COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

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RELEASED

The Honorable John D. Dingell
Chairman, Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

Subject: While the Clinch River Breeder Reactor Steam Generator Contract Could Not Have Been Terminated for Default, Many Aspects of the Contracting Process Are Questionable (EMD-82-37)

Your September 2, 1981, letter asked that we review the technical outlook for several components of the Clinch River Breeder Reactor (CRBR)--the Nation's first liquid metal fast breeder reactor demonstration plant--and report the results of our review. Because of significant cost and time frame overruns for one critical component--the steam generator--you also requested that we provide an interim report on whether or not the contract for the CRBR steam generator should be terminated for default. This report addresses your second concern. We will separately report on the technical outlook for the steam generator and other CRBR components.

As we told your staff in a November 19, 1981, briefing, we found no basis to support terminating the steam generator contract for default. Furthermore, even if such a basis existed, the Department of Energy (DOE) could not terminate the contract for default because it is not a party to the contract. Instead, DOE contracted with Westinghouse Electric Company for the CRBR nuclear steam supply system. Westinghouse, in turn, contracted with General Electric for the steam generating system, and that company contracted with Atomics International for the steam generator. General Electric's contract with Atomics International specifically permits DOE to direct General Electric, through Westinghouse, to terminate the contract only for the convenience of the Government.

General Electric, on the other hand, could have terminated the steam generator contract for default only if the contractor had failed to perform according to the contract. We found, however, that Atomics International was working toward a moving target because DOE and other CRBR project participants were continually directing changes to the contract technical specifications. Furthermore, the allowable cost and schedule impacts of many early specification changes are still unresolved. Consequently, DOE and General Electric have never been in a position to measure Atomics International's performance from a cost or schedule basis. The only available performance criterion has been the contractor's adherence to technical specifications, which were continually changing.

In November 1981, DOE directed Westinghouse (General Electric had been removed from the management tier) to terminate the steam generator contract for the convenience of the Government and to request new proposals for fabrication of the CRBR steam generators.

While there were no sufficient grounds to support termination of the steam generator contract, we found several unusual aspects concerning the Energy Research and Development Administration's (ERDA's) role in the selection of Atomics International to develop and supply the CRBR steam generators. 1/ Because the steam generator contract was actually awarded by a subcontractor, Federal procurement regulations did not apply to the awarding of this contract; however, the cornerstone of successful procurements at all levels is to maximize competition and seek reasonable prices for goods and services. ERDA's actions, in this procurement, eliminated competition, thereby decreasing the probability of obtaining an acceptable product at a reasonable price.

The remainder of this report describes the objectives, scope, and methodology of our work and discusses in more detail (1) the history and background of the steam generator contract, (2) the reasons why we believe a default termination could not be sustained, and (3) questionable aspects of DOE's management of the contract award process.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objective was to determine if the steam generator contract could be terminated for default because of a substantial

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1/The Atomic Energy Commission and ERDA were predecessor agencies to DOE. AEC was abolished on January 19, 1975, and many of its functions were transferred to ERDA. ERDA's functions were transferred to DOE on October 1, 1977.

breach of the contract by the contractor. Therefore, at DOE headquarters in Washington, D.C., the CRBR Project Office in Oak Ridge, Tennessee, and at various field and contractor locations, we

--gathered and reviewed the available contract documents to determine the initial contract requirements and the subsequent amendments to those requirements;

--gathered and reviewed all pertinent documents and correspondence describing the contractor's performance; and

--interviewed CRBR legal, procurement, and engineering personnel associated with the solicitation, award, and administration of the steam generator contract.

Some of the officials we contacted are no longer involved in the CRBR project and had to rely on their recollections. In addition, although such documents are normally retained as part of a procurement file, DOE officials were unable to find documentation of certain events such as minutes of DOE meetings to discuss the steam generator procurement. DOE officials could not recall if these documents ever existed or were mislaid.

Our audit was performed in accordance with GAO's current "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions." In addition, as you requested, we did not forward a copy of this report to DOE for review and comment. The facts presented in this report were discussed, however, with DOE and contractor officials to ensure accuracy.

