U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
REGION IV

Report No. 99900036/80-01 Program No. 51300

Company: Combustion Engineering, Inc.
911 West Main Street
Chattanooga, Tennessee

Inspection Conducted: April 7-11, 1980

Inspectors: D W Hunnicutt 4/23/80
for I. Barnes, Contractor Inspector Date
Components Section II
Vendor Inspection Branch

for D W Hunnicutt 4/23/80
L. E. Ellershaw, Contractor Inspector Date
Components Section II
Vendor Inspection Branch

Observer: D W Hunnicutt 4/23/80
for N. Ho, Assistant Director Date
Nuclear Reactor Division I
Nuclear Regulatory Bureau
Ministry of Science & Technology, Republic of Korea

Approved by: D W Hunnicutt 4/23/80
D. M. Hunnicutt, Chief Date
Components Section II
Vendor Inspection Branch

Summary

Inspection on April 7-11, 1980 (99900036/80-01)

Areas Inspected: Implementation of 10 CFR 50, Appendix B criteria and applicable codes and standards, including action on previous inspection findings, manufacturing process control, review of welding procedure specifications, review of special welding applications, review of welder qualifications, weld heat treatment, procurement document control, evaluation

of supplier performance, material identification and control, and welding material control. The inspection involved 64 inspector-hours on site by two (2) NRC inspectors.

Results: In the ten (10) areas inspected, no apparent deviations or unresolved items were identified in five (5) areas; the following deviations and unresolved items were identified in the remaining areas:

Deviations: Manufacturing Process Control - Signoff of a certain shop traveler was not in accordance with Criterion V of 10 CFR 50, Appendix B, and QC Procedure No. 14.1, Revision F (Notice of Deviation, Item A). M&P Specification N-5.5.10.1(d) was not in accordance with Criterion V of 10 CFR 50, Appendix B, and System No. 5 of the QA Manual with respect to providing methodology and appraisal requirements necessary to assure conformance with Section III of the ASME Code forming qualification requirements (Notice of Deviation, Item B). Review of Welding Procedure Specifications - DWP SAA-SMA 1.1-103-1 was not appropriately qualified in accordance with Criterion V of 10 CFR 50, Appendix B, and System No. 9 of the QA Manual (Notice of Deviation, Item C). Evaluation of Supplier Performance - Approval of the results of a vendor audit performed by an unapproved CE Division is not in accordance with Criterion V of 10 CFR 50, Appendix B, and System No. 7 of the QA Manual (Notice of Deviation, Item D). Welding Material Control - Mixing of different electrode types in a holding oven is not in accordance with Criterion V of 10 CFR 50, Appendix B, and System No. 8 of the QA Manual (Notice of Deviation, Item E).

Unresolved Items: Manufacturing Process Control - Compatability of the heat treatment cycle used by a plate vendor on test material with respect to time at temperature permitted by Combustion Engineering forming practice for plate, (Details I, C.3.b). Weld Heat Treatment - Adequacy of temperature measurement in the local postweld heat treatment of vessels (Details I, G.3.b).

DETAILS SECTION I

A. Persons Contacted

*J. T. Rich, General Manager, Nuclear Manufacturing
*W. A. Stone Jr., Manager, Nuclear Quality Assurance
*T. L. Bailey, Manager, FPSM Quality Assurance
*B. J. Bates, NQA Audit Coordinator
G. L. Burton, Supervisor, Welding Engineering
D. Butler, Supervisor, Welder Training
*B. G. Carlton, Design Engineering, Materials and Welding
D. F. Coleman, Section Manager, Manufacturing Engineering
*G. S. Cushman, Manager, Nuclear Component Manufacturing
*J. P. Fava, Section Manager, Inspection/NDE
*L. A. Hoenig, Supervisor, Standards and Engineering Quality Assurance
H. B. Holcomb, Manufacturing General Foreman
J. P. Houstrup, Structural Consultant, Analytical Engineering
*L. C. Miller, Section Manager, Nuclear Quality Engineering
W. S. Rice, Design Engineering
*R. J. Sullivan, Senior Quality Engineer, FPSM
*N. S. Wamack, Supervisor, Design Engineering, Materials and Welding
*W. W. Worley, Quality Engineer, FPSM
*M. R. McLellan, Authorized Nuclear Inspector, Hartford Steam Boiler Inspection and Insurance Co.

