

**Vietnam: NATIONAL STATUS AND ACHIEVEMENTS DURING THE R²D²P
(2006 - Present)**

I. INTRODUCTION

The 500-kW pool-typed, light water cooled and moderated, Dalat Nuclear Research Reactor (DNRR) was reconstructed and upgraded from the USA made 250-kW TRIGA reactor. The upgraded reactor reached the first criticality on 1 November 1983. And then, since March 1984, the reactor has been officially put into operation for the purposes of radioisotope production, neutron activation analysis, fundamental and applied research, and manpower training.

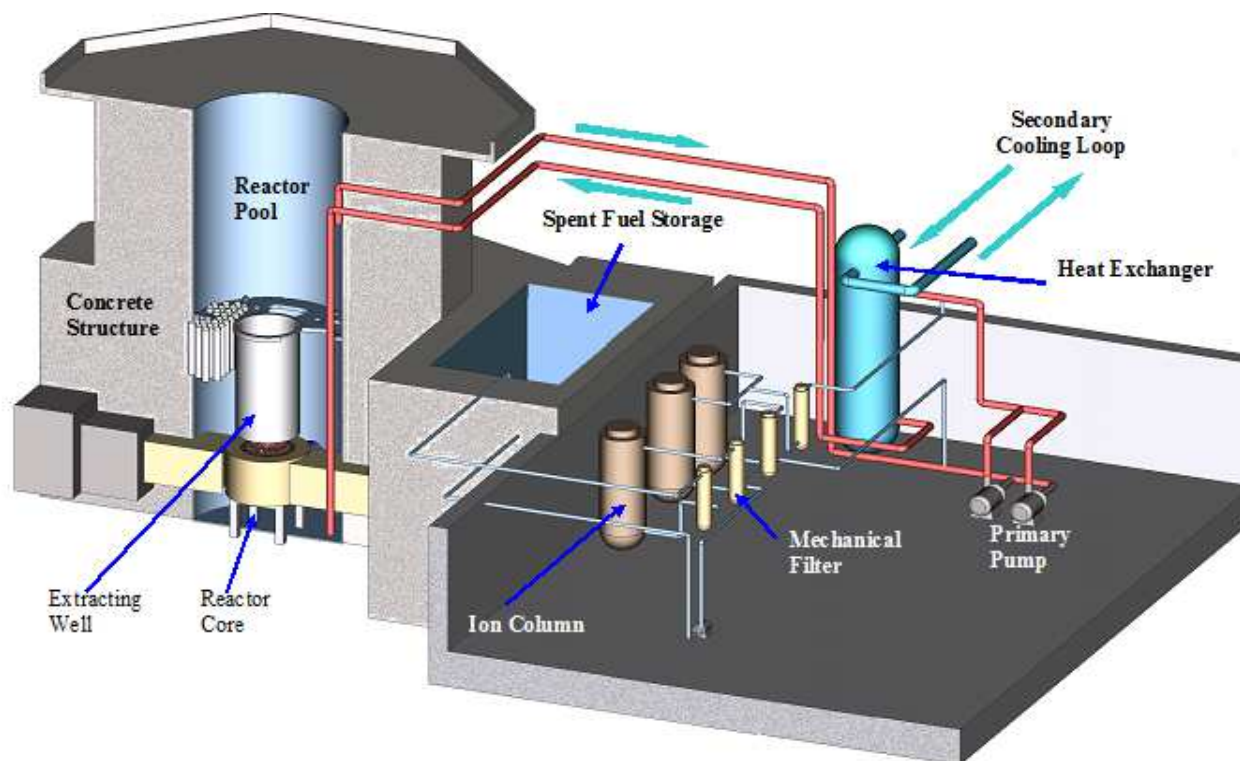


Figure 1. Vertical section view of the DNRR

Recently, after 27 years of operation, the initial decommissioning plan for the Dalat Nuclear Research Reactor (DNRR) was prepared by the operator within the national project and completed in September 2011. The purpose of the initial

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decommissioning plan of the Dalat Nuclear Research Reactor (DNRR) is to provide general information on the reactor as well as the radiological status at present time and the administrative and technical measures applied to implement decommissioning activities after the reactor is permanently shutdown.