BACKGROUND ON THE CRBR STEAM GENERATOR CONTRACT

In 1970 the Congress authorized the Atomic Energy Commission (AEC) to enter into cooperative arrangements with industry to build and operate the CRBR for the purpose of demonstrating that a liquid metal fast breeder reactor could be licensed and operated reliably and safely on a utility electric power supply system. Originally, the CRBR was to be completed in 1980 to permit a decision in the mid-1980s on whether or not to allow commercial deployment of this nuclear technology.

Early in the planning for the CRBR, AEC officials recognized that developing and demonstrating reliable steam generators for the CRBR would be a significant problem. Steam generators provide the transfer of heat from the reactor coolant to water, which is then converted to steam used to drive the plant's turbines. The turbines, in turn, drive the electrical generators. In some commercial reactors cooled with pressurized water, steam generator

difficulties account for as much as 25 percent of downtime and have resulted in plant outages of more than 1 year. The steam generator needed for the CRBR presents a bigger problem because the CRBR design uses sodium rather than water as a coolant. Sodium technology steam generators impose severe mechanical stresses on the metal barrier between sodium and water within the steam generator. Even a small failure allowing contact between the sodium and water raises the possibility of a fire or explosion resulting from a sodium and water interaction. Developing steam generators for the CRBR has lagged significantly behind development of other CRBR components largely because of a lack of domestic experience with sodium steam generators in a comparably sized facility.

ERDA selected Atomics International to develop and manufacture steam generators for CRBR, but it did not actually award the contract. Instead, it directed the award through both Westinghouse, the prime contractor for supplying the CRBR components, and the General Electric Corporation, 1/ at that time Westinghouse's subcontractor for supplying the CRBR steam generators and other steam supply system components. 2/

AEC initially directed that the steam generator contract be awarded competitively. Subsequently, however, an ERDA official, in his role of designated approving officer for the steam generator contract, directed that the competitive procurement be terminated and that the contract be awarded to Atomics International--a division of Rockwell International. This official informed us that this action was taken to broaden the industrial base of breeder vendors. Atomics International, the higher of the two bidders under the canceled competitive procurement, bid $26.5 million to develop and construct one prototype steam generator, nine plant units, and one backup unit. The other bidder under the competitive procurement--Foster Wheeler Corporation--had bid $20.4 million for the same work. Following ERDA's directive, in September 1975, General Electric entered into a contract with Atomics International to design, test, and fabricate a prototype steam generator and 10 plant units. The negotiated contract, signed in February 1977, had increased to $56 million, largely due to an increased scope of work and inflation.

1/ERDA's direction of the award was not based on any right it had under the contracts. It resulted from the dominant role ERDA held in the project.

2/In June 1980, DOE directed that Westinghouse assume responsibility for the steam generator contract. General Electric retained its other steam generating system responsibilities as a subcontractor to Westinghouse.

The contract called for delivery of the prototype steam generator in September 1978 and delivery of the 10 plant units between April 1979 and April 1980. In 1980, however, the contract was modified to require delivery of the prototype generator and one plant unit. The prototype unit was delivered for testing in August 1981--almost 3 years after the originally specified delivery date. Although materials were purchased and some fabrication work was begun on the plant unit, it was never completed and in November 1981, DOE directed Westinghouse to terminate the Atomics International contract for the convenience of the Government. Current estimates of total contract cost for the one prototype unit and the unfinished plant unit approximate $113 million.

SUFFICIENT BASIS TO SUSTAIN A TERMINATION FOR DEFAULT DID NOT EXIST

The steam generator contract provided that if Atomics International failed to perform in accordance with the terms and conditions of the contract, General Electric (and later Westinghouse) could terminate the contract for default. However, the contract also provided that delays beyond the control and without the fault or negligence of Atomics International could not support a default termination.

Under the provisions of the contracts between DOE, Westinghouse, General Electric, and Atomics International, DOE could have directed General Electric, through Westinghouse, to terminate the contract with Atomics International for convenience but not for default. Therefore, in this case only General Electric, until June 1980, or Westinghouse thereafter could have terminated the contract for default.

Atomics International was about 3 years late in delivering the prototype steam generator, and the estimated cost of the contract is more than double the $56 million initial contract price for a prototype plus 10 plant units. For two reasons, however, we do not believe a termination for default could be sustained against Atomics International. First, the technical requirements set out in the contract were changed almost immediately after award and were often changed during the course of the contract. Thus, Atomics International was constantly working towards a moving target. Second, while the changes in the technical requirements had significant implications for overall costs and schedules, General Electric and Atomics International never agreed on expected impacts of many of the changes--including 10 of the 14 major changes made shortly after award of the contract.

