VENDOR INSPECTION REPORT

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

Report No. 99900401/78-03

Company: Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

Inspection at: Windsor, Connecticut

Inspection Conducted: September 26-28, 1978

Inspectors: R. H. Buckley for J. R. Costello, Principal Inspector, Vendor Inspection Branch — 10/18/78 Date

R. H. Buckley for J. M. Johnson, Contractor Auditor, Vendor Inspection Branch — 10/18/78 Date

Approved by: Donald Gene Anderson / for C. J. Hale, Chief, Projects Section, Vendor Inspection Branch — 10/18/78 Date

Summary

Inspection on September 26-28, 1978 (99900401/78-03)

Areas Inspected: Implementation of the Combustion Engineering QA Program in the areas of design verification, procurement document control, and action on previous inspection findings. The inspection involved forty-eight (48) hours on site by two (2) USNRC inspectors.

Results: In the three (3) areas inspected, two (2) deviations and one (1) unresolved item were identified in one (1) area; no deviations or unresolved items were identified in the other two (2) areas.

Deviations: (1) Procurement Document Control - Contrary to 10 CFR 50, Appendix B, Criterion III, and implementing procedure PE QA No. 001, the

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transmittal sheet for unreviewed documents did not indicate when the documents would be reviewed (Notice of Deviation Enclosure, Item A). (2) Procurement Document Control- Contrary to 10 CFR 50, Appendix B, Criterion VI, and implementing procedure QADP 6.0, Supplement 3B to P.O. 9403833 to CE-KSB for Reactor Coolant Pumps did not receive the same review and approval as the original P.O., although quality affecting changes were involved (Notice of Deviation Enclosure, Item B).

Unresolved Item: (1) Procurement Document Control - It is not apparent why there should be a variance from the standard QA Program when QA requirements are imposed upon CE-KSB.

DETAILS SECTION I

(Prepared by J. R. Costello)

A. Persons Contacted

J. M. Burger, Supervisor Fuel and Control Element Assembly Development
S. C. Hatfield, Supervisor Fuel and Control Element Assembly Development
P. H. Hepner, Supervisor Safeguards Section
*D. M. Mayer, Supervisor Planning and Procedures, Plant Engineering
J. F. Mullooly, Supervisor Core Support Structures
V. A. Paggen, Supervisor Corrective Action, Reliability and Safety Assurance
F. J. Staron, Engineer, Hydraulic Design and Analysis Group
D. R. Wade, Lead Engineer Auxiliary Equipment

*Denotes those present at exit meeting.

B. Action on Previous Inspection Findings

1. (Closed) Deviation (Report No. 78-02): Contrary to CE topical report CENPD-210-A, one individual had performed audits of NDE processes when his NDE qualifications had expired. The inspector verified that the corrective action described in Combustion Engineering's letter of August 23, 1978, had been completed. In particular, the unqualified individual was requalified, the requalified individual reexamined the film and found acceptable, an independent qualified individual sample inspected the film and found the sample acceptable and the Quality Assurance Technical Services group has instituted a recall system to advise personnel in advance when their NDE qualifications are about to expire.

2. (Open) Deviation (Report No. 78-02): Contrary to CE topical report CENPD-210-A, managements audits are not documented through written operating procedures. CE will develop a procedure to control the management audits per CENPD-210-A. This will be accomplished by January 1979.

3. (Open) Deviation changed to Unresolved Item (Report No. 78-02): It is not apparent that the internal audit responsibilities of Group Quality Systems (GQS) can be carried out due to the present scope and staffing of the CE internal audit program. This will be further evaluated in 1979.

4. (Open) Deviation (Report No. 78-02): Contrary to 10 CFR 50, Appendix B, Criterion III, the adequacy of the vendor design of high pressure safety injection valves procured by CE for five (5) nuclear plants does not appear to have been verified adequately.

5. (Open) Deviation (Report No. 78-02): Contrary to 10 CFR 50, Appendix B, Criterion XV, no Field Action Report (FAR) was generated for inadequate HPSI header valves.

6. (Open) Deviation (Report No. 78-02): Contrary to 10 CFR 50, Appendix B, Criterion V, certifications of equipment with outstanding items were released without proper documented approvals. Combustion Engineering has indicated it was not the intent of QAP 8.1 to require a TWX (or equal) when an incomplete document package is recognized. CE will clarify the intent of the QAP via memo to GQC personnel. This will be evaluated during the next inspection.

