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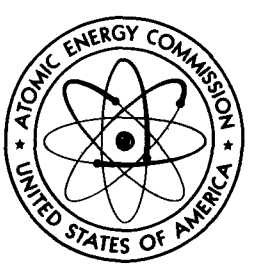
REACTOR TECHNOLOGY

NUCLEAR REACTORS BUILT, BEING BUILT, or PLANNED

in the
UNITED STATES
as of
December 31, 1966

Prepared by Office of the
Assistant General Manager
for Reactors

United States Atomic Energy Commission
Division of Technical Information



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Jan 1967

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FOREWORD

This compilation contains unclassified information about facilities built, being built, or planned in the United States as of Dec. 31, 1966, which are capable of sustaining a nuclear chain reaction. Certain projects relating to military and space systems are not listed in detail because of their classified nature.

Information is presented in five parts, each of which is categorized by primary function or purpose. The major parts, namely, civilian, military, production, and export, as well as such categories as power and propulsion, are self-explanatory. The major parts of the tabulation are indicated in the statistical summary on page 3. Various classes of reactors within these categories are defined as follows:

COMMERCIAL NUCLEAR POWER PLANT A nuclear facility constructed and operated under a license issued under Section 103 of the Atomic Energy Act of 1954 capable of producing steam for the generation of electricity, propulsion, and space or process heat applications upon which the AEC has made a finding of practical value within the meaning of Section 102 of the Atomic Energy Act. (No reactors presently in the category)

LARGE NUCLEAR POWER PLANT A plant having a nuclear capacity greater than 350 Mw(e) designed and constructed for operation as a central-station plant in a utility system Such plants over their lifetimes are expected to be economically competitive, or nearly so, with conventional plants in the geographic areas in which they are located (Part I, Sec 1A 1)

PROTOTYPE NUCLEAR POWER PLANT A nuclear power plant designed, constructed, and operated on a utility system principally for the purpose of proving out economic and technical aspects of a future nuclear power plant of the same general type. The generation of significant quantities of electricity, mechanical power, or process heat is a function of such a plant. (Part I, Sec. 1A.2)

EXPERIMENTAL POWER PLANT A relatively complete plant designed, engineered, constructed, and operated to provide the technical basis for a similar nuclear power plant in a larger size. Design flexibility permits changes to prove out different aspects of reactor technology. Electricity or power generation may or may not be included as part of the plant. (Part I, Sec. 2A.1)

REACTOR EXPERIMENT A reactor in the research and development program, designed for the limited purpose of testing the technical feasibility of a reactor concept or some unique reactor feature or piece of equipment. A reactor experiment is built with the intention of making changes in fueling structure, associated components, or other components of the reactors (Part I, Sec. 2A.2). Advanced Reactor System Experiments (Part I, Sec. 2B) involve investigations of promising new concepts that have potential for application in several reactor development programs.

GENERAL IRRADIATION TEST REACTOR This category includes only those reactors having (1) a thermal output of 10,000 kw or more, (2) test loops or experimental facilities within, or in proximity to, the core, and (3) the use of nuclear radiation for testing the life or performance of reactor components as its major function. (Part I, Sec. 3A, and Part IV, Sec. 2A)

SAFETY RESEARCH AND TEST REACTORS Includes reactors associated with a nuclear safety research or engineering-scale test program conducted for the purpose of developing basic design information or demonstrating safety characteristics of terrestrial and aerospace nuclear reactor systems. (Part I, Sec. 3B)

SPECIAL TEST REACTORS This category includes reactors designed for special testing purposes (Part II, Sec. 3A, and Part III, Sec. 3)

RESEARCH REACTOR Any reactor whose nuclear radiations are used primarily as a research tool for basic or applied research regardless of operating power level. May include facilities for testing reactor materials. (Part I, Sec. 3C; Part II, Sec. 3B; and Part IV, Sec. 2B)

TEACHING REACTOR Any reactor operated for the primary purpose of training in the operation and utilization of reactors and for instruction in reactor theory and performance. (Part I, Sec. 3D, and Part IV, Sec. 2C)

CRITICAL FACILITY A reactor capable of sustaining a nuclear chain reaction operating at extremely low power (a few watts) and designed to determine a critical mass, neutron-flux distribution, and other characteristics of a flexible arrangement of nuclear fuel, materials of construction, coolant, and other reactor components. Fluid critical facilities are used to explore the critical masses of various concentrations of solutions in differing geometries. Metal critical assemblies are used to investigate the variations in heterogeneous cores. The tabulation of these facilities in Part V excludes those that have been dismantled.

The abbreviated listings in the principal nuclear contractor column refer to the technical organization assigned primary responsibility for design and/or fabrication of the reactor system. The spelled-out forms for those abbreviations, as well as those for designers, shipbuilders, and facility operators, are given in the table on page 4.

Start-up dates refer to the year of first criticality. Estimated dates for projects not yet in service, based on the best available information, are included. The dates for non-Commission projects are estimates announced by the sponsoring organizations.

Reactors are listed as being *operable* under the following circumstances.

1. Federal Government reactors—when criticality is achieved.
2. Non-Federal Government reactors in the United States—when an operating license is issued by the Commission.
3. Reactors for foreign locations—when criticality is achieved.

Reactors are listed as *being built* under the following circumstances:

1. Federal Government reactors—when ground is broken, components are ordered, or construction contract is awarded.
2. Non-Federal Government reactors in the United States—when the construction permit is issued by the Commission.
3. Reactors for foreign locations—when an application for an export license is received by the Commission or when reliable information is received relating to the fabrication of reactor components

Reactors are listed as being *planned* under the following circumstances.

1. Federal Government reactors—when publicly announced as a project planned for construction by the agency involved or the project is otherwise appropriately authorized.
2. Non-Federal Government reactors in the United States—when license application is received by the Commission or a public announcement that includes principal contractor and reactor type is made.
3. Reactors for foreign locations—when public announcement that includes principal contractor and reactor type is made or when the Commission receives information that a U. S. reactor manufacturer is proceeding with preconstruction design and development on the basis of a letter of intent.

The Statistical Summary on page 3 does not include a breakdown for critical facilities. All other categories are summarized. Shutdown and dismantled reactors in these categories are included since such facilities have made significant contributions to reactor technology.

STATISTICAL SUMMARY

	Shut down or dismantled	*Operable*	*Being built*	*Planned*
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A 2 Prototypes, Central-Station Plants	1	13	1	1
B Prototypes, Maritime Propulsion (Seagoing)		1		
2 Experimental Reactor Systems (pages 6 to 9)				
A 1 Experimental Power Reactors (Generate Electricity)	4	3		1
A 2 Power-Reactor Experiments (Token Electrical Production, If Any)	8	2	1	
B Advanced Reactor System Experiments	4	1	1	
C Space Propulsion Experiments (ROVER)	13		5	*
D Auxiliary Power (SNAP)	7		2	
3. Test, Research, and University Reactors (pages 9 to 13)				
A General Irradiation Test	1	4	1	1
B Safety Research and Test	6	4	2	1
C. General Research	13	45	4	2
D. University Research and Teaching	3	43	5	1
II MILITARY REACTORS (pages 13 to 16)				
1 Defense Power-Reactor Applications (pages 13 and 14)				
A Power Reactors, Remote Installations	1	4	1	
B Propulsion Reactors (Naval)	2	79	36	8
2 Developmental Power Reactors (page 15)				
A Power-Reactor Experiments and Prototypes	3			
B 1 Naval Propulsion Reactor Prototypes	1	7		
B 2 Aircraft-Propulsion Reactor Experiments	4			
B 3 Missile-Propulsion Reactor Experiments (PLUTO)	2			
3 Test and Research (pages 15 and 16)				
A Test	3	4		
B Research		9	1	
III PRODUCTION REACTORS (pages 16 and 17)				
1 Materials Production (page 16)	4	10		
2 Process Development (page 17)		4		
3 Test (page 17)		2		
IV REACTORS FOR EXPORT (pages 17 to 19)				
1 Power Reactors (page 17)				
A Central-Station Electric Power		6	5	3
B Propulsion		1		
2 Test, Research, and Teaching Reactors (pages 18 and 19)				
A General Irradiation Test		4		
B General Research		26	2	
C University Research and Teaching		24	1	
V. CRITICAL ASSEMBLY FACILITIES (pages 19 to 22)				
1 Identification of Facilities (page 19)				
2. Identification of Experiments and Studies (pages 20 to 22)				
A. Civilian				
B Military				

*A number of engines and experimental reactors are expected to be tested

LIST OF CONTRACTORS, DESIGNERS, SHIPBUILDERS, AND FACILITY OPERATORS FOR WHICH ABBREVIATIONS APPEAR IN TABLES

AC	Allis-Chalmers Mfg. Co.
ACF	ACF Industries, Inc. (reactor activities absorbed by AC)
AG	Aerojet-General Corporation
AGN	Aerojet-General Nucleonics formerly a subsidiary and now a Division of Aerojet-General Corporation
AI	Atomics International, a Division of North American Aviation, Inc
Alco	Alco Products, Inc. (reactor activities absorbed by AC)
AMF	AMF Atomics, Inc., a Division of American Machine & Foundry Co.
ANL	Argonne National Laboratory, operated by the University of Chicago
ANPD	Aircraft Nuclear Propulsion Department, General Electric Company (name changed to Flight Propulsion Laboratory Department)
ARSS	American Radiator & Standard Sanitary Corp.
BAC	Bendix Aviation Corp.
Bethlehem	Shipbuilding Division, Bethlehem Steel Co (Now Quincy Division, General Dynamics Corp)
Bettis	Bettis Atomic Power Laboratory operated by Westinghouse Electric Corporation
Blaw-Knox	Blaw-Knox Co.
BNL	Brookhaven National Laboratory, operated by Associated Universities, Inc.
BNW	Battelle–Northwest a component of Battelle Memorial Institute
B&R	Burns & Roe, Inc.
B&W	Babcock & Wilcox Co.
CL	Clinton Laboratory of the Manhattan Engineer District
Comb.	Combustion Engineering, Inc.
Convair	Convair Division, General Dynamics Corp.
Cook	Nucledyne Co., a Division of Cook Electric Company
CW	Curtiss-Wright Corporation
Daystrom	Daystrom, Inc.
DOD	Department of Defense
DOW	The Dow Chemical Co., Rocky Flats Division
du Pont	E. I. Du Pont de Nemours & Company
Ebasco	Ebasco Services, Inc.
Electric Boat	Electric Boat Division, General Dynamics Corp.
FAST Inc	First Atomic Ship Transport Inc a subsidiary of American Export Isbrandtsen Lines
Fluor	The Fluor Corporation, Ltd.
FW	Foster Wheeler Corp.
GD (Quincy)	Quincy Division General Dynamics Corp
GDC	General Atomic Division, General Dynamics Corp
GE	General Electric Company
GM	General Motors Corp.
GNEC	General Nuclear Engineering Corp. (became a division of Combustion Engineering, Inc., in 1964)
GSA	General Services Administration
HKF	H. K. Ferguson Co.
Hughes	Hughes Aircraft Co.
IC	Internuclear Co.
INC	Idaho Nuclear Corporation
Ingalls	Ingalls Shipbuilding Corp.
Kaman	Kaman Nuclear, a Division of Kaman Aircraft Corp.
KAPL	Knolls Atomic Power Laboratory, operated by General Electric Company
KE	Kaiser Engineers, a Division of Henry J. Kaiser Co.
LASL	Los Alamos Scientific Laboratory, operated by the University of California
Lockheed	Lockheed Aircraft Corp.
Mare Island	San Francisco Bay Naval Shipyard, Mare Island
Martin	Martin-Marietta Corp.
Maxon	Maxon Construction Co.
Met. Lab.	Metallurgical Laboratory of the Manhattan Engineer District
NASA	National Aeronautics and Space Administration
NBS	National Bureau of Standards
Newport News	Newport News Shipbuilding & Dry Dock Co.
NRL	Naval Research Laboratory
NRTS	National Reactor Testing Station
NYSC	New York Shipbuilding Corp.
ORNL	Oak Ridge National Laboratory, operated by Union Carbide Nuclear Company, a Division of Union Carbide Corporation
PNWL	Pacific Northwest Laboratory operated by Battelle–Northwest
Portsmouth	Portsmouth Naval Shipyard
PPC	Phillips Petroleum Co.
PRDC	Power Reactor Development Company
P&W	Pratt & Whitney Aircraft Division, United Aircraft Corp.
Sandia	Sandia Laboratory, operated by Sandia Corp., a Subsidiary of Western Electric Co.
UCLRL	University of California Lawrence Radiation Laboratory
UNC	United Nuclear Corporation, Development Division
West.	Westinghouse Electric Corporation

