CHHOTUBHAI GOPALBHAI PATEL INSTITUTE OF TECHNOLOGY,

CIVIL ENGINEERING DEPARTMENT,

Visit of Kakrapar Atomic Power Station (Gujarat)

Nuclear Power Corporation of India Limited (NPCIL)

Government of India

Chhotubhai Gopalbhai Patel Institute of Technology,

Department of Civil Engineering,

Uka Tarsadia University

TECHNICAL SITE VISIT OF (Visit of Kakrapar Atomic Power Station (Gujarat)

12 March 2024

B. Tech Civil Students

Technical site Visit Report

Kakrapar Atomic Power Station

The technical site visit was arranged with Nuclear Power Corporation of India Limited (NPCIL) **Government of India**

The faculty co-ordinator: Dr. Vaibhav Pawar, Prof. Gunvant Solanki and Prof. Mehul Patel

Date of Visit: 12/03/2024

Total No. of Student: 03+08 (Sem VI + Sem VIII)- Total Boys: 07 Girls:04

Total No. of Faculties: **03**

Faculty Coordinators: Dr. Vaibhav Pawar, Asst. Prof. Mehul Patel and Asst. Prof. Gunvant Solanki

Details of Site visit at Kakrapar , Gujarat

nuclear power plant (NPP) is a thermal power station in which the heat source is a nuclear reactor. As is typical of thermal power stations, heat is used to generate steam that drives a steam turbine connected to a generator that produces electricity. As of September 2023, the International Atomic Energy Agency reported there were 410 nuclear power reactors in operation in 32 countries around the world, and 57 nuclear power reactors under construction. Nuclear plants are very often used for base load since their operations, maintenance, and fuel costs are at the lower end of the spectrum of costs. However, building a nuclear power plant often spans five to ten years, which can accrue to significant financial costs, depending on how the initial investments are financed. Nuclear power plants have a carbon footprint comparable to that of renewable energy such as solar farms and wind farms, and much lower than fossil fuels such as natural gas and coal. Nuclear power plants are among the safest mode of electricity generation, comparable to solar and wind power plants.

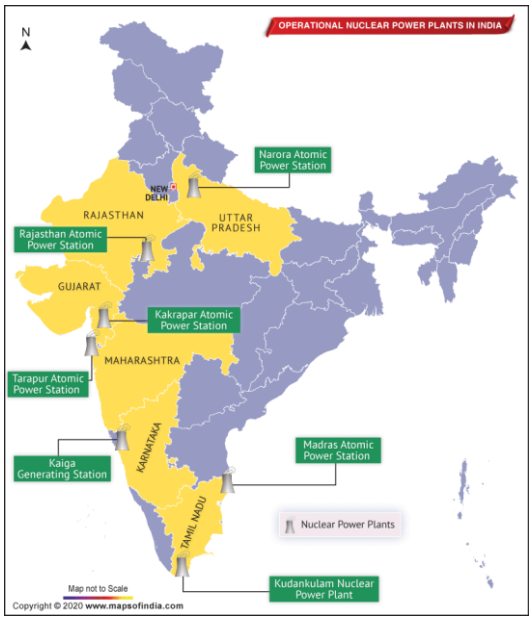
The conversion to electrical energy takes place indirectly, as in conventional thermal power stations. The fission in a nuclear reactor heats the reactor coolant. The coolant may be water or gas, or even liquid metal, depending on the type of reactor. The reactor coolant then goes to a steam generator and heats water to produce steam. The pressurized steam is then usually fed to a multi-stage steam turbine. After the steam turbine has expanded and partially

condensed the steam, the remaining vapor is condensed in a condenser. The condenser is a heat exchanger which is connected to a secondary side such as a river or a cooling tower. The water is then pumped back into the steam generator and the cycle begins again. The water-steam cycle corresponds to the Rankine cycle.

The nuclear reactor is the heart of the station. In its central part, the reactor's core produces heat due to nuclear fission. With this heat, a coolant is heated as it is pumped through the reactor and thereby removes the energy from the reactor. The heat from nuclear fission is used to raise steam, which runs through turbines, which in turn power the electrical generators.

Nuclear reactors usually rely on uranium to fuel the chain reaction. Uranium is a very heavy metal that is abundant on Earth and is found in sea water as well as most rocks. Naturally occurring uranium is found in two different isotopes: uranium-238 (U-238), accounting for 99.3% and uranium-235 (U-235) accounting for about 0.7%. U-238 has 146 neutrons and U-235 has 143 neutrons.

Nuclear stations are used primarily for base load because of economic considerations. The fuel cost of operations for a nuclear station is smaller than the fuel cost for operation of coal or gas plants. Since most of the cost of nuclear power plant is capital cost, there is almost no cost saving by running it at less than full capacity.



Kakrapar Gate 1 & 2

We are very much thankful to Director, CGPIT and Associate Professor and Head, Dr. Manoj Gundalia for motivation and Permission. Appreciate the cooperation from Mr. Gunvant Solanki, Mr. Mehul Patel during entire visit.

We are very much thankful to Senior Technician Sh. B.D. Vayas for guiding and helping us throughout the visit.