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CLASSIF.: U POST OFFICE REG. NO.:

FILE CODE: 50-172

DESCRIPTION: (Must Be Unclassified)
"In The Matter of PEC," APPLICANT'S AND AEC STAFF'S JOINT PROPOSED FINDINGS, CONCLUSIONS AND ORDER.

ENCLOSURES: (2 cys. rec'd)
1—"Certificate of Service"
2—PROPOSED FINDINGS, CONCLUSIONS AND ORDER (Preliminary Statement)

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UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

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IN THE MATTER OF	)	
	)	DOCKET NO. 50-171-CP
PHILADELPHIA ELECTRIC COMPANY	)	

APPLICANT'S AND AEC STAFF'S JOINT PROPOSED FINDINGS, CONCLUSIONS AND ORDER

Applicant and the AEC Staff jointly submit the Proposed Findings, Conclusions and Order attached hereto.

It has been noted by Counsel for Applicant and the AEC Staff that the corrected transcript received in the Office of the Hearing Examiner on January 12, 1962 reflects the proposed transcript corrections heretofore submitted by Applicant and the AEC Staff. Accordingly said corrected transcript has been used as the basis for transcript references in the Proposed Findings, Conclusions and Order.

Respectfully Submitted,

/S/ Eugene J. Bradley
Eugene J. Bradley
Attorney for Applicant

/S/ Thomas F. Engelhardt
Thomas F. Engelhardt
Attorney for the AEC Regulatory Staff

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Branch

UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

IN THE MATTER OF	)	DOCKET NO. 50-171-CP
	)	
PHILADELPHIA ELECTRIC COMPANY	)	

CERTIFICATE OF SERVICE

A copy of the attached "Applicant's and AEC Staff's Joint Proposed Findings, Conclusions and Order" has been served today by deposit in the U. S. Mail on this 17th day of January, 1962, addressed to:

William M. Gross, Esquire
Assistant Attorney General
Commonwealth of Pennsylvania
Department of Health
P. O. Box 90
Harrisburg, Pennsylvania

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/S/ Thomas F. Engelhardt

Thomas F. Engelhardt
Attorney for the AEC Regulatory Staff

UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

In the Matter of	)	
	)	Docket No. 50-171-CP
PHILADELPHIA ELECTRIC COMPANY	)	

PROPOSED FINDINGS, CONCLUSIONS AND ORDER

PRELIMINARY STATEMENT

1. This proceeding involves an application filed by Philadelphia Electric Company pursuant to the Atomic Energy Act of 1954, as amended, and the regulations of the Commission, for a permit to construct a 115 megawatt (thermal) high-temperature, gas cooled nuclear reactor. The application was filed with the Commission on July 25, 1960. In response to requests from the AEC Staff for supplemental technical information, amendments to the application were filed in September, 1960 (Amendment No. 1), August, 1961 (Amendment No. 2) and October, 1961 (Amendment No. 3).

2. The Commission issued a Notice of Hearing on November 8, 1961, which was published in the Federal Register on November 16, 1961 (26 F.R. 10736). The Notice of Hearing designated the time and place for a hearing to be held on the construction

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permit application and specified the following issues to be considered at the hearing:

(1) Whether the Applicant has submitted sufficient information to provide reasonable assurance that a utilization facility of the general type proposed in the application can be constructed and operated at the proposed location without undue risk to the health and safety of the public;

(2) Whether there is reasonable assurance that the technical information omitted from and required to complete the application will be supplied;

(3) Whether the Applicant is technically qualified to design and construct the proposed facility;

(4) Whether pursuant to Section 50.40(b) of the AEC's regulations the Applicant is financially qualified to design and construct the facility; and

(5) Whether the construction of the reactor will be inimical to the common defense and security or to the health and safety of the public.

3. The issues as so specified were not controverted by Applicant in its Answer, filed pursuant to Section 2.736 of the Commission's Rules of Practice, and no request for

their modification was otherwise made in the proceeding.

4. On December 1, 1961, upon Applicant's motion, a prehearing conference was held to determine the time for the exchange of prepared testimony and other procedural matters. The Commonwealth of Pennsylvania filed a Petition for Leave to Intervene on December 8, 1961. Applicant and the AEC Staff interposed no objection thereto and the Petition was granted by order of the Presiding Officer issued December 14,1961.

5. Pursuant to the aforementioned Notice of Hearing a hearing was held on December 18, 1961 in the auditorium of the Commission's headquarters at Germantown, Maryland. At the commencement thereof a member of the public made a limited appearance, pursuant to Section 2.731 of the Commission's Rules of Practice, and made a voluntary unsworn statement on the record but offered no testimony upon the issues involved in the proceedings. (Tr. 26-37).

