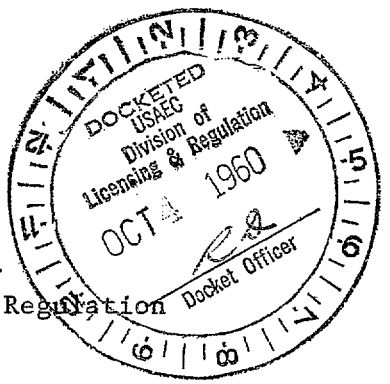
DOCKET NO. 50-174

File C

THE PENNSYLVANIA STATE UNIVERSITY
University Park, Pennsylvania

Vice President for Research



September 29, 1960

U. S. Atomic Energy Commission
Washington 25, D. C.

Attention: Mr. Harold Price, Director
Division of Licensing and Regulation

Gentlemen:

The Pennsylvania State University hereby respectfully requests that the U. S. Atomic Energy Commission grant a Class 104-C License to the University to possess, but not to operate at this time, the Curtiss-Wright Nuclear Research Reactor (CWRR) currently owned by the Curtiss-Wright Corporation and operated under License No. R-36. Attached as Appendices I and II to this application are letters indicating the intent of the Curtiss-Wright Corporation to give this reactor facility to the University and a letter from the University indicating its willingness to accept the facility.

The Pennsylvania State University is a non-profit educational institution incorporated under the laws of the Commonwealth of Pennsylvania. It is governed by a Board of Trustees all of whom are citizens of the United States. Dr. Eric A. Walker is the President of the University and is a citizen of the United States. The principal location of business is at University Park, Pennsylvania.

Specifically, The Pennsylvania State University makes application to the U. S. Atomic Energy Commission to:

a) Grant the University a Class 104-C License to possess, but not to operate at this time, the nuclear research reactor at Quehanna, Pennsylvania which is currently owned by the Curtiss-Wright Corporation, but which will be given to the University upon the receipt of appropriate licenses. The official name of this facility upon the completion of the title transfer is to be The Curtiss-Wright Nuclear Research Laboratory of The Pennsylvania State University. The description of the facility including a hazards summary are enclosed as Appendix V to this application. The technical competence to possess this facility on a non-operating basis is attached as Appendix III to this application entitled "Technical Competence to Possess."

b) Authorize the University to possess at the Curtiss-Wright Nuclear Research Laboratory 10 kilograms of contained uranium 235 as fuel for eventual operation of the facility. This uranium 235 will be contained in:

1) A set of 34 ten plate partially consumed fuel elements, containing a maximum of 4.7 kilograms of uranium 235.

2) A set of 30 nineteen plate unused fuel elements containing a maximum of 5.3 kilograms of uranium 235.

3) Two sealed fission chambers which contain a maximum of 3.5 grams of uranium 235.

A description of the arrangements for the storage and security of these materials during the period prior to obtaining a license to operate the reactor is attached as Appendix IV to this application and entitled, "Provisions for Safeguarding the Laboratory and Special Nuclear Material Within." A request for waiver of use and reprocessing charges will be submitted under separate cover.

c) Authorize the University to possess at the Curtiss-Wright Nuclear Research Laboratory a Plutonium-Beryllium Neutron Source for use in the University's educational and research efforts at the facility in the Nuclear Science and Engineering fields. The Plutonium-Beryllium source is currently possessed by the Curtiss-Wright Corporation and licensed under SNM-156. It is a typical sealed type neutron source manufactured by the AEC's Mound Laboratory. The source contains 14.99 grams of Pu-239. A description of the arrangements for the security of this source is contained in the attached Appendix IV. It is requested that the Commission will make this material available on loan to the University without charge for the use, reprocessing, and for such amounts of these materials as are consumed in the operation of educational programs during the term of the loan.

The Pennsylvania State University guarantees that adequate funds are available to carry out the program of adequately safeguarding the facility and material during the term of this license as specifically outlined in Appendices III and IV to this application.

If additional information can be supplied, please do not hesitate to contact us.

