Department of Energy
Washington, D.C. 20545

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Mr. Paul S. Check, Director
CRBR Program Office
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Check:

RESPONSE TO REQUEST FOR ADDITIONAL ENVIRONMENTAL INFORMATION

This letter transmits responses to Questions 290.9R, 320.3R, 320.4R, 320.6R, 320.8R, and 750.1R as requested in your October 26, 1981, letter. Also, an interim response to Question 320.7R is provided.

Sincerely,

John R. Longenecker

John R. Longenecker, Manager
Licensing & Environmental
Coordination
Office of Nuclear Energy

Enclosures

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Item 290.9R

Give the status of the NPDES Permit, the Clean Water Act 401 Certification, and other permits and approvals required prior to station operation.

Response

The specific details of individual permits and approvals are as follows:

1. U.S. Environmental Protection Agency (Region IV)

    a. Permit - The National Pollutant Discharge Elimination System (NPDES) Permit

    b. Status - A Draft NPDES Permit was initially issued November 4, 1976, however, due to the National Policy Debate concerning the future of the CRBRP Project, the draft permit was not further resolved. An up-to-date draft of the NPDES Permit application was prepared in late November 1981 and was transmitted to the EPA and the State of Tennessee in early December 1981. Recent conversations with both parties indicate that present unresolved issues are expected to be satisfied such that the EPA may issue a joint DOE-EPA Memorandum of Agreement pursuant to 40 CFR 122.66(c)(4)(i) by March 1982.

2. State of Tennessee, Bureau of Environmental Health Sciences, Division of Water Quality Control

    a. Permit - Clean Water Act - Section 401 Certification

b. Status - The State was provided information in early December 1981 relative to Section 401 Certification of the NPDES Permit. The State will review the information to assure compliance with applicable State requirements and to assure resolution of State concerns prior to concurrence with the EPA-DOE Memorandum of Agreement. The State indicates that it has not identified any significant concerns.

3. State of Tennessee, Department of Conservation, Division of Water Resources.

   a. Approvals - Registration of withdrawal of 50,000 or more gallons of water per day from the waters of Tennessee.

   b. Status - The registration form may be sent in as early as February 15, 1982 or whenever site work dictates a 50,000 gallons per day river water demand.

4. Federal Aviation Administration, Air Space and Procedures Branch

   a. Permit - Permits for tall structures--necessary for any structures 200 feet in height above the ground level at its base.

   b. Status - Permits have been obtained for those structures presently existing on site. No additional structures requiring such permits are presently planned.

5. Federal Aviation Administration, Air Space and Procedures Branch

   a. Permit - Permit for landing area (i.e., heliport) construction.

b. Status - Permits necessary for such construction will be initiated at least 60 days prior to heliport construction.

6. Federal Communication Commission (FCC), National Telecommunication and Information Agency (NTIA)

a. Permits - (1) Assignment of frequency authorization and approvals to operate a two-way radios during the plant's construction phase.

(2) Assignment of a frequency authorization and approvals to operate a radio communications (i.e., microwave receiver/transmitter system) system during the plant's operational phase.

b. Status - (1) The frequency authorization and the approval to operate two-way radios for the construction phase have been secured. Other necessary frequency authorizations will be secured as appropriate.

(2) The frequency authorization for the plant's operational phase will be secured prior to plant operation.

7. U.S. Coast Guard, Aids to Navigation Branch

a. Approval - An approval that insures that adequate lights and other markings are provided on structures near navigational channels such as the barge facility.

b. Status - U.S. Coast Guard approval was given November 30, 1981 that the Project's planned actions were adequate.

8. State of Tennessee, Bureau of Environmental Health Services, Division of Air Pollution Control

a. Permits - Permits are needed to both construct and operate the following emission sources:

Concrete Batch Plant
Rock Crusher Facility
Cooling Towers
Diesel Generators
Any stationary internal or external combustion units

b. Status - The necessary information for these permits is being assembled and the proper procedures for complying with their requirements are being followed. An assessment is being conducted to identify the potential to emit air contaminants from all sources. Individual permits will be processed to secure permits in a timely manner.

