

TA 60804
PDR

8712070097 860501
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5/1/85

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PLANT NO. 2
P. O. BOX 988
3010 GEORGE WASHINGTON WAY
RICHARD, WASHINGTON 92352

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(509) 377

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8

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NEW AND USED REPT (509) 377

JOHN - PLS MAKE SURE HOWARD RICHINGS
GETS THIS ASAP. THANKS.

LARRY A.

Lead Test Assembly Program

WNP-2

INTRODUCTION AND SUMMARY

The purpose of the Lead Test Assembly Program is to provide performance information relative to variations in the design parameters noted below. This test program is part of Exxon Nuclear's Advanced Fuel Development Program.

This test program will involve fabrication of two fuel assembly types, shown in Figures 1 and 2. Each of the assemblies will incorporate segmented and full-length characterized fuel rod configurations. The segmented rods shall be designed with the capability of being removed from the assemblies at different burnup levels and replaced with rods of appropriate enrichment. The removed rod will subsequently be separated and stored for later ramp testing. The assemblies are identical in design with the XN-1 reload except for the differences noted below.

In addition to characterization, various test fuel rod configurations will incorporate the following variations in design parameters:

- 1) Variations in pellet microstructure (grain size and pore size).
- 2) Variations in pellet fabrication process (ADU conversion, Dry Conversion, duplex, and gadolinia pellets).
- 3) Variations in cladding (normal production and beta heat-treat).
- 4) A plenum spacer insert which will allow quantitative, non-destructive fission gas analysis with poolside gamma spectroscopy measurement. This spacer insert will be incorporated only in full-length test rods.

* Duplex pellets incorporate a natural uranium core surrounded by a higher enriched uranium annulus, co-pressed & ground to the standard pellet configuration and producing a pellet with an average enrichment approximating that of a standard pellet.

SUMMARY OF ROD TYPES

Assemblies will contain segmented and full-length characterized fuel rods with type and location as specified in Figures 1 and 2. The remaining fuel rods required to complete an assembly array shall be of standard production design. A summary of the various characterized test rod types and quantities is given in Table 1.

CHARACTERIZATION SUMMARY

Table 2 summarizes the measurements to be performed for characterization.

LICENSING CONSIDERATIONS

Mechanical, thermal hydraulic, LOCA/ECCS, plant transient and neutronic design analyses were reviewed for the Lead Test Assemblies. The results of this review indicated that the Lead Test Assembly design has comparable margin to limits as the standard XN-1 Reload design. In no case are the test rods the limiting rods in the design analysis.

Table 1 Summary of Required Characterized Rods and Segments

| <u>Rod Type</u> | <u>Rod Qty.</u> | <u>Segments per Rod</u> | <u>Archive Samples</u> | <u>Cladding Description</u> | <u>Pellet Description</u> | <u>Pellet Enrichment</u> |
|-----------------|-----------------|-------------------------|------------------------|-----------------------------|---------------------------|--------------------------|
| A | 1 | 2 | 1 | Production | ADU - Large Pore | M |
| | | 2 | 1 | Production | ADU - Small Pore | M |
| B | 1 | 2 | 1 | Production | ADU - Large Grain | M |
| | | 2 | 1 | Production | ADU - Small Grain | M |
| C | 1 | 2 | 1 | Production | Duplex | M |
| | | 2 | 1 | Production | Dry Conversion | M |
| D | 1 | 2 | 1 | Beta Heat Treat | ADU - Production | M |
| | | 2 | 1 | Beta Heat Treat | Duplex | |
| E | 1 | N/A | | Beta Heat Treat | ADU - Large Grain | M |
| F | 1 | N/A | | Beta Heat Treat | ADU - Small Grain | M |
| G | 1 | N/A | | Beta Heat Treat | ADU - Large Pore | M |
| H | 1 | N/A | | Beta Heat Treat | Duplex | M |
| J | 2 | N/A | 1 | Beta Heat Treat | Gadolinia | ML |
| K | 2 | N/A | 1 | Production | Gadolinia | ML |
| L | 4 | N/A | — | Beta Heat Treat | Dry Conversion | M |
| Total | 16 Rods | | 10 Archive Samples | | | |

DRAFT

Table 2 Summary of Characterization Measurements

o Pellets

- Open/closed porosity
- Humidification, density, weight, volume
- Chemistry
- Ceramography (grain size)
- Resinter test
- Pore size
- Dish depth and volume

o Cladding

- I.D., O.D., wall thickness (ultrasonic 3-D)
- Standard QC mechanical test
- Texture measurements
- Contractile strain ratio (axial and circumferential)
- Cladding I.D. surface roughness
- Grain size and hydride orientation
- Standard chemistry

o Full Length Rods

- Rod length
- Plenum length
- Fuel column length
- Full length X-ray
- As-fabricated O.D. measurements

o Segmented Fuel Rods

- Overall fuel rod length and segment length
- Plenum length
- Fuel column length
- Full length X-ray showing pellet/pellet interfaces
- As-fabricated O.D. measurements

