

094609

Mr. Shea

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NOTICE OF HEARINGS

Committee : Joint Economic Committee

Subject : Liquid Metal Fast Breeder Reactor

Date : April 30, 1975

Time : 9:30 a.m.

Room : 2221 Dirksen Senate Office Building

Membership : Hubert H. Humphrey (D.-Minn.), Chairman
Wright Patman (D.-Texas), Vice Chairman

Majority : Senate:
Senators Sparkman, Proxmire, Ribicoff, Bentson,
and Kennedy

Minority : Senators Javits, Percy, Taft, and Fannin

Majority : House:
Representatives Bolling, Reuss, Moorhead, Hamilton, and
Long (La.)

Minority : Representatives Brown (Ohio), Brown (Michigan),
Heckler, and Roussetot

Principal Staffmen : George Tyler, Bill Cox, and Larry Yuspeh

GAO Witness : Elmer B. Staats, Comptroller General

Accompanied By: Phillip S. Hughes, Assistant Comptroller General
Henry Eschwege, Director, REDD
Richard Kelley, Associate Director, REDD
Ralph Carlone, Assistant Director, REDD
Martin J. Fitzgerald, Legislative Attorney, OCR

Car will leave G Street, First Basement at 9:10 a.m.

MJF
Martin J. Fitzgerald
Legislative Attorney, OCR

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

FOR RELEASE ON DELIVERY
EXPECTED AT 9:30 A.M.
WEDNESDAY, APRIL 30, 1975

STATEMENT OF
ELMER B. STAATS
COMPTROLLER GENERAL OF THE UNITED STATES
BEFORE THE
JOINT ECONOMIC COMMITTEE
ON THE LIQUID METAL FAST BREEDER REACTOR
PROGRAM--PAST, PRESENT, AND FUTURE

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

WE ARE HERE AT YOUR REQUEST TO DISCUSS OUR REVIEWS OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S (ERDA'S) LIQUID METAL FAST BREEDER REACTOR PROGRAM--THIS NATION'S HIGHEST PRIORITY ENERGY RESEARCH AND DEVELOPMENT PROGRAM.

OVER THE PAST YEAR CONGRESSIONAL AND PUBLIC INTEREST IN THIS PROGRAM HAS INTENSIFIED. THE PROGRAM'S TOTAL ESTIMATED COST AND THE AMOUNT OF FEDERAL FUNDS EXPECTED TO BE SPENT HAVE INCREASED. AS THE PROGRAM GAINED IN IMPORTANCE, WE IN THE GENERAL ACCOUNTING OFFICE DEVOTED ADDITIONAL RESOURCES TO REVIEWING ITS MANY FACETS AS PART OF OUR OFFICE-WIDE EFFORTS TO EXAMINE THE NATION'S RESPONSE TO THE ENERGY CRISIS.

DURING THE PAST 6 MONTHS WE ISSUED STAFF STUDIES ON ERDA'S FAST FLUX TEST FACILITY AND ON CERTAIN PROBLEM AREAS WHICH COULD AFFECT THE DEVELOPMENT SCHEDULE FOR THE CLINCH RIVER BREEDER REACTOR. THE FAST FLUX TEST FACILITY IS A KEY TESTING FACILITY FOR FUELS AND MATERIALS IN THE BREEDER PROGRAM. THE

CLINCH RIVER BREEDER REACTOR IS SCHEDULED TO BE THIS NATION'S FIRST PROJECT TO HELP DEMONSTRATE THE VALUE OF THE BREEDER CONCEPT. IN ADDITION WE RECENTLY PROVIDED THE JOINT COMMITTEE ON ATOMIC ENERGY OUR COMMENTS ON ERDA'S PROPOSED ARRANGEMENT FOR MANAGING THE CLINCH RIVER BREEDER REACTOR DEMONSTRATION PLANT PROJECT.