II. NATIONAL STATUS AND ACHIEVEMENTS

SUBJECT	GENERAL QUESTIONS	YES/NO	ANSWER FOR WHAT'S REASON YES/NO OR ORTHES
LEGAL AND REGULATORY FRAMEWORK (LRF)	1. Has there been any changes in the LRF of your country during the Project?	YES	- The government is being strongly conducting programs of nuclear energy applications with peace purposes especially the construction of Nuclear Power Plants in near future. - During the R²D²P (2006 - present), national law and regulation on nuclear energy application for peaceful purposes have been promulgated, following: + Vietnam's atomic energy law (No. 13/2008/L-CTN, June, 12, 2008); + Regulations for activities on nuclear control (No. 45 / 2010/QD-TTg, June, 14, 2010).
	2. Is an independent regulatory body in place?	YES But NOT Entire Independent	- Following duties and authorities of the Agency for Radiation and Nuclear Safety (VARANS) in Article 8, Vietnam Law' Atomic Energy. - The VARANS may be not to make independent regulatory judgements and decisions, free from any undue influences that might compromise safety, such as pressures associated with changing political circumstances or economic conditions, or pressures from government departments or from other organizations. Because the VARANS' duties and authorities in item 4, Article 8, Vietnam Law' Atomic Energy show that the VARANS will recommend to the relevant State competent authority to suspend operation research reactor and nuclear power plant if suspecting there is unsafe factor - At the present, the plan to make an entire independent regulatory is not considered yet.

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	3. Are roles and responsibilities clearly outlined?	YES	Vietnam Law' Atomic Energy, Article 8: Duties and authorities of the Agency for Radiation and Nuclear Safety The agency for radiation and nuclear safety is under the Ministry of Science and Technology and has the responsibility to assist the Minister in performing the following duties and authorities: 1) To develop draft legal documents on radiation and nuclear safety; 2) To organise for the notification of radioactive substances, radiation equipments, nuclear material, nuclear equipments, and to license for conducting radiation practices in accordance with its competency; 3) To conduct and organise verification on radiation and nuclear safety; 4) To carry out checking, inspection; to handle violations against regulations on radiation and nuclear safety; and to suspend radiation practices in accordance with its competency; to recommend to the relevant State competent authority to suspend operation research reactor and nuclear power plant if suspecting there is unsafe factor; 5) To organise nuclear control activities in accordance with provisions by laws; 6) To take part in emergency response to radiation and nuclear incidents within its competency; 7) To establish and maintain the national information system on radiation and nuclear safety; 8) To organise and cooperate for professional trainings on radiation and nuclear safety; 9) To carry out international cooperation activities in radiation and nuclear safety.
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	4. Are licensing requirements/regulations in place? Is the licensing review process clearly defined and understood by the operator?	YES	- Vietnam law on atomic energy, article 41: Construction and operation of nuclear research reactors; article 40: Decommissioning and decontamination of nuclear facilities, handling nuclear fuel, nuclear equipment, radioactive waste; article 39: Safety analysis report and safety assessment report for nuclear facilities List the documents which contains these requirements: - Article 35: Safety analysis report and safety assessment report of radiation facilities. + The safety analysis report when applying for permit for construction shall comprise of: a) Design, manufacturing; b) Tentative plan for installation, operation testing, handing over; c) Safety analysis for commissioning; d) Tentative plan for operation termination, dismantlement and decontamination. + The safety analysis report when applying for permit for operation termination shall comprise of: a) Justification for operation termination; b) Plan for dismantlement, decontamination; c) Plan for handling of radioactive sources, radioactive waste - Article 36. Dismantlement, decontamination of radiation facilities