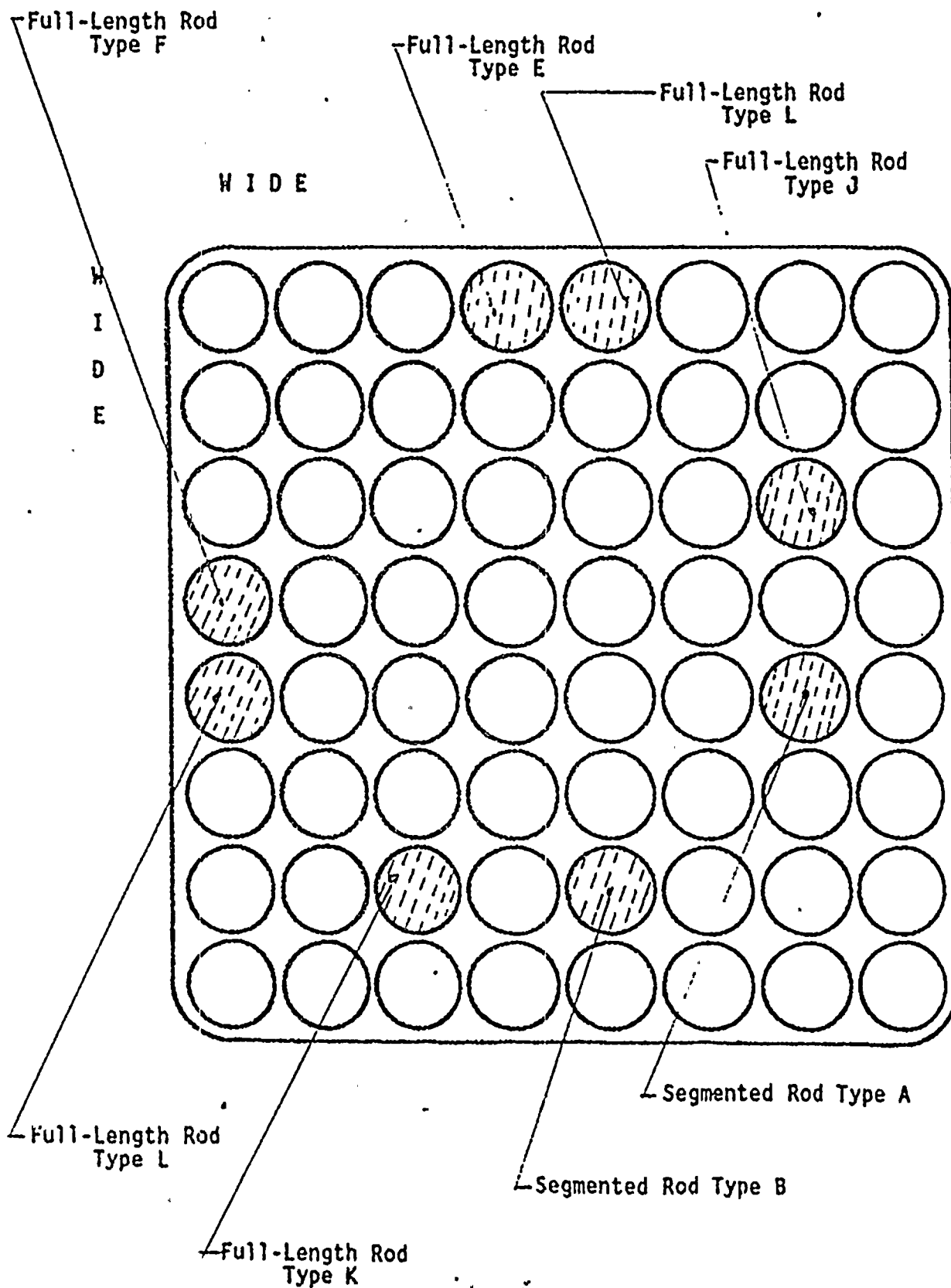


Figure 1. Rod Matrix - Assembly 1 (see Table 1)