6. The evidence adduced at the hearing was in the form of prepared written testimony and exhibits presented by seven witnesses on behalf of Applicant and two witnesses on behalf of the AEC Staff. The qualifications of each witness were fully and extensively stated in the evidence and each is

found to be an expert witness whose testimony has been given full credence. A consideration of all the testimony reveals no disagreement among the parties upon the material facts and issues and following the conclusion of the hearing proposed findings, conclusions and order, embodying the facts of record believed to be significant, relevant and material to the issues and the conclusions to be drawn therefrom, were jointly submitted by Applicant and the AEC Staff. These joint proposals are adopted herein, being fully supported by a careful consideration of the entire record.

FINDINGS OF FACT

7. Applicant is a public utility corporation organized and existing under the laws of the Commonwealth of Pennsylvania, with its general office located at 1000 Chestnut Street, Philadelphia, Pennsylvania. Its directors and principal officers are citizens of the United States and the corporation is not owned, controlled or dominated by an alien, a foreign corporation or a foreign government (Item 2, Joint Exhibit A). The company supplies electric service in Philadelphia, electric and gas service in the five surrounding Pennsylvania counties and steam heat service in portions of Philadelphia and West Chester, Pennsylvania. Through a subsidiary electric service is also supplied in parts of two

Maryland counties. (Tr. 62).

8. Applicant has contracted with the Commission to design and construct the proposed nuclear power plant, and to operate it for a period of five years, under the Commission's Power Reactor Demonstration Program. (Tr. 58). Bechtel Corporation is Applicant's prime contractor for the design and construction of the plant. (Tr. 59). General Atomic Division of General Dynamics Corporation, as subcontractor to Bechtel, is responsible for the nuclear steam supply system and under a contract with Applicant will supply fuel elements for the first five years of plant operation. (Tr. 59).

9. A program of research and development for the plant is being conducted by General Atomic under a contract between it and the Commission. (Tr. 59).

10. Associated with Applicant in the project is High Temperature Reactor Development Associates, Inc. (HTRDA), a non-stock, non-profit corporation formed by Applicant and fifty-two other utility companies interested in acquiring technical information, experience and training in the design, construction and operation of the facility. (Tr. 59, 262). Applicant and HTRDA have contracted with Bechtel Corporation to design and construct

the plant for a fixed price of $24,500,000, HTRDA to pay Bechtel $16,500,000 with the balance of $8,000,000 to be paid by Applicant. (Tr. 62, 262). Other costs, including fuel elements, additional equipment and services, land, off-site transmission and operator training bring the total estimated cost of the facility to approximately $31,300,000. (Tr. 60-62, 261). Applicant is soundly financed and has adequate resources at its command with which to meet its obligations toward the project. (Tr. 62-64, 264). The member companies of HTRDA are likewise financially qualified to assume their commitments, by virtue of which HTRDA has more than sufficient funds to meet its $16,500,000 obligation to Bechtel Corporation. (Tr. 73, 262, 263). Accordingly, Applicant is financially qualified to design and construct this facility and to assume financial responsibility for the allocation of special nuclear material requested in its application. (Tr. 64, 260).

11. Among Applicant's 9100 employees, over 260 are professional engineers directly engaged in power plant design and engineering. (Tr. 64, 361). Since 1952 its personnel have participated in other reactor projects for training and experience in reactor design, construction and operation. (Tr. 64-66, 361).

Bechtel Corporation is one of the world's largest designers and constructors of government works and industrial facilities and developers of natural resources. (Tr. 110). It has been engaged in nuclear activities since 1949, its projects including the Dresden Nuclear Power Station, the Humboldt Bay Boiling Water Reactor Plant, the Big Rock Point Boiling Water Reactor Plant and the Sodium Graphite Reactor Plant at Hallam, Nebraska. (Tr. 111, 361, 362). General Atomic Division of General Dynamics Corporation, with one of the world's largest privately owned centers of diversified nuclear research and development, employs a staff numbering more than 1200, including a technical staff of over 750 engineers, chemists, metallurgists, theoretical physicists, experimental physicists and technicians. (Tr. 156). A large number of its senior staff have previously been associated with the development, design and construction of reactor systems in the United States, Canada and England. (Tr. 156, 157). In conjunction with Bechtel Corporation and General Atomic, Applicant is well qualified to design and construct the proposed facility. (Tr. 67, 362).