1. POWER REACTORS

A. Central-Station Electric Power

A.1 Large Power Plants

Name and/or owner	Location	Principal nuclear contractor	Type	Power[1] Plant, net kw(e)	Power[1] Reactor, kw(t)	Start-up
BEING BUILT						
San Onofre Nuclear Generating Station (Southern California Edison and San Diego Gas and Electric Co.)[2]	San Clemente, Calif.	West.	Pressurized water	430,000	1,347,000	1967
Connecticut Yankee Atomic Power Plant (Connecticut Yankee Atomic Power Co.)[2]	Haddam Neck, Conn.	West.	Pressurized water	462,000	1,473,000	1967
Oyster Creek Nuclear Power Plant, Unit No. 1 (Jersey Central Power & Light Co.)	Toms River, N. J.	GE	Boiling water	515,000	1,600,000	1967
Nine Mile Point Nuclear Station (Niagara Mohawk Power Corp)	Scriba, N. Y.	GE	Boiling water	500,000	1,538,000	1968
Dresden Nuclear Power Station Unit No. 2 (Commonwealth Edison Co.)	Morris, Ill.	GE	Boiling water	715,000	2,255,000	1968
Robert Emmett Ginna Nuclear Power Plant (Rochester Gas & Electric Co)	Ontario, N. Y.	West	Pressurized water	420,000	1,300,000	1969
Millstone Nuclear Power Station (Connecticut Light & Power Co., Hartford Electric Light Co , and Western Massachusetts Electric Co.)	Waterford, Conn	GE	Boiling water	549,200	1,727,000	1969
Indian Point Station —Unit 2 (Consolidated Edison Co. of New York, Inc.)	Indian Point, N. Y.	West.	Pressurized water	872,900	2,758,000	1969
Dresden Nuclear Power Station Unit 3 (Commonwealth Edison Co.)	Morris, Ill.	GE	Boiling water	715,000	2,225,000	1969
PLANNED						
Malibu Nuclear Plant Unit No. 1 (Los Angeles Department of Water and Power)[2]	Corral Canyon, Calif.	West.	Pressurized water	462,000	1,727,000	1970
Turkey Point No 3 (Florida Power & Light Co.)	Turkey Point, Fla.	West.	Pressurized water	721,500	2,300,000	1970
Turkey Point No. 4 (Florida Power & Light Co)	Turkey Point, Fla.	West.	Pressurized water	721,500	2,300,000	1971
Pilgrim Station (Boston Edison Company)	Plymouth, Mass.	GE	Boiling water	549,000		1971
H. B Robinson S E Plant Unit 2 (Carolina Power & Light Co.)	Hartsville, S. C.	West.	Pressurized water	663,000	2,094,000	1970
Palisades Nuclear Power Station (Consumers Power Co. of Michigan)	Palisades Park, Mich.	Comb.	Pressurized water	700,000	2,200,000	1970
Point Beach Nuclear Station (Wisconsin Michigan Power Co.)	Two Creeks, Wis.	West.	Pressurized water	454,600	1,396,000	1970
Quad-Cities Station Unit No. 1 (Commonwealth Edison Co. & Iowa-Illinois Gas and Electric Co.)	Cordova, Ill.	GE	Boiling water	715,000	2,300,000	1970
Monticello Nuclear Generating Plant (Northern States Power Co)	Monticello, Minn.	GE	Boiling water	471,700	1,469,000	1970
Browns Ferry Nuclear Power Plant Unit No. 1 (TVA)	Decatur, Ala.	GE	Boiling water	1,064,500	3,293,000	1970
Browns Ferry Nuclear Power Plant Unit No. 2 (TVA)	Decatur, Ala.	GE	Boiling water	1,064,500	3,293,000	1971
Oconee Nuclear Station Unit No. 1 (Duke Power Co.)	Clemson, S. C.	B&W	Pressurized water	839,000	2,452,000	1971
Oconee Nuclear Station Unit No. 2 (Duke Power Co.)	Clemson, S. C.	B&W	Pressurized water	839,000	2,452,000	1972
Vermont Yankee Nuclear Generating Station (Vermont Yankee Nuclear Power Corp.)	Vernon, Vt.	GE	Boiling water	513,900	1,593,000	1970
Ft. Calhoun Plant (Omaha Public Power District)	Ft. Calhoun, Nebr.	Comb.	Pressurized water	450,000		1970
Quad-Cities Station Unit No. 2 (Commonwealth Edison Co. & Iowa-Illinois Gas & Electric Co.)	Cordova, Ill.	GE	Boiling water	715,000	2,300,000	1971
Peach Bottom Atomic Power Station Unit No. 2 (PEC, PSE&GC, ACEC, DP&LC)	Peach Bottom, Pa.	GE	Boiling water	1,065,000	3,294,000	1971
Burlington Nuclear Generating Station (PSE&GC, PEC, ACEC, DP&LC)	Burlington, N. J.	West.	Pressurized water	993,000	3,083,000	1971
Surry Power Station Unit No. 1 (Virginia Electric & Power Co.)	Hog Island, Va.	West.	Pressurized water	783,000	2,441,000	1970
Pacific Gas & Electric Co.	Diablo Canyon, Calif.	West.	Pressurized water	1,060,000		1971
Surry Power Station Unit No. 2 (Virginia Electric & Power Co.)	Hog Island, Va.	West.	Pressurized water	783,000	2,441,000	1971
Niagara Mohawk Power Corp.	Stillwater, N. Y.	GE	Boiling water	750,000		1972
Metropolitan Edison Co.	Pennsylvania	B&W	Pressurized water	839,000		1972
Philadelphia Electric Company with PSE&GC, ACEC, DP&LC		GE	Boiling water	1,065,000	3,294,000	1973

The dual-purpose 786,000-kw(e) (net) NPR–WPSS plant is listed on page 16 with footnote 51

Footnotes appear on pages 23 and 24

1. POWER REACTORS

A. Central-Station Electric Power

Name and/or owner	Location	Principal nuclear contractor	Type	Power[1] Plant net kw(e)	Power[1] Reactor, kw(t)	Start-up	Shut-down
A.2 Power-Plant Prototypes							
SHUT DOWN OR DISMANTLED							
Hallam Nuclear Power Facility, Sheldon Station (AEC and Consumers Public Power District[2,3]	Hallam, Nebr.	AI	Sodium graphite	75,000	256,000	1962	1964
OPERABLE							
Shippingport Atomic Power Station (AEC and Duquesne Light Co.)[4]	Shippingport, Pa.	West.	Pressurized water	90,000	505,000	1957	
Dresden Nuclear Power Station (Commonwealth Edison Co.)	Morris, Ill.	GE	Boiling water	200,000	700,000	1959	
Yankee Nuclear Power Station (Yankee Atomic Electric Co.)[2]	Rowe, Mass.	West.	Pressurized water	175,000	600,000	1960	
Big Rock Point Nuclear Power Plant (Consumers Power Co.)[2]	Big Rock Point, Mich.	GE	Boiling water	70,400	240,000	1962	
Elk River Reactor (AEC and Rural Cooperative Power Association)[2,5]	Elk River, Minn.	AC	Boiling water	22,000	58,200	1962	
Indian Point Station—Unit 1 (Consolidated Edison Co. of New York, Inc.)[6]	Indian Point, N. Y.	B&W	Pressurized water	270,000	615,000	1962	
Carolinas-Virginia Tube Reactor (Carolinas-Virginia Nuclear Power Associates, Inc.)[2,7]	Parr, S. C.	West.	Pressure tube, heavy water	17,000	65,000	1963	
Enrico Fermi Atomic Power Plant (Power Reactor Development Co.)[2]	Lagoona Beach, Mich.	PRDC	Sodium cooled, fast	60,900	200,000	1963	
Humboldt Bay Power Plant, Unit No. 3 (Pacific Gas and Electric Co.)	Eureka, Calif.	GE	Boiling water	68,500	240,000	1963	
Piqua Nuclear Power Facility (AEC and City of Piqua)[2]	Piqua, Ohio	AI	Organic cooled and moderated	11,400	45,500	1963	
Boiling Reactor Nuclear Superheat Project (AEC and Puerto Rico Water Resources Authority)[2]	Punta Higuera, P. R.	Comb.	Boiling water, integral nuclear superheat	16,500	50,000	1964	
Pathfinder Atomic Power Plant (Northern States Power Co.)[2]	Sioux Falls, S. Dak.	AC	Boiling water, nuclear superheat	58,500	190,000	1964	
Peach Bottom Atomic Power Station Unit No. 1—HTGR (Philadelphia Electric Co.)[2]	Peach Bottom, Pa.	GDC	Gas cooled, graphite moderated	40,000	115,000	1966	
BEING BUILT							
La Crosse Boiling Water Reactor (AEC and Dairyland Power Cooperative)[2]	Genoa, Wis.	AC	Boiling water	50,000	165,000	1967	
PLANNED							
Fort St. Vrain Nuclear Generating Station (Public Service Co of Colorado)[2]	Platteville, Colo	GDC	Gas cooled, graphite moderated	330,000	833,000	1971	

B. Propulsion (Maritime Seagoing Prototypes)

Name and/or owner	Nuclear designer	Shipbuilder	Type	Maximum shaft horsepower	Power,[1] kw(t)	Start-up
OPERABLE						
Nuclear Ship SAVANNAH (Maritime Administration—operated by FAST, Inc.)	B&W	NYSC	Pressurized water	22,000	80,000	1961

2. EXPERIMENTAL REACTOR SYSTEMS

A. Electric Power

Name (all owned by AEC except as noted)	Designation	Location	Principal nuclear contractor	Type	Power[1] Plant, net kw(e)	Power[1] Reactor, kw(t)	Start-up	Shut-down
A.1 Experimental Reactors								

				nuclear superheat				
Experimental Gas-Cooled Reactor (AEC and Tennessee Valley Authority)[8]	EGCR	Oak Ridge, Tenn.	KE–AC	Gas cooled, graphite moderated	21,900	84,300		
Sodium Reactor Experiment (AEC and Southern California Edison Co.)[10]	SRE-PEP	Santa Susana, Calif.	AI	Sodium graphite	7,500	30,000	1957	1966
OPERABLE								
Experimental Boiling Water Reactor[9]	EBWR	Argonne, Ill.	ANL	Boiling water	4,000	100,000	1956	
Saxton Nuclear Experimental Reactor Project (Saxton Nuclear Experimental Corp.)		Saxton, Pa.	West.	Pressurized water	3,000	23,500	1962	
Experimental Breeder Reactor No. 2[11]	EBR-2	NRTS, Idaho	ANL	Sodium cooled, fast	16,500	62,500	1963	
PLANNED								
Small Unified Reactor Facility with Systems for Isotopes, Desalting, and Electricity (NYASDA)[12]	SURFSIDE	Riverhead, L I, N Y	AMF Atomics	Pressurized water, pressure tube	2,500	33,000	1968	

A.2 Reactor Experiments

SHUT DOWN OR DISMANTLED								
Boiling Reactor Experiment No. 1	BORAX-1	NRTS, Idaho	ANL	Boiling water	No elec.	1,400	1953	1954
Homogeneous Reactor Experiment No. 1	HRE-1	Oak Ridge, Tenn.	ORNL	Aqueous homogeneous solution (UO_2SO_4)	140	1,000	1952	1954
Boiling Reactor Experiments[13]	BORAX-2, 3, 4	NRTS, Idaho	ANL	Boiling water	2,400	15,500	1954	1958
Homogeneous Reactor Experiment No. 2	HRE-2	Oak Ridge, Tenn.	ORNL	Aqueous homogeneous solution (UO_2SO_4)	300	5,200	1957	1961
Organic Moderated Reactor Experiment[14]	OMRE	NRTS, Idaho	AI	Organic cooled and moderated	No elec.	16,000	1957	1963
Experimental Breeder Reactor No. 1[15]	EBR-1	NRTS, Idaho	ANL	Sodium cooled, fast	150	1,400	1951	1964
Heavy Water Components Test Reactor	HWCTR	Savannah River Laboratory, Aiken, S. C.	du Pont	Pressurized heavy water	No elec.	61,000	1962	1964
Experimental Organic Cooled Reactor[16]	EOCR	NRTS, Idaho	Fluor–AI	Organic cooled and moderated	No elec.	40,000		
OPERABLE								
Plutonium Recycle Test Reactor	PRTR	Richland, Wash.	GE	Pressure tube, heavy water moderated and cooled	No elec.	120,000	1960	
ESADA Vallecitos Experimental Superheat Reactor (Empire States Atomic Development Associates and General Electric Company)	EVESR	Pleasanton, Calif.	GE	Light water moderated, superheater	No elec.	17,000	1963	
BEING BUILT								
Southwest Experimental Fast Oxide Reactor (Southwest Atomic Energy Associates)	SEFOR	Strickler, Ark.	GE	Sodium cooled, fast	No elec.	20,000	1968	

