

TECHNICAL MEETING ON "THE RESEARCH REACTOR DECOMMISSIONING DEMONSTRATION PROJECT" PHILIPPINE, 16 – 20 OCTOBER 2006

OPERATION STATUS OF DALAT NUCLEAR RESEARCH REACTOR AND DECOMMISSIONING PLANNING

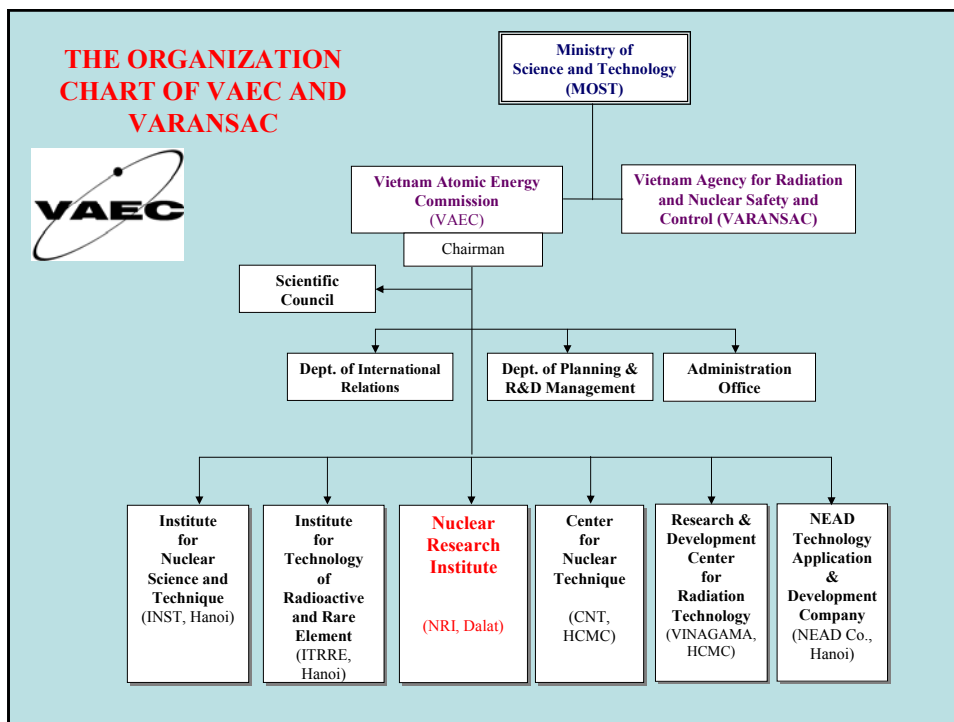


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CONTENTS

- **Nuclear Organizational Structure in VN**
- **Brief Introduction to the DNRR:**
 - **History of the reactor**
 - **Operation and Utilization of the reactor**
- **Decommissioning Planning**



NUCLEAR ORGANIZATIONAL... (1)

Vietnam Agency for Radiation and Nuclear Safety & Control (VARANSAC)