12. The nuclear reactor which Applicant proposes to construct

is graphite-moderated and helium cooled, with a nominal net electrical output of 40,000 kilowatts. The system is of the solid fuel type employing fuel and fertile material in the form of carbides dispersed in graphite and encased in a low permeability graphite sleeve. (Tr. 159, 276). The reactor core, located within a steel pressure vessel, is cylindrical in shape and includes an array of fuel elements, control rods and safety shutdown mechanisms surrounded by a graphite reflector. (Tr. 275, 276). Heat produced by the core will be removed by the forced circulation of helium which enters the reactor vessel at about 634° Fahrenheit, passes through the core, exits the core at about 1358° Fahrenheit, flowing equally to each of two external coolant loops. (Tr. 159, 276). The hot helium enters the steam generators and generates high pressure superheated steam. Circulation in each loop will be accomplished by means of a centrifugal circulator. (Tr. 159, 276.

13. The steam cycle for the reactor is typical of conventional power plants. Feedwater enters the steam generator at approximately 420° Fahrenheit at full power and the superheated steam emerges from the outlet of the steam generator at approximately 1005° Fahrenheit and a pressure of 1559 psia. (Tr. 159).

Certain features which are novel or represent extensions of current reactor practice will be incorporated in the Peach Bottom Reactor, including a substantially all-graphite core, unclad fuel material, dependence on low permeability graphite as structural and fission product barrier material, purging of fission products from fuel elements, trapping and collection of fission products, reactor control and safety mechanisms and high operating temperatures. However, an extensive research and development program has been underway for over four years to provide necessary technical information as a basis for these features. (Tr. 187, 188, 278).

14. The reactor core consists of 804 fuel elements, each element being 12 feet long and 3.5 inches in diameter. The active core diameter will be approximately 9.16 feet and the active core height 7.5 feet. Fuel within the active section is in the form of particles of uranium carbide-thorium carbide coated with pyrolytic carbon, included in graphite matrix fuel compacts, the compacts being located within the low permeability graphite sleeves. (Tr. 160, 161). Above the active section, the top part of each element will consist of a graphite reflector region and a fuel handling knob. Below the active section the bottom part of the element contains a

graphite reflector region and an internal fission product trap. Each element rests upon a standoff pin on a core support plate. There is no similar fixed support for the top of the core. Lateral support for the elements will be provided by movable side reflector pieces which exert a radial force on the core array. (Tr. 276). The suitability of this method of supporting the core has been confirmed by the operation of a half-linear-scale flow model containing all main components of the proposed core. (Tr. 162, 163).

15. The proposed fuel element design involves the application of graphite under conditions for which there is no previous experience in operating reactors. Particularly involved is the use of low permeability graphite in complex structural arrangements at conditions of temperature, temperature gradients and radiation exposures which are more severe than for present practice. (Tr. 286). A significant part of the supporting research and development program has been directed toward resolution of the effects of radiation exposure, the structural integrity and dimensional stability, the effective thermal conductivity of the material and the possible mobility of fuel, neutron poison and fission products within the fuel material. (Tr. 286, 287). The research and development program

relating to the fuel elements shows that the proposed elements can be developed to operate in a satisfactory manner. (Tr. 190, 292).

16. The temperature coefficient of reactivity has been studied extensively in the research and development program. The most significant temperature effects in this reactor arise from the temperature dependence of the neutron thermal utilization and the Doppler broadening of the thorium resonances (Doppler effect). A strong Doppler effect is important inasmuch as it serves to rapidly reduce the core reactivity during conditions of increasing fuel temperature. The overall temperature coefficient performs a similar function but with a considerably delayed effect. The Doppler coefficient was determined by calculational methods and the results checked experimentally. (Tr. 312). In order to enhance a strong negative overall temperature coefficient, about 5 kilograms of rhodium will be included in the graphite fuel elements. This feature results in a strong contribution to the overall temperature coefficient and some contribution to the prompt coefficient. It has been shown that both the prompt and overall temperature coefficient remain negative at all times during life and at all obtainable graphite temperatures. (Tr. 166, 313). The kinetics of the core have also been studied to

determine the effects of various reactivity transients and the results of these studies indicate satisfactory behavior during reactivity transients. (Tr. 313, 314).

