

Testing at ANL

Richard McKnight

Benchmark	Description
ZPR-6/6A	IEU-COMP-FAST-001 UO <sub>2</sub> LMFBR - HEU/DU/Na/Steel/Fe <sub>2</sub> O <sub>3</sub> /U <sub>3</sub> O <sub>8</sub> core - Du reflector
ZPR-6/7	MIX-COMP-FAST-001 Mixed oxide LMFBR - Pu/DU/Na/Steel/Fe <sub>2</sub> O <sub>3</sub> /U <sub>3</sub> O <sub>8</sub> core - DU reflector
ZPR-9/1	IEU-MET-FAST-013 HEU/DU core - Al reflector - ~11% enrichment - 12.5 v/o HEU/87.5 v/o DU unit cell
ZPR-9/2	IEU-MET-FAST-014 HEU/DU/W core - Al reflector - ~16% enrichment - 12.5 v/o HEU/62.5 v/o DU/25 v/o W unit cell
ZPR-9/3	IEU-MET-FAST-014 HEU/DU/W core - Al reflector - ~21% enrichment - 12.5 v/o HEU/43.75 v/o DU/43.75 v/o W unit cell
ZPR-9/4	HEU-MET-FAST-060 HEU/W core - Al reflector - 18.75 v/o HEU/81.25 v/o W unit cell
ZPR-9/5	HEU-MET-FAST-067 HEU/W/C core - Al reflector - 12.5 v/o HEU/43.75 v/o W/43.75 v/o C unit cell
ZPR-9/6	HEU-MET-FAST-067 HEU/W/Al (perforated) core - Al reflector - 12.5 v/o HEU/43.75 v/o W/43.75 v/o Al (45% Al,55% void) unit cell
ZPR-9/7	HEU-MET-FAST-070 HEU/W/Al (perforated) core - Al <sub>2</sub> O <sub>3</sub> reflector - 12.5 v/o HEU/43.75 v/o W/43.75 v/o Al (45% Al,55% void) unit cell
ZPR-9/9	HEU-MET-FAST-070 HEU/W/Al <sub>2</sub> O <sub>3</sub> /Al (perforated) core - Al <sub>2</sub> O <sub>3</sub> reflector, Al outer reflector - 12.5 v/o HEU/43.75 v/o W/25 v/o Al <sub>2</sub> O <sub>3</sub> /18.75 v/o Al (45% Al,55% void) unit cell
ZPR-6/10	PU-MET-INTER-002 Pu/C/Steel core - Steel reflector, Iron radial reflector - 6.25 v/o Pu/37.5 v/o C/56.25 v/o steel unit cell
ZPPR-21A	PU-MET-FAST-033 IFR fuel casting - 12.5 v/o Pu-U-Mo/25 v/o Pu-Al/12.5 v/o Zr/6.25 v/o DU/18.75 v/o SST/25 v/o void unit cell - graphite reflector
ZPPR-21B	MIX-MET-FAST-011 IFR fuel casting - 12.5 v/o Pu-U-Mo/18.75 v/o Pu-Al/12.5 v/o Zr/6.25 v/o DU/25 v/o void/21.875 v/o SST/3.125 v/o HEU unit cell - graphite reflector
ZPPR-21C	MIX-MET-FAST-011 IFR fuel casting - 12.5 v/o Pu-U-Mo/12.5 v/o Pu-Al/12.5 v/o Zr/6.25 v/o DU/25 v/o void/21.875 v/o SST/9.375 v/o HEU unit cell - graphite reflector
ZPPR-21D	MIX-MET-FAST-011 IFR fuel casting - 12.5 v/o Pu-U-Mo/6.25 v/o Pu-Al/12.5 v/o Zr/6.25 v/o DU/25 v/o void/25 v/o SST/12.5 v/o HEU unit cell - graphite reflector
ZPPR-21E	MIX-MET-FAST-011 IFR fuel casting - 12.5 v/o Pu-U-Mo/12.5 v/o Zr/6.25 v/o DU/25 v/o void/25 v/o SST/18.75 v/o HEU unit cell - graphite reflector
ZPPR-21F	HEU-MET-FAST-061 IFR fuel casting - 25 v/o HEU/12.5 v/o Zr/12.5 v/o DU/18.75 v/o SST/31.25 v/o void unit cell - graphite reflector
ZPR-3/23	HEU-MET-FAST-055 HEU/Al (perforated) core - DU reflector -12.5 v/o HEU/87.5 v/o Al (63% Al/37% void) unit cell
ZPR-3/41	IEU-MET-FAST-012 HEU/DU/Steel/Al (perforated) core - DU reflector - ~16% enrichment - 7.8125 v/o HEU/35.9375 v/o DU/6.25 v/o SST/50 v/o Al (45% Al,55% void) unit cell
ZPR-6/9 (U9)	IEU-MET-FAST-010 HEU/DU core - DU reflector - ~9% enrichment - 9.375 v/o HEU/90.625 v/o DU unit cell
ZPR-9/34 (U/Fe)	HEU-MET-INTER-001 HEU/Fe/Stainless steel core - Stainless steel reflector - 3.125 v/o HEU/87.5 v/o Fe/9.375 v/o stainless steel unit cell

