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SUBJECT: Estimate of Potential Fuel Reprocessing,
Revision No. 25 - Part A

TO: F. L. Culler

FROM: J. W. Ullmann

Abstract

The power and estimated reprocessing load is tabulated for existing and proposed United States and United States built reactors of 10 kw or greater thermal power.

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ESTIMATE OF POTENTIAL FUEL REPROCESSING
Revision No. 25 - Part A

<u>Reactor</u>	<u>Designer</u>	<u>Location</u>	<u>Nuclear Heat Mw</u>	<u>Net Elec. Mw</u>	<u>Startup Date</u>	<u>Estimated Annual Processing</u>		
						<u>Kg U-235</u>	<u>Metric tons U</u>	<u>Metric tons Th</u>
<u>AEC CIVILIAN POWER REACTORS</u>								
BORAX-4	Argonne	NRTS, Idaho	15	2	1957	--	--	0.3
EBR-1	Argonne	NRTS, Idaho	1.4	0.1	1957	30	1	--
EBR-2	Argonne	NRTS, Idaho	62	16.5	1960	60	1	--
EBWR	Argonne	Lemont, Illinois	30	4.5	1957	--	2	--
GCR	ACF Industries	NRTS, Idaho	84*	30*	1961	--	3*	--
HRE-3	ORNL	Oak Ridge, Tenn.	60	14	1962	--	--	3
HRT	ORNL	Oak Ridge, Tenn.	5	0.3	1957	4	--	--
LAMPRE-1	Los Alamos	Los Alamos, N. M.	1	--	1960	? ^a	--	--
LAMPRE-2	Los Alamos	Los Alamos, N. M.	10	--	?	? ^a	--	--
LAMPRE-3	Los Alamos	Los Alamos, N. M.	~50	15	?	? ^a	--	--
LAPRE-2	Los Alamos	Los Alamos, N. M.	1	--	1958	1	--	--
LMFRE	Babcock & Wilcox	Lynchburg, Va.	5	--	1961	?	--	--
OMRE	Atomics Int., NAA	NRTS, Idaho	16	--	1957	15	--	--
PRTR	General Electric	Richland, Washington	70	--	1960	~60 ^a	3	--
PWR	Westinghouse	Shippingport, Pa.	231	60	1957	60	15	--
SRE	Atomics Int., NAA	Santa Susana, Cal.	20	6	1957	--	2	--
(Passenger-Cargo Ship)	Babcock & Wilcox	"N. S. Savannah"	74	--	1960	--	2	--
			(735)*	(148)*		(230)	(33)*	(3)

* Indicates change since last issue of report.

^a Plutonium alloy.

Reactor	Designer	Location	Nuclear Heat Mw	Net Elec. Mw	Startup Date	Estimated Annual Processing		
						Kg U-235	Metric tons U	Metric tons Th
INDUSTRIAL REACTOR PROPOSALS								
Carolinas-Virginia NPA	Westinghouse	Parr Shoals, S. C.	61	17	1962	--	4	--
Chugach Elec. Assn.	Nuclear Dev. Corp.	Anchorage, Alaska	40	10	1962	--	6	--
City of Piqua	Atomics Int., NAA	Piqua, Ohio	45	12	1961	--	5	--
Commonwealth Edison ^a	General Electric	Morton, Ill.	626	180	1959	--	15	--
Consolidated Edison	Babcock & Wilcox	Peekskill, N. Y.	580	163 ^b	1960	--	--	8
Consumers Public Power	Atomics Int., NAA	Hallam, Neb.	245	75	1962	--	8	--
Detroit Edison-PRDC	APDA	Monroe, Mich.	300	90	1960	825 ^c	33	--
Florida-East Central	Gen. Nuc. Eng.	Tampa, Florida	173	46	1963	--	20	--
Gen. Public Utilities	?	Saxton, Pa.	~40	~10	1961	--	~3	--
Middle South Utilities	Atomics Int., NAA	?	~80	20	1962	--	--	~2*
New England Electric	?	?	~700	200	1964	--	35	--
Northern States Power	Allis-Chalmers	Sioux Falls, S. D.	203	62	1962	5*	4	--
PAR	Westinghouse	Allentown, Pa.	550	150	1963	--	--	12
Pacific Gas & Elec.	General Electric	Humboldt Bay, Calif.	171	50	1962	--	10	--
Pacific Power & Light	?	Yakima, Wash.	?	?	?	--	?	--
Rural Coop. Power Assoc.	ACF Industries	Elk River, Minn.	58	15 ^d	1960	--	--	1
VBWR	General Electric	Pleasanton, Calif.	30	5	1957	10	--	--
West Penn Group #1	B&W, NDA, or GE	Ohio Valley	~50	13	1962	--	4	--
West Penn Group #2	?	Ohio Valley	~700	200	1965	--	30	--
Yankee Atomic	Westinghouse	Rowe, Mass.	480 ^e	134 ^e	1960	--	14	--
			(5132)	(1452)		(840)*	(191)*	(23)*

