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

Report No. 99900081/81-01 Program No. 51500

Company: Exxon Nuclear Company, Inc.
Nuclear Fuels Department
2101 Horn Rapids Road
Richland, Washington 99352

Inspection Conducted: March 16-19, 1981

Inspectors: Lee L Brown for W. M. McNeill, Contractor Inspector — 4/17/81 Date
Components Section
Vendor Inspection Branch

Lee L Brown — 4/17/81
R. L. Brown, Contractor Inspector — Date
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Vendor Inspection Branch

Approved by: Lee L Brown for D. E. Whitesell, Chief — 4/17/81 Date
Components Section
Vendor Inspection Branch

Summary

Inspection on March 16-19, 1981 (99900081/81-01)

Areas Inspected: Implementation of Topical Report including design controls; periodic management meeting; controls of special processes; pellet attribute controls; and action on previous inspection findings. The inspection involved 54 inspector hours on site by two (2) NRC inspectors.

Results: In the six areas inspected no apparent nonconformances or unresolved items were identified in two of these areas. The following two nonconformances and one unresolved item were identified in the remaining areas.

Nonconformances: Pellet Attribute Controls: (1) The certification summary reports did not state that the inspections met the required confidence level (see Details Section II, Paragraph B.3.b.(1)). (2) The specifications nor quality control standards did not include the classification of the characteristic pellet grain structure (See Details Section II, Paragraph B.3.b.(2)).

Unresolved Item: Design Controls: The evaluation of preventative action on a previously identified problem (CAR 362) remains open till the next inspection.

DETAILS SECTION I

(Prepared by W. M. McNeill)

A. Persons Contacted

*C. A. Brown, PWR Design Manager
*G. J. Busselman, Fuel Design Engineering Manager
G. C. Cooke, Plant Transient Analysis Manager
R. A. Copeland, Design Coordinator
*T. L. Davis, QA Manager, Nuclear Fuels
S. F. Gaines, BWR Design Manager
*E. T. Johnson, QA Engineer
R. H. Kelley, Plant Transient Analysis Engineer
T. L. Krysinski, BWR Neutronics Manager
R. B. MacDuff, Fuel Testing Engineer
*J. A. Perry, QC Manager
R. A. Pugh, Mechanical Design Consultant
M. R. Schwab, Process Engineering and Development Manager
M. H. Smith, Design Coordinator
R. B. Stout, Neutronics and Fuel Management Manager
*C. J. Volmer, Quality Assurance Manager
K. N. Woods, Fuel Performance and Process Engineering Manager

*Denotes those attending the Exit Interview.

B. Action on Previous Inspection Findings

(Closed) Deviation (Report 80-02): some welding machines were found in use although beyond their calibration cycle. A review of new welding set ups in skeleton fabrication area found no further problem. Corrective action had been documented in the previous report.

C. Design Controls

1. Objectives

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

a. The manufacturer's design control activities are conducted in such a manner as to provide assurance that appropriate safety-related technical requirements have been implemented during the design of nuclear fuel.

b. The manufacturer's design control program, including its implementation, meets the requirements of the approved Topical Report.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of the Exxon Topical Report, XN-NF-1A, Revision 3, Section 3.0, Design Control, which established the general requirements for design control.

b. Review of Quality Assurance Procedure, XN-SOO-002, Design Control for Nuclear Fuel, Revision 8, which established specific requirements.

c. Inspection of the design files for jobs, Dresden 3 cycle 8 and Prairie Island 2 cycle 10. This inspection included Quotes, Proposals, and Contracts for the above projects. This inspection verified the translation of the above customer technical requirements into the Design Criteria, Index of Calculations, Design Package, and Design Report. The translation of the technical requirements used above was verified in Design Calculations, Fabrication Drawings, Material Specifications and Product Specifications. The type technical requirements were flow rates, power requirements, pressure, temperature, codes, over power limits, rod pitch, rod diameter, clad thickness, fuel length, handling loads, interface dimensions, etc.