9. U.S. Army Corps of Engineers, Operation Division, Regulatory Function Branch

a. Permits - A permit is required to perform the following:
   (1) to discharge dredge or fill materials into navigable waters,

   (2) to construct water intake and discharge facilities,

(3) to construct barge facilities, and

(4) to provide an access road and railroad fills. (below normal water level, elevation 741 feet, 225.86 meters).

b. Status - The Corps of Engineers Permit (No. 42,362) was initially issued May 6, 1977 and was extended on January 29, 1981, and will remain valid until May 4, 1984.

10. Tennessee Valley Authority, Division of Land and Forest Resources

a. Permit - A TVA Section 26a Permit is needed to perform the following activities:

(1) construction of water intake and discharge structures,

(2) construction of the barge facilities, and

(3) construction of access road and railroad fill permits.

b. Status - The TVA Section 26a Permit was initially issued April 19, 1977 and was extended on June 10, 1981, and will remain valid until June 25, 1982. A request for further extension of this permit will be processed by March 10, 1982, to avoid lapse of the permit.

11. U.S. Coast Guard and U.S. Army Corps of Engineer

a. Permit - Permit to place thermal monitors in the Clinch River.

b. Status - A computerized model is being developed by the TVA for use in their nuclear plants. This model performs thermal monitoring of river water using intake temperature and outfall temperature only. It is anticipated that this technique will be used at CRBRP and would eliminate the need for installing monitoring stations in the river. However, if this technique cannot be used, permits will be obtained and time is available to do so.

12. Tennessee Department of Transportation

a. Permit - Permit for excess weight/size vehicles.

b. Status - Permits for excess weight/size vehicles on the State highway system are secured on a case-by-case basis by the activity responsible for use of such vehicles. The vehicle/load description is provided to TDOT twenty-four hours in advance. TDOT provides a written (teletype) permit. To date, five permits have been requested and received for movement of five sodium pump drive motors.

13. Tennessee Department of Transportation

a. Permit - Grant of easement.

b. Status - The CRBRP railroad crossing of the Highway 58 right-of-way and beneath Gallagher Bridge is the only identified requirement of this type. TDOT has reviewed the location and design drawings of the crossing of the right-of-way and found them acceptable. Change to the existing grant of easement to the state for Highway 58 through Federal property is being developed.

14. City of Oak Ridge

a. Permit - Grant of easement.

b. Status - Two changes to the City of Oak Ridge's grant of easement from DOE for Bear Creek Road have been identified - one for the CRBRP water line crossing and one for the CRBRP railroad spur paralleling Bear Creek Road. Changes to the existing grant of easement will be initiated shortly with the City of Oak Ridge.

QUESTION 320.3R

Update those sections of Appendix E (Amendment VII - February 1977) to the CRBRP ER dealing with costs of delay associated with relocating the proposed plant. Specifically, provide new cost data for Tables 1 and 2 of Appendix E for all alternatives previously considered plus the cost associated with a move to potential sites on the TVA system. Additional discussion should include new Clinch River schedule, estimated months of delay associated with move, and date corresponding to reference time 0. Also, if timing requirements of the Project are still important, identify new critical dates for commercial operation and decision on full-scale LMFBR commercialization.

RESPONSE

Attached is an update of sections of Appendix E (Amendment VII - February 1977) to the CRBRP ER dealing with costs of delay associated with relocating the proposed plant (specifically Tables 1 and 2). This material was originally prepared as a response to a request for information from James L. Howard, United States General Accounting Office, dated June 24, 1981. We have not recalculated the minimum 33 month delay-cost impact for alternative sites on the CRBRP Project cost (Table 2). However, it is appropriate to assume that a reliable estimate for the three alternative site delay-costs for the 33 month scenario would be in the range of 15-20 percent less than the costs presented in Table 1 of the attachment (calculated for a Project delay of 43 months. In addition, we have not calculated costs associated with a move to potential sites on the TVA system. To complete these calculations would require considerable staff time and Project costs and it is doubtful that such an analysis would result in delay-costs significantly different from the delay-costs associated with moving to sites other than TVA sites (Table 1).