17. In this reactor, the philosophy of fission product control is to use a fuel cladding material which is not completely impervious to fission products, but to accept the release of some of these products from the fuel elements into the primary coolant system during routine operation. (Tr. 175-6). In order that the release of fission products from the fuel elements to the primary coolant system be held within tolerable limits, several measures are employed. First, release of volatile fission products from the fuel compacts is delayed until the short-lived products have decayed. Extensive experiments have demonstrated a moderate delay with uncoated fuel particles and a long delay with coated fuel particles, the latter to be used in the Peach Bottom Reactor. Second, most of the condensible fission products which do escape from the fuel compacts will be swept out of the active part of the core by means of a purge stream and removed in the cold end of the fuel element by an internal trap. Third, the noble gas and halogen fission products which do not decay within the fuel element will be carried by the helium purge stream to

charcoal traps external to the reactor pressure vessel where they are allowed to decay. Fourth, the sleeve of the graphite fuel element is made of low permeability graphite in order to impede the leakage of fission products from the purge stream into the primary coolant. (Tr. 176-7).

18. By utilizing these methods of fission product control, only a small fraction of the total activity produced is in the primary coolant system. The design activity of the primary coolant is approximately 4,000 curies, whereas the calculated activity near the beginning of life is approximately 100 curies. Although fuel compacts made with coated fuel particles will be used in the reactor, the analysis of the main coolant system activity and the external trapping system activity and heat load are conservatively based on the use of uncoated fuel particles. (Tr. 177).

19. Full confirmation of the method of controlling the release of fission product activity in the Peach Bottom Reactor has been obtained by means of an in-pile loop which is now being operated as a part of the research and development program. (Tr. 179). Although the concept of fission product purging and trapping has not been previously employed the principles above have been

applied in other operations and can be considered sound. The design requirements for the fission product trapping system appear to be reasonable, so that an acceptable trapping system can be designed and constructed for this reactor. (Tr. 333).

20. The reactor core will be located within a carbon steel pressure vessel which is approximately 14 feet in diameter and 35 feet high and has a nominal wall thickness of approximately 2-1/2 inches. Major components included within the pressure vessel are the core support plate, the upper and lower thermal shields, the plenum shroud and side reflectors. Penetrations in this vessel are required in the upper head for fuel handling; in the lower head for the control rod drives and emergency shutdown drive mechanisms, instrumentation, and purge gas lines; and at two locations in the cylindrical wall where concentric primary coolant pipes join the pressure vessel. The pressure vessel will be cooled during full power operation by coolant returning from the steam generators at approximately 634° Fahrenheit, the coolant pressure being maintained at 350° psia. (Tr. 168-170). Design of the vessel will conform to appropriate ASME and Pennsylvania state codes,

including the latest nuclear case rulings. The proposed design criteria for the pressure vessel are compatible with the operating requirements. Accepted practices will be followed during its construction and testing. (Tr.321-322).

21. The reator control system includes a set of control rods for normal reactor control and safety functions, two separate groups of safety rods for emergency reactor shutdown, and appropriate nuclear and process instrumentation. Normal control is accomplished by 36 boron-carbide control rods, each driven by a separate hydraulic mechanism. (Tr. 292, 293). A rod separation monitor will be installed on each control rod to detect possible separation of the control rod assembly. A mechanical lock will be provided which will prevent a fully inserted control rod from dropping out of the core as a result of structural failure and malfunction of the mechanical, electrical or hydraulic components of the drive. (Tr. 295). A prototype of the control rod and drive has been tested for several months in an atomosphere of pure helium under temperature gradients expected in actual service. (Tr. 172). The research and development program also has produced data regarding the irradiation stability of graphite components and graphite

B_4C specimens. (Tr. 298-300). On the basis of technical information furnished concerning this control rod system, there is good assurance that it will function in an acceptable manner. (Tr. 301).

22. A significant asset to the reliability of the shutdown capability of the reactor is provided by two independent emergency shutdown systems, one consisting of a group of 19 electrically driven shutdown rods and the other consisting of a minimum of 19 thermally released (fused) gravity-drop absorbers. (Tr. 301, 302). The safety and emergency shutdown capabilities proposed for the reactor are adequate under any credible circumstances. (Tr. 303).

23. The reactor instrumentation system consists primarily of equipment to monitor neutron flux, condition of the control rod and safety rod systems, and cooling system parameters. All normal and emergency instrumentation for the entire plant will be located in the control room which will be located in an auxiliary building adjacent to the reactor building. (Tr. 303).

24. Three separate systems are provided for cooling of the reactor under various conditions including the primary cooling system, the afterheat cooling system and the emergency cooling

system. The primary system is designed to function during power operation and for periods up to one hour following shutdown from power operation. The afterheat cooling system is designed to remove decay heat generated subsequent to one hour after shutdown. The emergency system functions when the normal means of cooling are denied. (Tr. 314, 315).

