EUROPEAN COMMISSION
5th EURATOM FRAMEWORK PROGRAMME 1998-2002
KEY ACTION : NUCLEAR FISSION

HTR-N

High-Temperature Reactor Physics and Fuel Cycle Studies

CONTRACT N°
FIKI-CT-2000-00020

Work Package 3

Fuel element physical parameters for Pu fuel cycles in a prismatic block type core

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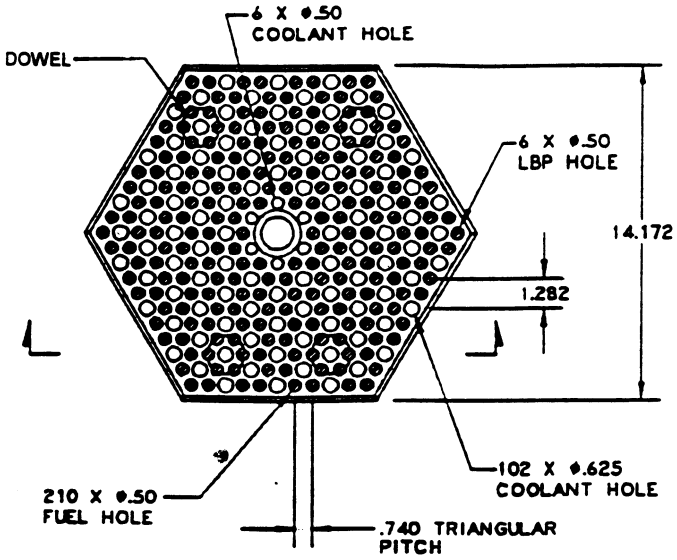
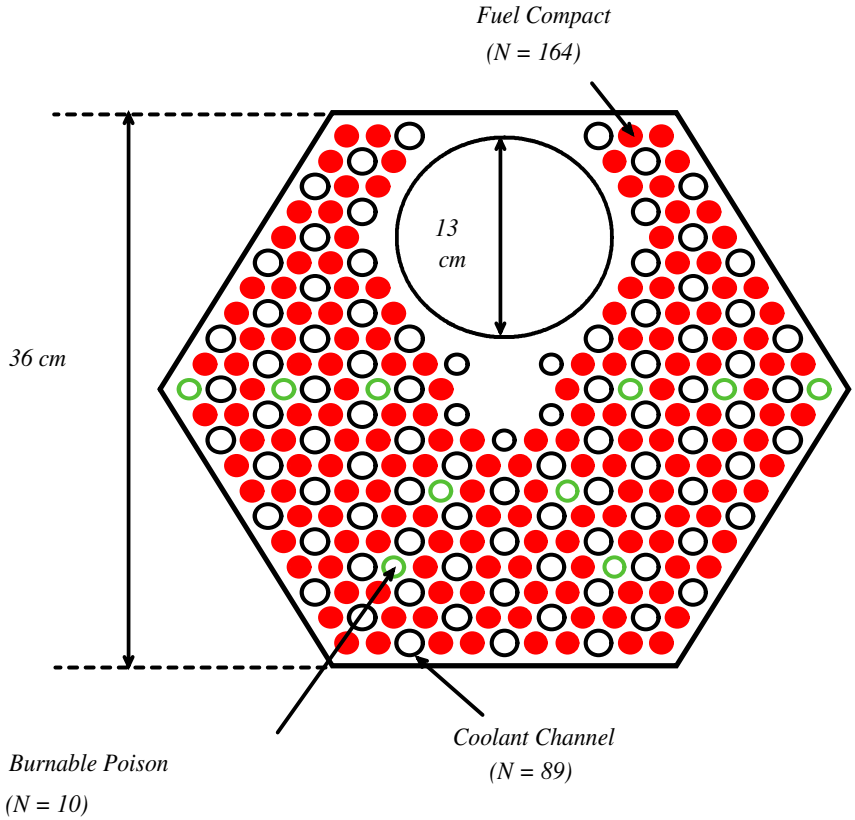
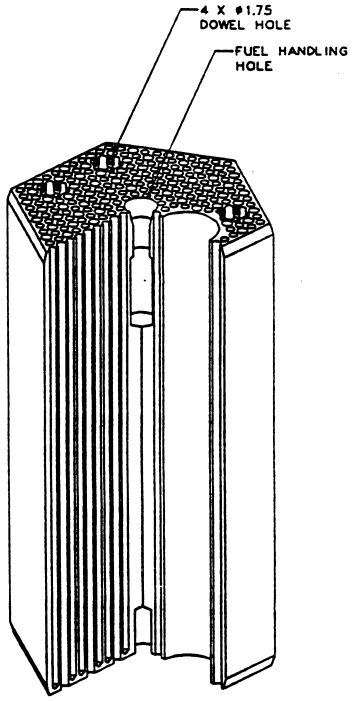
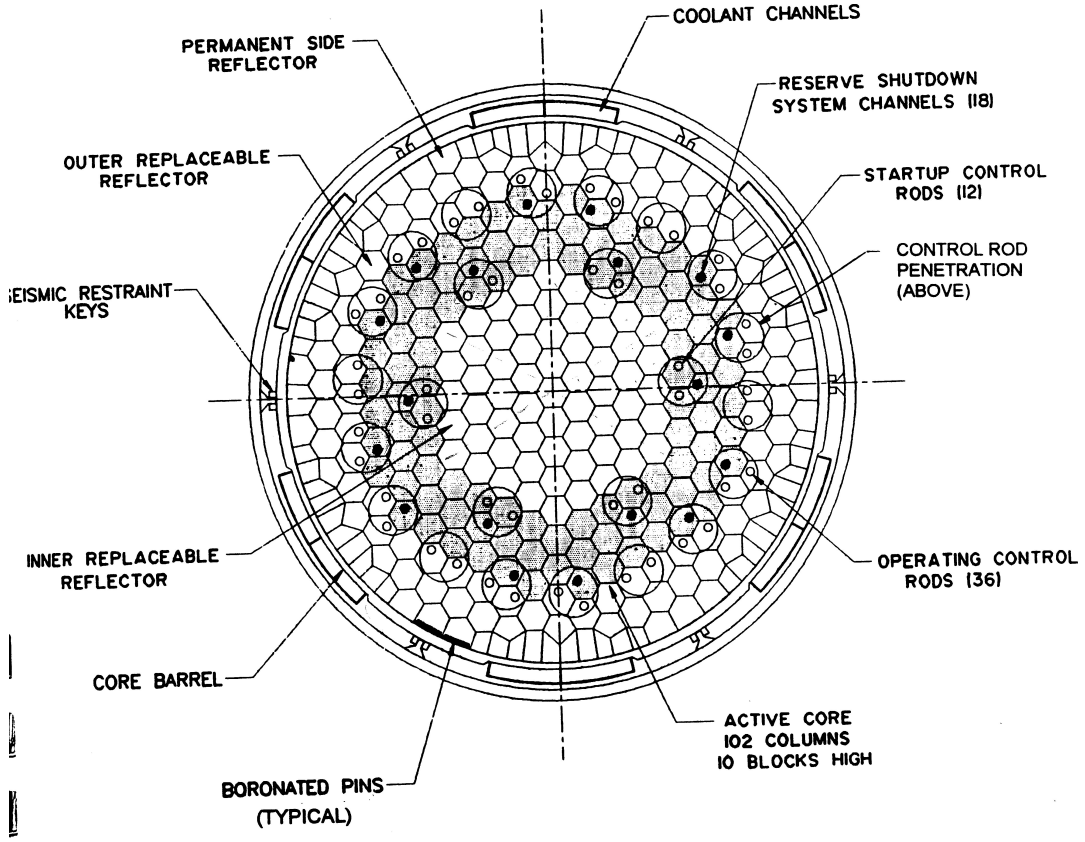
Dissemination level : **CO**
Document Number: HTR-N-00/12-D-3.1.3.
11/12/2000