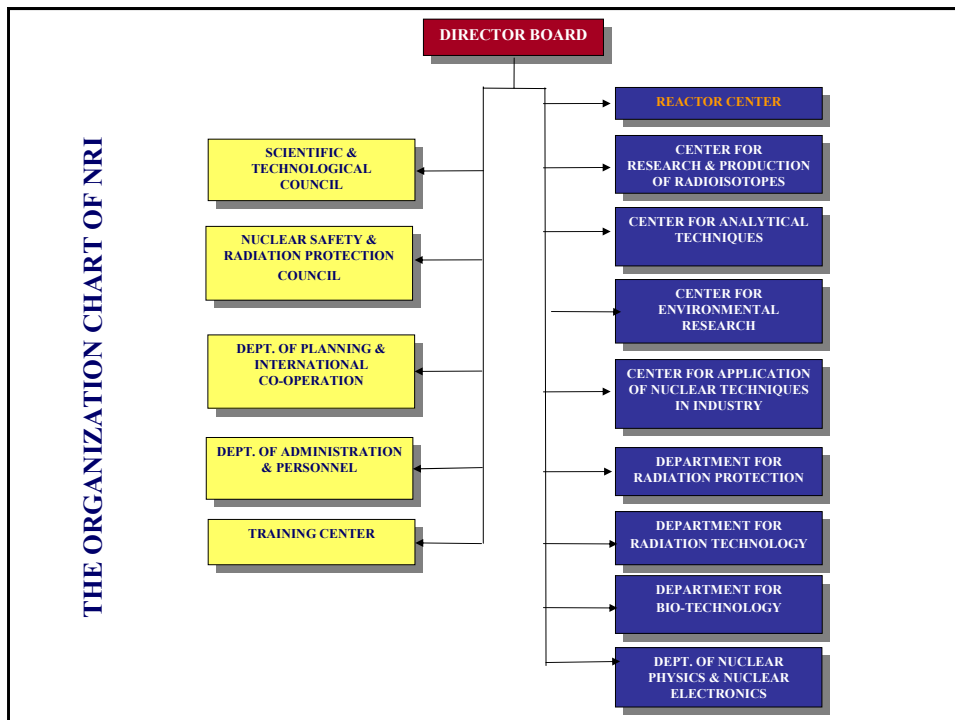
- Before 1994, VARANSAC belonged to the VAEC with the name of Radiation Protection and Nuclear Safety Department;
- Since July 31, 1994 VARANSAC has been established and directed by Ministry of Science and Technology.
- The VARANSAC's main activities are concentrated in the inspection and licensing for nuclear facilities; in radiation protection and management of radioisotope sources distributed in the country.



NUCLEAR ORGANIZATIONAL... (2)

Vietnam Atomic Energy Commission (VAEC)

- The VAEC was established in April 26, 1976 and directed by Prime Minister.
- In April 1994, VAEC has been re-organized and directed by Ministry of Science and Technology (MOST)
- VAEC's activities are focused on:
 - *Formulating the policy for nuclear power development;*
 - *Promoting the applications of nuclear techniques in medicine, industry, agriculture, geology, environmental protection, etc.;*
 - *Improving the research and development infrastructure;*
 - *Coordinating the International and Regional Co-operation.*





NUCLEAR ORGANIZATIONAL... (3)

Missions and roles of NRI are concentrated in:

- Managing and exploiting the research reactor and other scientific instruments at NRI
- Carrying out research and development in nuclear and related fields
- Preparing material & technical bases and manpower for the institute and for nuclear energy program in Vietnam
- Ensuring nuclear and radiation safety for the Institute and helping other organizations on radiation protection
- Carrying out activities on international collaboration in research and training



BRIEF INTRODUCTION... HISTORY OF THE REACTOR (1)

- ☞ **Early 1960:** Construction of the TRIGA Mark II reactor started
- ☞ **12/1962:** Completion of the reactor construction
- ☞ **26/2/1963:** First criticality of the TRIGA Mark II (at 12:40)
- ☞ **4/3/1963:** Official inauguration of TRIGA reactor with the nominal power of 250 kW
- ☞ **1963-1968:** Reactor operated with the 3 main purposes: *Training, Research, and Isotope Production*
- ☞ **1968-1975:** Reactor was in extended shutdown
- ☞ **1974-1975:** Fuels were unloaded and shipped back to USA



HISTORY OF THE REACTOR (2)

- ☞ **9/10/1979:** Contract No. 85/096-54100 for reconstruction and upgrading signed. Reactor name was changed to “IVV-9”
- ☞ **15/3/1982:** Start-up the reconstruction and upgrading work of the Dalat reactor.
- ☞ **01/11/1983:** First criticality of the IVV-9 reactor
- ☞ **20/3/1984:** Official inauguration of the IVV-9 reactor with the nominal power of 500 kW.
- ☞ **3/1984 to present:** Reactor has been operating for the purposes of: Radioisotope production, neutron activation analysis, fundamental and applied research, and manpower training.