25. It is proposed that the entire fuel inventory will be replaced at about three-year intervals; consequently, fuel handling activities normally will be performed infrequently. The fuel handling system includes a fuel transfer machine, a charge machine, a fuel element canning machine, a pickup cell and a viewing system. A water-filled spent fuel storage pit and associated equipment are provided outside of the containment building for storage of spent fuel. (Tr. 334). A building over the spent fuel pit is designed to retain radioactive materials which may be released if an accident were to occur in the spent fuel pit. (Tr. 118).

26. The containment building will be a vertical structure consisting of a cylindrical steel shell with dished top and bottom heads. Its diameter is 100 feet and its overall height is 162 feet. This building will contain the entire reactor system and

the steam generators. The reactor control room and conventional plant equipment are located outside the containment in conventional structures. (Tr. 339). Based upon conservative assumptions, the highest peak containment pressure resulting from the most severe accident postulated, which involves a series of failures, is 8.0 psig at 150° Fahrenheit. This has been used as the internal design pressure for the containment building. (Tr. 120-121). During operation the containment building will be filled with a reduced oxygen atmosphere to prevent the possibility of explosions or combustion of CO and H_2 which might be formed during certain postulated accidents. The oxygen burning system consists of a standard unit which burns a hydrocarbon fuel in air to cause combustion, converting the oxygen in the air to carbon dioxide and water. The water is removed by condensation. The resulting gas which contains about 0.5 percent oxygen will then be fed into the secondary containment vessel via the containment ventilation system. (Tr. 121).

27. Possible sources of radioactive gases under normal operating conditions have been identified. (Tr.123, 343). The containment ventilation and gaseous waste system includes equipment

for filtering and monitoring all gas exhausted to the stack. (Tr. 346). Calculations show that the total gaseous radioactive effluents from the plant result in an average annual concentration at the site boundary well below the maximum permissible concentrations specified in the Commission's regulations (10 CFR Part 20). (Tr. 123). The stack monitor will provide signals for alarms and automatic closure of the containment isolation valves if the stack activity exceeds predetermined limits. (Tr. 346). This reactor is expected to generate a minimum of liquid wastes. (Tr. 346). These wastes, which will be released to the Conowingo Pond through the condenser discharge, will be monitored for radioactivity and decontaminated by demineralization, if necessary, so that the concentrations are well within drinking water tolerances as set forth in 10 CFR Part 20 of the Commission's regulations. (Tr. 126, 127). All solid raioactive wastes will be shipped off-site for disposal. (Tr. 348).

28. Hypothetical accidents typical of the various accidents that conceivably could occur to this reactor as a result of operational errors and failure of various components and systems have been analyzed. (Tr. 348, 349). Postulated failures include

those involving the reactor, the fuel handling system, the fission product trapping system and conditions arising external to the plant. (Tr. 349). It has been demonstrated in each case that by following proper corrective action or through the inherent safety characteristics of the reactor and its systems, these accidents would not result in undue public hazard. (Tr. 349).

29. The probable maximum credible accident is the rupture of the doubly contained fission product purge line through which fission products purged from the fuel elements pass to the external fission product traps. (Tr. 162, 353, 354). This incident would release to the containment a total of 2.26 megacuries of activity. With inversion conditions, resulting exposures at the site boundary for the first 24 hours would be: whole body, 0.01 rem; thyroid, 6 rem. Since the calculated doses are not significant, the result of this accident would not cause undue hazard to the public. (Tr. 354). The scope of Applicant's reactor safety analysis includes all accidents considered credible, the assumptions on which the releases and consequences are based appear to be sufficiently conservative and the worst postulated releases do not result

in unacceptable exposures at the site boundary. (Tr. 354-A).

30. The research and development program has been undertaken to provide the necessary technical information in support of the proposed advanced reactor design. The major areas involved in the program include the graphite component integrity, fission product control, flow and heat transfer experiments, control rod and drive system and emergency shut-down systems. The scope of each phase of the program is sufficient to provide for an adeqaute investigation of the problems involved in the design of the proposed reactor. The program is now in an advanced stage of completion and results to date have provided good substantiation of the proposed design concepts. (Tr.338). Although some areas of the research and development program remain to be performed, in no case is this effort vital to the safety of this reactor and the information presented to date is adequate to assure that the plant can be designed as the Applicant has indicated. (Tr. 368).

