.
4. All welds containing defects of the type noted in this deficiency will be identified and dispositioned on nonconformance reports.
5. S & M procedure QCP-107 has been revised to require the removal of tack welds with magnetic particle testing after removal to ensure that sound metal has been reached.
6. Same as for item 5, above.
7. A code interpretation has been obtained from the American Welding Society Structural Welding Committee confirming the condition cited as an item of noncompliance with Structural Welding Code (AWS D1.1). Exact corrective action is contingent upon results of Engineering's evaluation of the condition.
8. Corrective action for this item is the same as that indicated for item 6 in Program Deficiency Corrective Action section of this report.
9. The use of copper backing bar is now specifically prohibited. Welds made utilizing copper backing bar will be ground from the root side to a sufficient depth to ensure complete removal of copper contamination.
10. The corrective action for this item is the same as that indicated for item 3 in the Program Deficiency Corrective Action section.
11. Specific corrective actions for other hardware deficiencies noted were given on the specific nonconformance reports in question.