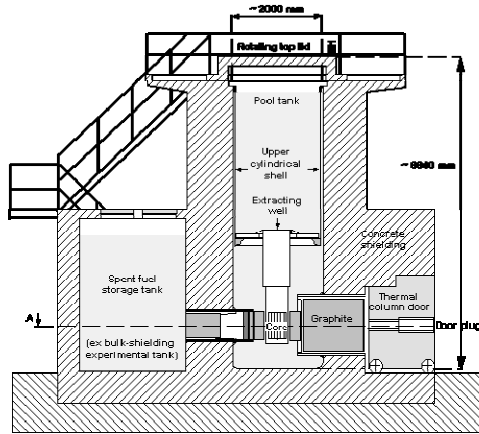


REACTOR CHARACTERISTICS

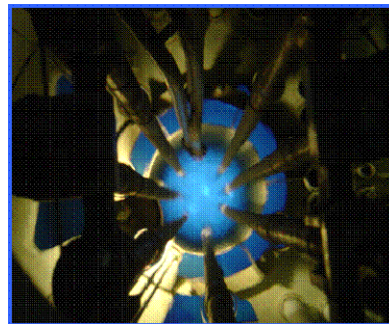
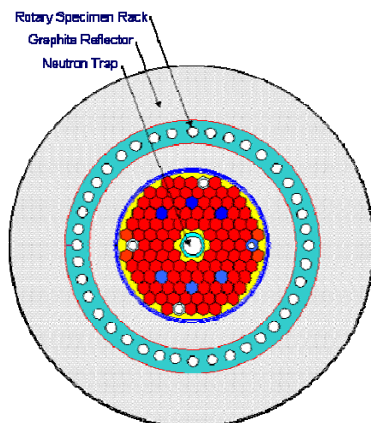
Reactor type	TRIGA Mark II, modified to Russian type of IVV-9
Nominal thermal power	500 kW, steady state
Coolant and moderator	Light water
Core cooling mechanism	Natural convection
Reflector	Beryllium and Graphite
Fuel type	VVR-M2, U-Al alloy, 36% enrichment
Number of control rods	7 (2 safety rods, 4 shim rods, 1 regulating rod)
Control rod material	B ₄ C for safety and shim rods, Stainless steel for automatic regulating rod
Neutron measuring channels	9 (6 CFC, 3 CIC)
Vertical irradiation channels	4 (neutron trap, 1 wet channel, 2 dry channels) and 40 holes at the rotary rack
Horizontal beam-ports	4 (1 tangential, 3 radial)
Thermal column	1
Spent fuel storage (temporary)	inside reactor building, next to the reactor shielding
Maximum thermal neutron flux in the core	$2.1 \times 10^{13} \text{ n.cm}^{-2}.\text{s}^{-1}$



Vertical Section View of the DNRR



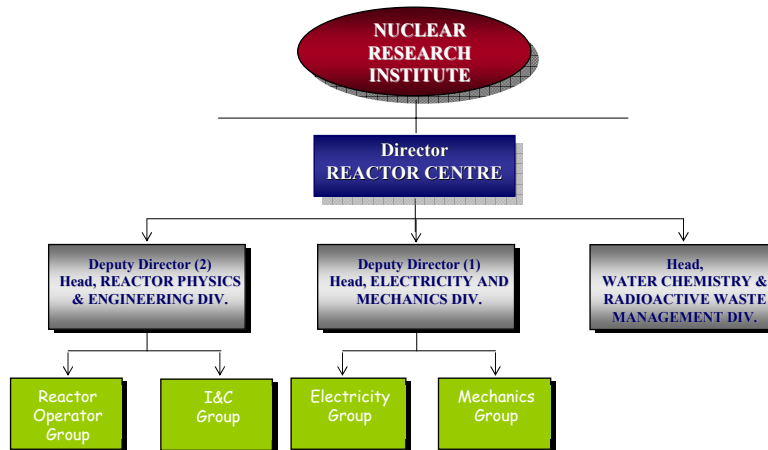
Reactor Core



Horizontal Section View of Reactor Core



ADMINISTRATIVE ORGANIZATION



OPERATING SCHEDULE AND CALENDER

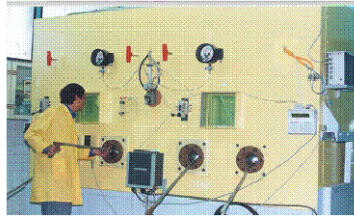


The control room of the DNRR

- Operating cycle: Continuous operation for 108 hrs at full power and then shut down for three weeks to carry out maintenance work (sometimes short-run).