Relocation of the plant to an alternate site--would result in a delay to the reference schedule of an estimated 43 months. The amount of increase in the estimated Project cost would depend on the alternate site. The alternate sites considered in this response include the Hanford Reservation, the Idaho National Engineering Laboratory, and the Savannah River Plant complex. The estimated cost increase over the reference case for each of these sites is summarized below:

	Incremental Cost Millions of Dollars
Hanford	$1577
Idaho	1654
Savannah River	824

A detailed breakdown of the cost impact associated with this relocation consideration is provided below. The 43-month delay is an estimate of the overall schedule delay that would occur if the plant were required to be relocated and includes the additional time required for such activities as enactment of appropriate legislation, gathering of site data, and submittal of a Final Environmental Statement.

TABLE 1. REFERENCE 43-MONTH DELAY-COST OF ALTERNATIVE SITES ON CRBRP PROJECT COST

Item	Incremental Cost Millions of Dollars		
	Hanford	Idaho	Savannah River
Escalation	601	601	601
Staff and Support Stretch Out	164	164	164
Equipment Procurement	6	13	10
Relocate Project Office	7	6	5
Additional Travel	3	3	1
Difference in Prevailing Labor Rates	429	376	51
Site Studies - Other than Geological	1	1	1
Site Studies - Geological	4	4	4
Site Work Package	1	1	1
Seismic	0	250	0
Foundation Materials and Walls	2	3	2
Site Adaptation Redesign	15	15	15
Excavation	(15)	0	(6)
Water Supply Line	1	1	0
Environmental Report Rework	1	1	1
Preliminary Safety Analysis Report Rework	1	1	1
Reduced Revenue from Sale of Power	356	214	(27)
TOTAL COST IMPACT - ADD	1577	1654	824

This summary of costs is considered to reflect the minimum cost increase to the CRBRP Project from use of the alternate sites shown. It is based upon a redirection of work activity to a pace that would enable an orderly cost effective schedule of activities such that the Project could proceed to completion upon the receipt of an FES 43 months after a decision that forced an alternative site.

The current reference planning bases for the Project assume that the plant will be constructed at the planned Oak Ridge site and that the licensing process will be resumed where it had been stopped in 1977, subject only to the incremental time and effort required by the Nuclear Regulatory Commission to properly staff the effort and to prepare for the public hearings process.

This plan is based on achieving initial plant criticality in September 1988. Key milestones are shown below:

TABLE
CRBRP KEY MILESTONES

Milestone	Schedule
NRC Commission grant Section 50.12 request	March, 1982
Start Site Preparation	March, 1982
NRC Grant an LWA under 10 CFR 50.10(e)(3)(i)-(ii)	June, 1983
Start Nuclear Island Mat	June, 1983
NRC grant of CP	June, 1984
Submit FSAR to NRC	June, 1985

Start Na System Testing	December, 1987
NRC grant of OL	April, 1988
Start Fuel Loading	May, 1988
Initial Criticality	September, 1988

Question 320.4R

Provide updated $ estimates of the program benefits associated with LMFBR commercialization (see Program FES (ERDA-1535), Table II.F-10 of Volume 1, and Section 11.5.1 of the ER). Also, provide $ estimate of the loss of benefits associated with the delay assumed in response to Q3. (See Buhl, Dec. 29, 1976, p. 31 for estimate based on 52 month delay).