7. (Open) Unresolved Item (Report No. 78-02): No internal audits are being conducted by either EQA or GQS personnel relative to the activities of Licensing and Project Management personnel in the Commercial Department.

8. (Open) Unresolved Item (Report No. 78-02): It is not clear whether ANSI N45.2.6 is applicable to surveillance personnel. This item will continue to be considered unresolved until NRR:QAB has completed their review.

9. (Closed) Unresolved Item (Report No. 78-02): It is not clear whether Integrated Manufacturing Quality Plans (IMQPs) are being approved six weeks prior to fabrication. The inspector verified that all of the IMQPs in question are now approved and no fabrication was authorized prior to the six week period for the items in question.

C. Design Verification

1. Objectives

The objectives of this area of inspection were to determine whether adequate procedures have been established and were being implemented to accomplish the following:

a. Identify individuals or groups who are authorized to perform design verification reviews.

b. Require the results of design verification be clearly documented (with the identification of the verifier clearly indicated) and filed so they are identifiable to the document reviewed and can be readily retrieved.

c. Require that design verification take into account the importance to safety, complexity, degree of standardization,

state of the art, similarity with previously proven designs, applicability of standardized or previously proven designs, known problems and their effects, and changes to previously verified designs.

d. Identify and document the method by which design verification is performed.

e. Prescribe the requirements for performing design verification whether it be by design review, alternate calculations, qualification testing, or a combination of these.

2. Method of Accomplishment

The preceding objectives were accomplished by a review of the topical report, pertinent portions of CESSAR, pertinent QA Program procedures, selected design and administrative documents and discussions with selected personnel of the CE staff.

In discussion with members of the CE staff, it was disclosed that the bulk of all design verifications is done by design reviews, with a few cases of qualification testing and an occasional use of alternate calculations.

The documents examined by the inspector are listed below:

a. Topcial Report CENPD-210-A and Chapter 17.1 of CESSAR.

b. QA Program Procedures.

1. Quality Assurance of Design Procedures (QADPs)

QADP 5.0	Design Process Description
QADP 5.1	Design Input
QADP 5.2	Design Analysis
QADP 5.3	Interface Control
QADP 5.4	Design Verification
QADP 5.5	Design Drawings
QADP 5.6	Procedures for the Preparation and Quality Assurance of Specifications
QADP 5.7	Design Changes and Corrective Action
QADP 5.8	Other Design Documents
QADP 5.11	Stress Reports
QADP 6.1	Requests for Approval or Review (RAR)
QADP 6.2	Technical Change Request
QADP 6.3	Deviation from Contract Requirements (DCR)

2. Group Quality Assurance Procedures (QAPs)

QAP 3.1	Submittal Instructions for Technical Change Request (TCR)
QAP 5.2	Review of Customers Bid Specifications for Nuclear Steam Supply System (NSSS) and Fuel
QAP 5.3	Review of Contracts
QAP 6.2	Submittal Instructions for Request for Approval or Review (RAR)
QAP 8.1	Certification of Equipment
QAP 15.1	Submittal Instructions for Deviation of Control Requirements (DCR)
QAP 15.2	Review of Deviations of Contract Requirements (DCR)
QAP 16.1	Corrective Action Report (CAR)

3. Design and Test Documents

The following documents were examined as typical cases of the different types of design verification:

(a) Independent Design Review

1. Component Design Requirements for Safety Injection System, Shutdown Cooling System and Containment Spray System for SYS 80-PE-CR30 (Revision 01).
   . This document was verified by an independent design reviewer who was on the approved list of qualified reviewers.

2. Component Design Requirements for the Safety System, Shutdown Cooling System and Containment Spray System, 14273-PE-CR30 (Revision 00).
   . This document is the project document which modifies the above listed SYS 80 document to fit the requirements of the project. This document also received an independent design review.

3. Compilation of NSSS Responses to Design Bases Dynamic Events for 14273 Project (Revision 00).
   . Sign off of independent review, September 21, 1977.

4. Computer Code Description and Verification Report for Descent, 00000-PE-CV31/2-00 (Revision 00).
   . The code testing for this document was completed on October 24, 1977. The independent design reviewer signed off on December 2, 1977.

5. System 80 Standard Plant Design - Lateral Hydraulic Loads on the Lower Support Structure (Post Core Condition), Analysis No. 3800-CA-064.
   . This calculation was made to supplement original calculation 3800-CA-049 which was based on higher pre-core flow rate conditions. Independent design review was completed.