Sincerely,

E. F. Osborn
Vice President for Research

McKay Donkin
Treasurer

Encs:
App. I & II-Letters of Intent
App. III-Technical Competence
App. IV -Procedures for Safeguarding Materials
App. V -Hazards Summary

EFO:FJR:RS

cc: M. Donkin
M. A. Williamson
P. Ebaugh
N. J. Palladino
F. J. Remick

Commonwealth of Pennsylvania
County of Centre :ss

Subscribed in form to before me this 1st. day of October, 1960

Notary Public

Notary Public
Centre County, Pa.
Expires

DOCKET NO. Appendix I 50-174 File 9.

CURTISS-WRIGHT CORPORATION

WOOD-RIDGE, NEW JERSEY

September 29, 1960

The Pennsylvania State University
University Park, Pennsylvania

Attention: Dr. Eric Walker

Gentlemen:

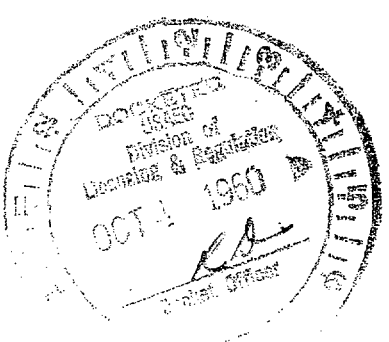
This will confirm the verbal offer of Curtiss-Wright Corporation to give to The Pennsylvania State University the reactor, hot cells facilities, and related facilities, buildings, and improvements located at Quehanna, Pennsylvania, together with certain personal property pertaining thereto.

In addition, Curtiss-Wright has offered to sublease to The Pennsylvania State University the parcel of land on which the above facilities are located and to provide in the sublease for maintenance of an exclusion area of such size as may be required by the Atomic Energy Commission on those premises adjacent to the reactor site which remain under Curtiss-Wright's control.

Very truly yours,

George R. Hill

George R. Hill
Executive Vice President



THE PENNSYLVANIA STATE UNIVERSITY

UNIVERSITY PARK • PENNSYLVANIA

Office of the President
Old Main

October 1, 1960

Mr. T. Roland Berner
Chairman, Board of Directors
Curtiss-Wright Corporation
Wood-Ridge, New Jersey

Dear Mr. Berner:

On behalf of the Trustees and for the University, permit me to thank you and the Curtiss-Wright Corporation for your offer to give the nuclear reactor at Quehanna with its associated facilities to us.

We accept subject only to the issuance to us of a license from the Atomic Energy Commission required in such instances.

I understand that the conveyance to us is made by a Deed of Gift and a lease.

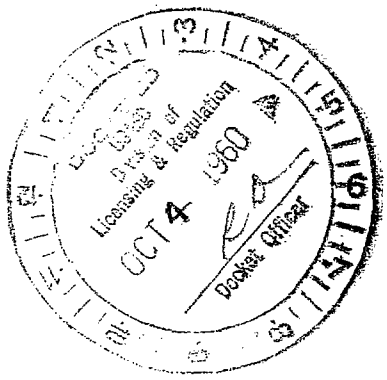
The gift provides us with additional capacity to further our educational and research efforts in a field in which we have been expanding rapidly for the past five years.

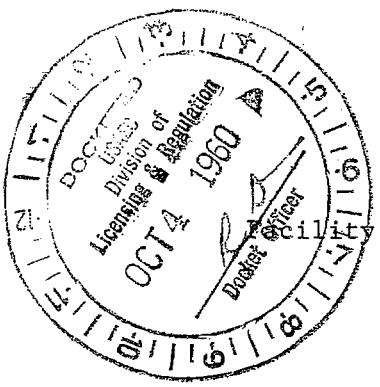
Thank you very much.

Sincerely,

Eric A. Walker

ERIC A. WALKER
President





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APPENDIX III to

Facility License Application from The Pennsylvania State University

Technical Competence to Possess

The license application to which this appendix is attached is our application for The Pennsylvania State University to possess, but not to operate at this time, the Curtiss-Wright Nuclear Research Reactor (CWRR) at Quehanna, Pennsylvania.

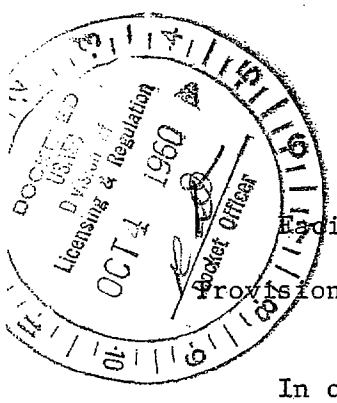
During the shutdown condition covered by this application there will be large quantities of contained special nuclear materials in storage in the facility, and therefore the University wishes to specify the administrative arrangement and line of responsibility which has been designed to guarantee the safeguarding of these materials and the protection of the health and welfare of the general public.