Overall, the contract was developmental in nature; the steam generator design was not fully developed or defined at the time of contract award; and the contractual arrangement

with Atomics International was largely lacking any specific performance parameters. Without such parameters, technical performance is difficult to measure. Furthermore, ERDA and its contractors knew that the basic design specified in the contract for development and fabrication by Atomics International was obsolete when the contract was awarded. ERDA and other Project participants made 14 major changes to the CRBR steam generator technical specifications almost immediately after General Electric awarded the contract. Finally, as late as 1979, several major design concerns (vibration suppression, stress factors, and tube spacing) were still unresolved.

The technical changes over the life of the contract also affected the cost and schedule of Atomics International's work. General Electric and Atomics International, however, never reached agreement on the allowable cost and schedule effects of many technical changes. Failure to resolve the cost and schedule impacts in a timely fashion precludes default due to cost or schedule overruns. As stated previously, the design was obsolete when the contract was awarded, and within a few days the CRBR project office directed extensive changes to that design. These changes involved instrumentation (for testing purposes) of the prototype and major design changes to increase resistance to damage from earthquakes. Over the life of the contract, more than 30 changes have been made in the technical specifications. Most were directed by CRBR project management, but some were suggested by Atomics International. Atomics International agreed to the technical aspects of these changes. However, in 14 cases--which involved critical changes to the design of the steam generator--the company and General Electric (and now Westinghouse) never agreed to the related allowable cost and schedule impacts. This prevented the establishment of legally binding cost and schedule criteria for evaluating the contractor's performance. Termination for default on a cost and schedule basis, therefore, would have been difficult to sustain. Further, we found no evidence that DOE or ERDA made any serious efforts--such as withholding progress payments or suspending the contract--to resolve these long-running cost and schedule disputes.

UNUSUAL ASPECTS OF THE CONTRACT AWARD PROCESS

While there were no sufficient grounds to support termination of the steam generator contract for default, our audit work disclosed several unusual features of the contract award process which are not consistent with sound procurement practices.

The cornerstone of successful procurement policy is to encourage competition because it provides the best opportunity for obtaining acceptable products at reasonable prices and it

helps prevent favoritism, collusion, and fraud. Although AEC initially intended that the procurement be competitive, its successor--ERDA--directed General Electric to terminate the ongoing competitive procurement action. ERDA then directed General Electric to award the contract to Atomics International. The basis for the award was inconsistent with the findings and recommendations of General Electric's evaluation of Atomics International's and Foster Wheeler's earlier competitive bids. Although Federal procurement regulations did not apply to this procurement because it was made by General Electric, ERDA did direct the contract award. ERDA's actions avoided competition and thus provided little assurance of obtaining an acceptable product at a reasonable price.

AEC initially decided on a competitive procurement

In early 1973, AEC awarded three contracts for developing conceptual CRBR steam generator designs. About a year later, AEC selected the steam generator design developed by Atomics International. On May 31, 1974, Atomics International submitted an unsolicited proposal to design and construct the CRBR steam generators. The proposal was endorsed by General Electric, the Project Management Corporation, 1/ and several program officials at AEC. The unsolicited proposal was rejected on June 25, 1974, however, when the Director of AEC's Reactor Research and Development Division directed that the contract be awarded competitively.

On July 17, 1974, General Electric submitted a preprocurement plan for the steam generator. This plan had three basic provisions--(1) the use of a cost-type contract 2/ for the prototype unit because the many unknowns involved in steam generator development and construction prevented potential bidders from accurately estimating costs; (2) the use of a fixed-price contract 3/ for the nine plant and one backup units, based on

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1/Project Management Corporation, is a non-profit corporation which represents the interest of the utilities in the CRBR project. During 1974, it was also responsible for administering the project.

2/A cost-type contract is a contract which reimburses the contractor for all allowable expenses incurred in performing the required work. A fee is also paid to cover contractor profit and other expenses.