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			+ When planning for operation termination, radiation facilities shall submit plans for dismantlement, decontamination and handling of radioactive sources, radioactive waste to the agency for radiation and nuclear safety for approval, and shall organise to execute the approved plans. + The documents which contains these requirement for permit of decontamination and decommissioning of nuclear reactor are not specific yet. However, The Ministry of Science and Technology shall specify procedures, formalities of verufication and approval of plan for decommissioning, decontamination, handling of nuclear fuel, nuclear equipment and radioactive waste - Article 38: Site approval for nuclear facilities + Application dossier for site approval includes the followings: a) Application for site approval; b) Report on site selection; c) Preliminary design of the nuclear facility; d) Report on environmental impact assessment; đ) Results from the verification of environmental impact assessment report; e) Preliminary safety analysis report; g) Safety assessment report; h) Plan for environmental monitoring of the land, air, ground water and surface water in the areas affected by the operation of the facility. - Article 41: Construction and operation of nuclear research reactors
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			+ Application dossier for permit of construction of nuclear research reactors shall include the following: a) Application for permit of construction; b) Detailed design of nuclear reactor and the associated establishments; c) Report on environmental impact assessment; d) Results from the verification of environmental impact assessment report; e) Safety analysis report; f) Quality assurance program related to the construction; g) Plan for decommissioning nuclear reactors; h) Safety assessment report; i) Other relevant documents.
	5. Does a decommissioning policy and strategy exist?	YES	The decommissioning of nuclear facilities has been mention in Vietnam law' atomic energy. - Article 35: Safety analysis report and safety assessment report of radiation facilities. + Section 3: The safety analysis report when applying for permit for construction shall comprise of: d) Tentative plan for operation termination, dismantlement and decontamination. + Section 5: The safety analysis report when applying for permit for operation termination shall comprise of: b) Plan for dismantlement, decontamination. - Article 36: Dismantlement, decontamination of radiation facilities. - Article 40: Decommissioning and decontamination of nuclear facilities, handling nuclear fuel, nuclear equipment, rad. waste.

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			- Article 41: Construction and operation of nuclear research reactors. + Section 1: Application dossier for permit of construction of nuclear research reactors shall include the followings: g) Plan for decommissioning nuclear reactors. - Article 48: Investment project for construction of nuclear power plants + Section 2: Dossier for the investment project for construction of a nuclear power plant to be submitted to the Prime Minister by the investor for approval shall include the followings: g) Plan for decommissioning of the nuclear power plant, and financial ensurance for decommissioning, for managing spent nuclear fuel and radioactive waste.
DECOMMISSIONING PLAN (DP)	1. Is a standard review plan for the DP in place?	NO	It is not specific regulations yet.
	Is this in line with IAEA Safety Report No. 45?	YES	According to Nuclear Research Institute's project submitted for Vietnam Atomic Energy Institute and Ministry of Science and Technology, the initial decommissioning plan for the Dalat Nuclear Research Reactor is in line with IAEA Safety Report No. 45.
	2. Is a DP available for each nuclear facility?	YES	The initial decommissioning plan for the Dalat Nuclear Research Reactor (DNRR) was prepared by the operator within the national project and completed in September 2011.
	3. Has the DP been reviewed / authorized by the regulator?	NO	The decommissioning plan for the DNRR will be submitted to VARANS in next time and when operation termination of radiation facilities
SUPPORTING DOCUMENTS TO THE DP	1. Has a safety assessment been prepared?	YES	- Safety assessment for decontamination and dismantling activities has been prepared since 2011.
	Reviewed, approved or authorized?	NO	- It has been reviewed and approved by VAEI and MOST. Not yet by VARANS

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	2. Has a cost estimate been prepared?	YES	- The preliminary cost estimates for decommissioning project of the Dalat Nuclear Research Reactor has been prepared since 2011. - It is based primarily on a study of the decommissioning costs of the University of Illinois' Advanced Teaching Research Isotope General Atomic (TRIGA) Mark II nuclear research reactor at Champaign-Urbana, U.S. and "Bottom up" technique and "Work Breakdown Structure – WBS" method. Furthermore, the decommissioning cost estimates result of the Dalat Nuclear Research Reactor are also compared with the decommissioning cost estimates of the nuclear research reactors that they have the similar characterizations to the Dalat Nuclear Research Reactor.
	Reviewed, approved or authorized?	NO	- It has been reviewed and approved by VAEI and MOST. Not yet by VARANS
	3. Has an environmental impact assessment been prepared?	YES	The environmental impact assessment during decommissioning has been prepared.
	Reviewed, approved or authorized?	NO	- It has been reviewed and approved by VAEI and MOST. Not yet by VARANS
OTHER ITEMS	Calculation of radioactivity inventory in the structures of the Dalat nuclear research reactor	YES	- Calculated by: + Experimentation + Computer code: MCNP5, ORIGEN2 - Some experiments have been carried out for comparison with calculation results.