B. Advanced Reactor System Experiments

SHUT DOWN OR DISMANTLED								
Los Alamos Power Reactor Experiment No. 1	LAPRE-1	Los Alamos, N. Mex.	LASL	Aqueous homogeneous (phosphoric acid)	No elec.	2,000	1956	1957
Los Alamos Power Reactor Experiment No 2	LAPRE-2	Los Alamos, N. Mex.	LASL	Aqueous homogeneous (phosphoric acid)	No elec.	1,000	1959	1959
Los Alamos Molten Plutonium Reactor Experiment	LAMPRE-1	Los Alamos, N Mex.	LASL	Fast molten plutonium fueled, sodium cooled	No elec.	1,000	1961	1963
Experimental Beryllium Oxide Reactor[17]	EBOR	NRTS, Idaho	GDC	Gas cooled, BeO moderated	No elec.	10,000		
OPERABLE								
Molten Salt Reactor Experiment	MSRE	Oak Ridge, Tenn.	ORNL	Single region graphite moderated	No. elec.	10,000	1965	
BEING BUILT								
Ultra High Temperature Reactor Experiment	UHTREX	Los Alamos, N Mex.	LASL	Helium cooled	No elec.	3,000	1967	

2. EXPERIMENTAL REACTOR SYSTEMS

C. Space Propulsion Experiments (Rover)[18]

Name (all owned by AEC except as noted)	Designation	Location	Principal nuclear contractor	Type	Reactor power,[1] kw(t)	Operated
SHUT DOWN OR DISMANTLED						
Nuclear Rocket Reactor Experiment	KIWI-A	NRDS, Nev.	LASL	Open cycle, hydrogen gas cooled	70,000	1959
Nuclear Rocket Reactor Experiment	KIWI-A Prime	NRDS, Nev.	LASL	Open cycle, hydrogen gas cooled	85,000	1960
Nuclear Rocket Reactor Experiment	KIWI-A3	NRDS, Nev.	LASL	Open cycle, hydrogen gas cooled	100,000	1960
Nuclear Rocket Reactor Experiment	KIWI-B1A	NRDS, Nev.	LASL	Open cycle, hydrogen gas cooled	300,000	1961
Nuclear Rocket Reactor Experiment	KIWI-B1B	NRDS, Nev.	LASL	Open cycle, liquid hydrogen	900,000	1962
Nuclear Rocket Reactor Experiment	KIWI-B4A	NRDS, Nev.	LASL	Open cycle, liquid hydrogen	500,000	1962
Nuclear Rocket Reactor Experiment	KIWI-B4D	NRDS, Nev.	LASL	Open cycle, liquid hydrogen	1,000,000	1964
Nuclear Rocket Reactor Experiment	KIWI-B4E	NRDS, Nev.	LASL	Open cycle, liquid hydrogen	950,000	1964
Nuclear Rocket Engine Reactor Experiment (NERVA)	NRX-A2	NRDS, Nev.	AG–West.	Open cycle, liquid hydrogen	1,100,000	1964
Nuclear Rocket Engine Reactor Experiment (NERVA)	NRX-A3	NRDS, Nev	AG–West.	Open cycle, liquid hydrogen	1,120,000	1965
Nuclear Rocket Reactor Experiment	Phoebus 1A	NRDS, Nev.	LASL	Open cycle, liquid hydrogen	1,070,000	1965
Nuclear Rocket Reactor Engine System Test (NERVA)	NRX-A4/ EST	NRDS, Nev	AG–West	Open cycle, liquid hydrogen	1,190,000	1966
Nuclear Rocket Engine Reactor Experiment (NERVA)	NRX-A5	NRDS, Nev	AG–West	Open cycle, liquid hydrogen	1,100,000	1966
BEING BUILT						
Nuclear Rocket Reactor Experiment	Phoebus 1B	NRDS, Nev	LASL	Open cycle, liquid hydrogen		1967
Nuclear Rocket Reactor Experiment	Phoebus 2A	NRDS, Nev	LASL	Open cycle, liquid hydrogen		1967
Nuclear Rocket Engine Reactor Experiment (NERVA)	NRX-A6	NRDS, Nev	AG–West	Open cycle, liquid hydrogen		1967
Ground Experimental Engine Experiment	XE-1	NRDS, Nev	AG–West	Open cycle, liquid hydrogen		1967
Nuclear Rocket Reactor Experiment	Phoebus 1C series	NRDS, Nev	LASL	Open cycle, liquid hydrogen		
PLANNED						
Ground Experimental Engine Test	XE series	NRDS, Nev	AG–West	Open cycle, liquid hydrogen		
Nuclear Rocket Reactor Experiments	Phoebus 2 series	NRDS, Nev	LASL	Open cycle, liquid hydrogen		

D. Auxiliary Power (SNAP)

Name (all owned by AEC except as noted)	Designation	Location	Principal nuclear contractor	Type	Power[4]		Start-	Shut-
					Plant,	Reactor,		

SNAP-8 Experimental Reactor	S8ER	Santa Susana, Calif.	AI	NaK cooled	No elec.	600	1962	1966
SNAP-10A Flight System[19]	S10FS-4	In orbit	AI	NaK cooled	0.5	39	1965	1965
SNAP-10A Flight System Ground Test No 3	S10FS-3	Santa Susana, Calif.	AI	NaK cooled	0.5	39	1964	1966
SNAP-10A Flight System	S10FS-5	Santa Susana, Calif.	AI	NaK cooled	0 5	39		
BEING BUILT								
SNAP-8 Ground Prototype System	S8DS	Santa Susana, Calif.	AI	NaK cooled		600	1967	
SNAP-2/10A — TSF Shielding Experiment	SNAP-TSF	Oak Ridge, Tenn	AI–ORNL	NaK cooled		10	1967	

3. TEST, RESEARCH, AND UNIVERSITY REACTORS

A. General Irradiation Test

Name and/or owner	*Designation*	*Location*	*Principal nuclear contractor*	*Operator*	*Type*	*Power,[1] kw(t)*	*Start-up*	*Shut-down*
SHUT DOWN OR DISMANTLED								
Westinghouse Testing Reactor	WTR	Waltz Mill, Pa.	Owner	Owner	Tank	60,000	1959	1962
OPERABLE								
Materials Testing Reactor (AEC)[20]	MTR	NRTS, Idaho	ORNL–ANL–Blaw-Knox	INC	Tank	40,000	1952	
Engineering Test Reactor (AEC)	ETR	NRTS, Idaho	KE–GE	INC	Tank	175,000	1957	
General Electric Testing Reactor	GETR	Pleasanton, Calif.	Owner	Owner	Tank	50,000	1958	
Plum Brook Reactor Facility (NASA)	NASA-TR	Sandusky, Ohio	NASA	NASA	Tank	60,000	1961	
BEING BUILT								
Advanced Test Reactor (AEC)	ATR	NRTS, Idaho	Ebasco–B&W	INC	Tank	250,000	1967	
PLANNED								
Fast Flux Test Facility	FFTF		BNW		Sodium cooled	400,000	1972	

B. Safety Research and Test

Name (all owned by AEC)	*Designation*	*Location*	*Principal nuclear contractor*	*Type*	*Power,[1] kw(t)*	*Start-up*	*Shut-down*
SHUT DOWN OR DISMANTLED							
SNAP 10A Transient Test No 3[21]	SNAPTRAN-3	NRTS, Idaho	PPC–AI	H_2O-reflected SNAP 10A	Transient	1964	1964
Special Power Excursion Reactor Test No. 1[22]	SPERT-1	NRTS, Idaho	PPC	Open tank	Transient	1955	1964
Kiwi — Transient Test Reactor	Kiwi-TNT	NRDS, Nev.	LASL	KIWI/NERVA	Transient	1965	1965
Special Power Excursion Reactor Test No. 2[23]	SPERT-2	NRTS, Idaho	PPC	Pressurized water	Transient	1960	1965
SNAP 10A Transient Test No. 1[21]	SNAPTRAN-1	NRTS, Idaho	AI–PPC	Be-reflected SNAP 10A	Transient	1963	1965
SNAP 10A Transient Test No 2[21]	SNAPTRAN-2	NRTS, Idaho	AI–PPC	Be-reflected SNAP 10A	Transient	1965	1966
OPERABLE							
Kinetic Experiment on Water Boilers	KEWB	Santa Susana, Calif.	AI	Homogeneous	Transient	1956	
Special Power Excursion Reactor Test No. 3	SPERT-3	NRTS, Idaho	PPC	Pressurized water	Transient	1958	
Special Power Excursion Reactor Test No. 4	SPERT-4	NRTS, Idaho	PPC	Pool	Transient	1962	
Transient Reactor Test	TREAT	NRTS, Idaho	ANL	Graphite	Transient	1959	
BEING BUILT							
Loss of Fluid Test	LOFT	NRTS, Idaho	PPC	Pressurized water	50,000	1970	
Power-Burst Facility	PBF	NRTS, Idaho	PPC	Tank	20,000	1968	
PLANNED							
Reactivity Accident Test	REACT	NRTS, Idaho	PPC		Transient		

3. TEST, RESEARCH, AND UNIVERSITY REACTORS

C. General Research

Name and/or owner	Designation	Location	Principal nuclear contractor	Type	Power,[1] kw(t)	Start-up	Shut-down
SHUT DOWN OR DISMANTLED							
Chicago Pile 1, rebuilt as CP-2 (Manhattan Engineer District–AEC)[24]	CP-1	Chicago, Ill.	Met. Lab.	Graphite	0.2–2	1942	1954
Oak Ridge Graphite Reactor (AEC)	X-10	Oak Ridge, Tenn.	CL	Graphite	3,800	1943	1963
Argonne CP-3, rebuilt as CP-3′ (Manhattan Engineer District–AEC)	CP-3′	Palos Park, Ill.	Met. Lab.	Heavy water	300	1944	1954
Los Alamos Water Boiler (AEC)	HYPO	Los Alamos, N. Mex.	LASL	Homogeneous	5.5	1944	1950
Los Alamos Fast Reactor (AEC)	Clementine	Los Alamos, N. Mex.	LASL	Fast, plutonium fuel, mercury cooled	25	1946	1953
Livermore Water Boiler (AEC)	LIWB	Livermore, Calif.	AI	Homogeneous	0.5	1953	1961
Atomics International	L-47	Canoga Park, Calif.	AI	Homogeneous	Negligible	1957	1958
American Radiator & Standard Sanitary Corp.[25]	UTR-1	Mountain View, Calif.	ARSS	Graphite/water	Negligible	1958	1960
Lockheed Aircraft Corp.		Dawsonville, Ga.	Lockheed	Pool	Negligible	1960	1960
General Dynamics Corp. (World Agricultural Fair–U. S. Exhibit Reactor)[26]	TRIGA-Mk II	San Diego, Calif.	GDC	U–Zr hydride, tank	50	1960	1960
UTR Test Reactor (American Radiator & Standard Sanitary Corp.)		Mountain View, Calif.	Owner	Graphite/water	Negligible	1961	1963
Louisiana State University Nuclear Science Center (Sandia Nuclear Assembly for Reactor Experiments)[27]	SNARE	Baton Rouge, La	Sandia	Pool	1	1965	1966
Aerojet-General Corporation	AGN-201P-103	San Ramon, Calif.	AGN	Homog. solid	Negligible	1957	1966
OPERABLE							
Brookhaven Research Reactor (AEC)	BGRR	Upton, N. Y.	HKF	Graphite	20,000	1950	
Bulk Shielding Reactor (AEC)[28]	BSR-1–BSR-2	Oak Ridge, Tenn.	ORNL	Pool	2,000	1950	
Los Alamos Water Boiler (AEC)	SUPO	Los Alamos, N. Mex.	LASL	Homogeneous	25	1950	
Low Intensity Test Reactor (AEC)[29]	LITR	Oak Ridge, Tenn.	ORNL	Tank	3,000	1950	
North American Aviation Water Boiler Neutron Source (AEC)[30]	AE-6(WBNS)	Santa Susana, Calif.	AI	Homogeneous	3	1952	
Argonne Research Reactor (AEC)	CP-5	Argonne, Ill.	ANL	Heavy water	5,000	1954	
Battelle Memorial Institute	BRR	West Jefferson, Ohio	AMF	Pool	2,000	1956	
Illinois Institute of Technology Research Institute (Armour Research Foundation)	ARR(L-54)	Chicago, Ill.	AI	Homogeneous	75	1956	
Omega West Reactor (AEC)	OWR	Los Alamos, N. Mex.	LASL	Tank	8,000	1956	
Argonne National Laboratory (AEC)	AGN-201-108	Argonne, Ill.	AGN	Homog. solid	Negligible	1957	
Argonne Nuclear Assembly for University Training (AEC)	Argonaut (CP-11)	Argonne, Ill.	ANL	Graphite/water	10	1957	
General Electric Nuclear Test Reactor	NTR	Pleasanton, Calif.	GE	Light water	30	1957	
Livermore Pool Type Reactor (AEC)	LPTR	Livermore, Calif.	FW	Tank	2,000	1957	
Atomics International	L-77	Canoga Park, Calif.	AI	Homogeneous	Negligible	1958	
Babcock & Wilcox Lynchburg Pool Reactor	LPR	Lynchburg, Va.	Owner	Pool	1,000	1958	
Brookhaven Neutron Source Reactor 1 (AEC)	SCHIZO	Upton, N. Y.	BNL	Tank	100	1958	
General Dynamics Corp.	TRIGA-Mk I	La Jolla, Calif.	GDC	U–Zr hydride, tank	250	1958	
Industrial Reactor Laboratories, Inc. (operated by Columbia University)		Plainsboro, N. J.	AMF	Pool	5,000	1958	