*Denotes those persons who attended the exit meeting.

B. Action on Previous Inspection Findings

1. (Closed) Deviation (Item A, Notice of Deviation, Inspection Report No. 79-02): Performance of a certain weld in a different position to that specified by the applicable welding procedure; failure to make required documentation relative to the use of a certain manual power source with a discrepant amperage indicator setting, and issue of welding materials without initialing of the requisition by the welders to certify reading and understanding of the applicable welding procedure, are not in accordance with Criterion V of 10 CFR 50, Appendix B, and QCP 9.2, Revision C.

   The inspector verified that committed instructions had been given to affected personnel, current welding material issue practices were consistent with the requirements of QCP 9.2 and affected tie straps had been removed by means of a Rejection Notice and replaced in accordance with DWP MA-801-0.

2. (Closed) Deviation (Item B, Notice of Deviation, Inspection Report No. 79-02): Performance of strip cladding on primary piping with

amperage, voltage and preheat valves not in accordance with the requirements of the assigned welding procedure and failure to perform required weld preparation cleaning for the shielded metal arc welding of a permanent attachment to primary piping.

The inspector verified that the strip cladding welding procedure had been requalified with respect to the observed out of range parameters; committed personnel reinstruction had been performed; delta ferrite checks had been completed of the strip cladding in the affected component and ammeters and voltmeters had been relocated at the strip cladding station to provide better visibility for welding personnel.

3. (Closed) Deviation (Item C, Notice of Deviation, Inspection Report No. 79-02): Presence of unidentified temporary attachment material welded to a lower vessel assembly and three piping subassemblies.

The inspector verified that a procedure had been developed addressing welding of unspecified temporary attachments, instructions had been given to shop supervision on control of temporary attachment materials and current shop travelers provided for compliance with Section III of the ASME Code fabrication requirements relative to attachment materials.

4. (Closed) Deviation (Item D, Notice of Deviation, Inspection Report No. 79-02): Failure to update and reissue a certain drawing to reflect the modification of an M&P Specification.

The inspector verified that committed actions with respect to drawing revision and revision of QC Procedure 6.2 had been accomplished.

C. Manufacturing Process Control

1. Objectives

The objectives of this area of the inspection were to verify that:

a. A system had been established for the control of manufacturing processes, which was consistent with applicable regulatory and ASME Code requirements.

b. The system was implemented.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of System No. 5, Revision F, of the QA Manual, "Instructions, Procedures, and Drawings."

b. Review of System No. 5, Revision E, of the QA Manual, "Instructions, Procedures and Drawings (Modifications for Nuclear Work Performed by Fossil Power Systems)."

c. Review of System No. 14, Revision D, of the QA Manual, "Examination Or Process Status."

d. Review of System No. 14, Revision C, of the QA Manual, "Examination Or Process Status (Modifications for Nuclear Work Performed by Fossil Power Systems)."

e. Review of QC Procedure No. 14.1, Revision F, "Inspection and Test Status."

f. Examination of material forming practices used in pipe manufacture relative to vendor material test information and Section III of the ASME Code qualification requirements for forming processes.

g. Examination of traveler documentation for vessel and piping subassemblies with respect to:

(1) Definition and control of sequencing of manufacturing operations to provide for compliance with ASME Code Section III fabrication requirements and QA program commitments.

(2) Compliance with designated hold points.

(3) Performance of required ASME Code nondestructive examinations and at appropriate times of examination.

(4) Completeness of operation signoff.

(5) Evidence of fabrication inspection definition and performance consistent with QA program commitments.

h. Visual examination of production welds with respect to welding procedure specification (WPS) and ASME Code requirements.

3. Findings

a. Deviations from Commitment

(1) See Notice of Deviation, Item A.

