II–6

ou SIRIUS ?
Reactor Jules Horowitz

Preliminary conceptual studies of REX 2000

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ABSTRACT

Nuclear R and D programs are, to some extent, completely dependent on research reactors availability. In France and others european countries, the major materials testings reactors were built in the sixties and are consequently ageing and reaching the end of their life, some of them having already been shut down. A situation with not a single large research reactor available in first half of next century cannot be imagined, given all the benefits drawn from the use of research reactors. The CEA has therefore started to evaluate the needs for neutron sources in the next four or five decades so as to design the most suitable new facilities to take over from the existing ones. REX 2000 is a new dedicated reactor project intended to meet the needs for fuels and materials testings after the year 2000. The preliminary conceptual studies which have been carried out along the last 18 months are presented and commented.

PRELIMINARY CONCEPTUAL STUDIES OF REX 2000

1. INTRODUCTION
2. PRESENT SITUATION OF R.R.
3. WHAT TYPE OF R.R. FOR WHAT TYPE OF NEEDS AFTER YEAR 2.000 ?
4. FUELS AND MATERIALS TESTING IN R.R.
5. REX 2000 PREMIMINARY OPTIONS
6. CONCLUSIONS

2. PRESENT SITUATION OF RESEARCH REACTORS

- AGEING
- SAFETY
- UTILIZATION FACTOR AND EXPERIMENTAL NEEDS
- OTHERS ISSUES

  FUNDING
  STAFF PROFICIENCY AND TRAINING
  PUBLIC ACCEPTANCE

RESEARCH REACTORS IN OPERATION IN WESTERN EUROPE

P ≥ 10 MW

AUSTRIA	ASTRA	10 MW	1960
BELGIUM	BR-2	80	1961
DENMARK	DR-3	12	1960
FRANCE	ORPHEE	14	1980
	OSIRIS	70	1966
	RHF	57	1971
	SILOE	35	1963
GERMANY	BER	10	1973
	FRJ-2	23	1962
NETHERLANDS	HFR	45	1961
NORWAY	HBWR	25	1959
SWITZERLAND	SAPHIR	10	1957
SWEDEN	R-2	50	1960

3. WHAT TYPE OF R.R. FOR WHAT TYPE OF NEEDS AFTER YEAR 2.000 ?

- MULTIPURPOSE REACTORS
- DEDICATED REACTORS
- REX 2000 PROJECT MAIN PURPOSES

4. FUELS AND MATERIALS TESTING IN R.R.

- ACKNOWLEDGED ADVANTAGES OF IRRADIATION EXPERIMENTS IN R.R.

  INSTRUMENTATION
  FLEXIBILITY
  LOW COST
  MULTIPLICITY

- DEBATED QUESTIONS

  NPP REPRESENTATIVITY

    NEUTRON FLUX AND SPECTRUM
    GAMMA HEATING
    THERMOHYDRAULICS
    TEST GEOMETRY

  STATISTICAL RESULTS

5. REX 2000 PREMIMINARY OPTIONS

- SMALL PWR OR MTR TYPE

- IRRADIATION VOLUME AND LOCATIONS

  AT THE CORE PERIPHERY
  IN THE CORE
  CENTRAL CROSSING LOOP

- OPEN CORE OR CLOSED VESSEL

- DOWNWARD OR UPWARD COOLING

- DRIVING CORE (LEU)

  FUEL PLATES
  FUEL RODS