Consumers Power Company

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November 15, 1972

Mr. John F. O'Leary, Director
Directorate of Licensing
United States Atomic Energy
Commission
Washington, DC 20545

Re: Docket 50-155
License No DPR-6
Additional Information -
Proposed Tech Spec
Change No 31

Dear Mr. O'Leary:

On November 10, 1972, during a telephone conversation, further information was requested by your staff with respect to our June 16, 1972 application for Amendment to Operating License No DPR-6 and Request for Change to the Technical Specifications of License No DPR-6, Docket No 50-155, for the Big Rock Point Nuclear Plant. This letter is submitted to provide the requested information. The question asked by your staff is included to provide clarity.

Question

Discuss the quality assurance program and quality control checks that are designed to assure the mechanical integrity of fuel over its anticipated lifetime, including design review effort, review and audit of quality assurance during manufacturing and planned inspection of fuel after delivery.

Indicate how fuel design and manufacturing minimize failures from hydriding and fuel-clad interaction.

Answer

Jersey Nuclear maintains an extensive program of quality assurance and quality control to assure differences from approved design specifications are identified and controlled. The control exists to insure that proper engineering decisions can be made relative to indicated differences from design. The control monitors the implementation of these engineering decisions as well. The attached table (Attachment I) illustrates checks made on fuel pellets and cladding. These are examples of the types of quality control checks made to measure conformance to specifications.

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The tests referenced above are performed, documented and available for review by Jersey Nuclear Quality Assurance personnel as well as Consumers Power Company personnel. Records of these tests are maintained by Jersey Nuclear, Consumers Power Company or both.

Consumers Power Company performs quality assurance audits during the manufacture of Reload G fuel assemblies. These audits serve to measure the performance of the vendor's quality assurance and quality control efforts. These audits are a thorough review of work performed by the vendor relative to the assemblies. The audits are documented and are maintained on file within Consumers Power.

The fuel assembly design has been reviewed within Jersey Nuclear by its Fuel Design Council. This Council is made up of the various heads of functional groups such as research and development, quality assurance, product design and manufacturing. The fuel design has also been reviewed by functionally cognizant (physics, thermal-hydraulic, mechanical and metallurgical) individuals within Consumers Power Company.

The design and manufacturing efforts on these assemblies address common industry fuel design manufacturing and performance problems. Controls are provided to assure pellets are loaded in their proper position within assemblies. Pellets are stamped with a unique identifying symbol. Manufacturing facilities are such that mixing of enrichments during pellet production is virtually impossible. Pellets are segregated by lot number and enrichment and placed in segregated, restricted storage. Quality assurance checks assure that the appropriate pellets are properly loaded into rods which also bear an enrichment identification. Quality control provides for use of an assembly matrix sheet during the loading of rods into spacer grids. This matrix sheet provides a check that rods are loaded in their proper positions.

Pellet specifications permit only very low levels of moisture and other hydrogenous materials. Pellets are maintained under controlled conditions following moisture determination and prior to rod loading to greatly reduce the moisture pickup. Assemblies with pellets manufactured to current limits have been examined by dry sipping, visual and nondestructive means following exposures of over 5000 MWd/MT in the Big Rock Point Plant reactor with no failures being noted.

The cold pellet-clad diametrical gap has been set at a nominal 0.0095" utilizing Jersey Nuclear mechanical design codes. This value is larger than that utilized in Big Rock Point Reload B. Pellet length to diameter ratio has been reduced to 0.86. Pellet standards have been set to provide pellets which are relatively free from chips and cracks. The design employs a dished pellet. These are some of the design considerations aimed at reducing the probability of even a small percentage of fuel-clad interaction fuel rod failures.

Reload G fuel assemblies will be visually and dimensionally inspected following their arrival at Big Rock Point. Consumers Power Company representatives will perform the inspection using approved, written procedures. Jersey Nuclear representatives will be present during the inspection and will be afforded opportunities to participate in the inspection.

Normally Reload G assemblies will be examined at refueling outages following periods of irradiation. Examination of the assemblies will consist of dry sipping to measure assembly integrity with selected assemblies receiving more detailed visual and nondestructive examination.

Yours very truly,

Ralph B. Sewell

RBS/map

Ralph B. Sewell
Nuclear Licensing Administrator

CC: BHGrier,
USAEC

ATTACHMENT I
Jersey Nuclear Component Inspection

Assembly Component	Attribute Inspected
1. UO_2 Final Pellet Test and Inspection	1. U Content
	2. O/U Ratio
	3. Halides
	4. Moisture
	5. Nitrogen
	6. Carbon
	7. Sorbed Gas
	8. Spectrographic Impurities
	9. EBC
	10. U-235
	11. Diameter
	12. Length
	13. Dish Diameter
	14. Dish Depth
	15. Perpendicularity
	16. Density
	17. Chamber
	18. Radial, Axial and Circumferential Cracks
	19. End and Circumferential Chips
	20. General Appearance
2. Zircaloy Tubing Receiving Inspection	1. ID
	2. Wall Thickness
	3. Length
	4. Defects
	a. Ultrasonic
	b. Eddy-Current
	5. Mechanical Properties
	a. US RT
	b. YS RT

ATTACHMENT I (Contd)

Assembly Component	Attribute Inspected
	c. % Elongation
	d. US (650°F)
	e. YS (650°F)
	6. Burst Test
	7. Flare Test
	8. Grain Size
	9. Corrosion Test
	10. Hydride Orientation
	11. Alloy Composition
	12. O, N and H Content
	13. Metallic Impurities
	14. EBC
	15. Surface Defects
	16. Straightness
3. Fuel Rod Certification (Prior to Release for Assembly Loading)	1. Helium Leak Check
	2. Weld Defects
	3. Rod Diameter
	4. Rod Length
	5. End Cap Alignment
	6. Rod Straightness
	7. Rod Identification
	8. Decontamination Check
	9. Appearance
	10. Confirmation of Process Records and QC Test Specification Data