The responsibility for the Curtiss-Wright Nuclear Research Laboratory of The Pennsylvania State University has been assigned to the College of Engineering and Architecture at the University. The Dean of this College is Dr. Merritt A. Williamson. Within this College, the responsibility has been assigned to the Department of Nuclear Engineering of which Mr. Nunzio J. Palladino is professor and head. Within the Nuclear Engineering Department the direct responsibility of operating the Laboratory within the provisions of all licenses has been assigned to Mr. Forrest J. Remick who has been appointed Acting Director of the Curtiss-Wright Nuclear Research Laboratory of The Pennsylvania State University. Mr. Remick is currently the Acting Director of Penn State Nuclear Reactor Facility on the University Park campus and his technical qualifications have been previously communicated to the AEC in prior license applications.

Mr. William F. Sjoborg has been appointed on the senior staff of the Curtiss-Wright Nuclear Research Laboratory and will work under the direction of Mr. Remick as a research associate. Mr. Sjoborg received a M.S. degree in physics from the University of Maryland in 1953, is a graduate of Oak Ridge Institute of Nuclear Studies Radioisotope Course and has taken additional graduate courses in physics at The Pennsylvania State University. Since 1953 Mr. Sjoborg has been actively engaged in experimental nuclear physics. From 1955 to present he was directly involved in the design and construction of the Curtiss-Wright Research Reactor, participated in the start-up and operation of that facility and was Head of the Experimental Physics Section conducting work at the reactor. Mr. Sjoborg has been assigned as a senior Penn State staff member to work at the Curtiss-Wright Nuclear Research Laboratory, and therefore, will guarantee the enforcement of the security provisions outlined in Appendix IV of this same application. Mr. Sjobory is a resident of Pine Glen, Pennsylvania, which is in the close proximity of the Quehanna site and thus will be able to maintain close contact with the facility on essentially a day to day basis.

Appendix III

The custodial-plant engineering personnel required and the roving guard personnel will be provided through appropriate service groups at the University. However, the supervision of these individuals in their direct responsibilities in working at the Laboratory will be under the supervision of both Mr. Remick and Mr. Sjoborg.



APPENDIX IV to

Facility License Application from The Pennsylvania State University

Provisions for Safeguarding the Laboratory and Special Nuclear Material Within

In order that the Curtiss-Wright Nuclear Research Laboratory of The Pennsylvania State University shall be adequately safeguarded during the term of the license which is being applied for under this application, the following procedures have been devised and will be placed into operation upon the transfer of title to the Laboratory. The staff requirements to ensure that these procedures are followed is described in Appendix III of this same application.

I. Storage of Special Nuclear Material

Thirty-four irradiated 10 plate fuel elements containing a maximum of 4.7 kilograms of uranium 235 from the research reactor core are stored and will continue to be stored in fuel element storage racks located in the large pool area. The stored fuel elements form a plane array along one wall of the pool, occupying storage positions 52-64, 67-79, and 82-89, as shown in Figure 1 of this appendix. The fuel elements in these storage racks are spaced approximately 5 inches on center and are approximately 18 feet below the surface of the pool. The fuel elements are secured in the storage racks by means of a hold-down device as shown in Figure 2 of this appendix.

The rod drives, guide assemblies, and magnets are stored in a dry area; the magnets have been removed from the rod drive mechanisms and stored as low level radioactive material.

The ion chambers, fission counter, and their encapsulations have been removed from the pool and stored as low level radioactive material in a dry area to prevent damage due to the development of a leak in the encapsulation.

To assure that sufficient shielding is maintained to prevent a radiation hazard, the water level in the reactor pool will be maintained at a height of at least 17 feet above the top of the stored fuel elements. Water will be added by personnel familiar with the operation of the pool water make-up and filling system.