Radiation Effects Reactor (Lockheed Aircraft Corp.)[31]	RER	Dawsonville, Ga.	Lockheed	Pool	3,000	1958
Brookhaven Medical Research Reactor (AEC)	MRR	Upton, N. Y.	Daystrom	Tank	5,000	1959
Fast Source Reactor (AEC)	AFSR	NRTS, Idaho	ANL	Fast	1	1959
Omaha Veterans Administration Hospital	TRIGA-Mk I	Omaha, Nebr.	GDC	U–Zr hydride, tank	18	1959
Puerto Rico Nuclear Center (AEC)	L-77	Mayaguez, P. R.	AI	Homogeneous	Neglig.	1959
General Dynamics Corp. TRIGA Pulsing Reactor[32]	TRIGA-Mk F	La Jolla, Calif.	Owner	U–Zr hydride, tank	1,500	1960
Puerto Rico Nuclear Center (AEC)		Mayagüez, P. R.	AMF	Pool	1,000	1960
Sandia Pulsed Reactor (AEC)	SPR	Sandia Base, N. Mex.	Sandia	Prompt burst		1961
Union Carbide Corp., Nuclear Division	UCC–ND	Sterling Forest, N. Y.	AMF	Pool	5,000	1961
Argonne Low Power Research Reactor (AEC)[33]	Juggernaut	Argonne, Ill.	ANL	Graphite/water	250	1962
Health Physics Research Reactor (AEC)[34]	HPRR	Oak Ridge, Tenn.	ORNL	Fast burst	1	1962
Sandia Engineering Reactor (AEC)	SER	Sandia Base, N. Mex.	Sandia	Tank	5,000	1962
NASA Mock-up Reactor	MUR	Sandusky, Ohio	Lockheed	Light water, pool	100	1963
Northrop Corporation (Space Radiation Laboratory)	TRIGA-Mk F	Hawthorne, Calif.	GDC	U–Zr hydride, tank	1,000	1963
USAEC European Exhibit Program[35]			Lockheed	Pool	10	1963
Babcock & Wilcox Nuclear Development Center Test Reactor	BAWTR	Lynchburg, Va.	Owner	Pool	6,000	1964
Biological Research Reactor (AEC)	JANUS	Argonne, Ill.	ANL	Tank	200	1964
Rhode Island Nuclear Science Center		Ft. Kearney, R. I.	GE	Pool	1,000	1964
Shield Test and Irradiation Reactor (AEC)[36]	STIR	Santa Susana, Calif.	AI	Pool	1,000	1964
AGN Industrial Reactor	AGNIR	San Ramon, Calif.	AGN	Pool	250	1965
Ames Laboratory Research Reactor (AEC)	ALRR	Ames, Iowa	AMF	Heavy water	5,000	1965
Brookhaven Neutron Source Reactor No. 2 (AEC)	PHRENIC	Upton, N. Y.	BNL	Tank	100	1965
Brookhaven High Flux Beam Research Reactor (AEC)	HFBR	Upton, N. Y.	BNL	Heavy water	40,000	1965
High Flux Isotope Reactor (AEC)	HFIR	Oak Ridge, Tenn.	ORNL	Tank flux trap	100,000	1965
General Dynamics Corp. Thermionic Research TRIGA Reactor	TRIGA-Mk III	La Jolla, Calif.	Owner	U–Zr hydride, tank	1,500	1965
BEING BUILT						
National Bureau of Standards	NBSR	Gaithersburg, Md.	NBS–B&R	Heavy water	10,000	1967
High Temperature Lattice Test Reactor (AEC)	HTLTR	Richland, Wash.	BNW	Graphite	2	1967
Sandia Pulsed Reactor (AEC)	SPR-II	Sandia Base, N. Mex.	Sandia	Prompt burst	Transient	1967
Annular Core Pulsed Reactor (AEC)	ACPR	Sandia Base, N. Mex.	GDC	U–Zr hydride, pool	Transient	1967
Dow Chemical Co	TRIGA-Mk I	Midland, Mich.	GDC	U–Zr hydride, tank	100	1967
Fast Neutron Source Reactor		Upton, N. Y.	BNL	Fast	1	1967
PLANNED						
Argonne Advanced Research Reactor (AEC)	AARR	Argonne, Ill.	ANL	Light water, tank	100,000	1970
Radiation Effects Reactor-II	RER-II	Dawsonville, Ga.	Lockheed			
U. S Geological Survey Laboratory	TRIGA-Mk I	Denver, Colo	GDC	U–Zr hydride, tank	1,000	

3. TEST, RESEARCH, AND UNIVERSITY REACTORS

D. University Research and Teaching*

Name and/or owner	Designation	Location	Principal nuclear contractor	Type	Power,[1] kw(t)	Start-up	Shut-down
SHUT DOWN OR DISMANTLED							
Pennsylvania State University		University Park, Pa.	Owner	Pool	200	1955	1965
William Marsh Rice University	AGN-211-101	Houston, Tex.	AGN	Homog. solid, pool	Neglig.	1959	1965
The Curtiss-Wright Nuclear Research Laboratory of the Pennsylvania State University		Quehanna, Pa.	Owner	Pool	1,000	1958	1966
OPERABLE							
Texas A&M University	AGN-201-106	College Station, Tex.	AGN	Homog. solid	Neglig.	1957	
Catholic University of America	AGN-201-101	Washington, D. C.	AGN	Homog. solid	Neglig.	1957	
Colorado State University	AGN-201-109	Ft. Collins, Colo.	AGN	Homog. solid	Neglig.	1957	
Oklahoma State University of Agriculture and Applied Science	AGN-201-102	Stillwater, Okla.	AGN	Homog. solid	Neglig.	1957	
University of Akron	AGN-201-104	Akron, Ohio	AGN	Homog. solid	Neglig.	1957	
University of New Mexico[37]	AGN-201-112	Albuquerque, N. Mex.	AGN	Homog. solid	Neglig.	1957	
University of Michigan (Ford Nuclear Reactor)		Ann Arbor, Mich.	B&W	Pool	2,000	1957	
University of Utah	AGN-201-107	Salt Lake City, Utah	AGN	Homog. solid	Neglig.	1957	
Massachusetts Institute of Technology	MITR	Cambridge, Mass.	ACF	Heavy water	5,000	1958	
Oregon State University	AGN-201-114	Corvallis, Oreg.	AGN	Homog. solid	Neglig.	1958	
University of Arizona	TRIGA-Mk I	Tucson, Ariz.	GDC	U–Zr hydride, tank	100	1958	
University of Delaware	AGN-201-113	Newark, Del.	AGN	Homog. solid	Neglig.	1958	
University of Oklahoma	AGN-211-102	Norman, Okla.	AGN	Homog. solid, pool	Neglig.	1958	
Iowa State University	UTR-10	Ames, Iowa	ARSS	Graphite/water	10	1959	
Leland Stanford University		Palo Alto, Calif.	GE	Pool	10	1959	
University of Florida	UFTR	Gainesville, Fla.	GNEC	Graphite/water	100	1959	
University of Wyoming	L-77	Laramie, Wyo.	AI	Homogeneous	Neglig.	1959	
Virginia Polytechnic Institute	UTR-10	Blacksburg, Va.	ARSS	Graphite/water	100	1959	
West Virginia University, College of Engineering	AGN-211-103	Morgantown, W. Va.	AGN	Homog. solid, pool	Neglig.	1959	
Worcester Polytechnic Institute		Worcester, Mass.	GE	Pool	1	1959	
North Carolina State University		Raleigh, N. C.	Cook	Graphite/water	10	1960	
University of California at Los Angeles, College of Engineering	Educator	Los Angeles, Calif.	AMF	Graphite/water	100	1960	
University of Illinois	TRIGA-Mk II	Urbana–Champaign, Ill.	GDC	U–Zr hydride, tank	250	1960	
University of Maryland	UMNE-1	College Park, Md.	AC	Tank	10	1960	
University of Virginia		Charlottesville, Va.	Owner–B&W	Pool	1,000	1960	
University of Wisconsin		Madison, Wis.	GE	Pool	250	1960	
Nuclear Science Center Reactor, Texas A&M University	NSCR	College Station, Tex.	Convair	Pool	100	1961	
Ohio State University		Columbus, Ohio	Lockheed	Pool	10	1961	
University of Kansas	Model 4180	Lawrence, Kans.	BAC	Pool	10	1961	
University of Missouri at Rolla		Rolla, Mo.	CW	Pool	200	1961	
University of Washington	Educator	Seattle, Wash.	AMF	Graphite/water	10	1961	
Washington State University		Pullman, Wash.	GE	Pool	100	1961	

Western New York Nuclear Research Center, Inc. (State University of New York)	PULSTAR	Buffalo, N. Y.	AMF	Pool	2,000	1961
Cornell University	TRIGA-Mk II	Ithaca, N. Y.	GDC	U–Zr hydride	100	1962
Kansas State University	TRIGA-Mk II	Manhattan, Kans.	GDC	U–Zr hydride, tank	100	1962
Purdue University		West Lafayette, Ind.	Lockheed	Pool	10	1962
University of Nevada	L-77	Reno, Nev.	AI	Homogeneous	Neglig.	1963
University of Texas	TRIGA-Mk I	Austin, Tex.	GDC	U–Zr hydride, tank	10	1963
New York University[38]	AGN-201M-105	New York City	AGN	Homog. solid	Neglig.	1964
Georgia Tech. Research Reactor	GTRR	Atlanta, Ga.	GNEC	Heavy water	1,000	1964
Penn State TRIGA Reactor (Pennsylvania State University)	PSTR	University Park, Pa.	GDC	Tank	1,000	1965
University of California[32]	TRIGA-Mk III	Berkeley, Calif.	GDC	Tank	1,000	1966
University of Missouri		Columbia, Mo.	Owner-IC	Tank	5,000	1966
BEING BUILT						
Mississippi State University[39]	RRR	State College, Miss.	Owner	Homogeneous	0.5	1967
Columbia University	TRIGA-Mk II	New York City	GDC	U–Zr hydride, tank	250	1967
Lowell Technological Institute		Lowell, Mass.	GE	Pool	1,000	1968
Oregon State University	TRIGA-Mk III	Corvallis, Oreg.	GDC	Tank	1,000	1967
Brigham Young University	L-77	Provo, Utah	AI	Homogeneous	Neglig	
PLANNED						
North Carolina State University	PULSTAR	Raleigh, N. C	AMF	Pool	1,000	1968