31. The proposed plant will be located in Peach Bottom Township, York County, in southeastern Pennsylvania. The site is situated on the west shore of the Conowingo Pond, which is formed on the Susquehanna River by the backwater of the Conowingo Dam.

From this dam the Pond extends upstream about fifteen miles to the Holtwood Dam, which is about six miles north of the site (Tr. 80, 81, 355). Applicant owns the six hundred acre site and its wholly owned subsidiaries own the land on both sides of the Pond to a distance of three hundred feet from the shoreline (Tr. 81). The reactor will be located about 225 feet from the shoreline and will have a minimum exclusion distance to the west of 3,000 feet. The Pond to the east is about 7600 feet wide (Tr. 81, 355). Steep hills rise to an elevation of about 300 feet above plant grade within a one mile radius of the plant. (Tr. 81, 355).

32. 1.7 miles to the southwest of the site about fifty persons live in the Slate Hill area and about seventy persons reside in the Peach Bottom community, 2.3 miles to the east. Within a ten mile radius the only sizeable communities are Delta, Pennsylvania and Cardiff, Maryland, four miles to the southwest and having a combined population of less than 2000 (Tr. 82, 356). Within a five mile radius of the site the population density is 73 persons per square mile and within a ten mile radius, 80 persons per square mile. (Tr. 82).

33. Applicant has made detailed studies of the meteorological

conditions obtaining in the area of the proposed site, the area being one for which ample meteorological information is available. (Tr. 84, 85). For the year as a whole the most frequent wind direction is west. During the summer months the prevailing wind is slightly south of west and during winter it veers to north of west. (Tr. 84). Applicant has established a program of weather observation in the immediate site area and has also engaged a Professor of Meteorology in the School of Engineering Science at Johns Hopkins University as a consultant in the continuing program of analysis of the detailed meteorological data relating to the site. (Tr. 85, 86). This program will provide further insight into the micro-meteorological factors which control local diffusion. (Tr. 86).

34. The site is in a region of minor seismicity, studies indicating no reports of any earthquakes at Peach Bottom or the immediate vicinity during the past thirty years. (Tr. 89, 90). The water table slopes downward toward Conowingo Pond with the result that groundwater discharges into the Pond. Water cannot flow through the ground to and across the land boundaries of the general site area since there are no deep aquifers in the region and the bedrock tightens rapidly with depth. (Tr. 88).

35. The river below the site is presently the sole source of water for the City of Havre de Grace, the Perry Point Veterans' Hospital and the Bainbridge Naval Training Station, which supplies the town of Port Deposit. The City of Baltimore is constructing a pipeline which will take water from the Susquehanna River about one-quarter mile upstream from the Conowingo Dam. This facility is intended to supplement the city's water supply from other sources, which at present rates of use hold about one year's supply of water. (Tr. 89, 356).

36. Because Conowingo Pond is a valuable water resource many special features have been incorporated in the design of the plant to guard against the possibility of accidental release of any radioactive liquids from the plant. (Tr. 244). The Professor of Oceanography and Director of the Chesapeake Bay Institute at Johns Hopkins University has been engaged by Applicant to conduct experimental and analytical studies of circulation currents in the Pond, which studies have been utilized to evaluate the probable dispersion pattern for hypothetical releases to the Pond from the site. (Tr. 88, 89). An analysis of the effects of postulated accidents upon the waters of the Conowingo Pond indicate that no dangerous conditions

would result. (Tr. 244, 245, 359). An examination of the meteorological, hydrological and geological characteristics of the proposed site and the population distribution in the area indicates that it is acceptable for a reactor of this general type. (Tr. 98, 358, 360).

37. Applicant instituted an environmental radiation monitoring program in August, 1960 to determine the background radiation levels existing in the environs of the Peach Bottom area. The monitoring stations have been operating continuously since the beginning of the program. Media being sampled in the area include air particulate matter, surface water, well water, rain water, vegetation, silt, earth, fish, shellfish, milk and small game. Applicant plans to continue this monitoring program after the plant is in operation, with such modifications as may be required. (Tr. 90).

38. Expert witnesses for both Applicant and the AEC Staff have concluded that a reactor of the general type proposed can be constructed and operated at the Peach Bottom site without creating undue risk to the health and safety of the public. (Tr. 228, 365). The Commission's Advisory Committee on Reactor Safeguards has reviewed the safeguards aspects of the Peach Bottom Reactor in March, 1960, in December, 1960 and in October,

1961. The application and all amendments thereto have been reviewed by the Committee. In its report to the Commission dated November 1, 1961, the Committee concluded:

> "Since the continuing research program gives reasonable assurance that all health and safety problems can be satisfactorily resolved, the ACRS believes that the proposed reactor can be constructed at the Peach Bottom site with reasonable assurance that it can be operated without undue risk to the health and safety of the public." (Tr. 363, 364).