Response

The program benefits, and potential losses associated with delay are described in the cited passages of the ER and FES. Based on today's information, those values are a conservative representation of benefits and losses. See Appendix E ER update. In addition, however, the benefits of Clinch River are measured in terms of the information it will generate to satisfy the program and project objectives and analyses of the need for and benefits of the LMFBR program are outside the scope of the Commission's review of CRBRP. United States Energy Research and Development Administration et al. (Clinch River Breeder Reactor Plant). CLI-76-13, 4 NRC 67 (1976).

Item 320.6R

Review Section 8 -- Need for the Proposed Facility -- of the CRBRP FES (NUREG 0139) and based on post-1977 developments regarding the CRBR project identify all revisions and updates necessary to make this section factually consistent with the current status of the program.

Response

Conclusions made in Section 8 of the CRBRP FES (NUREG 0139), support the need for CRBRP as a key part of the LMFBR development program. Post 1977 developments do not alter these conclusions. Current actions and policy decisions by Congress and the Reagan administration are evidence that the conclusions drawn in the CRBRP FES are still valid. The President's October 8, 1981, nuclear energy policy statement established this Administration's definitive policy on the LMFBR program and CRBRP project, as follows:

> "I am directing that government agencies proceed with the demonstration of breeder reactor technology, including completion of the Clinch River Breeder Reactor. This is essential to ensure our preparedness for longer-term nuclear power needs."

Continuing Congressional support is evidenced by the enactment of the Omnibus Budget Reconciliation Act of 1981.[1] This continued the authorization for the CRBRP and set the stage for additional funding. The Conference Report accompanying this legislation[2] explicitly states the intent of Congress that the Project is a key step in the development of the LMFBR, and that the Project must be constructed in a timely and expeditious manner, so that a

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[1] Omnibus Budget Reconciliation Act of 1981 (Pub. L. No. 97-35).

[2] House Conference Report No. 97-208, 97th Cong., 1st Sess., 2 at 827 (1981).

decision on the commercialization and deployment of breeder reactors can be made on the basis of information obtained in the operation of the plant.

On August 30, 1976 the Nuclear Regulatory Commission established the guidelines for the consideration of specific issues in the CRBRP construction permit proceeding. The Commission specified that any inquiry into the need for the CRBRP must be limited to consideration of the likelihood that the CRBRP will meet the objectives of the demonstration plant project.

The demonstration objectives of the CRBRP remain unchanged:

- o to demonstrate the technical performance, reliability, maintainability, safety, environmental acceptability, and economic feasibility of an LMFBR central station electric powerplant in a utility environment;
- o to confirm the value of this concept for conserving important nonrenewable natural resources.

The role of the CRBRP in the LMFBR development program is essentially unchanged since 1976. The schedule for CRBRP and the overall LMFBR development program has changed but the importance of the demonstration plants to the program is undiminished. NRC staff concluded in 1977 that the probability of CRBRP meeting it objectives was high. Progress in the development of the CRBRP design, since 1977, provides further assurance that the CRBRP will meet its objectives.

CRBRP Program Summary

Significant progress has been made to date in the design, development, and hardware procurement areas of the CRBRP. The project is in a position to begin site clearing and construction upon receipt of the necessary approvals from the NRC. The following list includes some of the significant accomplishments to date:

- o Overall plant design about 90% completed and project-funded research and development about 95% completed;
- o About 7,000 architect-engineering drawings of the required 9,400 prepared;
- o Procurement contracts for over $500 million of hardware representing approximately 60% of the total required project hardware placed;
- o Manufacture of approximately $251 million of hardware completed and about $120 million of effort accomplished on other hardware in process;
- o Contributions made to advancement of the worldwide state-of-the-art om LMFBR plants, such as the heterogeneous core;
- o Continuous evaluation and updating of the plant design to remain current with changing regulatory requirements;
- o Issuance in 1977, by the NRC, of the Site Suitability Report and the Final Environmental Statement, which concluded that the site is suitable for the plant and that the action called for lunder the National Environmental Policy Act is the issuance of a construction permit;
- o Licensing activities were resumed with the Nuclear Regulatory Commission staff in 1981; and
- o Prototype steam generator and prototype primary pump delivered to Energy Technology Engineering Center for testing in sodium.