Thirty unused 19 plate fuel elements containing a maximum of 5.3 kilograms of uranium 235 are stored and will continue to be stored in a locked storage room at the Laboratory. The facility for storage and arrangement of the material stored are as follows:

All the special nuclear material is stored on steel shelves, which are bolted to upright supporting members of 1 inch x 1 inch x 1/8 inch thick steel angle. Horizontal spacing between shelves is a minimum of 12 inches, vertical spacing between shelves is not less than 12 inches in order to separate the material on any shelf from the material stored on shelves above

and below it. Not more than four elements, containing not more than 780 grams of U-235, are stored on any shelf. All materials are stored dry and unmoderated. Other special nuclear material will not be stored closer than 10 feet from this material without prior approval of storage facilities and plans by the U. S. Atomic Energy Commission.

The key to the locked storage room will be retained only in the hands of competent technical personnel who are aware of the potentially hazardous nature of the material.

The occurrence of a set of conditions which would bring about accidental criticality is extremely unlikely. The accidental moderation of the material due to flooding is practically impossible; the storage room is above ground level on a high plateau, approximately 1200 feet above the principal rivers in the region. The inadvertent introduction of moderating materials into the area will be prevented, since the storeroom will not be used for storage of other materials. The limitation on the quantity of material to be stored on a single shelf and the minimum spacing between shelves provides a second safeguard against accidental criticality. The estimated critical mass for a reactor made up from these fuel elements, with water moderation and full water reflection is in excess of 2.5 kilograms of U-235. The quantity of material on a single shelf is, therefore, less than one third (1/3) of a critical mass under flooding conditions, and in case of flooding the 12-inch minimum spacing would effectively isolate the material on adjacent shelves. Criticality without moderation is impossible with the elements and quantities involved. These elements are currently stored under SNM-172 as amended issued to the Curtiss-Wright Corporation.

The plutonium-beryllium neutron source whose possession and use is requested in this application will normally be stored in its paraffin filled shipping container in a room separate from the special nuclear material stored as described above. The source will be used only by those individuals who are aware of the potential hazard of this source in an unshielded or ruptured condition. Specifically, in the immediate future it will be under the direct control of the individuals referred to in Appendix III or by University health physics staff for obtaining routine smear samples as prescribed by normal health physics procedures. The container will be appropriately labeled as required under sections 20.203-f2 and f4 of Part 20 of the Federal standards for protection against radiation.

II. Monitoring

During normal working hours on at least a one shift basis several Penn State staff members will be working at the Laboratory at Quehanna. In addition to making visual and periodic checks of the stored materials they will be able to inspect and check the extensive monitoring system which already exists at the Laboratory and is described in Appendix V of this application. During the hours that these individuals are not present the monitoring will continue. The following specific provisions are mentioned:

The reactor bay will be continuously monitored by a radiation monitor on the reactor bridge above the set of hot ten plate fuel elements stored in the pool and which also will adequately monitor the set of fuel elements in dry storage in a locked storage room adjacent to the reactor bay. Any condition which would raise the radiation level will be detected by the monitor which will actuate an audible alarm in the building and which will also actuate an alarm at the accountability desk of Building No. 7 of the Curtiss-Wright Corporation Research Center approximately seven miles from the reactor site.

Upon receipt of a signal via the monitoring circuit appropriate senior staff members of the Penn State Laboratory will be notified and would proceed to investigate the cause of the alarm. This arrangement directly parallels the system currently in use at the Nuclear Reactor Facility on the University Park campus.

Any leak that might occur in fuel elements due to corrosion of fuel plate cladding would be detected by a radiation monitor located next to the recirculating water demineralizers. This detector is connected to the alarm system described. In addition weekly water samples will be taken and analyzed for activity.

III. Periodic Inspection of the Laboratory

As previously mentioned several staff members directly involved in the operation of the Laboratory will normally be present in the Laboratory during normal work hours. In addition, a contingent of people conducting research in various sections of the Laboratory are expected to be present during the period covered by this application. Thus adequate surveillance will not be a problem. During the off shift periods a guard will periodically visit the Laboratory to assure that the premises are not disturbed and that no hazardous conditions have developed. During his tour the guard will check for vandals, the monitoring devices, the storage facilities for special nuclear materials and will be required to punch a time clock to guarantee that the inspection has been carried out.

Normal health physics procedures will be followed to obtain water, air and smear samples on a routine basis and in a manner consistent with the liability and potential hazard that exists.