^aWith Nuclear Power Group.

^bAdditional 112 Mw electricity from oil-fired superheater.

^cAs 26% U-235.

^dAdditional 7 Mw electricity from hydrocarbon-fired superheater.

^eFirst core will produce 392 Mw heat, 110 Mw electricity.

Reactor	Designer	Location	Nuclear Heat Mw	Net Elec. Mw	Startup Date	Estimated Annual Processing		
						Kg U-235	Metric tons U	Metric tons Th
TESTING REACTORS								
ASTR	Convair	Fort Worth, Texas	1	--	1954	1	--	--
BSR-1	ORNL	Oak Ridge, Tenn.	0.1*	--	1950	--	--	--
ETR	General Electric	NRTS, Idaho	175	--	1957	140	--	--
GETR	General Electric	Pleasanton, Calif.	30	--	1958	25	--	--
GTR	Convair	Fort Worth, Texas	0.1	--	1953	--	--	--
HWCTR	DuPont	Aiken, S. C.	62	--	1961	?	?	--
Ind. Testing Reactors	General Electric	Wadesboro, N. C.	50	--	1960	40	--	--
Lockheed (RERL)	General Electric	Dawsonville, Ga.	10	--	1958	10	--	--
MTR	ORNL	NRTS, Idaho	40	--	1952	35	--	--
NACA	NACA	Sandusky, Ohio	60	--	1959	45	--	--
NETR	ACF Industries	WADC, Dayton, Ohio	10	--	1958	10	--	--
NTR	General Electric	Pleasanton, Cal.	0.03	--	1957	--	--	--
STPR	General Electric	NRTS, Idaho	0.1	--	1958	--	--	--
TRS-1	ORNL	Oak Ridge, Tenn.	0.1	--	1954	--	--	--
TSR-2	ORNL	Oak Ridge, Tenn.	5	--	1959*	2	--	--
*TTR-1	Knolls	Schenectady, N. Y.	0.01	--	1951	--	--	--
TREAT	Argonne	NRTS, Idaho	0.1	--	1959	--	--	--
WTR	Westinghouse	Yukon, Pa.	20	--	1959	15	--	--
			(473)*	(0)		(331)*	(0)	(0)
PRODUCTION PROGRAMS								
Hanford (8) ^a	General Electric	Richland, Wash.		--	1944			
Savannah River (5) ^b	DuPont	Aiken, S. C.		--	1954			
SCRUP (NRU & NRX)	AECL	Chalk River, Can.	240	--	1957	--	100	--
			(240)	(0)		(0)	(100)	(0)

^aB, C, D, DR, F, H, KE, KW.^bR, P, K, L, C.

