ATTACHMENT B

UNIT 2 PROPOSED SPECIFICATIONS

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 217 fuel assemblies with each fuel assembly containing a maximum of 236 fuel rods clad with Zircaloy-4. Each fuel rod shall have a nominal active fuel length of 150 inches and contain a maximum total weight of 1900 grams uranium. The initial core loading shall have a maximum enrichment of 2.91 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.1 weight percent U-235.

CONTROL ELEMENT ASSEMBLIES

5.3.2 The reactor core shall contain 83 full length and 8 part length control element assemblies.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR with allowance for normal degradation pursuant of the applicable Surveillance Requirements,

b. For a pressure of 2500 psia, and

c. For a temperature of 650°F, except for the pressurizer which is 700°F.

MAR 01 1985

ATTACHMENT D

UNIT 3 PROPOSED SPECIFICATIONS

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 217 fuel assemblies with each fuel assembly containing a maximum of 236 fuel rods clad with Zircaloy-4. Each fuel rod shall have a nominal active fuel length of 150 inches and contain a maximum total weight of 1900 grams uranium. The initial core loading shall have a maximum enrichment of 2.91 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.1 weight percent U-235.

CONTROL ELEMENT ASSEMBLIES

5.3.2 The reactor core shall contain 83 full length and 8 part length control element assemblies.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR with allowance for normal degradation pursuant of the applicable Surveillance Requirements,

b. For a pressure of 2500 psia, and

c. For a temperature of 650°F, except for the pressurizer which is 700°F.

MAR 01 1985

ATTACHMENT E

ANALYSIS SUMMARY

LEAnderson
6/4/85

JUSTIFICATION FOR STORAGE OF 4.1 W/O ENRICHED FUEL IN SAN ONOFRE 2/3 FUEL STORAGE RACKS

1. PURPOSE

Criticality calculations were performed to verify that the SONGS 2/3 spent and new fuel storage racks and the fuel transfer carrier can acceptably store 4.1% enriched fuel from a criticality standpoint. The original design was performed for 3.7% enriched fuel and contained sufficient margin to keep the worst k-effective in the spent fuel storage rack below 0.95 and the worst k-effective of the new fuel storage racks below 0.98. The original design calculations are documented in References 1 and 2.

2. METHODOLOGY

The method for calculating the criticality of various fuel storage and fuel handling configurations is comprised of the following computer programs:

1. KENO-IV/S
2. NITAWL-S
3. EPRICELL-2
4. DANCOFF

The KENO-IV/S and NITAWL-S programs were obtained from the Technical Data Management Center at Oak Ridge National Laboratory as part of the SCALE-2 Computer Code System (Reference 3). The EPRICELL-2 and DANCOFF were obtained from the Electric Power Research Institute as part of the ARMP code package (Reference 4).

KENO-IV/S is a multi-group Monte Carlo criticality program. It utilizes a very simple geometry input that is capable of modeling three-dimensional systems exactly. The principal result calculated by KENO-IV/S is the system k-effective, the estimate of criticality.

NITAWL-S performs the resonance shielding calculations for these nuclides which have resonance parameters included in their basic cross section data. NITAWL-S uses the Nordheim Integral treatment for the resonance calculations. The 27-group neutron cross section library furnished with the SCALE package was used for these analyses for input to both NITAWL-S and KENO-IV/S.

EPRICELL-2 is an EPRI computer program for fuel pin cell calculations. In these analyses it was used to generate fuel material concentrations for the 4.1% enriched fuel and the DANCOFF factors for input to NITAWL-S.

The DANCOFF program calculates the DANCOFF factor based on Lauer's method and was used to independently check the values calculated by EPRICELL-2 and to calculate values at water densities below the limit at which EPRICELL ceases to function.

The basic sequence of calculations is as follows:

1. Generation of Dancoff factors at various water densities and calculation of fuel nuclide concentrations using EPRICELL-2 and DANCOFF.

2. Generation of 27 group neutron libraries for use in KENO-IV/S with the NITAWL-S program calculating resonance effects.

3. KENO-IV/S calculation of the reference configuration using nominal conditions.

4. KENO-IV/S calculations with normal and abnormal variations of system conditions (i.e. pitch, water density, fuel handling accident, etc.).

5. The reference case k-effective is combined with the calculation-to-measured bias from Reference 5 and all the normal and abnormal k-effective variations to estimate the worst system k-effective.

The system worst k-effective is then compared to the design limits specified in NRC Regulatory Guide 1.13(6) or the NRC standard review plan (7), whichever is applicable. These limits are 0.95 for spent fuel storage racks and fuel handling systems and 0.98 for new fuel storage racks.

3. RESULTS

Spent Fuel Rack

Reference Case k-effective	0.90111
KENO-IV Calculation Uncertainty $\Delta k (2\sigma)$	0.00266
Calculation-to-Measured Bias Δk (from DC-1859)	0.01332
Worst Normal Conditions Δk Minimum Rack Pitch & Eccentric Fuel Load	0.01503
Worst Abnormal Temperature Δk (39°F)	0.00192
Dropped Fuel Assembly Accident Δk	0.00214
Waterlogged fuel pins (1% failed) Δk	0.00008
Worst k-effective	0.93626

New Fuel Rack

Reference Case k-effective	0.38218
KENO-IV Calculation Uncertainty $\Delta k(2\ \sigma)$	0.00208
Calculation-to-measured Bias Δk (from DC-1859)	0.01332
Normal Humidity Range Δk	0.01301
Accident Δk (Worst of flooding or fuel handling accident)	max (0.46567,0.08527)
Worst k-effective	0.87626

Fuel Transfer Carrier

Worst Temperature k-effective	0.89226
KENO-IV Calculation Uncertainty $\Delta k(2\ \sigma)$	0.00232
Calculation-to-measured Bias Δk (from DC-1859)	0.01332
Worst k-effective	0.90790

4. REFERENCES

1. NES 81A0529, Rev. 0, "Nuclear Design Analysis Report for the San Onofre Nuclear Generating Station Units 2 and 3 High Density Fuel Storage Racks", December 16, 1977.

2. NES 81A0534, Rev. 0, "Nuclear Design Analysis Report for the New Fuel Storage Racks for the San Onofre Nuclear Generating Station Units 2 and 3", October 6, 1978.

3. NUREG/CR-0200, "SCALE-2 A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation", Technical Data Management Center, Oak Ridge National Laboratory.

4. "Advanced Recycle Methodology Program System Documentation", Electric Power Research Institute, CCM-3, January 1976.

5. "KENO-IV Benchmarking Calculations for SONGS 2/3 Criticality Analyses", C. W. Gabel, May 1985, DC-1859.

6. NRC Regulatory Guide 1.13 Revision 1, December 1975.

7. NRC Standard Review Plan, NUREG-0800, Section 9.1.1, Pages 9.1.1-9.1.4, "New Fuel Storage".