3/A fixed-price contract disburses to the contractor a specific amount of funds. From that payment, the contractor is responsible for covering incurred costs. Any amount remaining is the contractor's fee or profit.

then current dollars but with escalation tied to economic indices; and (3) the selection of a contractor based on lowest probable cost if all other aspects are equal. AEC approved the plan and on July 31, 1974, General Electric issued a request for proposals based on that procurement plan.

Five potential suppliers attended General Electric's pre-bid conference. Two withdrew because they considered the fixed-price aspect of the plant units too risky. A third potential supplier withdrew because it considered the design to be inadequately defined. Subsequently, Atomics International and Foster Wheeler submitted responsive proposals to General Electric. Atomics International's bid was $26.5 million, and Foster Wheeler's bid was $20.4 million for the prototype steam generator, nine plant units, and a backup unit.

By April 25, 1975, General Electric completed cost negotiations and recommended to Westinghouse that the contract be awarded to Foster Wheeler on the basis of price, management commitment, schedule, and warranty considerations. On May 9, 1975, General Electric further reported to Westinghouse that with an assumed 8-percent annual escalation, the total price difference between the two proposals increased from about $6.1 million to $9.0 million. Furthermore, this analysis assumed that profit, fee, and fixed costs--such as depreciation--were not subject to escalation. General Electric noted that these assumptions were consistent with Foster Wheeler's proposal. Atomics International, on the other hand, proposed that profit and fee be escalated. Escalation of profit and fee further widened the cost difference between the two proposals.

On May 12, 1975, the engineer in the CRBR project office with responsibility for steam generators endorsed General Electric's recommendation. He specifically cited Foster Wheeler's lower price and superior fabrication capability. On May 13, 1975, Westinghouse concurred with General Electric's analysis and recommendation and, in addition, cited Foster Wheeler's superior manufacturing capability.

ERDA canceled the competitive procurement

While these evaluations and recommendations were being developed, however, AEC officials were independently considering directing the steam generator contract award to Atomics International. On January 9, 1975, AEC officials met to discuss whether AEC would award a contract for the steam generators to Foster Wheeler--the same company which they believed would be supplying the CRBR intermediate heat exchangers and sodium check valves. AEC's policy was to involve as many vendors as possible

in CRBR to broaden the base of the Nation's breeder reactor manufacturing capability. They decided to inform Foster Wheeler that (1) it was unlikely that the same company would be awarded both the intermediate heat exchanger and the steam generator contracts and (2) Foster Wheeler should consider withdrawing from the steam generator competition. None of the participants at that meeting could recall to us, however, if they had actually notified Foster Wheeler.

On January 29, 1975, the project engineer for the CRBR steam generator objected to the "broadening the base" argument. Westinghouse had also considered and discounted that argument during its evaluation. The project engineer pointed out that other vendors were already responsible for producing more than one component. Atomics International was, in fact, already a major CRBR subcontractor responsible for auxiliary and supporting systems.

Another result of the January 9, 1975, meeting was a decision to assign AEC's San Francisco Operations Office responsibility for evaluating General Electric's pending procurement recommendations. In May 1975, shortly after General Electric completed its evaluation of the two competitive proposals, the San Francisco Operations Office announced that it disagreed with General Electric's recommendation that the contract be awarded to Foster Wheeler. The Operations Office concluded that Atomics International should be awarded the contract because it had developed the steam generator design concept and had manufactured and tested a very small steam generator similar to the CRBR design.

In an August 4, 1975, memorandum, ERDA's 1/ Controller objected to a directed contract award to Atomics International. In addition to noting the substantial cost differential, the Controller stated that the proposed directed award

--is counter to the June 1974 determination by AEC's management that this contract should be open for competition,

--establishes an undesirable precedent which could lead to a "way of life" for future procurements, and

--adds additional costs to an existing project cost overrun.

On August 6, 1975, ERDA's Director of Procurement also objected to a directed contract award to Atomics International because, in his view, a directed procurement had not been adequately justified.

1/Ibid., p. 2.

On August 21, 1975, ERDA's Director of Reactor Research and Development informed ERDA's Administrator of his intention to reject all bids previously solicited and to direct the placement of a cost-type contract for both the prototype and 10 plant units with Atomics International. The Director cited the following as the basis for this directed placement:

--Greater potential for maintaining continuity of vendor experience and for developing a breeder reactor industrial base.