UTILIZATION OF THE DNRR (1)



I-131 Production Line



Radioisotopes and Pharmaceuticals Produced at DNRI

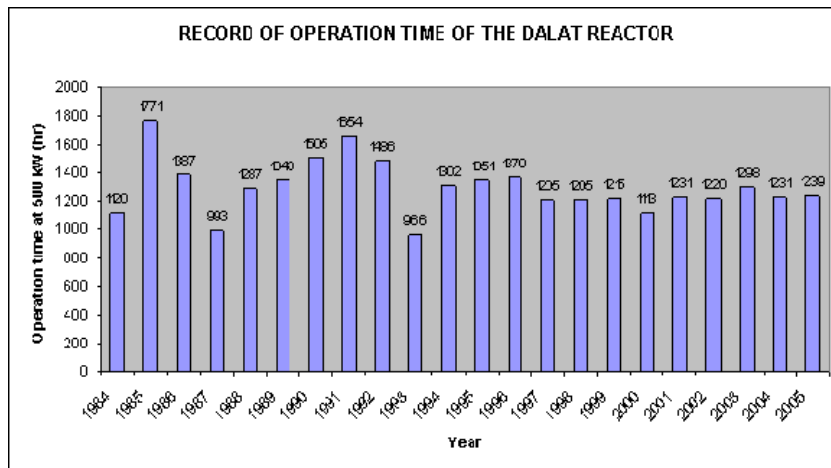
DNRR is currently utilized for the following purposes:

- S *Radioisotope Production*
- S *Neutron Activation Analysis*
- S *Basic and applied research in nuclear physics*
- S *Research on reactor physics and thermo-hydraulics*
- S *Personnel training and education*



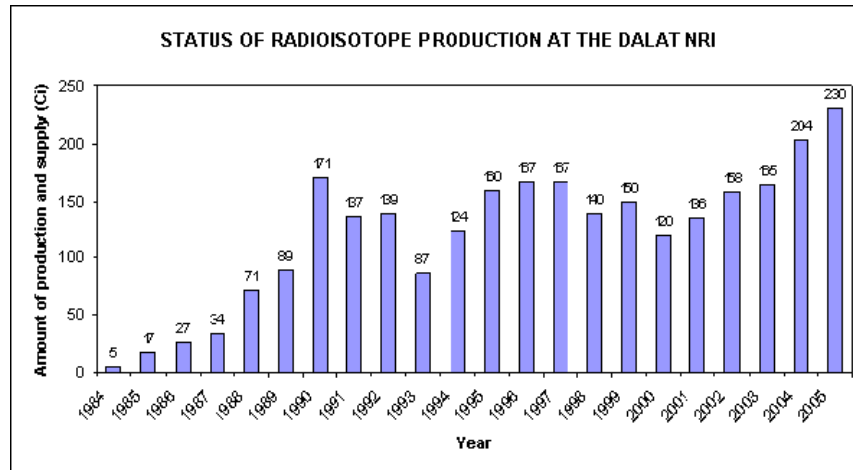
RESULTS OF OPERATION AND UTILIZATION (1)

RECORD OF OPERATION TIME OF THE DALAT REACTOR





RESULTS OF OPERATION AND UTILIZATION (2)



DECOMMISSIONING PLANNING

- There is not provisions for decommissioning in Regulatory framework yet. A nuclear law which includes provisions for decommissioning has been preparing and it will be reviewed by the government next year.
- There is not Decommissioning Plan for the DNRR.
- Some problems are faced with decommissioning planning:
 - * *Lack of experience*
 - * *Lack of personnel training*
- International cooperation is needed.



CONCLUDING REMARKS

- The DNRR is an unique nuclear reactor in Vietnam at present time. The reactor has been safely operated and effectively utilized so far.
- The DNRR will continue operation until 2020. After this time the utilization of the reactor will be changed. The reactor use only for research and training.
- A new multipurpose research reactor is now under consideration in Vietnam. If the proposal for new RR is approved by our government, the initial decommissioning plan will be considered in design stage.

**THANK YOU
FOR YOUR ATTENTION!**