(2) Operation Nos. 0555 and 0565 on the shop traveler for Contract No. 72473, Job and Control No. 725722 -007,

required, respectively, hot and cold forming of pipe segments in accordance with M&P Specification N - 5.5.10.1(1). Paragraph 3.4 in this specification states, "Cold sizing process shall comply with Paragraph NB - 4213 of ASME Code Section III."

No further definition or reference was made, however, of the methods to be used to accomplish and/or verify compliance with this requirement in terms of existing Combustion Engineering - Chattanooga Nuclear Operations (CE - CNO) NB-4213 forming qualifications for piping material. (See Notice of Deviation, Item B.).

b. Unresolved Items

Paragraph 2.4 in Purchase Specification N - PIF29 (c), which was applicable to plate purchased for forming into pipe segments, required by the vendor to heat treat plate test samples in the CE-CNO forming temperature range for a minimum of 3/4 hour per inch of thickness prior to mechanical testing of the material. M&S Specification N - 5.5.10.1(d) permits, however, furnace holding times of up to ten (10) hours prior to forming of the plate. No information was made available to the inspector that would confirm the notch ductility properties, as measured by the vendor, were still representative of the plate properties after exposure up to ten (10) hours in the forming temperature range. This item is considered unresolved pending completion of committed verification testing.

D. Review of Welding Procedure Specifications

1. Objective

The objective of this area of the inspection was to determine if the welding procedure specifications (WPS) used by CE-CNO in production welding were being prepared, qualified and controlled in accordance with the CE-CNO QA program and applicable ASME Code requirements.

2. Method of Accomplishment

The preceding objective was accomplished by:

a. Review of System No. 5, Revision F, of the QA Manaul, "Instructions, Procedures, and Drawings."

b. Review of System No. 9, Revision E, of the QA Manual, "Control Of Construction Processes."

c. Review of shielded metal arc and submerged arc WPS with respect to definition of applicable essential, supplementary essential and nonessential variables required by Section IX of the ASME Code.

d. Examination of the supporting procedure qualification records (PQRs) for the WPS identified in c. above with respect to:

(1) Listing of all required essential variables.

(2) Documentation of nonessential variable parameters used for welding the PQRs.

(3) Consistency of essential variable valves and ranges with those permitted by the WPS.

(4) Performance of all mechanical tests required by Sections III and IX of the ASME Code.

(5) Verification that the mechanical test results complied with ASME Code requirements.

(6) Certification by the manufacturer.

3. Findings

a. Deviation from Commitment

Paragraph QW-201.1 in Section IX of the ASME Code states in part, "The welding procedure specification (WPS) shall cover . . . variables described for each welding process as either essential or nonessential (see QW-252 through QW-281) . . ." Paragraph QW-201.2 states in part, "The specific facts including . . . the essential variables (as listed in QW-252 through QW-282) used in qualifying a WPS shall be recorded in a form called Procedure Qualification Record (PQR) . . . A change in any essential variable shall require requalification, to be recorded in another PQR . . . ."

Tables QW-253 and QW-254 in Section IX of the ASME (through the Summer 1978 Addendum) list increases in amperage or voltage as supplementary essential variables where notch toughness properties are specified, for the shielded metal arc and submerged arc welding processes. The Winter 1978 Addendum to Section IX of the ASME Code modified these supplementary essential variables to an increase in heat input or volume of weld metal deposited per unit length of weld, over that qualified.

Contrary to the above, DWPS SAA-SMA 1.1-103-1 permitted the following with respect to the listed supporting PQRs:

(1) Increases in amperage, voltage, heat input and volume deposited above the qualified parameters for the submerged arc welding process.

(2) Increases in amperage above the qualified valves for the shielded metal arc welding process.

(See Notice of Deviation, Item C.).

b. Unresolved Items

None.

c. Items Requiring Followup Inspection

The current CE-CNO welding surveillance program does not require documented verification of welder and welding operator compliance with WPS arc voltage requirements, although the program does require verification to be performed. Several shielded metal WPS and those submerged arc WPS used for reactor vessel pressure boundary welds specify the use of a single voltage value rather than a range, which would appear to be a difficult criteria for welding personnel to comply with. Insufficient time was available during the inspection to review production welding compliance with this WPS parameter requirement. This subject will be examined in greater detail during a subsequent inspection.