IN MAY WE PLAN TO RELEASE A REPORT ON THE COST AND SCHEDULE ESTIMATES FOR THE FIRST BREEDER DEMONSTRATION PLANT AND FAIRLY SOON THEREAFTER AN ISSUE PAPER ON THE BROAD RANGE OF PROMISES AND UNCERTAINTIES OF THE TOTAL BREEDER PROGRAM--THE NEED FOR THE PROGRAM, THE POTENTIAL BENEFITS TO BE REALIZED FROM IT, AND RISKS ASSOCIATED WITH COMMERCIAL USE OF THIS TYPE OF ENERGY.

EARLIER THIS WEEK, WE SUBMITTED A COMPREHENSIVE REPORT TO THE CONGRESS ON HOW THE BREEDER PROGRAM STARTED, WHERE IT IS TODAY, AND CURRENT PLANS FOR ITS FUTURE OPERATION. I WOULD LIKE TO DISCUSS TODAY SOME OF THE HIGHLIGHTS OF THAT REPORT.

PROGRAM COST

THE BASIC OBJECTIVE OF THE LIQUID METAL FAST BREEDER REACTOR PROGRAM IS TO DEVELOP A BROAD TECHNOLOGICAL AND ENGINEERING BASE WITH EXTENSIVE UTILITY AND INDUSTRIAL INVOLVEMENT WHICH WILL LEAD TO A STRONG, COMPETITIVE COMMERCIAL BREEDER INDUSTRY. COMMERCIALIZATION OF BREEDERS HAS BEEN PROCEEDING ALONG TWO LINES OF EFFORT--THE BASE TECHNOLOGY PROGRAM AND THE DEMONSTRATION PLANT PROGRAM. UNDER THE BASE TECHNOLOGY PROGRAM, EMPHASIS IS PLACED ON DEVELOPING KEY TECHNICAL AREAS.

THIS PART OF THE PROGRAM INCLUDES ENGINEERING DEVELOPMENT, MANUFACTURING, AND PROOF TESTING EFFORTS.

THE DEMONSTRATION PLANT PROGRAM IS THE KEY TO THE PROGRAM'S TRANSITION FROM THE TECHNOLOGY DEVELOPMENT PHASE TO LARGE-SCALE COMMERCIAL UTILIZATION. PLANS FOR BUILDING THE CLINCH RIVER BREEDER REACTOR NEAR OAK RIDGE, TENNESSEE, ARE NOW IN THE PRELIMINARY DESIGN STAGES. THIS FACILITY IS TO BE A 350-MEGAWATT ELECTRIC POWER PLANT AND IS PRESENTLY SCHEDULED TO BE OPERATIONAL BY MID-1982. IT IS A COOPERATIVE GOVERNMENT/INDUSTRY EFFORT.

UNTIL RECENTLY, THE BREEDER PROGRAM STRESSED THE PROGRESSIVE DEVELOPMENT OF SIX SUCCESSIVELY LARGER DEMONSTRATION PLANTS. THIS APPROACH WOULD HAVE REQUIRED CONSIDERABLE GOVERNMENT SUPPORT TO DEVELOP LARGER COMPONENTS FOR EACH SUCCESSIVE DEMONSTRATION PLANT. IN MID-1974, THE ATOMIC ENERGY COMMISSION (AEC)--THE PREDECESSOR AGENCY TO ERDA-- REALIZED THAT THIS APPROACH PLACED TOO MUCH EMPHASIS ON PLANT CONSTRUCTION AND OPERATION AND NOT ENOUGH ON DEVELOPING PLANT COMPONENTS. CONSEQUENTLY, AEC TERMINATED PLANS FOR ALL BUT ONE DEMONSTRATION PLANT AND DECIDED TO BUILD INSTEAD A FACILITY TO TEST LARGE COMPONENTS. THIS MAJOR REDIRECTION PLACES THE CLINCH RIVER PLANT IN A VERY IMPORTANT POSITION.