PART II MILITARY REACTORS

1. DEFENSE POWER-REACTOR APPLICATIONS

A. Remote Installations

Name (all owned by DOD)	*Designation*[40]	*Location*	*Principal nuclear contractor*	*Type*	*Power*[1] *Plant, net kw(e)*	*Power*[1] *Reactor, kw(t)*	*Start-up*	*Shut-down*
SHUT DOWN OR DISMANTLED								
Portable Medium Power Plant No. 2A[41]	PM-2A	Camp Century, Greenland	Alco	Pressurized water	1,560	10,000	1960	1963
OPERABLE								
Stationary Medium Power Plant No. 1 (Formerly APPR-1)	SM-1	Ft. Belvoir, Va.	Alco	Pressurized water	1,750	10,000	1957	
Portable Medium Power Plant No. 1[42]	PM-1	Sundance, Wyo.	Martin	Pressurized water	1,000	9,370	1962	
Portable Medium Power Plant No. 3A	PM-3A	McMurdo Sound, Antarctica	Martin	Pressurized water	1,500	9,510	1962	
Stationary Medium Power Plant No. 1A[43]	SM-1A	Fort Greely, Alaska	Alco	Pressurized water	1,640	20,000	1962	
BEING BUILT								
"Sturgis" Floating Nuclear Power Plant[44]	MH-1A	Fort Belvoir, Va	Martin	Pressurized water	10,000	45,000	1967	

1. DEFENSE POWER-REACTOR APPLICATIONS

B. Propulsion (Naval)

Name (all owned by U S Navy)	Designation	Shipbuilder	Start up	Shut-down
SHUT DOWN OR DISMANTLED				
SEAWOLF Sodium Reactor[45]		Electric Boat (Groton)	1956	1959
USS THRESHER[46]	SSN593	Portsmouth	1961	1963
OPERABLE				
USS NAUTILUS	SSN571	Electric Boat (Groton)	1954	
USS SEAWOLF[45]	SSN575	Electric Boat (Groton)	1960	
USS SKATE	SSN578	Electric Boat (Groton)	1957	
USS SWORDFISH	SSN579	Portsmouth	1958	
USS SARGO	SSN583	Mare Island	1958	
USS SEADRAGON	SSN584	Portsmouth	1959	
USS SKIPJACK	SSN585	Electric Boat (Groton)	1958	
USS TRITON (2 reactors)	SSN586	Electric Boat (Groton)	1959	
USS HALIBUT	SSN587	Mare Island	1959	
USS SCAMP	SSN588	Mare Island	1961	
USS SCORPION	SSN589	Electric Boat (Groton)	1960	
USS SCULPIN	SSN590	Ingalls	1961	
USS SHARK	SSN591	Newport News	1960	
USS SNOOK	SSN592	Ingalls	1961	
USS PERMIT	SSN594	Mare Island	1962	
USS PLUNGER	SSN595	Mare Island	1962	
USS BARB	SSN596	Ingalls	1963	
USS TULLIBEE	SSN597	Electric Boat (Groton)	1960	
USS GEORGE WASHINGTON	SSBN598	Electric Boat (Groton)	1959	
USS PATRICK HENRY	SSBN599	Electric Boat (Groton)	1960	
USS THEODORE ROOSEVELT	SSBN600	Mare Island	1960	
USS ROBERT E LEE	SSBN601	Newport News	1960	
USS ABRAHAM LINCOLN	SSBN602	Portsmouth	1960	
USS POLLACK	SSN603	NYSC	1963	
USS HADDO	SSN604	NYSC	1964	
USS TINOSA	SSN606	Portsmouth	1963	
USS DACE	SSN607	Ingalls	1963	
USS ETHAN ALLEN	SSBN608	Electric Boat (Groton)	1961	
USS SAM HOUSTON	SSBN609	Newport News	1961	
USS THOMAS A EDISON	SSBN610	Electric Boat (Groton)	1961	
USS JOHN MARSHALL	SSBN611	Newport News	1962	
USS GUARDFISH	SSN612	NYSC	1966	
USS FLASHER	SSN613	Electric Boat (Groton)	1966	
USS LAFAYETTE	SSBN616	Electric Boat (Groton)	1963	
USS ALEXANDER HAMILTON	SSBN617	Electric Boat (Groton)	1963	
USS THOMAS JEFFERSON	SSBN618	Newport News	1962	
USS ANDREW JACKSON	SSBN619	Mare Island	1963	
USS JOHN ADAMS	SSBN620	Portsmouth	1964	
USS JAMES MONROE	SSBN622	Newport News	1963	
USS NATHAN HALE	SSBN623	Electric Boat (Groton)	1963	
USS WOODROW WILSON	SSBN624	Mare Island	1963	
USS HENRY CLAY	SSBN625	Newport News	1963	
USS DANIEL WEBSTER	SSBN626	Electric Boat (Groton)	1964	
USS JAMES MADISON	SSBN627	Newport News	1964	
USS TECUMSEH	SSBN628	Electric Boat (Groton)	1964	
USS DANIEL BOONE	SSBN629	Mare Island	1963	
USS JOHN CALHOUN	SSBN630	Newport News	1964	
USS ULYSSES S GRANT	SSBN631	Electric Boat (Groton)	1964	
USS VON STEUBEN	SSBN632	Newport News	1964	
USS CASIMIR PULASKI	SSBN633	Electric Boat (Groton)	1964	
USS STONEWALL JACKSON	SSBN634	Mare Island	1964	
USS SAM RAYBURN	SSBN635	Newport News	1964	
USS NATHANAEL GREENE	SSBN636	Portsmouth	1964	
USS STURGEON	SSN637	Electric Boat (Groton)	1966	
USS BENJAMIN FRANKLIN	SSBN640	Electric Boat (Groton)	1965	
USS SIMON BOLIVAR	SSBN641	Newport News	1965	
USS KAMEHAMEHA	SSBN642	Mare Island	1965	
USS GEORGE BANCROFT	SSBN643	Electric Boat (Groton)	1965	
USS LEWIS AND CLARK	SSBN644	Newport News	1965	
USS JAMES K POLK	SSBN645	Electric Boat (Groton)	1966	
USS QUEENFISH	SSN651	Newport News	1966	
USS GEORGE C MARSHALL	SSBN654	Newport News	1966	
USS HENRY L STIMSON	SSBN655	Electric Boat (Groton)	1966	
USS GEORGE WASHINGTON CARVER	SSBN656	Newport News	1966	
USS LONG BEACH (2 reactors)	CGN9	Bethlehem	1961	
USS ENTERPRISE (8 reactors)	CVAN65	Newport News	1960	
USS BAINBRIDGE (2 reactors)	DLGN25	Bethlehem	1962	
USS FRANCIS SCOTT KEY	SSBN657	Electric Boat (Groton)	1966	
USS MARIANO G VALLEJO	SSBN658	Mare Island	1966	
BEING BUILT				
JACK	SSN605	Portsmouth		
GREENLING	SSN614	GD (Quincy)		
GATO	SSN615	GD (Quincy)		
HADDOCK	SSN621	Ingalls		
WHALE	SSN638	Electric Boat (Quincy)		
TAUTOG	SSN639	Ingalls		
GRAYLING	SSN646	Portsmouth		
POGY	SSN647	NYSC		
ASPRO	SSN648	Ingalls		
SUNFISH	SSN649	GD (Quincy)		
PARGO	SSN650	Electric Boat (Groton)		
PUFFER	SSN652	Ingalls		
RAY	SSN653	Newport News		
WILL ROGERS	SSBN659	Electric Boat (Groton)		
SAND LANCE	SSN660	Portsmouth		
LAPON	SSN661	Newport News		
GURNARD	SSN662	Mare Island		
HAMMERHEAD	SSN663	Newport News		
SEA DEVIL	SSN664	Newport News		
GUITARRO	SSN665	Mare Island		
HAWKBILL	SSN666	Mare Island		
BERGALL	SSN667	Electric Boat (Groton)		
SPADEFISH	SSN668	Newport News		
SEAHORSE	SSN669	Electric Boat (Groton)		
Submarine	SSN670	Newport News		
NARWHAL	SSN671	Electric Boat (Groton)		
PINTADO	SSN672	Mare Island		
Submarine	SSN673	Electric Boat (Groton)		
Submarine	SSN674	Electric Boat (Groton)		
Submarine	SSN675	Electric Boat (Groton)		
Submarine	SSN676	Electric Boat (Groton)		
TRUXTUN (2 reactors)	DLGN35	NYSC		
Deep Submergence Research Vehicle	NR 1	Electric Boat (Groton)		
Aircraft Carrier	CVAN68	Unassigned		
PLANNED				
Guided Missile Frigate[47]	DLGN	Unassigned		
Submarine	SSN677	Unassigned		
Submarine	SSN678	Unassigned		
Submarine	SSN679	Unassigned		
Submarine	SSN680	Unassigned		
Submarine	SSN681	Unassigned		
Submarine	SSN682	Unassigned		

2. DEVELOPMENTAL POWER

A. Electric-Power Experiments and Prototypes for Remote Installations

Name (all owned by AEC except as noted)	Designation[40]	Location	Principal nuclear contractor	Type	Power[1] Plant, net kw(e)	Power[1] Reactor, kw(t)	Start-up	Shut-down
SHUT DOWN OR DISMANTLED								
Stationary Low Power Plant No. 1	SL-1	NRTS, Idaho	ANL	Boiling water	300	2,200	1958	1961
Gas Cooled Reactor Experiment[48]	GCRE	NRTS, Idaho	AGN	Gas cooled, light water moderated	No elec.	2,200	1960	1962
Mobile Low Power Plant No. 1[49]	ML-1	NRTS, Idaho	AGN	Gas cooled, light water moderated	300	3,300	1961	1965

B. Propulsion Experiments and Prototypes

Name (all owned by AEC except as noted)	Designation	Location	Principal nuclear contractor	Type	Power,[1] kw(t)	Start-up	Shut-down
B.1 Naval							
SHUT DOWN OR DISMANTLED							
Submarine Intermediate Reactor Mark A	S1G	West Milton, N. Y.	GE	Sodium		1955	1957
OPERABLE							
S1W Reactor Facility	S1W	NRTS, Idaho	West.	Pressurized water		1953	
Large Ship Reactor Prototype (2 reactors)	A1W	NRTS, Idaho	West.	Pressurized water		1958	
Submarine Advanced Reactor Prototype	S3G	West Milton, N. Y.	GE	Pressurized water		1958	
Small Submarine Reactor Prototype	S1C	Windsor, Conn.	Comb.	Pressurized water		1959	
Destroyer Reactor Prototype	D1G	West Milton, N. Y.	GE	Pressurized water		1962	
Natural Circulation Test Plant	S5G	NRTS, Idaho	GE	Pressurized water		1965	
B.2 Aircraft							
SHUT DOWN OR DISMANTLED							
Aircraft Reactor Experiment	ARE	Oak Ridge, Tenn.	ORNL	Molten salt		1954	1954
Heat Transfer Reactor Experiment No. 1	HTRE-1	NRTS, Idaho	ANPD	Air cooled	20,000	1956	1957
Heat Transfer Reactor Experiment No. 2	HTRE-2	NRTS, Idaho	ANPD	Air cooled	14,000	1957	1961
Heat Transfer Reactor Experiment No. 3	HTRE-3	NRTS, Idaho	ANPD	Air cooled	32,000	1958	1961
B.3 Missile (Project PLUTO)							
SHUT DOWN OR DISMANTLED							
Experimental Propulsion Test Reactor	Tory-IIA	NTS, Nev.	UCLRL	Air cooled	150,000	1960	1961
Experimental Propulsion Test Reactor[50]	Tory-IIC	NTS, Nev.	UCLRL	Air cooled	600,000	1964	1964

3. TEST AND RESEARCH

A. Test

SHUT DOWN OR DISMANTLED							
Tower Shielding Reactor No. 1	TSR-1	Oak Ridge, Tenn.	ORNL	Tank	500	1954	1958
Nuclear Effects Reactor (AEC)	FRAN	NTS, Nev.	UCLRL	Prompt burst	Transient	1962	1964
Nuclear Effects Reactor (AEC)	KUKLA	LRL, Livermore	UCLRL	Prompt burst	Transient	1959	1964

3. TEST AND RESEARCH

A. Test (Continued)

Name (all owned by AEC except as noted)	Designation	Location	Principal nuclear contractor	Type	Power,[1] kw(t)	Start-up	Shut-down
OPERABLE							
Ground Test Reactor (USAF)	GTR	Ft. Worth, Tex.	Convair	Pool	10,000	1953	
Aerospace Systems Test Reactor (USAF)	ASTR	Ft. Worth, Tex.	Convair	Light water	10,000	1954	
Tower Shielding Reactor No. 2	TSR-2	Oak Ridge, Tenn.	ORNL	Light water	100	1960	
Nuclear Engineering Test Reactor (USAF)	NETR	Dayton, Ohio	Maxon–AC	Tank	10,000	1965	