E. Review of Special Welding Applications

1. Objective

The objective of this area of the inspection was to determine if special welding applications such as tube to tube sheet welds and cladding conformed to the requirements of the CE-CNO QA program and the additional requirements established by ASME Code Sections III and IX.

2. Methods of Accomplishment

The preceding objective was accomplished by:

a. Review of System No. 5, Revision F, of the QA Manual, "Instructions, Procedures, and Drawings."

b. Review of System No. 9, Revision E, of the QA Manual, "Control Of Construction Processes."

c. Observation of gas tungsten arc tube to tube sheet welding operations on Contract No. 70277, Job and Control No. 770371-105.

d. Observation of strip cladding operations on Contract No. 75173, Job and Control No. 728126-010.

e. Observation of shielded metal arc overlay operations on Contract No. 75173, Job and Control No. 72816-010.

f. Review of applicable WPSs for witnessed operations and examination of supporting PQRs with respect to the additional requirements for these processes contained in Sections III and IX of the ASME Code.

g. Review of practices used to assure adequacy of chemical composition of overlay cladding.

3. Findings

a. Within this area of the inspection, no deviations from commitment or unresolved items were identified.

b. Items Requiring Followup Inspection

Observation of tube to tube sheet welding operations on Contract No. 70277, Job and Control No. 770371-105, revealed that the gas tungsten arc equipment was not fitted with a voltmeter, that would allow direct monitoring by the welding operator of developed voltage with respect to the 13-14 volts requirement of the applicable WPS, DWPS-GTAA-43.43-03. The inspector was informed that voltage was periodically checked by Welding Engineering personnel and was routinely controlled in production welding by the control of electrode to work distance. A template had been developed to facilitate maintenance of this distance on the automated equipment. Insufficient time was available during the inspection to verify use and viability of a template for control of voltage within the specified limits.

This item will be further reviewed during a subsequent inspection.

F. Review of Welder Qualifications

1. Objective

The objective of this area of the inspection was to determine if welders and welding operators were qualified in accordance with Section IX of the ASME Code and the CE-CNO QA program.

2. Method of Accomplishment

The preceding objective was accomplished by:

a. Review of System No. 9, Revision E, of the QA Manual, "Control Of Construction Processes."

b. Review of welder and welding operator qualifications with respect to the requirements of Section IX of the ASME Code, for the processes, positions and work observed being performed.

c. Review of system used to maintain welder and welding operator qualifications.

3. Findings

Within this area of the inspection, no deviations from commitment or unresolved items were identified.

G. Weld Heat Treatment

1. Objective

The objective of this area of the inspection was to determine if heat treatment related to welding is specified and performed in accordance with the CE-CNO QA program and applicable ASME Code requirements.

2. Method of Accomplishment

a. Review of System No. 9, Revision E, of the QA Manual, "Control of Construction Processes."

b. Review of M&P Specification N-4.3.8.5(e), "Process Specification For Interstage and Final Postweld Heat Treatment of Nuclear Components."

c. Examination of Nuclear Fabrication Practice No. 200-4-1 with respect to thermocouple placement on steam generators and reactor vessels.

d. Discussions with cognizant Engineering personnel relative to analytical work performed with respect to developed thermal gradients in local postweld heat treatment.

e. Observation of a local postweld heat treatment cycle in progress on a steam generator, with respect to compliance with set up instructions.

f. Examination of one (1) local postweld heat treatment time-temperature chart with respect to compliance with M&P specification requirements.

g. Assuring a tracking system was in effect with respect to accumulated component postweld heat treatment time versus test material heat treatment qualification times.

3. Findings

a. Deviations from Commitment

None.

b. Unresolved Items

Local postweld heat treatment of vessels is performed by CE-CNO without any monitoring of metal temperature on I.D. vessel surfaces to assure required metal temperature is achieved through the weld thickness. Insufficient time was available during the inspection to review the technical basis for this practice. This item is considered unresolved pending detailed review at a subsequent inspection.