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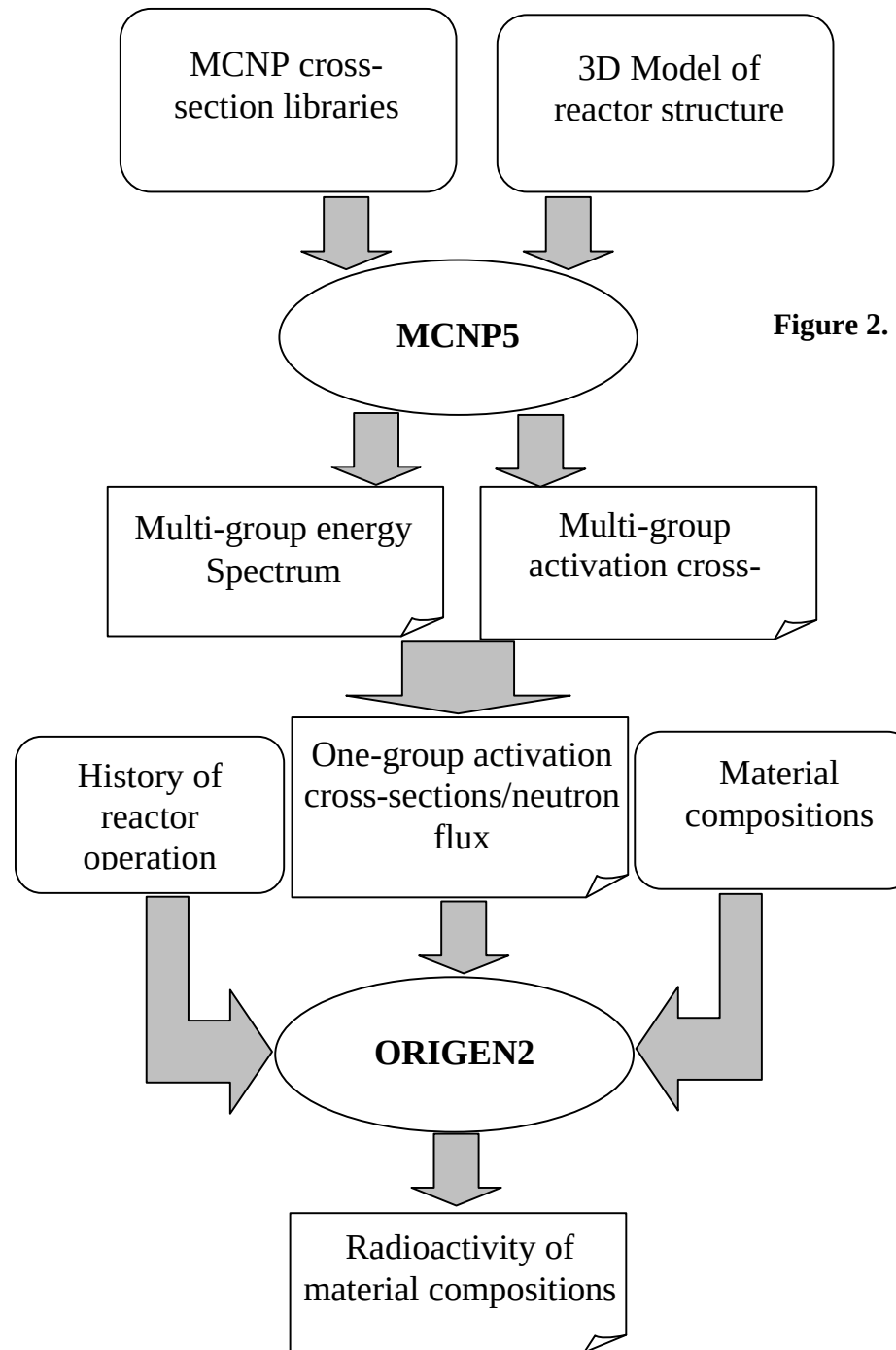


Figure 2. Flowchart of calculation procedure