

***The History of the Dalat Nuclear Reactor***

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In the 1960's, under the Atoms for Peace Program, the United States government (USG) provided a nuclear reactor to Vietnam, namely the Dalat Nuclear Reactor. Since the beginning of its operation, the nuclear reactor has been located in the Dalat Nuclear Research Institute, which is in the heart of Dalat city. Before the fall of South Vietnam in 1975, the core and fuel of the nuclear reactor were removed and returned to the USG. However, the nuclear reactor infrastructure remained undestroyed. In 1982, the Russian reconstructed and refueled the nuclear reactor for the purpose of basic research and development in reactor physics as well as engineering. There are basic facts about the Dalat Nuclear Reactor that many individuals are aware of. Yet, there are interesting and declassified facts about the Dalat Nuclear Reactor that most of the general public are uninformed. Thus, by using a database, called The Virtual Vietnam Archive, owned by the Texas Tech University, those interesting and declassified facts about the Dalat Nuclear Reactor were searched and revealed from many primary resources. Part of this project also includes finding and tracking original, legitimate documents in Vietnamese text, later translating them into English. This project will contribute to future research on similar topics.



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## ABSTRACT

## METHODS

In the 1960's, under the Atoms for Peace Program, the United States government (USG) provided a nuclear reactor to Vietnam, namely the Dalat Nuclear Reactor. Since the beginning of its operation, the nuclear reactor has been located in the Dalat Nuclear Research Institute, which is in the heart of Dalat city. Before the fall of South Vietnam in 1975, the core and fuel of the nuclear reactor were removed and returned to the USG. However, the nuclear reactor infrastructure remained undestroyed. In the 1980's, the Russian reconstructed and refueled the nuclear reactor for the purpose of basic research and development in reactor physics as well as engineering. There are basic facts about the Dalat Nuclear Reactor that many individuals are aware of. Yet, there are interesting and declassified facts about the Dalat Nuclear Reactor that most of the general public are uninformed. Thus, by using a database, called The Virtual Vietnam Archive, owned by the Texas Tech University, those interesting and declassified facts about the Dalat Nuclear Reactor were searched and revealed from many primary resources. Part of this project also includes finding and tracking original, legitimate documents in Vietnamese text, later translating them into English. This project will contribute to future research on similar topics.

The Vietnam Center and Archive has collected records of the Vietnam War, including documents of historical events and developments that occurred throughout that era. By effectively utilizing the Vietnam Center and Archive, primary documents about the Dalat Nuclear Reactor were examined. Legitimate sources in Vietnamese were also discovered and translated into English to support this project.