Base Technology Program Progress

The base technology program is structured to satisfy the goal of developing the technological data required to support LMFBR power plant design, construction, and safe operation. The elements of the base program include safety, components, materials and structures, fuels and other core materials and physics. For each of these program elements, significnt accomplishments since the mid-1970's are reviewed below:

<u>Safety</u>

- o The reliability of the reactor shutdown system and shutdown heat removal system has been established through extensive out-of-reactor laboratory testing.

- o Experiments conducted with molten fuel have provided important data for validation of analytical methods to be applied to fuel movement from breached pins. As a result, self-termination of unprotected overpower accidents, unportected loss of flow, it can be shown that extensive system damage is unlikely.

- o The experimental data base, together with computer codes that extrapolate those data to prototypic accident conditions,, indicates that the inherent nature of fuel motion under molten core conditions makes the core self-dispersive, and that recriticality is therefore unlikely.

- o Earlier uncertainly over the limit which can be placed on the extent of the damage associated with a postulated whole core accident has been substantially reduced. For the CRBRP, the adequacy of the plant design to withstand such an accident has been established.

<u>Components</u>

- o Tests were completed on the FFTF prototype pump in 1977. The test facilities at the Energy Technology Engineering Center (ETEC) were subsequently modified to accommodate CRBRP-size components.

- o A CRBRP prototype pump and steam generator have been fabricated and are being installed for testing in 1982.

- o Prototype components representative of large plant components are being fabricated for eventual testing in the ETEC.

<u>Materials and Structures</u>

- o Developed design rules which have adopted by the ASME Code and which are being applied worldwide in the design of LMFBR plants.

- o Advanced the technology base for materials data, fabrication, nondestructive examination, advanced alloys, sodium technology, and high temperature design methods and criteria.

Physics

- o Critical experiments in a CRBRP mockup core were completed in the Zero Power Plutonium Reactor. Analysis of these experiments will verify much of the CRBRP neutronic design and safety parameters.
- o Studies of the FFTF physics measurements were initiated to confirm developmental LMFBR design methodology and to improve knowledge of the FFTF test irradiation environment.
- o Reference FFTF fuels and cladding were successfully tested to goal burnup and beyond clad breach in the EBR-II. The mechanical design of the FFTF fuel pin is identical to that of the CRBRP.
- o Fabrication of pins for four FFTF cores was completed.
- o Control assembly lifetimes were doubled.
- o Improved alloys that promise significantly extended lifetimes for fuel pin cladding were developed. The list of candidate alloys has been narrowed to three.
- o Criticality of the Fast Flux Test Facility was achieved in February 1980. Full power was demonstrated in December 1980 and natural circulation was demonstrated in 1981.
- o The Experimental Breeder Reactor II operated and supplied electrical power to the grid at 71-77% capacity while serving as a fuels and materials test facility from 1976-1980.

With respect to the specific CRBRP demonstration objectives reviewed by the staff in NUREG 0139, progress since 1977 is especially noteworthy in LMFBR technical performance and realiability.

Technical Performance and Reliability

Technical performance and reliability have been demonstrated in the foreign sector by the operation of Phenix at a 65% capacity factor, as well as operation of the BN-350 and Joyo reactors.

Confidence in U.S. capability is based on continuing EBR-II performance after 19 years of operation and recent FFTF startup and operation at full power. There is apparently no remaining question about technical feasibility, at least through intermediate plant size. Super Phenix, currently under construction, should remove all technical feasibility questions.

An important remaining issue is the cost of commercial size LMFBR's. The cost will help determine when the LMFBR can be competitive with alternates. Continued developed is the only satisfactory way to resolve that question.