3. Findings

a. Nonconformances

None.

b. Unresolved Item

It was found during this inspection, that some design calculations were nonconservative in their assumptions. This error occured because some design information was not labled as maximum, nominal, or minimum. For example, the mechanical design of fuel assembly hold down springs used a minimum rather than maximum flow rate. This problem had been independently identified during a customer audit of the exact same calculations several weeks preceding the inspection (CAR 362). Corrective action has been established for these particular calculations. The extent of preventive action remains open at this time as an unresolved item. For example: what other projects may be involved and what other calculations may be involved has yet to be fully verified.

c. Follow Up Item

During this inspection, it was identifeid that the Index of Calculations was not issued before a Parts List for one job. The design control procedure requires that the Index be issued before the Parts List. On Dresden it was noted that the areas of safety and thermal-hydraulic were not yet issued although the Parts List had been issued on November 25, 1980. This problem had been previously identified in an internal audit finding (CAR 347). The corrective and preventative action have been established and a schedule established for such. Follow up will be performed during the next inspection to verify close out of this problem by Exxon.

D. Periodic Management Meeting

1. Objectives

The objectives of this meeting were to accomplishs the following:

a. To meet the company management and those persons responsible for administrative of the Exxon Nuclear Company, Inc. QA program and to reestablish channels of communication.

b. To redetermine the extent of the company's involvement in the commercial nuclear business.

c. To explain NRC direct inspection program including VIB organization, inspection methods and documentation.

2. Method of Accomplishment

The preceding objectives were accomplished by a meeting with Mr. Astley, Vice President Fuels Manufacturing, and S. J. Beard, Vice President Engineering and Technology.

The following is a summary of the meeting:

a. The VIB organization was described and its relationship to NRC Region IV and the NRC Headquarters component of the Office of Inspection and Enforcement.

b. The VIB was described including the reasons for its establishment, its objectives, its implementation structure.

c. The conduct of VIB inspections was described and how our inspections are documented including the report, responses to reports, how proprietary information in handled, the Public Document Room, and the White Book.

d. The company's contribution to the nuclear industry and inspection history were discussed including current and projected activity.

e. The company quality assurance program was discussed.

3. Findings

No changes have occurred other than personnel since the last meeting.

G. Exit Interview

The inspectors met with management representatives (denoted in paragraph A) at the conclusion of the inspection on March 19, 1981. The inspectors summarized the scope and findings of the inspection.

DETAILS SECTION II

(Prepared by Ross L. Brown)

A. Persons Contacted

B. R. Black, Manager, QC Engineering
R. M. Crawford, Manager Manufacturing Engineering
E. N. Harbinson, Senior QA Engineer
*E. T. Johnson, Senior QA Engineer
R. A. Nelson, General Supervisor, QC Inspection
W. C. Spence, Shift Supervisor, QC Inspection
L. J. Troyer, General Supervisor, Pelleting Operations

*Attended exit meeting.

B. Pellet Attribute Controls

1. Objectives

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

a. Sufficient inspections of pellet attributes are made to give assurance that pellets meet specifications and contractural requirements.

b. The manufacturer's system is capable of detecting cracked, chipped or otherwise defective or degraded pellets and rejecting them or controlling their utilization.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of Project Parts List, to determine applicable documents, for fuel pellet quality control.

b. Review of Product Specification No. XN-S30061, Revision 28 to ascertain the required inspections and acceptance criteria for fuel pellets.

c. Review of drawing No. XN-NF-303, 383, Revision 1 "Fuel Pellets," to determine the dimensional requirements and tolerances for fuel pellets.

d. Review of QC Standards Index No. XN-N-1Q-6, Revision 4 to identify applicable QC Standards.

e. Review of QC Standard No. XN-NF-P68152, Revision 31 to determine the requirements to produce and release finished pellets.

f. Review of Process Specification No. XN-NF-P20, 199, Revision 8, to determine the Product sampling requirements.

g. Review of QA Document File No. 13776, to verify conformance with specified requirements.

h. Observations by the inspector to verify that the manufacturing and inspection methods and controls are identified on the production card (traveler) and the requirements are being implemented.