B. Research

OPERABLE							
Thermal Test Reactor No. 1	TTR-1	Schenectady, N. Y.	KAPL	Graphite	10	1951	
Naval Research Reactor (USN)	NRR	Washington, D. C.	NRL	Pool	1,000	1956	
U. S. Naval Post Graduate School (USN)	AGN-201-100	Monterey, Calif.	AGN	Homog. solid	Neglig.	1956	
Army Materials Research Reactor (Army Materials Research Agency, USA)	AMRR	Watertown, Mass.	BAC	Pool	2,000	1960	
Diamond Ordnance Radiation Facility (Harry Diamond Laboratories, USA)	DORF	Silver Spring, Md.	GDC	U–Zr hydride	100	1961	
Armed Forces Radiobiology Research Institute (DASA, DOD)	AFRRI	Bethesda, Md.	GDC	U–Zr hydride, tank	100	1962	
Walter Reed Research Reactor (Walter Reed Army Institute of Research, USA)	WRRR	Washington, D. C.	AI	Homogeneous	50	1962	
Fast Burst Reactor Facility (Army Missile Test and Evaluation Directorate, USA)	FBRF	White Sands, N. Mex.	Kaman	Bare, fast	10	1964	
Nuclear Effects Reactor (AEC)	Super KUKLA	NTS, Nev.	UCLRL	Prompt burst	Transient	1964	
Aberdeen Pulsed Reactor Facility (Ballistic Research Laboratories, USA)	APRF	Aberdeen, Md.	UNC	Bare, fast	10	1966	

PART III PRODUCTION REACTORS

1. MATERIALS PRODUCTION

Designation	Nuclear designer	Type	Location	Startup	Shutdown
SHUT DOWN					
R Reactor	du Pont	Heavy water	Savannah River Plant, Aiken, S. C.	1953	1964
DR Reactor	GE	Graphite	Richland, Wash.	1950	1964
H Reactor	GE	Graphite	Richland, Wash.	1949	1965
F Reactor	du Pont	Graphite	Richland, Wash.	1945	1965
OPERABLE					
B Reactor	du Pont	Graphite	Richland, Wash.	1944	
D Reactor	du Pont	Graphite	Richland, Wash.	1944	
C Reactor	GE	Graphite	Richland, Wash.	1952	
KE Reactor	GE	Graphite	Richland, Wash.	1955	
KW Reactor	GE	Graphite	Richland, Wash.	1955	
N Reactor[51]	GE	Graphite	Richland, Wash.	1963	
P Reactor	du Pont	Heavy water	Savannah River Plant, Aiken, S. C.	1954	
K Reactor	du Pont	Heavy water	Savannah River Plant, Aiken, S. C.	1954	
L Reactor	du Pont	Heavy water	Savannah River Plant, Aiken, S. C.	1954	
C Reactor	du Pont	Heavy water	Savannah River Plant, Aiken, S. C.	1955	

Name (all owned by AEC)	Designation	Location	Nuclear designer	Type	Power,[1] kw(t)	Startup
OPERABLE						
Process Development Pile[52]	PDP	Savannah River Laboratory, Aiken, S. C.	du Pont	Heavy water	1	1953
Standard Pile[52]	SP	Savannah River Laboratory, Aiken, S. C.	du Pont	Graphite	2–10	1953
Physical Constants Test Reactor	PCTR	Richland, Wash.	GE	Graphite	0.1	1955
Thermal Test Reactor No. 2	TTR-2	Richland, Wash.	GE	Graphite	0.1	1955

3. TEST

OPERABLE						
Hanford 305 Test Reactor	HTR	Richland, Wash.	du Pont	Graphite	Neglig.	1944
Savannah River Test Pile 305	SR-305	Savannah River Laboratory, Aiken, S. C.	du Pont	Graphite	1	1953

PART IV REACTORS FOR EXPORT

1. POWER REACTORS[53]

A. Central-Station Electric Power

Name and/or owner	Location	Principal nuclear contractor	Type	Power[1] Plant, net kw(e)	Power[1] Reactor, kw(t)	Start-up
OPERABLE						
Germany, Kahl Nuclear Power Station (Rhine-Westphalia Power Co., RWE)	Kahl-am-Main	GE	Boiling water	15,600	60,000	1960
Italy, Garigliano Nuclear Power Station (Project ENSI of SENN)	Punta Fiume (on Garigliano River)	GE	Boiling water	150,000	506,000	1963
Japan, Government of, Japan Power Demonstration Reactor (JAERI)	Tokai-Mura	GE	Boiling water	12,500	45,000	1963
Italy (Project Enrico Fermi of SELNI, Edisonvolta)	Trino Vercellese	West.	Pressurized water	240,000	615,000	1964
France (Franco-Belgian Society for Nuclear Energy of Ardennes—SENA)	Givet (near Chooz)	West.	Pressurized water	266,000	825,000	1966
West Germany (Kernkraftwerk-RWE-Bayernwerk or KRB)	Gundremmingen (near Gunzburg)	GE	Boiling water	237,000	801,000	1966
BEING BUILT						
India, Government of (Tarapur Nuclear Power Station)	Tarapur (north of Bombay)	GE	Boiling water	380,000	1,322,000	1967
Japan (Japan Atomic Power Company—JAPCO No 2)	Tsuruga, Honshu	GE	Boiling water	310,000		1969
Spain, Zorita Nuclear Power Plant Unit No. 1	Near Madrid	West.	Pressurized water	153,000	515,000	1968
Spain, Government of (Nuclenor)	Santa Maria de Garona	GE	Boiling water	440,000		1969
Switzerland, NOK Nuclear Electric Generating Station Unit No. 1	Beznau near Baden	West.	Pressurized water	350,000	1,130,000	1969
PLANNED						
Japan, Mihama Nuclear Power Station Unit No. 1 (Kansai Electric Power Co)	Niu, Honshu	West.	Pressurized water	300,000		1970
Japan, Tokyo Electric Power Co Unit No. 1	Fatuba, Honshu	GE	Boiling water	350,000		1970
Switzerland (Bernische Kraftwerk A.G —BKW)	Muehleberg near Bern	GE	Boiling water	306,000		1971

B. Propulsion

Name	Owner	Designer	Designation	Type	Start-up
OPERABLE					
S5W for HMS Dreadnought	Great Britain	West.	S5W	Pressurized water	1962

2. TEST, RESEARCH, AND TEACHING

A. General Irradiation Test

Owner	Location	Principal nuclear contractor	Type	Power,[1] kw(t)	Start-up
OPERABLE					
Japan, Government of (Atomic Energy Research Institute)	Tokai-Mura	AMF	Heavy water, tank	10,000	1960
Netherlands, Government of (Reactor Center)	Petten	AC	Tank (MTR)	30,000	1961
South Africa, Government of (Atomic Energy Board)	Pelindaba (near Pretoria)	AC	Tank	20,000	1965
Sweden, Government of (Atomic Energy Company)	Studsvik	AC	Tank (MTR)	30,000	1961

B. General Research

OPERABLE					
Australia (Atomic Energy Commission)	Lucas-Heights, New South Wales	ARSS	UTR-10	10	1961
Austria, Government of (Seibersdorf Research Center)	Seibersdorf	AMF	Pool	5,000	1960
Colombia (Colombian Institute of Nuclear Affairs)	Bogotá	Lockheed	Pool	10	1965
Denmark, Government of (Atomic Energy Commission)	Riso	AI	L-55	0.5	1957
Denmark, Government of (Atomic Energy Commission)	Riso	FW	Tank	5,000	1958
Germany, Federal Republic of (Society for the Utilization of Nuclear Energy in Shipbuilding and Navigation, Inc.)	Geesthacht	B&W	Pool	5,000	1958
Germany (Interatom, Inc.) (USAEC Middle East Exhibit Program)[54]	Duisburg	AI	L-77	Negligible	1958
Greece, Government of (Atomic Energy Commission)	Athens	AMF	Pool	1,000	1961
Indonesia (Institute for Atomic Energy)	Bandung	GDC	TRIGA-Mk II	250	1964
Israel, Government of (Atomic Energy Commission)	Nahal Soreq	AMF	Pool	5,000	1960
Italy (C.A.M.E.N.)	Leghorn	B&W	Pool	5,000	1963
Italy, Government of (National Committee for Nuclear Energy)	Ispra	AC	Heavy water, tank	5,000	1959
Italy, Government of (National Committee for Nuclear Energy)	Rome	GDC	TRIGA-Mk II	100	1960
Italy (SORIN Nuclear Center)	Saluggia	AMF	Pool	1,000	1959
Japan, Government of (Atomic Energy Research Institute)	Tokai-Mura	AI	L-54	50	1957
Korea, Government of (Atomic Energy Commission)	Seoul	GDC	TRIGA-Mk II	100	1962
Pakistan, Government of (Atomic Energy Commission)	Islamabad	AMF	Pool	5,000	1965
Philippines, Government of (National Science Development Board)	Quezon City	GE	Pool	1,000	1963
Portugal, Government of (Nuclear Energy Board)	Sacavém	AMF	Pool	1,000	1961
Spain, Government of (Nuclear Energy Board)	Moncloa	GE	Pool	3,000	1958
Switzerland, Government of (Reactor, Inc.)[55]	Wuerenlingen	ORNL	Pool	1,000	1955
Turkey, Government of (Atomic Energy Commission)	Istanbul	AMF	Pool	1,000	1962
Venezuela, Government of (Institute of Neurology and Brain Research)[56]	Caracas	GE	Pool	3,000	1960
Vietnam, Government of (Institute of Nuclear Research)	Dalat	GDC	TRIGA-Mk II	250	1963
West Berlin, City of (Institute for Nuclear Research)	West Berlin	AI	L-54	50	1958
Yugoslavia, Federal People's Government of (Josef Stefan Nuclear Institute)	Ljubljana	GDC	TRIGA-Mk II	100	1966
BEING BUILT					
Italy (CNEN)	Padua	AMF	Pool	Negligible	1967
Mexico (National Institute for Nuclear Energy)	Salazar	GDC	TRIGA-Mk III	1,000	1967

Owner	Location	Principal nuclear contractor	Type	Power,[1] kw(t)	Start-up
OPERABLE					
Austria, Government of (Vienna Polytechnic Institute)	Vienna	GDC	TRIGA-Mk II	100	1962
Brazil, Government of (University of São Paulo)	São Paulo	B&W	Pool	5,000	1957
Brazil (University of Minas Gerais)	Belo Horizonte	GDC	TRIGA-Mk I	30	1960
Canada (McMaster University)	Hamilton, Ont.	AMF	Pool	1,000	1959
China, Republic of (National Tsing-Hua University)	Hsinchu	GE	Pool	1,000	1961
Congo, Government of Kinshasa (University of Louvanium)[57]	Kinshasa	GDC	TRIGA-Mk I	50	1959
Finland, Government of (Institute of Technology)	Helsinki	GDC	TRIGA-Mk II	100	1962
Germany, Federal Republic of (Technical University of Munich)	Munich	AMF	Pool	1,000	1957
Germany, Federal Republic of (Universities of Frankfurt and Darmstadt)	Frankfurt	AI	L-54	50	1958
Germany (Johannes Gutenberg, University of Mainz)	Mainz	GDC	TRIGA-Mk II	30	1965
Italy (University of Milan)	Milan	AI	L-54	50	1959
Italy (University of Palermo)	Palermo	AGN	201-110	Negligible	1960
Italy (University of Pavia)	Pavia	GDC	TRIGA-Mk II	250	1966
Japan (Kyoto University)	Kyoto	IC	Tank	1,000	1964
Japan (Kinki University)	Osaka	ARSS	UTR-10	Negligible	1961
Japan (Musashi University)	Kawasaki City	GDC	TRIGA-Mk II	100	1963
Japan (Rikkyo University)	Yokosuka City	GDC	TRIGA-Mk II	100	1961
Netherlands, Government of (Delft Technical University)[58]	Delft	AMF	Pool	100	1963
Switzerland (University of Basel)[59]	Basel	AGN	211-100	Negligible	1958
Switzerland (University of Geneva)[60]	Geneva	AGN	201-111	Negligible	1958
Thailand (Chulalongkorn University)	Bangkok	CW	Pool	1,000	1962
United Kingdom (Queen Mary College, London University)	London	ARSS	UTR-B	Negligible	1964
United Kingdom, Government of (Scottish Research Reactor Center)	East Kilbride	ARSS	UTR-100	100	1963
Uruguay (University of Montevideo)[61]	Montevideo	Lockheed	Pool	10	1960
BEING BUILT					
Iran, Government of (University of Tehran)	Tehran	AMF	Pool	5,000	1967