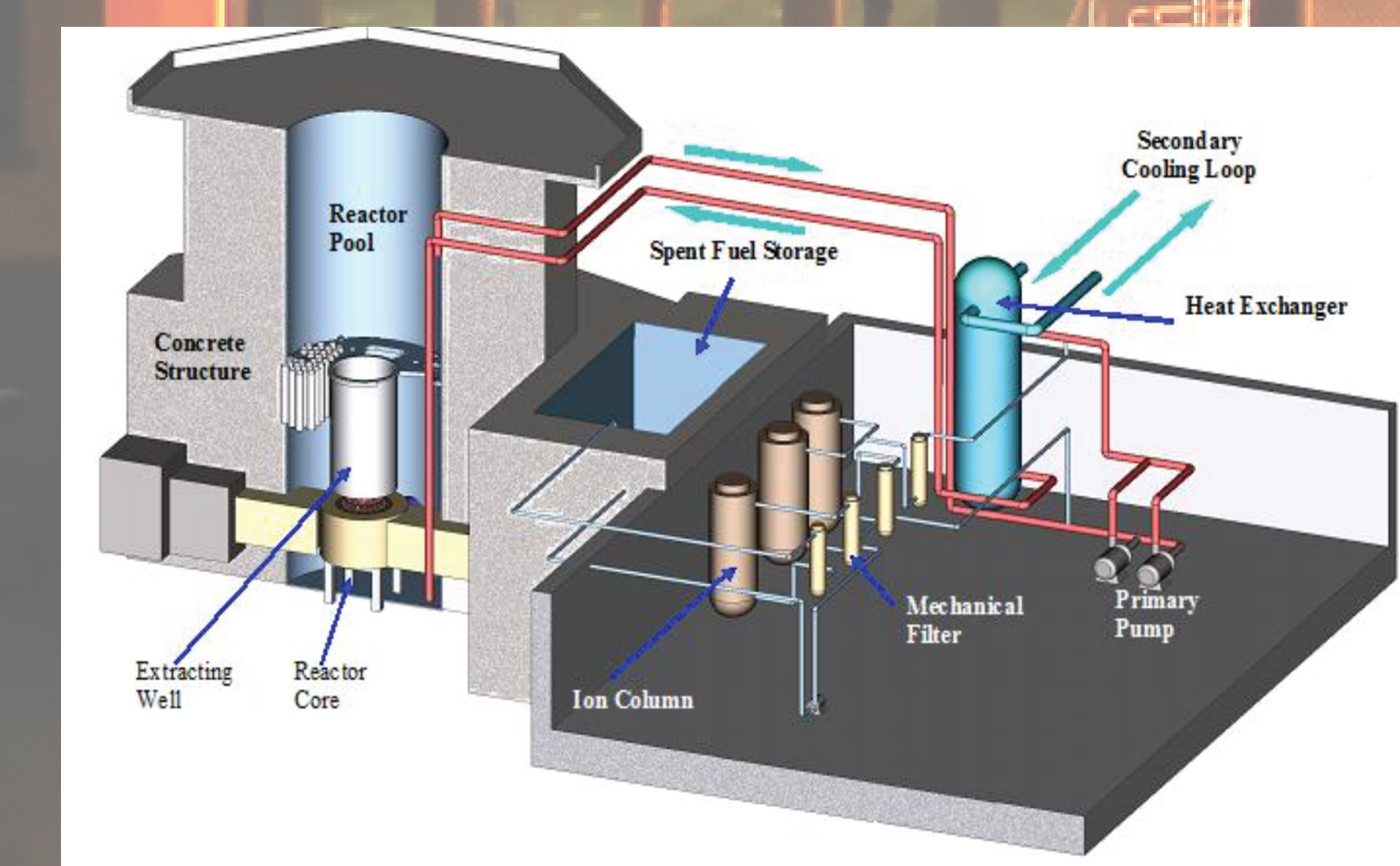
## RESULTS

Originally, the DNR was shaped as a rectangle. However, it was re-shaped to an octagon by the famous Vietnamese architect, Thu Viet Ngo, who also designed the famous Independence Palace in Vietnam (a symbolism of the fall of South Vietnam on April 30th, 1975). His reason was to remind people to only use the nuclear reactor for peaceful purposes.



The DNR supplied P-32 samples to use for skin disease treatments and Tc-99m radiotopes to diagnose liver, kidney, brain, and other diseases.

The DNR is identical in infrastructure with the TRIGA Research Reactor at the John Jay Hopkins Laboratory in San Diego, California.



TRIGA means:  
 T- Training  
 R- Research  
 I- Isotope production  
 GA- General Atomics

From 1984-2014: the total operation time of the DNR was about 39,000 hours and the total energy released was about 780 MWd.