6. Specification for Standard Plant for Safeguard Pumps for System 80 Standard Design, SYS 80-PE-410 (Revision 03).
   . Signed off by independent reviewer on December 19, 1977. Note that earlier revisions did not have independent design review as the Quality Assurance of Design Procedures were not effective until May 3, 1976, and all the earlier revisions predated this time and were covered by department procedures.

7. Drawing E-STD-164 812 (6 sheets) Revision 4, Lower Support Structure Assembly.
   . Revision 4, dated February 28, 1978, was signed off by an independent design reviewer.

8. Design and Manufacturing Specification for Reactor Vessel Core Support and Internal Structures for System 80 Standard Design, SYS 80-RCE-0400 (Revision 01).
   . Independent design review was signed of on February 22, 1976.

9. Fuel Assembly Batches A, B, and C, Mechanical Design Criteria and Verification Checklist.
   . Each individual calculation had independent reviews.

10. Analysis No. 4562-610-78, Documentation of Acceptability of Worn fuel

Assemblies loaded in Cycle 4.
. Independent design review, September 22, 1978.

11. Analysis No. 6370-610-39, Statistical Determinations of the End of Life Axial Gap between Fuel Rod and Flow Plate.
. Independent design review, October 12, 1977.

12. Engineering Specification for Fuel Assemblies No. 1370-ECD-0100 (Revision 01).
. Independent design review September 28, 1978.

(b) Alternate Calculations

1. System 80 Standard Plant Design Lateral Hydraulic Loads on the Lower Support Structure, Analysis No. 3800-CA-049.
. This document was verified by an independent design reviewer who was on the approved list of qualified reviewers. Alternate calculations were used to verify pages 20-25 of a 32 page report.

(c) Qualification Testing

1. 14 x 14 Fuel Bundle with Sleeved Guide Tubes.

(a) Engineering Development Test Report #660-Demonstrate acceptability of sleeved guide tubes from standpoint of wear by 500 hour hot flow test.

(b) Test Procedure - Wear Evaluation Test in TF-2B of a 14 x 14 Test Fuel Bundle with Sleeved Guide Tubes.

(c) Test Report - Wear Evaluation Test 14 x 14 Fuel Bundle with Sleeved Guide Tubes, TF-2B. Test report verified by independent reviewer.

(d) Test Report (Metallurgical) - Evaluation of Sleeved Guide Tube Performance in

Loop Test. Test report verified by independent reviewer.

(e) Memo to cognizant personnel dated June 17, 1978, summarizing test results which showed the functional adequacy of the 14 x 14 sleeved fuel assembly.

3. Findings

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

b. While reviewing QADP 3.0, Organization and Responsibilities, it was noted that the procedure is obsolete and should be updated. This will be further evaluated in the next inspection.

D. Exit Meeting

A meeting was conducted with management representatives at the conclusion of the inspection on September 28, 1978. In addition to the individuals indicated by an asterisk in the Details Section, those in attendance were:

G. P. Allocca, Reliability Supervisor, Group Quality Systems
C. J. Bogacz, Mechanical Supervisor, Group Quality Control
E. P. Flynn, Director, Plant Apparatus and Engineering Quality Assurance
F. G. Harvey, Senior Engineer, Engineering QA
C. W. Hoffman, Director, Group Quality Assurance
D. R. Knauff, Supervisor, Contract Quality Assurance
W. D. Mawhinney, Project Manager
B. L. Riggs, Planning Supervisor, Group Quality Systems
T. R. Swift, Manager, Contract Quality Assurance

The inspector summarized the scope and findings of this inspection for those present at the meeting. Management representatives acknowledged the statements of the inspector.

DETAILS SECTION II

(Prepared by J. M. Johnson)

A. Persons Contacted

E. E. Antico, QA Engineer, Group Quality Control
*G. S. Brunetto, Group Quality Control Supervisor
E. R. D'Amaddio, Supervisor, Reactor Coolant Pumps and Primary Supports
L. Dungan, Engineering Quality Assurance Engineer
*G. R. Fargo, Manager, Quality Assurance Technical Services
*G. J. Huba, Manager, Engineering Quality Assurance
*D. M. Mayer, Supervisor, Planning and Procedures, Plant Engineering
B. R. Riggs, Supervisor, Group Quality Assurance
K. K. Tomany, Quality Assurance Engineer
D. R. Wade, Plant Apparatus Engineer
*T. Weichand, Purchasing Manager

*Denotes those present at exit meeting.