PART V CRITICAL ASSEMBLY FACILITIES

1. IDENTIFICATION OF FACILITIES

Abbreviation	Name and location of facility	Operator	No of cells	No of control panels
AC	Allis-Chalmers Critical Experiment Facility, Greendale, Wis.	Owner	1	1
AI	Atomics International Critical Experiment Laboratory, Santa Susana, Calif.	Owner	3	3
ANL	Argonne National Laboratory (AEC), Argonne, Ill.	ANL	5	5
ANL-ID	Argonne National Laboratory, Idaho Division (AEC), NRTS, Idaho	ANL	1	1
ARMF-I and II	Advanced Reactivity Measurement Facility (AEC), NRTS, Idaho	INC	2	2
ATF	SNAP Acceptance Test Facility (AEC), Santa Susana, Calif.	AI	1	1
ATRC	Advanced Test Reactor Critical Facility (AEC), NRTS, Idaho	INC	1	1
Bettis	Bettis Plant (AEC), Pittsburgh, Pa.	West.	6	6
BMI	Battelle Memorial Institute, West Jefferson, Ohio	Owner	1	1
BNL	Brookhaven National Laboratory (AEC), Upton, N. Y.	BNL	5	5

1. IDENTIFICATION OF FACILITIES (*Continued*)

Abbreviation	*Name and location of facility*	*Operator*	*No of cells*	*No of control panels*
B&W	The Babcock & Wilcox Co., Lynchburg, Va.	Owner	3	3
Comb.	Nuclear Engine Laboratory of Combustion Engineering, Inc., Windsor, Conn.	Owner	3	2
Cornell	Cornell University Zero Power Reactor, Ithaca, N. Y.	Owner	1	1
ETRC	Engineering Test Reactor Critical Facility (AEC), NRTS, Idaho	INC	1	1
GDC	General Dynamics Corp., San Diego, Calif.	Owner	2	2
GE-CEF	General Electric Company, Vallecitos Laboratory Experimental Physics Facility, Pleasanton, Calif.	Owner	2	1
GEANP	Evendale Critical Experiment Facility (AEC), Evendale, Ohio	GE	2	2
KAPL	Knolls Atomic Power Laboratory (AEC), Schenectady, N. Y.	GE	7	7
LASL	Los Alamos Scientific Laboratory (AEC), Los Alamos, N. Mex.	LASL	4	4
Livermore	University of California Lawrence Radiation Laboratory Critical Assembly Area (AEC), Livermore, Calif	UCLRL	1	1
Lockheed	Lockheed Aircraft Co , critical facility for RER	Owner	1	1
LPTF	Low Power Test Facility (AEC), NRTS, Idaho	GE	2	2
Manhattan	Manhattan College Corporation Critical Facility, New York City	Owner	1	1
Martin	Martin Co., Middle River, Md.	Owner	3	3
NASA	Lewis Research Center, Cleveland, Ohio	Owner	3	2
ORNL-CF	Oak Ridge National Laboratory Critical Facility (AEC), Oak Ridge, Tenn.	ORNL	3	5
ORNL-PCA	Pool Critical Assembly, BSF Pool (AEC), Oak Ridge, Tenn.	ORNL	1	1
PNWL-CML	Critical Mass Laboratory (AEC), Richland, Wash.	BNW	1	1
PNWL-PRCF	Plutonium Recycle Critical Facility (AEC), Richland, Wash.	BNW	1	1
RFP-NSF	Nuclear Safety Facility, Rocky Flats Plant (AEC), Colo.	DOW	1	1
Rensselaer	Rensselaer Polytechnic Institute	Owner	1	1
SCF	SNAP Critical Facility (AEC), Santa Susana, Calif.	AI	1	1
SGCF	SNAP Generalized Critical Facility (AEC), Santa Susana, Calif.	AI	1	1
UCLRL-NTS	University of California Lawrence Radiation Laboratory (AEC), NTS, Nev (Hot Box)	UCLRL	1	1
UNC	United Nuclear Corporation, Development Division, Pawling, N. Y.	Owner	4	3
West.	Westinghouse Reactor Evaluation Center Critical Experiment Station (CES), Yankee Critical Facility (YCF), and Astronuclear Experimental Facility, Waltz Mill, Pa.	Owner	3	3

2. IDENTIFICATION OF EXPERIMENTS AND STUDIES

A. Civilian

Facility	*Subject of current experiment or study*	*Designation*	*Startup*
OPERABLE			
AC	Vacant	CRBR-CX	1959
AI, AETR	Nuclear properties of epithermal, fast, and coupled reactor systems	AETR	1960
AI, SCGA	Nuclear properties of sodium–graphite systems	SCGA	1959

ANL, Building 316, Cell B[62]	Contains ZPR-7, high-conversion (H_1-C) critical experiments	ZPR-7	1956
ANL, Building 316, Cell C[62]	Flux-trap configuration critical studies for AARR	ZPR-5	1957
ANL-ID	Intermediate-size Pu-fueled reactor physics experiments	ZPR-3	1955
ARMF, ETR-MTR Area (INC)	Reactor-physics constants and reactivity changes caused by test-reactor irradiation	ARMF-I and II	1960
ATRC, ATR Area (INC)	ATR physics, core-loading and core-design measurements	ATRC	1964
Bettis	Critical experiments	CCFA	1954
Bettis	LWB physics	LWBCC	1963
BMI, Cell 1	Experiments with plastic-moderated assembly	BMI-CX	1957
BNL, Building T-526	Exponential and critical assembly		1956
BNL, Building T-526A	Exponential and critical assembly		1962
B&W, Cell 1	Advanced Test Reactor criticals		1962
B&W, Cell 2[63]	Spectral Shift Control Reactor		1958
B&W, Cell 3[63]	Small-lattice experiment		1958
Comb., Building 1, Cell 1	Vacant		
Comb., Building 2, Cell 1	Vacant		
Comb., Building 2, Cell 2	Vacant		
Cornell	Reactor-physics research	ZEPR	1962
ETRC, ETR-MTR Area (INC)	ETR physics, core loading and core design	ETRC	1957
GDC	Neutronic feasibility studies of enriched tungsten water-moderated reactors for nuclear rockets		1965
GDC	Neutron yield, pulse shape, and spectra measurements, small electronic component irradiation	APFA	1965
GE, CEF	Thermal and mixed-spectrum critical assembly	TCA–MSCA	1961
LASL, Kiva I	Cold criticals for ROVER reactors	ZEPO and Honeycomb	1957
LASL, Kiva III	Cold critical operation of ROVER test reactors, environmental chamber, and general-purpose critical assembly		1962
LASL, Pit Bldg, TA-35	Criticals for UHTREX and Molten Plutonium reactors		1965
LPTF, Cell 1	Fast-spectrum refractory metals experiment	710	1963
LPTF, Cell 2			
Manhattan	Critical experiment assembly		1964
Martin, Cell 1	Martin power-reactor experiments		1957
Martin, Cell 2	Homogeneous dispersions in a plastic of uranium, stainless steel, and boron		1958
NASA, Materials and Stresses Building[64]	NASA Test Reactor critical experiments (NASA-ZPR-I system)		1959
NASA-ZPR-II[64]	NASA Zero Power Reactor II solution type critical		1963
ORNL-CF, Building 9213, Cell E	Uranium–paraffin experiments related to physics and safety of homogeneous reactors	CA-28	1950
ORNL-CF, Building 9213, Cell S	Comparison of nuclear properties of U^{235} and U^{233}		
ORNL-CF, Building 9213, Cell W	Reactor-physics and nuclear-safety studies with homogeneous uranium solutions, slightly enriched-uranium lattices in water, TSR-2 tests; investigations of neutron absorbers as poisons in chemical-processing equipment		1950
ORNL-PCA, Building 3010	Physics research on reactivity effects	PCA	1958
PNWL-CML	Plutonium criticals		1961
PNWL-PRCF	Plutonium recycle criticals		1963
SCF	Criticals for SNAP reactors		1959
SGCF	Critical facility for flight-system acceptance testing		1963
Renssalaer	Critical experiment assembly		1966

A. Civilian (Continued)

Facility	*Subject of current experiment or study*	*Designation*	*Startup*
UNC, Cell 1	Pawling lattice test rig	PLATR	1959
West., CES	Reactor-fuel-measurement facility design		1958
West., ANEF	NERVA reactor experiments	NRX-CX	1964
West., YCF	Loose-lattice critical experiments		1957
GDC	High temperature gas cooled reactor experiment	HTGRE	1966
BEING BUILT			
ANL-ID	Plutonium criticals for fast reactors	ZPPR	1968
GDC	Accelerator Pulsed Fast Critical Assembly	APFA-III	1967

B. Military

Facility	*Subject of current experiment or study*	*Designation*	*Startup*	*Shutdown*
OPERABLE				
Bettis	Surface-ship physics[65]	SS-CF	1957	
Bettis	High-temperature physics and mock-up	HTTF	1959	
Bettis	Physics measurements	CCFB	1960	
Bettis	Clean critical experiments[65]	CCX	1961	
GEANP-1	Vacant			
GEANP-2	Vacant			
KAPL	Physical data	SHCA	1962	
KAPL	Reactor-physics studies with plastic moderator and mock-up	PMA	1954	1966
KAPL	Submarine advanced reactor mock-up	ATR	1954	
KAPL	SAR physics and mock-up	FPR	1956	
KAPL	D1G cold-water mock-up	CWA	1958	
KAPL	SAR high-temperature high-pressure physics and mock-up	PTR	1958	
KAPL	Cold Water Reactor test assembly	CWTA	1960	
Lockheed	RER core configurations	CERF	1958	
LASL, Kiva II	Critical-configuration safety tests	Comet II	1953	
LASL, Kiva II	Plated bare-plutonium sphere studies	Jezebel	1954	
LASL, Kiva II	Jacketed enriched-core lateral and base reflector of water studies, used as neutron sources for exponential column	Hydro	1956	
LASL, Kiva II	Spherical metal cores in thick metal reflector	Flattop	1957	
LASL, Kiva II	Water-immersion safety tests	Water tank	1961	
Livermore	Critical measurements with different geometries		1953	
Livermore	Project PLUTO cold critical experiments		1957	1964
Livermore	Cold critical experiments for Tory-IIC		1963	1964
RFP	Critical-configuration safety tests	NSF	1965	

FOOTNOTES

1 Power-capacity figures are based on the best available information. In all instances thermal capacity of the nuclear reactor is given, the electrical output, when shown, is the net electrical capacity of the power plant For reactors being built or planned, plant capacity is rounded to the nearest hundred kilowatts. Where a plant has a stretch capacity, the initial capacity is given until the stretch value is approved

2. This project is under the Power Demonstration Program

3. The Hallam Nuclear Power Facility was shut down in September 1964 due to moderator can failures In August 1965 the Commission terminated its contract with Consumers Public Power District for operation of the nuclear plant In May 1966 CPPD turned down their option to purchase the plant In June 1966 the AEC announced deactivation and dismantling of the nuclear facility

4 The Shippingport station is provided with a turbogenerator rated at 90,000 kw(e) net Use of a heat dissipation system permits operation at 150,000 kw(e) gross equivalent on core 2 Power operation with core 2 began Apr 30, 1965

5 The 58,200-kw(t) capacity of the Elk River Reactor is increased to 73,000 kw(t) by a fossil-fired superheater to produce 22,000 net kw(e) Thermal capacity of the reactor is equivalent to about 16,000 kw(e), the 14,800 kw(t) from the superheater is equivalent to about 6000 kw(e)

6 In the Consolidated Edison Indian Point Station, the 615,000 kw(t) from the reactor is increased by an oil-fired superheater to produce 270,000 net kw(e).

7 In the CVTR plant about 8600 kw(t) is lost to the moderator, and about 300 kw(t) is lost through the piping, this gives a net of 56,000 kw(t) The thermal energy from the reactor is increased to about 66 000 kw(t) by an oil-fired superheater to produce 17,000 net kw(e) Thermal capacity of the reactor is equivalent to about 14,500 kw(e), the 10,000 kw(t) of the superheater is equivalent to about 2500 kw(e).