## 1979 - 1983

## 1984 - 1985

## 2001 - 2013

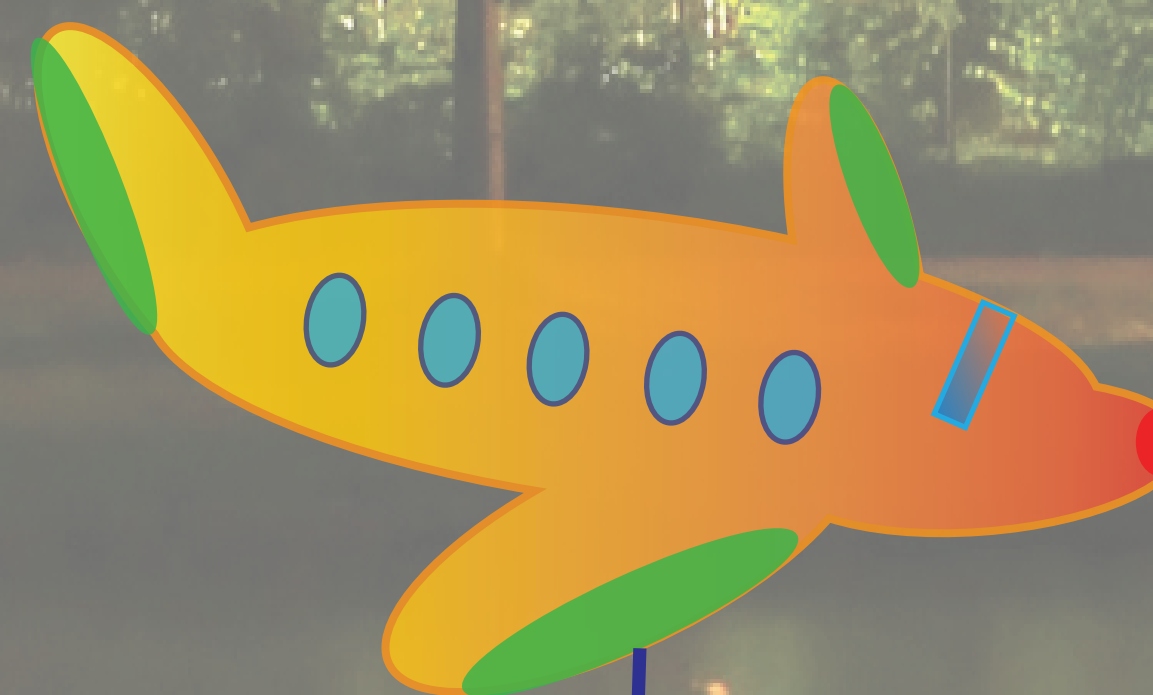
- The reconstruction and expansion of the DNR were approved in 1979 after an agreement between Vietnam and Russia.
- 1982-1983: New components that were installed in the DNR infrastructure include: the reactor core, the cooling system, and the reactor control system.

- With assistance from the International Atomic Energy Agency, the Russian refueled the DNR with 140 packs of WWR-M2 High Enriched Uranium (HEU) fuel of 36% U-235.
- From 1984-1985, the DNR operated more than 4,000 hours and 2x more effectively than before with the nominal power of 500 KW.

- 2011: Vietnam finished switching from HEU to LEU fuel for safety and cost effectiveness.
- 11/30/2011: The DNR reached its "full capacity" with the new 72 LEU fuel packs at 3:35 PM.
- 07/03/2013: Vietnam completed shipping 106 packs of HEU (both fresh and spent) fuel to Russia.

## 1968 - 1975

The Dalat Nuclear Reactor was shut down.



Before the fall of South Vietnam in 1975, the core and fuel of the DNR were removed and returned to the United States because the Vietnamese government was unable to make the lease payment on the DNR. This action left the DNR infrastructure with the reactor tank, the concrete shielding, the graphite reflector, the beam tubes, and the thermal column.

## 1960

- The Dalat Nuclear Reactor (DNR) was originally named TRIGA-MARK II with a nominal power of 250 KW.
- It was made by the General Atomics Corporation in San Diego, California and worth 350,000 USD.
- The United States government equipped additional utensils and nuclear sources to the Vietnamese government but stopped in 1962 due to the expense of the Vietnam War.
- The DNR used the Low Enriched Uranium (LEU) fuel of 19.75% U-235.
- It was one of the first nuclear reactors in Southeast Asia and reached its "full capacity" on 2/26/1963 and became operational on 3/3/1963 under the direction of the former South Vietnamese government.

## 1967

- The Dalat Nuclear Research Institute was constructed in 04/1961 and completed in 12/1962 costing 22,000,000 Vietnamese Dong.
- The Institute consisted of 7 Divisions:
  - Reactor Operations Division
  - Health Physics Division
  - Radiochemistry Division
  - Radiobiology Division
  - Physics Division
  - Electronics Division
  - Training Division
- At the time, the Institute employed a total of 48 persons: 15 scientists, 9 technicians, 4 clerks, and 20 guards and laborers.
- The primary goal of the Institute is to conduct studies on agriculture, produce radioisotopes for medicine and industrial use, carry out fundamental and applied research on nuclear and reactor physics, as well as provide skilled reactor operators for Vietnam.