ERDA ENVISIONS THAT OPERATION OF THE FIRST LARGE COMMERCIAL BREEDER WILL BEGIN IN 1987--A TARGET DATE WHICH HAS SLIPPED 3 YEARS SINCE 1969. ERDA HAS PROJECTED THAT 186 COMMERCIAL-SIZE BREEDERS WILL BE BUILT AND IN OPERATION BY THE YEAR 2000. THERE ARE INDICATIONS FROM THE PRIVATE SECTOR, HOWEVER, THAT THESE

PROJECTIONS ARE OPTIMISTIC AND POSSIBLY UNREALISTIC.

TOTAL PROGRAM EXPENDITURES FROM FISCAL YEAR 1948 THROUGH FISCAL YEAR 1974 WERE \$1.8 BILLION. RECENT ESTIMATES SHOW THAT AN ADDITIONAL \$8.9 BILLION WILL BE NEEDED TO CARRY THE PROGRAM THROUGH THE YEAR 2020, INDICATING A TOTAL PROGRAM COST OF \$10.7 BILLION--AN INCREASE OF ABOUT \$6.8 BILLION IN ESTIMATED COSTS SINCE 1968. IT SHOULD BE NOTED THAT THE ADDITIONAL \$8.9 BILLION DOES NOT INCLUDE THE EFFECTS OF ANY INFLATION AFTER FISCAL YEAR 1976. THIS IS IN ACCORDANCE WITH A LONG-ESTABLISHED OFFICE OF MANAGEMENT AND BUDGET POLICY, WHICH REQUIRES FEDERAL AGENCIES TO MAKE ALL ESTIMATES OF THE COSTS AND BENEFITS OF PROGRAMS IN CONSTANT DOLLARS FOR EACH YEAR OF THE PLANNING PERIOD.

THE \$10.7 BILLION ESTIMATE INCLUDES \$300 MILLION FOR PROVIDING A GOVERNMENT SUBSIDY TO ONE PLANT, THE SO-CALLED NEAR COMMERCIAL BREEDER REACTOR, TO BE CONSTRUCTED AFTER COMPLETION OF THE CLINCH RIVER DEMONSTRATION PLANT. ERDA AND ITS CONTRACTORS HAVE ESTIMATED THAT THE SUBSIDY COULD BE AS HIGH AS \$2 BILLION FOR SEVERAL PLANTS IF THE PROGRAM DOES NOT ATTAIN ITS DEVELOPMENT GOALS. ASIDE FROM FEDERAL FUNDS GOING INTO THE PLANT, ABOUT ONE-HALF BILLION DOLLARS IS EXPECTED TO BE SPENT BY PRIVATE INDUSTRY OVER THE NEXT 5 TO 10 YEARS TO DEVELOP THE BREEDER AND BUILD THE CLINCH RIVER BREEDER REACTOR.

FEDERAL ENERGY RESEARCH AND DEVELOPMENT HAS GROWN MARKEDLY FROM FISCAL YEAR 1971 WHEN IT WAS \$420 MILLION TO AN ESTIMATED \$1.8 BILLION FOR FISCAL YEAR 1976. FEDERAL FUNDING FOR

DEVELOPING THE BREEDER WAS \$168 MILLION FOR FISCAL YEAR 1971, ABOUT 40 PERCENT OF THAT YEAR'S TOTAL FEDERAL ENERGY RESEARCH AND DEVELOPMENT FUNDING. IN FISCAL YEAR 1976, FUNDING FOR THE BREEDER IS EXPECTED TO BE \$474 MILLION, ABOUT 26 PERCENT OF TOTAL FEDERAL ENERGY RESEARCH AND DEVELOPMENT FUNDING.