8 The EGCR project was terminated in January 1966 prior to the completion of construction.

9 SRE operated at 20 Mw(t) until shut down in February 1964 for modification to permit an increase in power level to 30 Mw(t) On Dec 2 1966 the AEC announced deactivation of SRE because of limited resources of manpower and funds

10 The EBWR was converted to a 100,000-kw(t) plant, but its electrical output is limited by turbogenerator capacity. The plant achieved 100,000 kw(t) on Nov 11, 1962 Operation of EBWR in the Boiling Water Program was closed out in December 1962 The reactor is now being used in support of the Plutonium Recycle Program and attained criticality using plutonium as its principal fuel on Sept. 22, 1965 The facility is now planned for use at 40,000 kw(t)

11 Current operation of EBR-2 is limited to 45 Mw(t) and 11 to 12 Mw(e) net.

12 In addition to electricity, SURFSIDE is designed to produce 1,000,000 gallons per day of fresh water and 200,000 curies annually of radioactive isotopes

13 This facility was originally built and operated in 1954 as the Boiling Reactor Experiment No 2 (BORAX-2) With the addition of a turbogenerator, it operated during 1955 as BORAX-3, and on July 17, 1955, produced sufficient electricity to light and power Arco, Idaho—a U. S first BORAX-4, a further modification, operated from December 1956 until June 1958, when the experiment was shut down

14 OMRE demonstrated the technical and economic feasibility of using liquid hydrocarbon terphenyls as coolant and/or moderator

15 In a trial run on Dec 21 and 22 1951, EBR-1 generated the world's first electric power from nuclear energy and was the first to demonstrate, in 1953, the feasibility of breeding and the compatibility with breeding economy of sodium-potassium alloy as a liquid-metal coolant. It operated with a plutonium-bearing core (Mark IV) from November 1962 to December 1963 The reactor was decommissioned and dismantled early in 1964.

16 EOCR construction terminated in December 1962. Facility mothballed prior to operation

17 The EBOR reactor experiment was terminated in December 1966 prior to the completion of construction

18 Typical space propulsion rockets operate for 20 to 40 minutes Therefore space propulsion reactor experiments in context with other reactor applications operate for minutes rather than years.

19 S10FS4 operated in orbit during April-May 1965. Operation terminated unexpectedly after 43 days at power probably due to a sequence of failures of electrical components of the spacecraft with resulting spurious commands shutting down the reactor An identical ground test unit, S10FS3, operated successfully for more than a year before being shut down in 1966 Another flight system unit, S10FS-5, is in storage at Santa Susana, Calif

20 In August 1958 the MTR was operated up to 30,000 kw(t) using plutonium as fuel It demonstrated the ability of plutonium fuel elements to perform satisfactorily in a high-flux power reactor

21. The SNAPTRAN series of experiments was designed to develop, in a land-based environment, safety information on space auxiliary power reactors through excursion testing at various temperatures and rates of reactivity insertion. The destructive experiments approach the maximum credible accidents postulated for SNAP reactor systems.

22 A highly enriched plate core was driven to destruction in SPERT-I in the fall of 1962. A low-enriched oxide core successfully resisted destruction in safety tests

23. SPERT-II has been shut down and placed in standby for possible future use

24. In 1943 the Manhattan Engineer District disassembled Chicago Pile 1 and rebuilt it at Palos Park, Ill , as Chicago Pile 2 CP-2 had a thermal-power level of 10 kw

25 This reactor was shipped abroad for exhibition purposes in the USAEC Atoms for Peace Exhibit in the Tokyo International Trade Fair in 1959, and in Cairo, Egypt, and Lahore, Pakistan, in 1960

26. This TRIGA-Mk II was operated at the New Delhi World Agricultural Fair in 1960 It has been dismantled for storage in California by GDC

27 In 1965 and 1966 this reactor was operated at Sandia, N Mex , as SNARE Prior to that time it operated at the National Reactor Testing Station, Idaho as the Shield Test Pool Reactor (Susie) in the Aircraft Nuclear Propulsion Program from 1959 to 1962 It was shut down in 1966 and has been transferred to Louisiana State University

28. The BSR-2 which became operable in 1959 is a stainless-steel-UO_2 core that can be used alternately in the same facility with BSR-1 (aluminum alloy core)

29 The LITR began as a mechanical model of the MTR After MTR engineering aspects were proved, nuclear fuel, control devices, shielding, and instruments were added, the reactor, then called MTR critical experiment, went critical for the first time in the spring of 1950 Research facilities were added, and power was increased to the present level in the fall of 1951

30. The AE-6, also designated WBNS, was built and first operated at Downey Calif It was moved to Santa Susana in 1956

31 The RER was previously used in the terminated Aircraft Nuclear Propulsion Program A license authorizing Lockheed to operate the reactor as a commercial facility was issued in July 1962, and in August 1962 the USAF transferred the facility to the General Services Administration. Lockheed acquired title to the facility in March 1965

(Footnotes continue on the next page)

32. This TRIGA reactor is capable of being pulsed to peak power levels of approximately 1,200,000 kw(t) for fractions of a second at repeated intervals
33. After the assembly and operation of this reactor in the Government exhibit at Geneva in September 1958, it was dismantled and returned to ANL, where it was rebuilt as a 250-kw(t) Juggernaut
34 The HPRR was previously operated in the Nevada BREN facility It is now installed in the Dosimetry Applications Research Facility
35 This reactor was operated in the USAEC Atoms for Peace Exhibit in Vienna, Austria, in June 1963, in Belgrade, Yugoslavia, in September 1963, in Madrid, Spain, in April 1964, in Lisbon, Portugal, in April 1965, in Utrecht, Netherlands, in March 1966, and is scheduled for Dublin Ireland in September–October 1966 and Stockholm, Sweden, in May 1967
36 This reactor was previously designated STF for SNAP Shield Test Facility.
37 AGN-201-112 was operated at the University of California, Berkeley, beginning in 1957 The University of New Mexico filed an application in April 1966 for transfer and reconstruction of the reactor at a site on its campus The reactor achieved criticality at the University of New Mexico on Oct 7 1966
38 AGN-201M-105 was previously owned and operated by the National Naval Medical Center, Bethesda, Md , in 1957–1962 Title to the reactor was transferred to New York University early in 1964
39 This reactor was originally operated by North Carolina State University as the Raleigh Research Reactor (RRR) It was transferred in March 1966 to Mississippi State University for reactivation The original 10-kw research reactor was started up in 1953 and was dismantled in 1955 The reactor was reactivated with a 500-watt core in March 1957 Early in 1959 the reactor was modified for 100-watt operation and moved to a new location in the Nuclear Science Laboratory, and a new 10-kw heterogeneous-core Argonaut type reactor was built in the original RRR shield vacated by the homogeneous core The RRR was dismantled by N C State in 1963
40 Reactors in the Army Power Program are identified by symbolic nomenclature to reflect mobility characteristics, power range, development sequence, and field sequence The first capital letter indicates mobility characteristics S (stationary operation), not designed for subsequent relocation, P (portable), semimobile, stationary operation, capable of being dismantled and reassembled for use in successive locations, and M (mobile), capable of being moved intact, or virtually intact, for use in successive locations The second capital letter indicates the power range as measured by design capacity for continuous operation L (low), 100 to 1000 kw(e), M (medium) 1000 to 10,000 kw(e), and H (high), 10,000 kw(e) or more Arabic numerals indicate order in which plants having the same mobility and power characteristics are initiated If not followed by an additional letter, the designation indicates a prototype or pilot plant The last capital letter (when present) indicates the alphabetical order in which field plants of a specific type are initiated
41 The PM-2A was shut down on July 9, 1963, and dismantled during April–June 1964 The reactor vessel was then used by the AEC at the National Reactor Testing Station, Idaho, for NDT (nil ductility transition temperature) investigations of materials that had been subjected to long-term irradiation. Defects were sequentially introduced into the vessel wall during a series of tests involving pressure and temperature conditions which exceeded the range permitted in operating nuclear power plants The final test on Nov. 18, 1966, resulted in a brittle fracture under conditions even more severe than those which had been previously predicted to cause failure The test program confirmed laboratory data on the adequacy of reactor-operating limitations to prevent brittle fracture of a pressure vessel The remaining parts of the primary system and the secondary system are in storage pending commitment by the Army for final disposition
42 The PM-1 produces 7 million Btu/hr for space heating in addition to electrical output
43. The SM-1A produces 38 million Btu/hr for space heating in addition to electrical output
44 The MH-1A was installed in the STURGIS (formerly the Liberty Ship CHARLES H CUGLE), at Mobile Ala It has been towed to Ft Belvoir After acceptance testing in 1966 at Fort Belvoir, Va , the plant will be located at sites as required by the Department of the Army
45 The USS SEAWOLF, originally commissioned with a sodium-cooled reactor in March 1957, was recommissioned with a pressurized-water reactor on Sept 30, 1960
46 The USS THRESHER (SSN593) was lost in the Atlantic on Apr 10, 1963
47 In FY 1967 Congress authorized the DLGN originally authorized in FY 1966 The FY 1967 authorization also included long-lead-time procurements for a second, new DLGN
48 The GCRE facility was first built and operated to test a gas-cooled light-water-moderated 2200-kw(t) reactor as part of the program to develop the ML-1 Operation of the reactor experiment ended in April 1961 following a pressure-vessel failure. Modifications to provide a "dry" facility for testing ML-1 type reactor skids were completed in April 1965.
49 ML-1 operation was terminated and the plant dismantled following a decision in October 1965 to phase out the ML-1 program during FY 1966 Department of the Army is continuing related power-conversion activities
50 The Tory II-C was successfully tested at full design power during May 1964 Subsequent to cancellation of the Pluto program on July 1, 1964, the reactor was placed in the Pluto disassembly building at NTS for storage
51 Ground-breaking ceremonies for construction of power-conversion equipment by the Washington Public Power Supply System were held Sept 26, 1963 Initial electric-power generation began April 8, 1966 Full power output of 800 Mw(e) utilizing N-Reactor steam was achieved on Nov 29, 1966
52 The PDP and the SP are also used in the Heavy Water Power Reactor Program PDP has been modified to include a Resonance Test Reactor facility
53 In addition to the export power reactors listed, Westinghouse provided the design and furnished nuclear components, including fuel elements, control rods, and instrumentation for the 11 5-Mw(e) Belgium BR-3 pressurized-water reactor at Mol
54 This L-77 reactor was operated in the commercial exhibit of the 1958 International Conference in Geneva and in the USAEC Atoms for Peace Exhibits in Beirut, Lebanon in October 1961, in Athens, Greece, in May 1962, and in Bangkok, Thailand, in November 1962. It is presently in storage without fuel at Interatom, Inc
55 This is the 1955 Geneva Conference reactor rebuilt with increased power and now operating at Wuerenlingen, Switzerland
56 The Venezuela Research Reactor was shut down in September 1961 It is expected that the reactor will not be operated again until 1966
57 This TRIGA reactor was operated at the 1958 International Conference in Geneva prior to shipment to the University of Lovanium It began operating at the University of Lovanium in June 1959 It is the first reactor to be operated on the African continent
58 The Netherlands research reactor was originally operated at the Amsterdam International Exhibition in June 1957, major portions of the exhibition reactor system were used to fabricate the present reactor
59 This reactor was operated in the International Science Section of the Brussels International Exhibition, Apr 15 to Oct 1, 1958, prior to transfer to the University of Basel
60 The AGN-201-111 was operated first in the USAEC Atoms for Peace Exhibit in Rome, Italy, in July 1958 and later in the commercial exhibit of the 1958 International Conference in Geneva prior to transfer to the University of Geneva
61 Prior to its sale to the University of Montevideo in 1966, this reactor was part of the USAEC Exhibit Program It was in Buenos Aires, Argentina, in the fall of 1960, in Rio de Janeiro Brazil, in the spring of 1961, in Lima, Peru, in the fall of 1961, in Mexico City in the spring of 1962, in Santiago, Chile, in the fall of 1962, in Bogotá, Colombia, in the spring of 1963, and in Montevideo, Uruguay in the fall of 1963
62 Zero-power experiments of historical interest previously conducted in ANL facility cells include the NAUTILUS core design (ZPR-1), the Savannah River reactor design (ZPR-2), and a series of fast-neutron studies (ZPR-4) and interactions between two basic systems (ZPR-5) The following experiments have been performed in the ZPR-7 facility thorium, uranium, deuterium criticals (THUD), and a series of flux-trap criticals for the Argonne High Flux Research Reactor
63 The B&W cells 2 and 3 share a control panel, only one cell can be operated at any one time
64 The NASA ZPR-I and ZPR-II systems will be operated from the same control panel, but it will be possible to operate only one system at a time
65 The cell has one control panel for two pots Experiments may be operated in either pot, but not simultaneously

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