TRANSNUCLEAR, INC.

June 10, 1985

Mr. Neal Moore
Office of International Programs
Mail Stop 414-A (EWS Towers)
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: XSNM02216
(NUK-461)

Dear Mr. Moore:

Enclosed for your information is the original reactor checklist for our application XSNM-2216, dated May 7, 1985.

Please note that on page two of the checklist, the second item under "average burnup" now reads "134 % fifa," instead of "1.34 % fifa."

Sincerely,

Barbara A. Hannett
Traffic Coordinator

encl: As stated above

cc: D. Dubois/Euratom

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24.05.1985

CHECKLIST FOR USE IN REVIEW OF REQUESTS FOR HEU TO DETERMINE TECHNICAL AND ECONOMIC JUSTIFICATION

1) Name of reactor and facility

THTR = "Thorium-Hochtemperatur-Reaktor"
Owner: HKG = "Hochtemperatur-Kernkraftwerk, GmbH, Gemeinsames Europäisches Unternehmen" (Common European Enterprise), D 4700 Hamm 1, Federal Republik of Germany

2) Location

Hamm-Uentrop, Land North-Rhine-Westphalia, Federal Republic of Germany; Hamm is located at the east part of the Ruhr-district

3) Quantity of uranium requested (kg U)

218 kg U

4) Enrichment in the isotope U-235

appr. 93.15 $\pm$ 0.15 % U-235

5) Quantity of uranium requested (kg U-235)

203.4 kg U-235

6) Type of fuel element and form of uranium

Graphite sphere, diameter 60 mm, containing coated particles. Uranium/Thorium-oxide kernels 1 : 10. Kernel diameter 400 µm; coated with PyC

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7) Current reactor power level (MW th)

Reactor will come in operation; the operation license was obtained on April, 9, 1985; full operation is to be expected mid 1985

Designed output

750 MW thermal
296 MW electric net

8) Duty factor, average burnup

Duty (load) factor: 74 %
Average burnup: 11.4 % fima
1 34 % fifa

9a) Current core loading (kg U-235)

appr. 344 kg U-235

b) Amount of fuel per element (kg U-235)

0.96 g U-235
10.20 g Thorium

c) Number of elements in core

First Loading:
358,200 fuel elements
43,500 absorber elements (containing Boron and Hafnium)
272,500 spheres of pure graphite (without fuel)

674,200

In equilibrium:

675,000 fuel elements

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d) Average core life

3 years at full load
4 years at 74 % load

e) Active core dimensions

Diameter	5.6 m
Height	6.0 m

f) Neutron flux

Average thermal 1,21 . 10^{14} n/cm^2 . sec

10) Annual fuel useage (kg U-235)

165.5 kg U-235 at 74 % load

11) Annual spare fuel requirement, if any (kg U-235)

No annual spare fuel requirement (on-load refuling)

12) Plans to increase, decrease reactor power level

No plans

13) Estimated annual supply of current fuel request

Current fuel element fabrication at 35,000 elements/year, containing appr. 34.4 kg U-235.
Increase of fuel element fabrication to 100,000 elements/year is planned for 1986. A further increase of fuel element fabrication to 170,000 elements/year is planned for 1987 and following years

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14) Required manufacture's working stock, if any, included in this request (kg U-235)

According to the before mentioned fabrication figures the demand for highly enriched Urnanium (HEU) is as follow:

year	fabrication of fuel demand/years	requested kg HEU (including 1.3 % losses + 0.3 % for samples)
1986	100,000	218
1987	170,000	220
1988	none	0
1989	170,000	178
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The higher demand fo HEU in the years 1986 and 1987 is due to the fact that a new fabrication building at Nukem GmbH, Hanau, shall be constructed in 1988 and that, therefore, the manufacturing of kernels (the first step of the production of fuel element is not possible in 1988. To avoid any bottleneck in fabrication of kernels, the pre-fabrication of the kernels shall be done in 1986 and 1987.