B. Procurement Document Control

1. Objectives

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

a. The organizations involved in the execution of procurement activities have been identified and their responsibilities delineated.

b. Procurement documents include the scope of work to be performed by the supplier, the technical requirements, material and equipment specifications, procedures and instructions, test and inspection requirements, acceptance requirements, and identification, packaging, handling and shipping requirements.

c. Procurement documents require that the supplier have a documented quality assurance program consistent with 10 CFR 50, Appendix B.

d. The supplier is required to incorporate appropriate quality assurance program requirements in sub-vendor procurement documents.

e. Procurement documents provide rights of access to the supplier's plant facilities and records, identification of

manufacturing hold points, witness points and notification of the time of these events, documentation requirements, records requirements, and requirements for reporting and approving of the disposition of nonconformances.

f. Procurement documents are reviewed by the QA organization before transmittal to the prospective suppliers and these reviews are documented.

g. Changes to procurement documents undergo the same degree of review and controls as the original documents.

h. Measures to control the release and distribution of procurement documents are being implemented.

2. Method of Accomplishment

The preceding objectives were accomplished by an examination of:

a. Documents establishing program commitments: Combustion Engineering Quality Assurance Program (Topical Report CENPD-210-A, Revision 3): Sections 17.4 (Procurement Document Control), Table 17-3 (Commitment Table of Regulatory Guides and ANSI Standards).

b. Implementing procedures to assure that procedural controls have been provided to satisfy topical commitments and items (a) through (h) of the Objectives section above:

(1) Quality Assurance of Design Manual: QADP 6.0, Revision 0 and 1 (Procurement Control); QADP 6.3 (Deviation from Contract Requirements).

(2) Group Quality Assurance (GQA) Manual: QAP 4.1 (Procurement Document Control); QAP 16.1 (Corrective Action Report-CAR); 00000-WQC 11.1, Revisions C and D (Vendor Quality Control Program Specification).

(3) CE Procurement Manual.

c. Superceded procedures which were applicable to work performed on some of the documents listed in d. below:

(1) Quality Surveillance Manual: WQC 10.2 and WQC 11.6 (and green revision sheet).

(2) Engineering Procedure PE QA No. 001, Revisions 0 and 1, Project Specifications.

d. Documents examined to verify implementation of above program and procedural requirements, and to satisfy implementation of (a) through (h) of the Objectives section above:

(1) Documents associated with the purchase of Safeguard Pumps (Low Pressure Safety Injection - LPSI; High Pressure Safety Injection - HPSI; and Containment Spray - CS) from Ingersoll - Rand:

(a) P.O. (Purchase Order) 9500775 for Project 13172 (LPSI).

(b) P.O. 9500088 for Project 14273 (Units 1, 2, and 3), (HPSI).

(c) P.O. 9500089 for Project 14273 (Units 1, 2, and 3), (LPSI).

(d) P.O. 9500090 for Project 14273 (Units 1, 2, and 3), (CS).

(e) Specification SYS 80-PE-410, Revisions 1 and 2 (generic safeguards pump specification) including Addendum 1, "QA Requirements for Category B Parts."

(f) Project Specification 14273-PE-402, Revisions 0 and 1.

(g) DCR (Design Change Request) 9500775-1 and approvals.

(h) RAR (Request for Review and Approval) 9500775-17 and approvals.

(i) Ingersoll - Rand letter dated May 19, 1978, to CE: Subject: LPSI and CS Pump Impeller Locking Nut Arrangement.

(2) Documents associated with procurement of RC (Reactor Coolant) Pumps and Motors from CE-KSB;

(a) P.O. 9403833 for Project 14273.

(b) P.O. Supplement 8 (dated June 28, 1978) to P.O. 9602815 (generic P.O. for all System 80 RC Pumps) deleting all CE-GQC hold and inspection points except final inspection prior to shipment.

(c) P.O 940388 Supplement 8 re: hold and inspection points and P.O. Supplement 12 deleting all but final inspection. These are for Project 14273.

(d) P.O. Supplement 3B (dated October 4, 1976) to P.O.s 9403833, 9403834, and 9403835 for Project 14973, 14373, and 14473, and P.O.s 9403827, 9403828, 9403829, 9403830, 9403831, 9403832, 9403824, and 9403826 for other projects.