Timing

The Prototype Large Breeder Reactor (PLBR) referred to in NUREG 0139 as the plant to follow the CRBRP, is no longer part of DOE planning. Design studies have been carried out on a 1000 MWe LMFBR developmental plant, during 1978-81 under the name Conceptual Design Study (CDS) and more recently as the Large Developmental Plant (LDP) project. A decision to proceed with construction of the LDP could come as early as FY 1984, with operation in the mid-1990's.

Should construction of the LDP begin in the mid-1980's, it would overlap CRBRP construction by 3-4 years. In NUREG 0139, LDP and the CRBRP construction were scheduled to overlap by about one year. The potential increased overlap, now contemplated, does not significantly increase the technical risk associated with the LDP. To the contrary, it is DOE's belief that an overlap of 3-4 years is considered to be consistent with most efficient use of LMFBR program resources.

The current schedule with a potential construction overlap allows for assimilation of knowledge gained in design, construction, and licensing of the CRBRP. Overlap will allow for a more efficient use of the design team through continuity of effort as well as assimilation of all available project information. Such key information as base program R&D, construction and planning techniques, and equipment manufacturing experience is already being used in concept studies for the LDP. Results of CRBRP component tests will be available in 1982 for use in the preliminary engineering design of the LDP. CRBRP startup and testing data that will be particularly useful in the large plant effort include data associated with sodium systems and inert gas systems.

Experience gained from design of the CRBRP was factored into the conceptual design studies of the LDP and further benefits would be realized as the design continues. For example, CRBRP equipment design and fabrication experience will be directly applicable to the LDP as most of the CRBRP components will be fabricated before preliminary engineering design of the LDP were initiated.

CRBRP construction planning and techniques are currently being incorporated into LDP construction planning evaluations. CRBRP construction experiene will provide valuable input for the final planning and implementation of a cost-effective and schedule-oriented LDP construction plan.

Start-up testing of systems at the CRBRP will provide and equipment confirmation data useful in design activities and subsequent test operations for LDP. This testing input can be particularly useful in the liquid metal and inert gas systems.

Operation of the CRBRP will provide additional on-line information useful for verification of designs and components concepts common to the LDP and the CRBRP and will provide additional input for testing procedures in such areas as remote fuel handling. CRBRP operating experience will also be factored into the procurement specifications of such LDP systems as the plant-wide computerized control system. In the event that early

CRBRP operation discloses an unexpected system problem, the phasing of the two projects provides time to implement corrections.

Additionally, operation of the CRBRP, in the course of demonstrating the technical performance, safety, and economics of an LMFBR plant in a utility environment, will develop information and expertise in plant start-up operation and maintenance. This experience will be valuable in the planning and implementation of thse key functions for the LDP and in contributing to the broad base of experience and information that is important for commercial and industrial application of the LMFBR concept.

CRBRP experience is also applicable in large-plant confirmatory research and development work where much of the CRBRP work developed in the areas of safety, physics, fuels, materials, and component development is directly applicable. Nearly all this work will be completed before preliminary engineering design of the LDP. In addition, critical CRBRP components such as the steam generator and primary sodium pump will undergo thorough testing in 1982 and information developed during this testing program will be factored into the design process.

CRBRP operation and the follow-on operation of the LDP will serve to provide important experience and data regarding the LMFBR technology, environmental acceptability, economics, and value ad a practical future option for generating electric power and conserving nonrenewable natural resources.

Technical Alternatives to the CRBRP

A key feature of the U.S. LMFBR development program remains avoiding premature foreclosure of technological alternatives. In any construction project, design choices must be made among feasible alternatives. To the extent possible during development, there is merit in keeping open options that might be exercised later. For some of the technological alternatives examined by NRC staff in NUREG 0139, additional information is now available.