39. In connection with its application for a construction permit Applicant has requested an allocation by the Commission of 1636 kilograms of enriched U-235 for use in the operation of the facility. The quantities of special nuclear material requested are reasonable and are supported by data submitted by Applicant. (Item 2, Joint Exhibit A, Tr. 260).

40. Applicant will not permit any individual to have access to Restricted Data until the Civil Service Commission shall have made an investigation and report to the Commission on the character, associations and loyalty of such individual, and the Commission shall have determined that permitting such person to have access to Restricted Data will not endanger the common defense and security. (Item 2, Joint Exhibit A).

Conclusions

41. After a careful consideration of the entire decisional record and in the light of the particularized factors and reasons hereinabove set out, it is concluded that the construction permit herein sought should be issued, specifically because:

1. The Applicant has submitted sufficient information to provide reasonable assurance that a utilization facility of the general type proposed in the application can be constructed and operated at the proposed location without undue risk to the health and safety of the public;

2. There is reasonable assurance that the technical information omitted from and required to complete the application will be supplied;

3. The Applicant, collectively with Bechtel Corporation and General Atomic Division of General Dynamics Corporation, is technically qualified to design and construct the proposed facility;

4. The Applicant is financially qualified to design and construct the facility; and

5. The construction of the reactor will not be inimical to the common defense and security or to the health and safety of the public.

WHEREFORE it is ordered, subject to review by the Commission upon its own motion, or after petition to review, if any:

(1) The Director of the Division of Licensing and Regulation of the Atomic Energy Commission is hereby directed to issue to Philadelphia Electric Company a construction permit in the form and content attached to this decision.

(2) The Director of the Division of Licensing and Regulation of the Atomic Energy Commission is further directed to allocate or arrange for the allocation to Philadelphia Electric Company, for use in the operation of the reactor 1636 kilograms of Uranium 235 contained in uranium in the isotopic ratios specified in the application.

(3) In accordance with the provisions of Sections 2.751 and 2.752 of the Commission's Rules of Practice, a petition to review this decision may be filed within twenty days after the date of issuance hereof, on or before , 1962; if no such petition is granted by the Commission, or if the Commission does not direct the record to be certified to it for final decision not later than ten days after the expiration of said twenty day period, this decision shall, in accordance with the Commission's Rules of Practice, become final on , 1962.

UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. 50-171

CONSTRUCTION PERMIT

Construction Permit No._____

Pursuant to the Atomic Energy Act of 1954, as amended (hereinafter referred to as "the Act") and Title 10, CFR Part 50, "Licensing of Production and Utilization Facilities", the Atomic Energy Commission (hereinafter referred to as "the Commission") hereby issues a construction permit to Philadelphia Electric Company (hereinafter referred to as "the Applicant") to construct a 115 megawatt (THERMAL) advanced type, high temperature, gas-cooled, thermal neutron reactor as a utilization facility (hereinafter referred to as "the facility").

This permit shall be deemed to contain and be subject to the conditions specified in Sections 50.54 and 50.55 of said regulations; is subject to all applicable provisions of the Act, and rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

A. The earliest date for the completion of the facility is March 1, 1964.

   The latest date for the completion of the facility is December 31, 1964.

B. The site proposed for the facility is the location in Peach Bottom Township, York County, Pennsylvania, described in the Applicant's "Application for a Construction Permit and Class 104 License" as amended (hereinafter referred to as "the application").

C. This permit authorizes the Applicant to construct the facility in accordance with the application heretofore filed in this proceeding without further authorization.

D. If the Applicant desires Commission approval of the final design of the facility or any part thereof, or of any particular technical specification, prior to consideration of a license to operate, it may request that the Commission grant specific approval of such final designs or technical specifications by appropriate amendment to this permit.

E. The Applicant shall submit to the Commission under oath or affirmation within six months of the date of issuance of this permit and at six month intervals thereafter, reports containing:

1. A summary of the status of the design of the facility and scheduled dates of design completion on major facility components;

2. A description of any changes in the facility design, as described in the application, involving hazards considerations and an evaluation of such hazards considerations;

3. A summary of the status and results of research and development activities conducted by the Applicant and/or its subcontractors relating to the design of the facility or hazards considerations involved in the facility;

4. Status of construction of the project.

F. The Applicant shall submit to the Commission, under oath or affirmation no later than one calendar year from the date of issuance of this permit, the following:

1. A report which shall contain detailed information on the design of the gas and liquid waste disposal systems and in particular, information relating to the flow processes of the systems, the capacities of the systems and the concentrations of radioactive material to be contained in these systems.