Reactor	Designer	Location	Nuclear Heat Mw	Net Elec. Mw	Startup Date	Estimated Annual Processing		
						Kg U-235	Metric tons U	Metric tons Th
RESEARCH REACTORS								
*Argonaut (CP-11)	Argonne	Lemont, Ill.	0.01	--	1957	--	--	--
Armour Research Inst.	Atomics Int., NAA	Chicago, Ill.	0.05	--	1956	--	--	--
*Babcock & Wilcox	Babcock & Wilcox	Lynchburg, Va.	0.01		1958	--	--	--
Battelle Memorial Inst.	AMF Atomics	Columbus, Ohio	1	--	1956	0.3	--	--
Brookhaven Research	Brookhaven	Upton, N. Y.	20	--	1950	15	--	--
Brookhaven Medical	Nuclear Dev. Corp.	Upton, N. Y.	1	--	1958	1	--	--
*Cornell U.	Vitro Eng.	Itnaca, N. Y.	0.01	--	1959	--	--	--
CP-5	Argonne	Lemont, Ill.	4	--	1954	3	--	--
Curtiss-Wright	Curtiss-Wright	Quehanna, Pa.	1	--	1958	1	--	--
Georgia Inst. of Tech.	Gen. Nuc. Eng.	Atlanta, Ga.	4	--	1960	3	--	--
Ind. Reactor Labs.	AMF Atomics	Plainsboro, N. J.	5	--	1958	7	--	--
*IRGA	General Dynamics	San Diego, Cal.	0.01	--	1958	--	--	--
LITR	ORNL	Oak Ridge, Tenn.	3	--	1950	2	--	--
LPTR	Foster Wheeler	Livermore, Calif.	1	--	1958	1	--	--
MIT	ACF Industries	Cambridge, Mass.	1	--	1958	1	--	--
Naval Research Lab.	N. R. L.	Washington, D. C.	0.1	--	1956	--	--	--
Neutron Source	Brookhaven	Upton, N. Y.	0.1	--	1958	--	--	--
Omega West	Los Alamos	Los Alamos, N. M.	2	--	1957	2	--	--
ORNL Graphite	ORNL (1958 Version)	Oak Ridge, Tenn.	10	--	1943	7	--	--
ORR	ORNL	Oak Ridge, Tenn.	20	--	1958	17	--	--
Pennsylvania State	Penn. State U.	University Park, Pa.	1	--	1955	1	--	--
Sandia	Sandia Corp.	Albuquerque, N. M.	5	--	1960	4	--	--
*TRIGA	General Dynamics	Lajolla, Calif.	0.01	--	1958	--	--	--
Union Carbide	AMF Atomics	Sterling Forest, N.Y.	5	--	1958	4	--	--
*U. of Arizona	General Dynamics	Tucson, Ariz.	0.01	--	1958	--	--	--
U. of Buffalo	AMF Atomics	Buffalo, N. Y.	1	--	1958	1	--	--