Assembly	Benchmark	Version 6		Version 7		Experiment		C/E V6	std dev	C/E V7	std dev
		k-eff	std dev	k-eff	std dev	k-eff	std dev				
ZPR-6/6A	IEU-COMP-FAST-001	1.00347	0.00038	0.99856	0.00036	1.0016	0.0009	1.0019	0.0010	0.9970	0.0010
ZPR-6/7	MIX-COMP-FAST-001	1.00307	0.00034	1.00048	0.00035	1.0005	0.0009	1.0026	0.0009	1.0000	0.0009
ZPR-9/1	IEU-MET-FAST-013	1.01608	0.00035	1.00678	0.00034	1.0022	0.0010	1.0138	0.0011	1.0046	0.0011
ZPR-9/2	IEU-MET-FAST-014	1.01572	0.00035	1.01024	0.00036	1.0032	0.0010	1.0125	0.0011	1.0070	0.0011
ZPR-9/3	IEU-MET-FAST-014	1.01618	0.00036	1.01316	0.00035	1.0025	0.0010	1.0136	0.0011	1.0106	0.0011
ZPR-9/4	HEU-MET-FAST-060	1.02113	0.00036	1.02166	0.00036	1.0013	0.0011	1.0198	0.0012	1.0203	0.0012
ZPR-9/5	HEU-MET-FAST-067	1.01783	0.00036	1.01587	0.00037	1.0023	0.0011	1.0155	0.0012	1.0135	0.0012
ZPR-9/6	HEU-MET-FAST-067	1.01689	0.00035	1.01511	0.00038	1.0029	0.0012	1.0139	0.0013	1.0122	0.0013
ZPR-9/7	HEU-MET-FAST-070	1.01400	0.00037	1.01571	0.00039	1.0039	0.0012	1.0101	0.0013	1.0118	0.0013
ZPR-9/9	HEU-MET-FAST-070	1.00899	0.00040	1.01135	0.00037	1.0029	0.0012	1.0061	0.0013	1.0084	0.0013
ZPR-6/10	PU-MET-INTER-002	1.03466	0.00047	1.03900	0.00047	1.0016	0.0013	1.0330	0.0014	1.0373	0.0014
ZPPR-21A	PU-MET-FAST-033	1.00181	0.00042	1.00279	0.00040	1.0002	0.0015	1.0016	0.0016	1.0026	0.0016
ZPPR-21B	MIX-MET-FAST-011	1.00083	0.00040	1.00281	0.00041	1.0007	0.0014	1.0001	0.0015	1.0021	0.0015
ZPPR-21C	MIX-MET-FAST-011	0.99635	0.00041	0.99824	0.00043	0.9998	0.0015	0.9965	0.0016	0.9984	0.0016
ZPPR-21D	MIX-MET-FAST-011	1.00202	0.00041	1.00483	0.00042	1.0018	0.0015	1.0002	0.0016	1.0030	0.0016
ZPPR-21E	MIX-MET-FAST-011	1.00187	0.00040	1.00553	0.00040	1.0012	0.0017	1.0007	0.0017	1.0043	0.0018
ZPPR-21F	HEU-MET-FAST-061	1.00181	0.00040	1.00512	0.00040	1.0006	0.0018	1.0012	0.0018	1.0045	0.0019
ZPR-3/23	HEU-MET-FAST-055	1.00659	0.00030	1.00452	0.00031	1.0016	0.0020	1.0050	0.0020	1.0029	0.0020
ZPR-3/41	IEU-MET-FAST-012	1.00837	0.00036	1.00498	0.00035	1.0018	0.0018	1.0066	0.0018	1.0032	0.0018
ZPR-6/9	IEU-MET-FAST-010	1.01818	0.00046	1.00532	0.00045	1.0015	0.0012	1.0167	0.0013	1.0038	0.0013
ZPR-9/34	HEU-MET-INTER-001	1.01355	0.00052	1.00971	0.00051	1.0006	0.0011	1.0129	0.0012	1.0091	0.0012