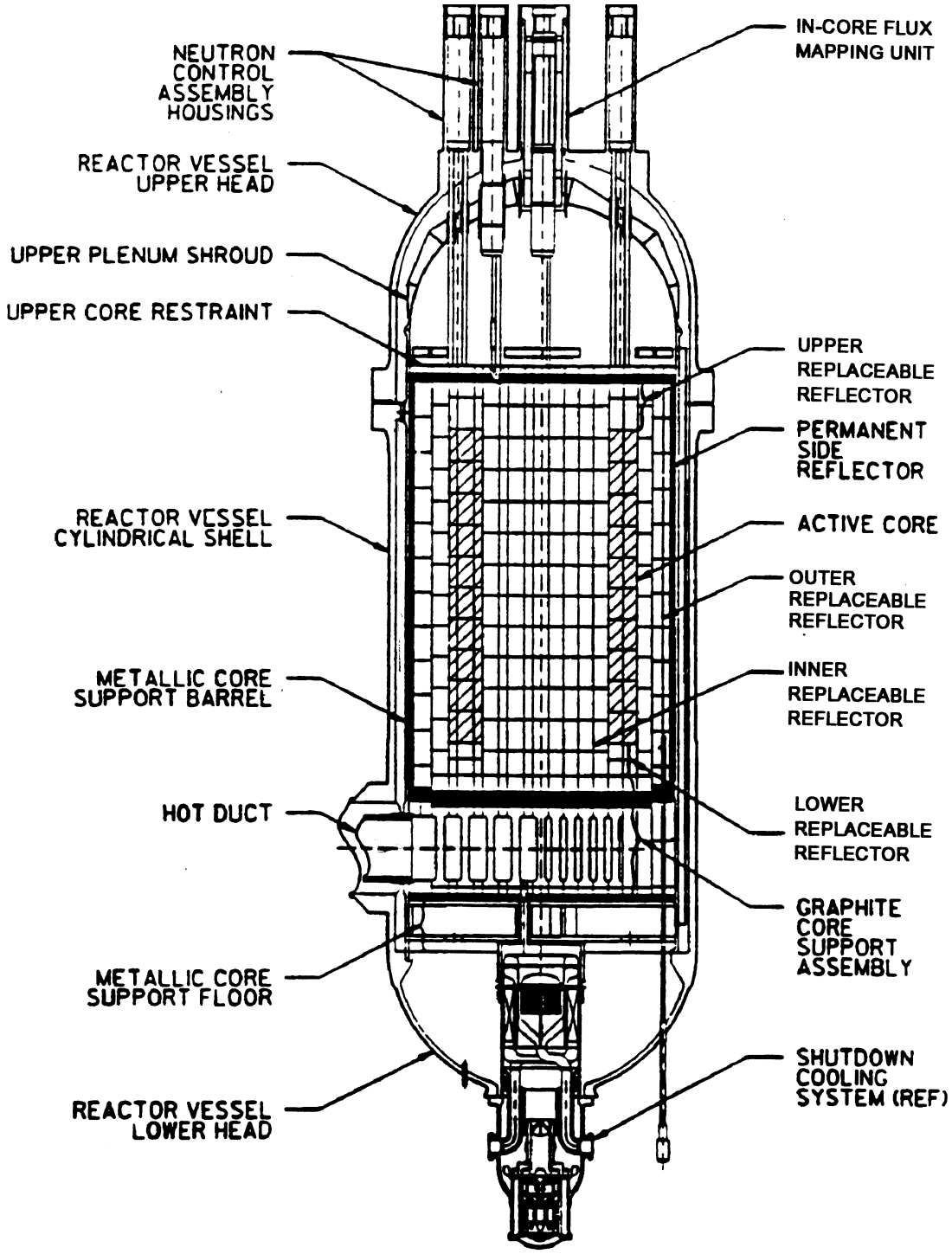
Core power	600	MW
Core power density	6.6	MW/m^3
Core inlet outlet He temperatures	491/850	Celsius
Helium pressure	7	MPa
(Average core temperatures for fuel/graphite	*800/750*	*Celsius)*
Core columns	102	
Number of fuel elements	1020	(10/column)
Standard	720	
Control	360	
Effective core height	80	m
Hexagonal fuel dimensions		
Flat to flat	36	cm
Height	80	cm
Central fuel handling hole		
Diameter	40	mm
Height	380	mm
Control rod hole diameter	130	mm
Fuel compact diameter	12.45	mm
Fuel compact length	49.3	mm
Compacts in fuel hole	15	
Coolant hole diameter		
Small	12.70	mm
Large	15.88	mm
Holes available for fuel and poison	216/174	*standard/control element*
Number of coolant holes		
Small	6/5	*standard/control element*
Large	102/84	*standard/control element*
Example of poison particle (natural boron)		
B_4C kernel (diameter)	200	µm
Buffer coating (thickness)	18	µm
Pyrocarbon coating (thickness)	23	µm
Fuel particles		
see HTR-N-00/10-D-3.1.2		
fuel kernel (diameter)	200	µm
coatings C/C/SiC/C (thickness)	100/35/35/40	µm
Plutonium isotopic composition		
see HTR-N-00/10-D-3.1.2		
PuO_2 density	10.0	g/cm^3
Graphite density	1.74	g/cm^3