<u>Reactor</u>	<u>Designer</u>	<u>Location</u>	<u>Nuclear Heat Mw</u>	<u>Net Elec. Mw</u>	<u>Startup Date</u>	<u>Estimated Annual Processing</u> <u>Kg U-235</u>	<u>Metric tons U</u>	<u>Metric tons Th</u>
<u>RESEARCH REACTORS, Continued</u>								
*U. of Florida	Gen. Nuc. Eng.	Gainesville, Fla.	0.01	--	1958	--	--	--
U. of Michigan	Babcock & Wilcox	Ann Arbor, Mich.	1	--	1957	1	--	--
U. of Virginia	Babcock & Wilcox	Charlottesville, Va.	1	--	1958	1	--	--
Washington State College	General Electric	Pullman, Washington	0.1	--	1959	--	--	--
Water Boiler	Los Alamos	Los Alamos, N. M.	0.04	--	1944	--	--	--
Watertown Arsenal	Bendix	Boston, Mass.	1	--	1959	1	--	--
			(129)	(0)		(70)	(0)	(0)
<u>EXPORT REACTORS</u>								
(?)Argentina	General Electric	Buenos Aires	3	--	1958	2	--	--
Austria	AMF Atomics	Dollensheim	5	--	1959	4	--	--
Austria	General Dynamics	Vienna	0.01	--	1959	--	--	--
Belgium (BR-2)	Nuclear Dev. Corp.	Mol	50	--	1959	40	--	--
Belgium (BR-3)	Westinghouse	Mol	43	11.5	1959	--	2	--
*Belgium	General Dynamics	Ghent	0.01	--	1959	--	--	--
Brazil	Babcock & Wilcox	Sao Paulo	5	--	1957	3	--	--
Canada	General Dynamics	Chalk River	0.01*	--	1957*	--	--	--
Canada	AMF Atomics	Hamilton	1	--	1958	1	--	--
Denmark (DR-2)	Foster Wheeler	Risoe	5	--	1958	4	--	--
France (Triton)	CAEA	Foutenay-aux-Roses	1	--	1958	1	--	--
France (Melusine)	CAEA	Grenoble	1	--	1958	1	--	--
(?)France (Pegase)	French AEC	Fontenay-aux-Roses	50	--	1960	40	--	--
Germany	AMF Atomics	Munich	1	--	1957	1	--	--
Germany	Atomics Int., NAA	Frankfurt	0.05	--	1958	--	--	--
Germany	Atomics Int., NAA	West Berlin	0.05	--	1958	--	--	--
Germany	Babcock & Wilcox	Hamburg	1	--	1958	1	--	--
Germany	General Electric	R. W. E., Kahl	~60	15	1960	--	4	--
Greece	AMF Atomics	Thessalonika	1	--	1958	1	--	--

Reactor	Designer	Location	Nuclear	Net	Startup	Estimated Annual Processing		
			Heat Mw	Elec. Mw		Date	Kg U-235	Metric tons U
EXPORT REACTORS, Continued								
Israel	AMF Atomics	Tel-Aviv	1	--	1959	1	--	--
Iran	AMF Atomics	Amirabad	1	--	1959	1	--	--
Italy	AMF Atomics	(SORIN) Chivasso	1	--	1958	1	--	--
Italy	ACF Industries	(CISE) Ispra	5	--	1958	4	--	--
Italy	Atomics Int., NAA	(Fermi Center) Milan	0.05	--	1958	--	--	--
Italy	Westinghouse	(SELNI) Milan	492	134	1961	--	22	--
Italy	Vitro Engineering	(SENN) Rome	500	150	1962	--	25	--
Japan (JRR-1)	Atomics Int., NAA	Tokai-Mura	0.05	--	1957	--	--	--
Japan (JRR-2)	AMF Atomics	Tokai-Mura	10	--	1959	8	--	--
Netherlands	AMF Atomics	Delft	1	--	1957	1	--	--
Netherlands	ACF Industries	Petten	20	--	1959	15	--	--
Portugal	AMF Atomics	Lisbon	1	--	1959	1	--	--
Puerto Rico	AMF Atomics	Mayaguez	1	--	1960	1	--	--
Spain	General Electric	Moncloa	3	--	1958	2	--	--
Sweden	ACF Industries	Studsvik	30	--	1958	25	--	--
Switzerland	ORNL	Wurenlingen	1	--	1955	1	--	--
Taiwan	General Electric	Taipei	1	--	1959	1	--	--
Venezuela	General Electric	Caracas	3	--	1958	2	--	--
			(1298)*	(310)*		(163)	(53)*	(0)
TOTALS SHOWN (For Military Reactors see Part B)			3006*	1910*		1634*	377*	26*

NOTE: The above data have been assembled from reports, magazines, and newspaper articles; and some of the listings are undoubtedly incorrect or out-of-date. In addition, some of the estimated processing rates are the author's estimates in cases where they have not been announced by the reactor's designers. Any additions or corrections will be welcome.

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