2. A description of the duties and qualifications of facility operating personnel and a description of the program and schedule for training such personnel.

G. This permit is provisional to the extent that a license authorizing operation of the facility will not be issued by the Commission unless the Applicant has submitted to the Commission (by amendment to the application) the complete Final Hazards Summary Report (portions of which may be submitted and evaluated from time to time) and the Commission has found that

the final design provides reasonable assurance that the health and safety of the public will not be endangered by operation of the facility in accordance with the specified procedures.

H. Upon the filing of any additional information needed to bring the original application up to date, upon filing of proof of financial protection as required by Section 170 of the Act and the Commission's regulations, and upon a finding by the Commission that construction of the facility has been completed in accordance with the final design as approved by the Commission, and that the facility has been constructed and will operate in conformity with the provisions of the Act and the Rules and Regulations of the Commission, and in the absence of any good cause shown to the Commission why the granting of a license would not be in accordance with the Act, the Commission will issue a Class 104 license to the Applicant pursuant to Section 104(b) of the Act.

Pursuant to Section 50.60 of the regulations in Title 10, Chapter 1, CFR Part 50, the Commission has allocated to the Applicant for use in the operation of the reactor 1636 kilograms of Uranium-235 contained in uranium in the isotopic ratios specified in the Applicant's application.

Estimated schedules of special nuclear material transfers to the Applicant and returns to the Commission are contained in Appendix "A" which is attached hereto. Transfers by the Commission to the Applicant will be conditioned upon return to the Commission by the Applicant of material substantially in accordance with Appendix "A" attached hereto.

FOR THE ATOMIC ENERGY COMMISSION

APPENDIX "A"
TO
PHILADELPHIA ELECTRIC COMPANY
CONSTRUCTION PERMIT NO.

ESTIMATED SCHEDULE OF TRANSFERS OF SPECIAL NUCLEAR MATERIAL

(1) Date of Transfer (Fiscal Year)	(2) Kg U-235 from AEC to P. E.	(3) Kg Fissile U Returns to AEC from P. E. Recoverable Scrap Spent Fuel* (U-235)	(U-235+U-233)	(4) Kg Fissile U Net Yearly Distribution	(5) Cumulative Distribution Kg Fissile U
1962	63.7			63.7	63.7
1963	127.3			127.3	191.0
1964	(Startup)	7.0		(7.0)	184.0
1965					184.0
1966					184.0
1967	183.7			183.7	367.7
1968		6.7	42.6	(49.3)	318.4
1969			64.0	(64.0)	254.4
1970	183.7			183.7	438.1
1971		6.7	42.6	(49.3)	388.8
1972			64.0	(64.0)	324.8
1973	183.7			183.7	508.5
1974		6.7	42.6	(49.3)	459.2
1975			64.0	(64.0)	395.2
1976	183.7			183.7	578.9
1977		6.7	42.6	(49.3)	529.6
1978			64.0	(64.0)	465.6
1979	183.7			183.7	649.3
1980		6.7	42.6	(49.3)	600.0
1981			64.0	(64.0)	536.0
1982	183.7			183.7	719.7
1983		6.7	42.6	(49.3)	670.4
1984			64.0	(64.0)	606.4
1985	183.7			183.7	790.1
1986		6.7	42.6	(49.3)	740.8
1987			64.0	(64.0)	676.8
1988	183.7			183.7	860.5
1989		6.7	42.6	(49.3)	811.2
1990			64.0	(64.0)	747.2
1991	183.7			183.7	930.9
1992		6.7	42.6	(49.3)	881.6
1993			64.0	(64.0)	817.6
1994	183.7			183.7	1001.3
1995		6.7	42.6	(49.3)	952.0
1996			64.0	(64.0)	888.0
1997	183.7			183.7	1071.7
1998		6.7	42.6	(49.3)	1022.4
1999			64.0	(64.0)	958.4
2000	183.7			183.7	1142.1
2001		6.7	42.6	(49.3)	1092.8
2002			64.0	(64.0)	1028.8
2003				0.0	1028.8
2004	(Spare fuel returned)	6.9	42.6	(49.5)	979.3
2005			64.0	(64.0)	915.3

*Net after reprocessing