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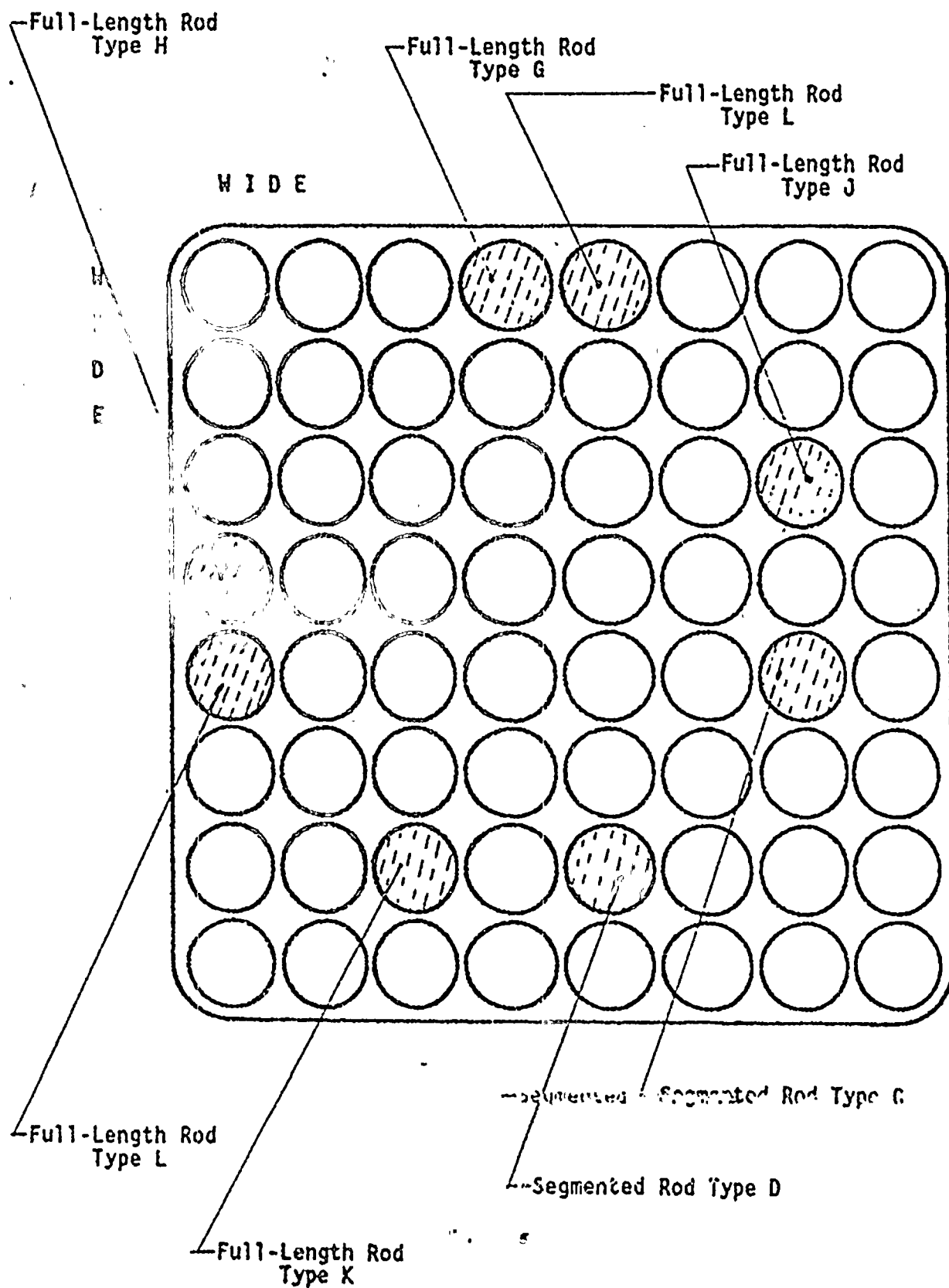
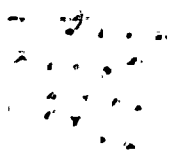


Figure 2. Rod Matrix. - Assembly 2 (see Table 1)



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April 30, 1985

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Mr. G. C. Sorensen, Manager
Regulatory Programs
Washington Public Power Supply System
P.O. Box 968
3000 George Washington Way
Richland, Washington 99352
SUBJECT: WPPSS NUCLEAR PROJECT NO. 2

The following documents concerning our review of the subject facility are transmitted for your information.

- ☐ Notice of Receipt of Application, dated _____.
- ☐ Draft/Final Environmental Statment, dated _____.
- ☐ Notice of Availability of Draft/Final Environmental Statement, dated _____.
- ☐ Safety Evaluation Report, or Supplement No. _____, dated _____.
- ☐ Notice of Hearing on Application for Construction Permit, dated _____.
- ☐ Notice of Consideration of Issuance of Facility Operating License, dated _____.
- ☒ Monthly Notice; Applications and Amendments to Operating Licenses Involving no Significant Hazards Considerations, dated April 1985.
- ☐ Application and Safety Analysis Report, Volume _____.
- ☐ Amendment No. _____ to Application/SAR dated _____.
- ☐ Construction Permit No. CPPR- _____, Amendment No. _____ dated _____.
- ☐ Facility Operating License No. _____, Amendment No. _____, dated _____.
- ☐ Order Extending Construction Completion Date, dated _____.
- ☐ Other (Specify) _____

Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

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