ELEMENTS AND FACILITIES
MAKING UP THE PROGRAM

THE BREEDER PROGRAM CONSISTS OF SIX MAJOR PROGRAM AREAS, EACH OF WHICH CONTRIBUTES AN IMPORTANT ELEMENT OF TECHNOLOGY. THE SIX AREAS ARE--REACTOR PHYSICS, FUELS AND MATERIALS, FUEL RECYCLE, SAFETY, COMPONENT DEVELOPMENT, AND PLANT EXPERIENCE. EACH AREA HAS AT LEAST ONE MAJOR TEST OR DEMONSTRATION FACILITY WHICH IS TO CONTRIBUTE SIGNIFICANTLY TO THE OBJECTIVE OF COMMERCIALIZING THE BREEDER.

WE IDENTIFIED 22 MAJOR FACILITIES IN USE OR BEING BUILT IN SUPPORT OF THE PROGRAM. THERE ARE PLANS TO BUILD EIGHT MORE MAJOR FACILITIES. THE ESTIMATED COST OF ALL OF THESE FACILITIES IS ABOUT \$3 BILLION OR ALMOST 30 PERCENT OF TOTAL PROGRAM COSTS. THREE OF THE MOST IMPORTANT FACILITIES HAVE EXPERIENCED LARGE COST INCREASES AND SCHEDULE DELAYS. FOR EXAMPLE, THE FAST FLUX TEST FACILITY, ORIGINALLY ESTIMATED IN 1967 TO COST \$87.5 MILLION AND TO BEGIN OPERATIONS EARLY IN 1974, IS NOW FORECAST TO COST \$512 MILLION AND OPERATIONS ARE NOT EXPECTED TO BEGIN UNTIL EARLY IN 1980.

ESTIMATED COSTS FOR THE CLINCH RIVER DEMONSTRATION PLANT ITSELF HAVE INCREASED FROM \$699 MILLION TO \$1.7 BILLION OVER THE LAST 2 YEARS AND THE SCHEDULED START-UP HAS BEEN SLIPPED

FROM 1980 TO 1982. THE SODIUM PUMP TEST FACILITY, A FACILITY FOR TESTING BREEDER PUMPS, ORIGINALLY ESTIMATED IN 1966 TO COST \$6.8 MILLION, IS PRESENTLY ESTIMATED TO COST \$17.5 MILLION. ERDA IS PLANNING TO MODIFY THIS FACILITY SO IT CAN TEST CLINCH RIVER BREEDER REACTOR PUMPS. THESE MODIFICATIONS, WHICH ARE PLANNED TO BEGIN IN FISCAL YEAR 1978, ARE CURRENTLY ESTIMATED TO COST \$40 MILLION, THEREBY INCREASING THE PROJECT'S TOTAL COST TO \$57.5 MILLION.

CONTINUED AVAILABILITY OF
QUALIFIED FUEL FABRICATORS

PRIVATE INDUSTRY'S INVOLVEMENT IN THE DEVELOPMENTAL STAGES OF THE LMFBR PROGRAM IS ESSENTIAL FOR MEETING THE PROGRAM OBJECTIVE OF ESTABLISHING A TIMELY CAPABILITY FOR A COMMERCIALY COMPETITIVE BREEDER PROGRAM. WITHIN THE FUELS AND MATERIALS AREA, THERE IS A POTENTIAL PROBLEM CONCERNING THE CONTINUED AVAILABILITY OF QUALIFIED COMMERCIAL FABRICATORS OF BREEDER FUEL.

IN 1972 AEC AWARDED FIXED-PRICE CONTRACTS TO TWO COMPANIES TO FABRICATE FUEL FOR THE FIRST TWO FAST FLUX TEST FACILITY REACTOR CORES. BASED ON CURRENT PROJECTIONS, BOTH FABRICATORS WILL COMPLETE PRODUCTION BETWEEN JUNE AND AUGUST 1975. ACCORDING TO ERDA, THE ONLY OTHER MARKET FOR SUCH FUEL IN THE NEXT SEVERAL YEARS WILL BE THE CLINCH RIVER PROJECT. THIS FUEL WILL NOT HAVE TO BE ORDERED UNTIL LATE 1978. WITHOUT FOLLOW-ON FUEL FABRICATION WORK AFTER MID-1975, THE CURRENT PRODUCTION FACILITIES OF BOTH THESE CONTRACTORS CAN BE EXPECTED TO SHUT DOWN AND IT IS UNCERTAIN IF THESE FACILITIES COULD OR WOULD

BECOME OPERATIONAL AGAIN WHEN NEEDED SEVERAL YEARS LATER.

