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AND THE NATIONAL DEFENSE PROGRAM

C. D. Harrington

April 21, 1972

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FIGURE 1

PROPOSED RESTART OF HANFORD KE REACTOR
SALIENT FEATURES

- ④ SHORT STARTUP AND PREPARATION
 - STARTUP AND FULL POWER IN 7 MONTHS
 - REPAIR AND REPLACEMENT COST - \$375,000
 - PRESTARTUP LABOR AND MATERIAL COST - \$4.416 MILLION
- ④ LARGE PRODUCTION CAPACITY
 - 1080 Kg Pu PER YEAR
- ④ LOW COST
 - EQUILIBRIUM INCREMENTAL OPERATING COST - \$9.950 MILLION
- ④ HIGH PRODUCT PURITY
 - 93.48 PERCENT Pu-239
 - 6.0 PERCENT Pu-240
 - 0.52 PERCENT Pu-241

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April 21, 1972

U. S. Atomic Energy Commission
Richland Operations Office
Richland, Washington 99352

Attention: Mr. T. A. Nemzek, Manager

Gentlemen:

DOUGLAS UNITED NUCLEAR, INC.
AND THE NATIONAL DEFENSE PROGRAM

Reference: DUN-7904, "Douglas United Nuclear and the National
Defense Program," C. D. Harrington, March 24, 1972,
(Secret).

The referenced document presents the results of an updated study to determine the preparation, schedules and cost for restart of KE Reactor and the subsequent plutonium production and incremental conversion cost of sustained plant operation. The restart of Hanford's KE Reactor features short startup time, large capacity, low cost, and high purity product (Figure 1).

The study shows that KE Reactor can be restarted and achieve full power 7 months after authorization. This relatively short startup time is achievable because of (a) a large inventory of finished fuel that can be readily recertified for immediate use and a similarly large inventory of uranium cores and cladding components, (b) the current availability of skilled and experienced manpower in the Tri-Cities area, and (c) the excellent condition of the reactor and water treatment facilities which have exhibited no deterioration as a result of corrosion or mildew.

Prestartup costs are \$4,416,000 for labor and material with only \$375,000 for facility repair and replacement. Over 375 kg of plutonium are produced in the first year.

Equilibrium operation is achieved near the end of the second year. Douglas United Nuclear annual incremental cost is \$9,950,000 for equilibrium operation with an incremental conversion cost of \$9.20 per gram. The large capacity of KE Reactor results in 1080 kg per year at 6 percent Pu-240 content. Incremental reactor production and cost schedules are shown in Figure 2.

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U. S. Atomic Energy Commission

-2-

April 21, 1972

Of comparable importance to the large capacity and the low cost of production is the high purity of the product. Plutonium containing 6 percent Pu-240 and only 0.52 percent Pu-241 would be produced. The total radiation emitted by the Pu-241 isotope is thus minimal. This will result in reduced exposure of personnel to ionizing radiation in the subsequent fabrication and handling of the plutonium.

Reactor operation following restart would be in compliance with nuclear safety and environmental requirements as contained in AEC Manual Chapters and Operating Safety Limit documents. Concentration of radioactivity in the Columbia River would be 20 percent of maximum permissible concentrations at the site boundary without any facility modification. A reduction of these concentrations could be attained with capital expenditures. The cost and effectiveness of methods which could be implemented to further reduce concentrations of radioactivity releases are shown in Figure 3. At full reactor power level, the discharge of KE Reactor effluent to the Columbia River would raise the river temperature 1.85 F and 1.1 F at the minimum regulated and minimum daily average river flows respectively. These temperature increases are well below the 2.15 F permitted by State thermal standards for a river temperature of 64 F, the maximum river temperature anticipated to occur during the next several years. The effects of the reactor thermal discharge on the aquatic biology of the river have been studied for some 25 years with up to nine reactors operating with no detectable adverse effects.

Your consideration of this program proposal is solicited.

Very truly yours,

Original Signed By
C. D. HARRINGTON
Charles D. Harrington
President

CDH:bmp

Attachments

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FIGURE 2

PROPOSED RESTART OF HANFORD KE REACTOR
INCREMENTAL OPERATING PRODUCTION COST AND SCHEDULE

REACTIVATE FACILITIES
& RECRUIT PERSONNEL

REACTOR CHECKOUT

FUEL LOADING

POWER ASCENSION

PRODUCTION 4000 MW

4400 MW

RENOVATION COSTS	(\$1000)	375			
PREPRODUCTION COSTS	(\$1000)	4416			
OPERATING COSTS	(\$1000)		4638	10,020	9950
Pu PRODUCT	(Kg)		375	1060	1080

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FIGURE 3

PROPOSED RESTART OF HANFORD KE REACTOR
EFFLUENT TREATMENT ALTERNATES

* ELAPSED TIME FROM AUTHORIZATION TO BENEFICIAL USE

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