6 X ø.50
COOLANT HOLE
DOWEL
6 X ø.50
LBP HOLE
14.172
1.282
102 X ø.625
COOLANT HOLE
210 X ø.50
FUEL HOLE
.740 TRIANGULAR
PITCH


Fuel Compact
(N = 164)
13
cm
36 cm
Coolant Channel
(N = 89)
Burnable Poison
(N = 10)


4 X ø1.75
DOWEL HOLE
FUEL HANDLING
HOLE


COOLANT CHANNELS
PERMANENT SIDE
REFLECTOR
RESERVE SHUTDOWN
SYSTEM CHANNELS (18)
OUTER REPLACEABLE
REFLECTOR
STARTUP CONTROL
RODS (12)
CONTROL ROD
PENETRATION
(ABOVE)
SEISMIC RESTRAINT
KEYS
INNER REPLACEABLE
REFLECTOR
OPERATING CONTROL
RODS (36)
CORE BARREL
ACTIVE CORE
102 COLUMNS
10 BLOCKS HIGH
BORONATED PINS
(TYPICAL)


NEUTRON CONTROL ASSEMBLY HOUSINGS
REACTOR VESSEL UPPER HEAD
UPPER PLENUM SHROUD
UPPER CORE RESTRAINT
REACTOR VESSEL CYLINDRICAL SHELL
METALLIC CORE SUPPORT BARREL
HOT DUCT
METALLIC CORE SUPPORT FLOOR
REACTOR VESSEL LOWER HEAD
IN-CORE FLUX MAPPING UNIT
UPPER REPLACEABLE REFLECTOR
PERMANENT SIDE REFLECTOR
ACTIVE CORE
OUTER REPLACEABLE REFLECTOR
INNER REPLACEABLE REFLECTOR
LOWER REPLACEABLE REFLECTOR
GRAPHITE CORE SUPPORT ASSEMBLY
SHUTDOWN COOLING SYSTEM (REF)