15) Fabrication loss, if any, included in this request (kg U-235)

fabrication loss is 1.3 %

16) Names of convertor and fabricator of fuel

Enriched uranium hexafluoride will be converted and manufactured into complete elements at Nukem GmbH. Nukem is partner in the group, which erects the reactor. In 1972, after signature of the contract for building the THTR, Nukem founded the 100 % affiliate HOBEG, Hochtemperaturreaktor-Brennelement GmbH, responsible within the Nukem organisation for the fabrication of high-temperature fuel elements. In the case of the THTR-elements

17) Location

Hanau, State of Hessia, Fed. Rep. of Germany. Hanau ist located appr. 25 km east of Frankfurt.

18) Inventory

Fuel inventory for THTR-production imported from the USA is 786.451 kg HEU corresponding to appr. 731 kg U-235 as of Dec. 31, 1984.

a) Quantity of scrap U-235, useable, non-useable (kg U-235)

As per end of Dec. 84 appr. 10 kg HEU in form of scrap.
Corresp. to appr. 9.3 kg U-235
This scrap is useable. No unuseable scrap.

b) Quantity of fabricated unirradiated stored fuel available

As per end of Dec. 84

First core	358,200 elements
Reloads appr.	349,223 elements
	707,423 elements are manufactured
containing appr.	679 kg U-235

c) Quantity of unirradiated non-fabricated stored fuel (which) will be available from fabrication planned or in process)

Received from the US DOE and General Electric	731 kg U-235
elements stored as per Dec. 31, 1984	679 kg U-235
fuel in different stages of fabrication as per Dec. 31, 1984	52 kg U-235

d) Amount of spent fuel stored (kg U-235)

No spent fuel stored.

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19) Date at which current inventory, including a, b, c will be expended

Appr. mid of 1988.

20) Date current requested fuel will be needed (at reactor)

Appr. end of 1988. According to the time schedule as per end of Dec. 1984.

21) Date current requested fuel will be needed by convertor and fabricator

Beginning of 1986

22a) Time taken for shipment from USA to convertor/fabricator

Less than 1 week; plus 2 to 4 weeks for arrangements with "Deutsche Luftwaffe".

b) Lead time for ordering in USA

180 days (Utility Services Contract)

23) Date at which current requested fuel will be expended i.e., when a further HEU supply will be needed at reactor

End of 1989. According to the time schedule as per end of Dec. 1984.

24) Dates at which reactor could be converted to 45 % fuel; to 20 %, including time required for licensing procedure

The THTR-reactor is the prototype of a power-reactor and not a research reactor. The conclusions of INFCE (Working-group VIII) and the international program RERTR (reduced enrichment in research and testreactors) do not apply.

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Moreover a conversion from HEU to MEU or LEU, i.e. conversion of the fuel cycle, would have increased the erection time of the reactor by appr. 5 years due to licensing problems. The whole licensing procedure would have to be started again from beginning. A change of the core design would furthermore influence all components of the primary coolant cycle and cause restrictions in reactor operation. This on the other hand would most probably require a new public hearing.

25) History and dates of previous HEU supplies by the U.S.

Quantities of HEU already received from the USA for the fabrication of THTR fuel elements are the following:

month/year	kg U
6/72	48.038
8/72	48.021
11/72	47.997
2/73	16.317
3/73	31.683
4/73	48.083
7/73	48.023
3/74	96.025
6/74	63.948
12/74	16.009
1/76	47.949
7/77	103.082
6/78	120.005
from GE 6/84	51.271
sum	786.451

26) Amount of fuel of U.S.-origin previously consumed during operation of reactor

None, reactor only in operation mid 1985.

27) Status of cooperation between reactor operator and Argonne National Laboratory in reduced enrichment program (RERTR).

No cooperation. Cooperation between Nukem and RERTR in the field of MTR.

28) status of agreement between reactor operator and ANL to reduce enrichment

No agreement

29) Status of cooperation between reactor operator and IAEA reduced enrichment program

No cooperation.

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