THERE IS A STRONG POSSIBILITY THAT THE CAPABILITY OF ONE OR BOTH CONTRACTORS WILL BE LOST TO THE PROGRAM WITH A CONSEQUENT LOSS OF ASSURANCE THAT THE IDENTIFIED NEAR-TERM FUEL NEEDS OF THE FAST FLUX TEST FACILITY AND THE CLINCH RIVER PLANT CAN BE MET. TO MAINTAIN A CAPABILITY IN PRIVATE INDUSTRY TO FABRICATE BREEDER FUEL, ERDA PLANS TO SELECT, WITHIN A FEW MONTHS, ONE OF THE TWO CONTRACTORS TO FABRICATE TWO ADDITIONAL CORES FOR FUTURE USE IN THE FAST FLUX TEST FACILITY. IT IS ANTICIPATED THAT THIS APPROACH WILL ALLOW ONE CONTRACTOR TO CONTINUE OPERATIONS UNTIL ABOUT MID-1978. ERDA IS RELYING ON THE BREAK IN OPERATIONS BETWEEN COMPLETION OF FAST FLUX TEST FACILITY WORK AND BEGINNING OF CLINCH RIVER WORK TO BE SHORT ENOUGH FOR THE SUPPLIER TO CONTINUE IN BUSINESS.

FUEL RECYCLE AREA--LEAST ADVANCED

THE ABILITY TO RECYCLE PLUTONIUM FOR USE IN THE BREEDER IS ESSENTIAL TO THE BREEDER CONCEPT. THIS ABILITY--FUEL RECYCLING--IS PROBABLY THE LEAST TECHNOLOGICALLY ADVANCED AREA AT THIS TIME. THE NUCLEAR REGULATORY COMMISSION IS PRESENTLY CONSIDERING THE QUESTION OF ALLOWING RECYCLING OF PLUTONIUM FOR USE AS FUEL IN LIGHT-WATER REACTORS. A DECISION IS EXPECTED IN LATE 1977 OR EARLY 1978. THE COMMISSION'S DECISION REGARDING PLUTONIUM RECYCLING FOR LIGHT-WATER REACTORS WILL BE SIGNIFICANT TO THE BREEDER PROGRAM SINCE THE HEALTH, SAFETY, AND SAFEGUARD IMPACTS OF USING PLUTONIUM ARE SIMILAR FOR BOTH TYPES OF REACTORS.

MANAGEMENT OF THE BREEDER PROGRAM

THE ERDA DIVISION MANAGING THE BREEDER PROGRAM EXPERIENCED DELAYS IN REACHING AGREEMENT ON PROGRAMMATIC AND TECHNICAL MATTERS AFFECTING THE PROGRAM. THE AGENCY IS CURRENTLY IMPLEMENTING A NEW SYSTEM FOR ADMINISTERING, MANAGING, AND CONTROLLING ITS VARIOUS PROGRAMS, OF WHICH THE BREEDER IS THE MOST IMPORTANT. THIS NEW MANAGEMENT CONTROL SYSTEM HOLDS PROMISE FOR PROVIDING GREATER PROGRAM VISIBILITY AND A STRONGER MANAGEMENT FOCUS ON THOSE AREAS OF THE PROGRAM EXPERIENCING PROBLEMS.