The design of the primary heat transport system in LMFBRs falls into two categories: the pool (where the entire primary system is contained within a relatively large primary vessel) or the loop (where piping external to the reactor vessel transports sodium to pumps and heat exchangers). Experience indicates that either concept can be constructed and operated safety and reliably. Indeed the French, British, Soviet, and U.S. programs have all included at least one shift in the loop/pool choice.

The DOE Conceptual Design Study (CDS) concluded that there was no overwhelming advantage to either concept.[3] There would be no environmental differences and safety differences would be insignificant. Participants, drawn from the industry, recommended a loop concept for what is now the LDP, but recognized that there may be merit in the pool concept for commercial plants.[3] Regardless of the choice, the developments that are required in components and other key base technology areas are much the same. For example, the steam generators are equally applicable to either concept, and the pump technolgoy required for a pool system is probably less complex than that now being developed for a loop system. In both instances, the design, manufacting, and operating experienced gained are an effective base for future plants. The conclusion is that the U.S. program, now on the loop path for the CRBRP, is not precluded from a future switch to a pool system. Thus, the program retains more flexibility than does a specific project, in which changes in choice of technology can add considerable expense.

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[3]"LMFBR Conceptual Design Study; Phase I Summary Technical Report," CDS-500-1, U.S. Department of Energy, p. 4-29 (1980).

An updated Table 8.1 is provided to reflect events since NUREG 0139 was issued.

Fuels

Another example of the flexibility built into the U.S. program deals with fuel type. In the Conceptual Design Study for a large plant, flexibility was maintained with respect of choice of fuel type by making the design of the reactor internals capable of accepting either the reference oxide fuel design, or a carbide fuel. Similarly, it has been shown that the CRBRP could operate satisfactorily on a variety of fuel cycles, and the reference core design was switched from homogeneous to heterogeneous without other significant changes in cost, environmental or safety aspects.

In the recent large plant studies (CDS and LDP), oxide fuel was selected for at least the first several cycles. Super Phenix will use oxide fuel. Thus the use of oxide fuel in the CRBRP not only does not foreclose future U.S. emphasis on other fuels, but is presently consistent with the consensus choice for larger plants.

Foreign Purchase

It has been proposed that another alternative would be for the U.S. to purchase foreign technology rather than to pay for our own domestic LMFBR fuel cycle development program. Such proposals often neglect to account for the extensive domestic development work that would still be necessary to assure the foreign breeder designs would satisfy unique U.S. licensing requirements. This may involve, among other things, the need to make substantial plant modifications to key safety features such as the reactor containment building, reactor safety systems, and shutdown heat removal systems.

In addition, one of the central features U.S. energy policy of the past four Administrations has been to reduce U.S. reliance on foreign sources of energy supply. Regardless of current alliances, political or commercial barriers 20-40 years hence could prevent a foreign LMFBR supplier from selling to the U.S. Even if reactors were sold, without a complete domestic fuel cycle capability, the U.S. would have to rely on foreign sources of reactor fuel supply. This could have national security implications that are not unlike those associated with current U.S. dependence on foreign supplies of oil.