H. Exit Meeting

A post inspection exit meeting was held by the inspectors on April 11, 1980, with the management and Authorized Inspection Agency representatives denoted in paragraph A. above. The inspectors summarized the scope and findings of the inspector. Management acknowledged the statements of the inspectors, with questions being confined primarily to clarification of the findings presented.

DETAILS SECTION II

(Prepared by L. E. Ellershaw)

A. Persons Contacted

B. J. Bates - NQA Audit Coordinator
J. C. Clements - Welding Material Storage Room Attendant
J. P. Rava - Section Manager, CNO Inspection
R. Hillis - Lead Quality Assurance Engineer
H. Holcomb - Foreman
P. Jackson - QA Engineering Assistant
P. McDaniels - Foreman, CNO
J. Myatt - Quality Assurance Engineer
E. Pruitt - Welding MAterial Storage Room Attendant
R. Walls - Foreman, CNO
J. E. White - Quality Assurance Engineer
J. Wilson - Foreman, FPS

B. Material Identification and Control

1. Objectives

The objectives of this area of the inspection were to verify that CE-CNO had implemented the requirements for the control and identification of material in accordance with the QA Manual and applicable NRC and ASME Code requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of QA Manual System 7, "Control of Purchased Material, Items and Services" revision E, dated January 11, 1980.

b. Review of QA Manual System 8, "Identification and Control of Material and Items" revision D, dated October 12, 1979.

c. Observation of components, subassemblies, and assemblies and a review of respective identification with comparison against the Certified Material Test Reports.

d. Discussions with cognizant personnel.

3. Findings

a. Deviation From Commitment

None

b. Unresolved Item

None

C. Evaluation of Supplier Performance

1. Objectives

The objectives of this area of the inspection were to verify that CE-CNO had implemented the requirements for evaluation of Supplier Performance in accordance with the QA Manual and applicable NRC and ASME Code requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of QA Manual System 7, "Control of Purchased Material, Items and Services" revision E, dated January 11, 1980.

b. Review of 10 selected vendor audits and comparing against the Approved Vendors List.

c. Review of Audit checklists used during the performance of the above audits.

d. Discussions with cognizant personnel.

3. Findings

a. Deviation from Commitments

See Notice of Deviation, Item D.

b. Unresolved Item

None

D. Welding Material Control

1. Objectives

The objectives of this area of the inspection were to verify that CE-CNO had implemented the requirements for the control of welding material in accordance with the QA Manual and applicable NRC and ASME Code requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of QA Manual System 8, "Identification and Control of Material and Items" revision D, dated October 12, 1979.

b. Review of QC Procedure 8.1, "Welding Material Control" revision D, dated September 30, 1977.

c. Observation of welding materials in the welding material storage areas.

d. Review of Welding Material Requisition slips and observation of welding materials actually issued to welders.

e. Observation of 15 approved heat numbers of welding materials (electrodes and wire), and review of their respective Certified Material Test Reports (CMTR).

f. Review of 11, approved wire/flux combinations and their respective CMTRs, to verify qualifications of those combinations.

g. Review of Weld Inspection Forms

h. Discussions with cognizant personnel.

3. Findings

a. Deviation from Commitments

See Notice of Deviation, Item E.

b. Unresolved Item

None

E. Procurement Document Control

1. Objectives

The objectives of this area of the inspection were to verify that CE-CNO had implemented the requirements for the control of procurement documents in accordance with the QA Manual and applicable NRC and ASME requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of QA Manual System 4, "Procurement Document Control" revision E, dated October 12, 1979.

b. Review of CE-CNO purchase orders to subcontractors, to assure pass-through of Customer requirements and applicable ASME Code and NRC requirements.

c. Verification of Quality Assurance review and approval of purchase orders.

d. Review of subcontractor documentation packages, to assure compliance with purchase order requirements.

e. Verification that subcontractor material test reports met material specifications and supplemental CE-CNO requirements.

f. Discussions with cognizant personnel.

3. Findings

a. Deviation from Commitment

None

b. Unresolved Item

None