3. Findings

a. Unresolved Items

None.

b. Nonconformances

(1) Exxon management stated that it was their intention that when the sample size and upper and lower limit values are reported that should represent the required confidence level. Prior to the conclusion of the inspection, form XN-F00,115 was revised to state the inspection meets the specified confidence level. This item is considered closed and no further response is required.

(2) Exxon management stated that this examination is for information only and not an accept or reject examination. Prior to the conclusion of the inspection the QC Standard was revised to state this examination is for information only.

The revised standard was approved by the appropriate Exxon management, therefore, this item is considered closed and no further response is required.

c. The inspector verified the following:

(1) The production methods and controls are specified and are adhered to during production.

(2) The specifications, standard and drawings describes the inspection plan including the acceptance criteria for the following pellet attributes:

(a) Density,

(b) Geometry (length, diameter, dish and land dimensions, prependicularity, cylindricity, etc.),

(c) Visual appearance (chip, cracks, surface inclusions, etc. including visual standards),

(d) Density changes in resintering tests.

(3) The QA Document File No. 13776 included the following documents for five pellet lots which are complete and properly signed:

(a) Quality Release

(b) Enrichment certificate

(c) Analytical Report - Isotopic

(d) Fabrication Cards

(e) Production Parameters

(f) Conversion Process Parameters

(g) Powder Preparation Parameters

(h) Resintered Pellet Density

(i) Analytical Laboratory Report

(j) Pellet Certification Summary

(k) Pellet Inspection

(l) Grain structure ceramographs before and after resintering.

C. Controls of Special Processes (Helium Leak Testing and Welding)

1. Objectives

The objectives of this area of the inspection were to verify that special processes are properly qualified and controlled in accordance with the approved Topical Report No. XN-NF-Section 9.0.

2. Method of Accomplishment

The preceding objectives were accomplished by a review of the following documents, observations by the inspector and discussions with cognizant personnel:

a. Related to Helium Leak Testing personnel qualification.

(1) Technical Certification Standard No. XN-NF-64, Revision 10, Procedure No. XN-NF-P68387, Section 5.2 and Attachment. XV, to determine the required technical and physical qualifications for each tester and required documentation.

(2) Certification file for five Helium Leak Testing personnel.

b. Related to Control of Welding

(1) Specification No. XN-NF-P20, 467,

(2) Specification No. XN-NF-P20, 202,

(3) Specification No. XN-NF-P20, 203 and

(4) Specification No. XN-NF-P20, 258

to determine the procedural requirements for the various welding processes used in the manufacture of fuel.

(5) Standard No. XN-S 68, 106, and

(6) Specification No. XN-NF-P20, 269

to determine the requirement for testing, and certification of fuel rod welding.

(7) Qualification Certification for Specification Nos. XN-NF-P20, 269, XN-NF-P20; 258, XN-NF-P20, 202, and XN-NF-P20, 467, to verify conformance with requirements specified in the above specifications and standards.

3. Findings

a. No nonconformances or unresolved items were identified in this area of the inspection.

b. The inspector verified the following information in this area of the inspection.

(1) The welding specifications outlines the requirements for qualification of the end closure weld design, welding procedures, and welding equipment performing stainless steel or zircaloy rod end closure welds.

(2) The welding operator certification specifications describes the general plans for training, testing and certifying welding operators conducting stainless steel or zircaloy rod closure welds and assembly welds of skeletons and spacers.

(3) The personnel certification and qualification standards and procedures describes the qualification requirements of personnel responsible for the performance of quality control inspection, examination and testing activities (including helium leak testing). These documents also describe the method for verification of the technical and physical qualifications of each inspection technician.

(4) The qualification and certification files indicated conformance with the specification and procedural requirements.

(5) Observations by the inspector indicated that the operators (welding and helium leak test) were familiar with the applicable procedure and were adhereing to its requirements.