WORLD-WIDE FAST BREEDER REACTOR PLANTS

Name	Country	Power Megawatts thermal	Power Megawatts electric	Pool or Loop	Initial Operation
Decommissioned					
Clementine	USA	0.025	—	Loop	1946
Experimental Breeder Reactor-1	USA	1	0.02	Loop	1951
BR-1/BR-2	USSR	0.1	—	Loop	1956
LAMPRE	USA	1	—	Loop	1961
Fermi	USA	200	60.9	Loop	1963
SEFOR	USA	20	—	Loop	1969
Dounreay Fast Reactor	UK	72	14	Loop	1959
Rapsodie	France	20/40[b]	—	Loop	1966[b]
Operable					
BR-5/BR-10[a]	USSR	5/10[a]	—	Loop	1959[a]
Experimental Breeder Reactor-II	USA	62.5	18.5	Pool	1963
BOR-60	USSR	60	12	Loop	1969
BN-350	USSR	1000	150[c]	Loop	1972
Phenix	France	567	233	Pool	1973
Prototype Fast Reactor	UK	600	250	Pool	1974
Joyo	Japan	100[d]	—	Loop	1977
BN-600	USSR	1470	600	Pool	1980
Fast Flux Test Facil.	USA	400	—	Loop	1979
KNK-II[e]	W. Germany	58	20	Loop	1977
Under Construction					
Super-Phenix	France[g]	2900	1200	Pool	
SNR-300	W. Germany[f]	770	312	Loop	
Prova Elementi di Combustibile	Italy	140	—	Modified Pool	1978
Planned					
Monju	Japan	714	300	Loop	
Clinch River Breeder Reactor	USA	975	359	Loop	1989
Commercial Fast Reactor	UK	3230	1320	Pool	
SNR-2	W. Germany[g]	5000	1200-2000	Loop	1985-6
BN-1600	USSR	5000	1600	Pool	

[a] Initially operated at 5 megawatt thermal as BR-5; upgraded to BR-10 (10 megawatt thermal) in 1973.

[b] Initially operated at 20 megawatt thermal; power increased to 40 megawatt thermal in 1970 with "Fortissimo" core.

[c] Also produces the equivalent of 200 megawatt electric as process steam for desalination.

[d] To be operated initially at 50 megawatt thermal.

[e] Operated 1971 through 1974 as a thermal reactor, KNK-I.

[f] In cooperation with Belgium and the Netherlands.

[g] Tripartite effort of French, German and Italian electric utilities.

Item 320.8R

Provide updated justification for excluding other energy sources as viable alternatives to CRBRP. Currently, ER Section 9.1 dismisses depletable energy resources based on energy growth rates, nuclear expansion plans, costs, and estimates of energy resource stocks, all reflecting 1975 expectations. In addition, as a result of the passage of time and advances made in implementing the larger next state demonstration LMFBR, provide justification for not considering this as a viable alternative energy source.

Response

Other energy sources can be excluded as viable alternatives to the CRBRP on the ground that the need for a demonstration plant facility, including its timing and objectives is to be taken as given in the Commission's review of CRBRP. United States Energy Research and Development Administration et al. (Clinch River Breeder Reactor Plant). CLI-76-13, 4 NRC 67 (1976). Further, the alternative of the next larger state demonstration LMFBR can be excluded on the ground that the structure, pace, timing and objectives of the LMFBR Program are likewise to be taken as given. Id. DOE has undertaken a Supplement to the LMFBR Program Environmental Statement and will complete that process in March of 1982.

QUESTION 750.1R

Since there are no known commercial plans for participating in the CRBR fuel cycle on a licensed basis, it appears that the fuel cycle related to CRBR will have to be carried out by DOE in its own unlicensed facilities. Accordingly, it will be necessary for DOE to project its plans for carrying out the fuel cycle functions related to processing, safeguarding and transportation of duels and for managing the handling and disposal of wastes.

In this regard, please provide an amendment to the environmental report that describes DOE's planned program and facilities for such functions related to CRBr, including estimates of the resource uses and effluents and assessments of the potential effects, including radiological, resulting from such activities. This report will serve as the basis for NRC to perform its independent evaluations of these functions for CRBR licensing purposes.

RESPONSE:

The information requested in question 750.1R is provided in the ER Amendment XII.

QUESTION 320.7R Update the internal costs of the CR project. Maintain level of detail in Section 8.3.1 including Table 8.3-1 of the ER. Also, indicate portions of the internal cost to be borne by federal government, participating utilities, etc.

RESPONSE

The CRBRP Project cost estimate to the level of detail reflected in Section 8.3.1 including Table 8.3-1 of the Environmental Report is currently being updated consistent with the current schedule baseline. This estimate will be completed in March 1982, at which time, the Environmental Report will be updated.