THE DEMONSTRATION PROJECT IS MANAGED JOINTLY BY ERDA AND ITS UTILITY INDUSTRY PARTICIPANTS. THIS MANAGEMENT ARRANGEMENT IS COMPLEX AND POTENTIALLY CUMBERSOME. ON MARCH 10, 1975, ERDA SUBMITTED TO THE JOINT COMMITTEE ON ATOMIC ENERGY FOR ITS CONSIDERATION PROPOSED LEGISLATION FOR A NEW MANAGEMENT STRUCTURE FOR THE PROJECT. MANAGEMENT CONTROL WOULD BE GIVEN TO ERDA TO STRENGTHEN AND STREAMLINE THE GOVERNMENT'S CONTROL OVER THE PROJECT COMMENSURATE WITH THE GOVERNMENT'S INVESTMENT IN THE PROJECT--NOW ESTIMATED AT ABOUT \$1.5 BILLION. IN OUR REPORT TO THE JOINT COMMITTEE ON ATOMIC ENERGY EARLIER THIS MONTH WE POINTED OUT THAT THE ERDA PROPOSAL DID NOT CLEARLY DELINEATE THE MANNER IN WHICH THE PROJECT WOULD BE MANAGED AND THAT ERDA MIGHT NOT BE ABLE TO EXERCISE USUAL MANAGEMENT PREROGATIVES.

FOREIGN BREEDER PROGRAMS

DEVELOPING A LIQUID METAL FAST BREEDER REACTOR IS A HIGH PRIORITY NATIONAL ENERGY PROGRAM OF FIVE OTHER MAJOR INDUSTRIAL

NATIONS--THE UNITED KINGDOM, FRANCE, JAPAN, WEST GERMANY, AND THE SOVIET UNION. ERDA BELIEVES THAT, OF THE FOREIGN PROGRAMS, THE SOVIET UNION AND FRANCE ARE PROBABLY THE MOST ADVANCED IN REACTOR DEVELOPMENT. THE UNITED KINGDOM, FRANCE, AND THE SOVIET UNION ALREADY HAVE DEMONSTRATION-SIZE BREEDERS IN OPERATION. ALTHOUGH THERE ARE SOME DIFFERENCES BETWEEN THE UNITED STATES AND FOREIGN PROGRAMS, ALL FOREIGN PROGRAMS ARE AIMED ULTIMATELY AT COMMERCIAL-SIZE PLANTS IN THE THOUSAND MEGAWATT OR GREATER RANGE. ALSO, THESE PROGRAMS INCLUDE THE CONSTRUCTION OF INTERMEDIATE SIZE PLANTS.

AN ERDA REVIEW GROUP REPORTED THAT FOREIGN BREEDER PROGRAMS CAN CONTRIBUTE IMPORTANT DATA AND INFORMATION TO THE U.S. PROGRAM BUT THE UNITED STATES COULD NOT SAVE ANY LARGE AMOUNT OF EFFORT BY USING THE FOREIGN PROGRAMS.

IN ORDER FOR THE CONGRESS TO KNOW WHETHER GREATER RELIANCE CAN BE PLACED ON THE USE OF FOREIGN BREEDER TECHNOLOGY, WE ARE SUGGESTING THAT THE CONGRESS EXPLORE IN GREATER DEPTH WITH ERDA THE ADVANTAGES AND DISADVANTAGES OF USING FOREIGN BREEDER TECHNOLOGY.

IN CONCLUSION, MR. CHAIRMAN, I WANT TO POINT OUT THAT THE ERDA ADMINISTRATOR IS CURRENTLY REVIEWING THE PLANS FOR THE BREEDER AS PART OF AN ENERGY DEVELOPMENT PLAN WHICH WILL BE SUBMITTED TO THE CONGRESS BY JUNE 30, 1975. THUS, EXISTING PLANS FOR THE BREEDER PROGRAM ARE SUBJECT TO CHANGE BOTH AS TO SCHEDULE AND COST.

WE SHALL BE GLAD TO RESPOND TO YOUR QUESTIONS.