(e) Documents required by Supplement 3B to take precedence over System 80 RC Pumps Specification SYS-80-PE-480: Equipment Purchase Agreement dated September 1, 1975; Memo of Understanding between CE and CE/KSB, dated July 15, 1975; Exceptions and Interpretations to CE General Specification SYS-80-PE-480, Revision 0.

(f) QC-CAR (Corrective Action Report) 77-018, dated June 20, 1977, and its closure on basis of deletion of hold and inspection point requirements (except final).

(g) QC-CAR-77-029 (transmitted by letter GQC-77-180); and followup QC-CAR-78-017, dated April 18, 1978, (transmitted by letter GQC-78-045).

(h) DCR 9602815-1 re: witness and hold points missed for RC pump casing, and its closure.

(i) "Green sheet" Revision to WQC 11.6 approved by F. Driscoll on December 18, 1974, permitting conditional contracts to vendors not on the Approved Vendor List.

(j) Approved Vendor Lists (AVLs) dated September 8, 1978, April 10, 1978, and selected prior AVLs.

(k) Letters and memos re: RC Pump purchase:

Memo: from GQC Engineer to Purchasing dated December 20, 1976, concerning failure to get inter-departmental approval for Supplement 3B (technical nature) and request for approval list to be circulated.

Memo: from GQC Supervisor dated December 17, 1974, concerning a number of PRs (Purchase Requisitions)

for RC pumps not meeting requirements of MSQS Manual because Vendor CE-KSB not on AVL.

CE/KSB Letter 77-0667 to CE dated October 18, 1977, indicating a surcharge to honor CE hold and inspection points.

Memo: DSP-78-473 dated June 12, 1978, giving meeting minutes for meeting deleting inspection and hold points (except final).

Memo: From Manager, GQC dated October 25, 1978, re: CE/KSB failing ASME Survey.

3. Findings

a. In this area of the inspection, two (2) deviations were identified (See Notice of Deviation Enclosure, Items A and B, and additional information below).

(1) Concerning Item A, Enclosure (Notice of Deviation), this project specification is invoked by P.O.s 9500088, 9500089, and 9500090, and affects twelve (12) pumps for Project 14273. The prior revision of the specification, 14273-PE-410, Revision 0, was not verified and has a stamp indicating that it will be verified (QA'd) by July 25, 1975. This was not done and apparently followup was lacking. Hence no independent review has been performed of either Revision 0 or 1.

By report, Revision 2 has been generated because the CS pump for Unit 1 did not meet the requirements of the specification. Evaluation of PSAR commitments is underway prior to verification of Revision 2, which modifies hydraulic requirements because Ingersoll - Rand test values for shut-off (head) values were higher than specification design requirements.

(2) Concerning Item B, Enclosure (Notice of Deviation), P.O. Supplement 3B to P.O. 9403833 was approved only by Procurement. No review and approval was obtained from Engineering, QA, or Project Manager, as were required on the original order. A memo from GQC to Purchasing dated December 20, 1976, noted that due to the technical nature of parts of the supplements, an approval list should be circulated for interdepartmental approval. Apparently, however, this action was not taken. Technical changes include requirements for surface finish of clad parts in contact with reactor

coolant, and requirements for pump bearing to accept 10 minutes of operation without cooling water (the SYS 80 specification requires 30 minutes, by report). This supplement is generic and is invoked on all RC pump orders to CE-KSB. Therefore, it affects approximately 32-36 RC pumps.

b. In this area of the inspection, one (1) unresolved item was identified as follows:

Further examination will be made of the purchase of Reactor Coolant (RC) pumps from CE-KSB to determine whether this procurement meets NRC regulatory requirements and applicable CE program and procedural commitments, including the following specific areas:

1. Placement of Purchase Orders (P.O.s) in 1974, to a vendor not on the Approved Vendor List.

2. Status and restrictions of CE-KSB Interim Letter from ASME which expires October 25, 1978.

3. Reasons for removal of CE-KSB from CE Approved Vendor List.

4. Deletion of P.O Supplement 2 by P.O. Supplement 3B.

5. Status of items 2, 3, and 4 of P.O. Supplement 3B.

6. Removal of hold and inspection point requirements except for final inspection by P.O. Supplement 9602815 (generic) and specific P.O. supplements such as Supplement 12 to P.O. 9403833 for Contract 14273.

7. Adequacy of procedure QAP 16.1 in requiring vendor corrective action to CARs such as QCCAR-78-017 (reissue of QCCAR-77-029).