--Potential for more efficient job control and coordination by placing the design and fabrication responsibilities with the vendor who developed the basic CRBR steam generator concept.

--Prices quoted by the two companies vary from original cost estimates by amounts large enough to question (1) the validity of either company's estimates and (2) the wisdom of procuring the 10 plant units on a fixed-price basis.

Two days later, ERDA's Director of Reactor Research and Development notified the CRBR Project Director that he had canceled the original competition and was directing the award of a cost-plus-incentive-fee contract for both the prototype and 10 plant units to Atomics International. ERDA's Controller had previously objected to the proposed cost-plus-incentive-fee contract on a directed procurement because, in his opinion, additional qualified firms would have competed for the steam generator contract on a cost-plus-incentive-fee basis.

In summary, at this point in the process AEC had rejected an unsolicited proposal in order to obtain competitive bids. Proposals were requested, evaluated, and a vendor was recommended by General Electric. AEC's successor--ERDA--then canceled the competition and directed that the contract be awarded to Atomics International. This action was officially justified primarily on the basis of Atomics International's capability to fabricate a working steam generator. This, of course, directly conflicts with General Electric's and Westinghouse's earlier evaluations. Furthermore, ERDA personnel involved in this decision consistently told us that the award to Atomics International was based on broadening the breeder reactor industrial base rather than technical capability even though Atomics International was already responsible for other breeder systems.

On September 19, 1975, General Electric wrote Atomics International of its intention to enter into a contract on a cost-plus-incentive-fee basis for the steam generators pending

negotiation and agreement of a definitized contract. A $56-million contract was subsequently awarded to Atomics International. The difference between Atomics International's $26.5 million bid and the $56 million contract was due to technical changes and inflationary increases.

CONCLUSIONS

Our review of the CRBR steam generator contract indicates that DOE could not have directed that the contract be terminated due to default because the contract terms permitted DOE to terminate it only for the Government's convenience. Furthermore, Westinghouse probably also could not have terminated the contract for default, even though (1) the cost had increased from $56 million for one prototype and 10 plant units to the current estimate of more than twice that figure for only the prototype unit and some work on the plant unit and (2) delivery of the prototype steam generator was almost 3 years late.

The contract clearly provided for developmental work. Numerous changes were made to the technical specifications at the direction of ERDA, DOE, other CRBR project participants, and as suggested by Atomics International. In fact, ERDA and other project participants changed the technical specifications shortly after General Electric awarded the contract.

Also, General Electric and Atomics International never agreed on allowable cost and schedule effects of 14 critical technical changes. Thus, dollars and time were quickly eliminated as performance evaluation criteria. Furthermore, efforts by ERDA, and later by DOE, to resolve the impasse over change order cost and schedule impacts were unsuccessful.

While the contract could not have been terminated for default, we found unusual aspects of the contract award process. Specifically:

--ERDA canceled an ongoing competitive procurement and directed the contract award while General Electric was negotiating with two bidders. Furthermore, ERDA directed the award to the higher of the two bidders.

--The request for proposal specified a fixed-price contract for the 10 CRBR plant units but the directed contract award was on a cost-plus-incentive-fee basis. Other potential suppliers had no opportunity to compete on that basis.

--The original plan to award the contract based on best price and technical capability was informally changed to the single criterion of broadening the breeder industrial base. The directed award did little, however,

to achieve this objective because Atomics International was already a major CRBR subcontractor.

Regarding the "broadening the base" criterion, the formal source justification was only partly based on that criterion and largely on Atomics International's potential for technical performance. General Electric's and Westinghouse's evaluations, however, favored Foster Wheeler's technical capability.

Competition is the cornerstone of a successful procurement system. It provides a means to obtain an acceptable product at a reasonable price. ERDA's avoidance of competition in this case, and its and DOE's subsequent failure to act to resolve the impasse over change order cost and schedules impacts, may have contributed to the costly and, thus far unsuccessful, development of CRBR steam generators.

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As arranged with your office, we will provide a copy of this report today to the Chairman, Subcommittee on Energy Research and Production, House Committee on Science and Technology. Also, as arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time, we will send copies of the report to the Director, Office of Management and Budget, the Secretary of Energy, and to other interested parties, and make copies available to others upon request.

Sincerely yours,

Charles A. Bowsher

Comptroller General
of the United States