Electricity is one of the most important parameter for economic development. Among all types of energies, nuclear energy is one of the cheapest source of electricity. Therefore number of nuclear power plants are commercially operated in different countries all over the world.

Kakrapar Atomic Power Station (KAPS) is the fifth power plant situated about 85 km by road east of Surat city on Surat-Dhulia road and on the southern bank of Moticher lake which is about 4 km from Kakrapar weir. Kakrapar weir is 30 km downstream of Ukai dam built on the Tapi river. KAPS comprises of two pressurized heavy water reactors of 220 MWe fuelled with natural uranium with on line refueling facilities. Unit I of nuclear power station became commercially operational in 1992 and Unit II in September 1995. KAPP 3 and 4 units are under advanced stage of construction. Due to continuous operation of KAPS, low level solid, liquid and gaseous waste is generated which contains various fission products such as $^{90}\text{Sr}$, $^{137}\text{Cs}$, $^{131}\text{I}$, etc., and activation products like $^3\text{H}$(tritium), $^{60}\text{Co}$ etc. In PHWR heavy water ($\text{D}_2\text{O}$) is used as a coolant and moderator, tritium is produced on a large scale. It is produced by the neutron activation of deuterium of heavy water. Therefore tritium is one of the most important activation products in PHWR type of nuclear reactor.
Current study was carried out to assess the distribution of tritium around KAPS environment due to continuous operation of KAPS for last twenty one years. Tritium is released into the environment through gaseous and liquid route. To carry out systematic study, KAPS environment was categorized into atmospheric, terrestrial and aquatic environment.

From atmospheric environment, tritium activity was monitored from twenty six locations up to 30 km distance from KAPS by studying the air through wind rose pattern which gave the predominant wind direction and the affected C, D and L sectors in KAPS area. Tritium in atmospheric environment was estimated by condensing the moisture present in the atmospheric air. The tritium activity was found to be BDL (below detectable level) from most of the samples. The sampling locations of maingate, nursery, ESL, Moticher, Nanicher, Koliwada, Ratania regulator and Bedkua showed higher activity. However this activity was within the permissible limit laid by of Atomic Energy Regulatory Board (AERB).

From terrestrial environment, Tissue Free Water Tritium (TFWT) and Organically Bound Tritium (OBT) were analysed from soil and papaya samples, collected from near intake point and blow down point
locations which are within the plant premises. Samples of soil, papaya, rice, brinjal, sugarcane from Kakrapar Moticher, Ratania regulator and Jamankua at distance of 1.6-5.0 km from the KAPS were also analyzed for TFWT and OBT. All the terrestrial samples showed the activity BDL.

Under the aquatic environment water, silt, vegetation (Hydrilla sp. and Myrophyllum sp.) and fish (Ophiocephalus sp.) were collected from various seventeen locations from upstream to downstream of Moticher reservoir and open wells of villages upto 30 km to monitor the tritium activity. The tritium activity in water samples from all the locations except blow down point was BDL. The blow down point showed the maximum tritium activity which was also within the permissible limit by AERB. Silt, aquatic vegetations and fish samples from all sampling locations except the blow down point showed BDL level of tritium activity.

To check the dilution pattern of tritium activity in Moticher lake, the study was carried out from blow down point of KAPS to downstream. Twenty sampling locations were covered using iron road grids at the gap of ten meters up to the distance of fifty meters. Each grid contained five sampling points. The last one additional location was at the distance of sixteen hundred meters. Tritium radio-activity was measured from blow
down point upto down stream of Ratania regulator (1600 meters) and was found to be diluted in the rage of 69-310 times.

This study revealed that the air tritium activity was observed in plant premises and nearby locations while other sampling locations showed activity BDL. Except blow down point location of aquatic environment, all other sampling locations of aquatic environment and samples from terrestrial environment showed the tritium activity BDL.

The present study concludes that there was least impact on KAPS environment due to continuous operation of Kakrapar Atomic Power Station with respect to tritium activity (radiological parameter) eventhough the reactor was continuously operated for last more than twenty years. The present study illustrated that the nuclear power station generated the electricity with excellent capacity factors, earning handsome profits with almost negligible impact around the KAPS environment. However in future, attention is needed to discharge the effluents containing radioactivity from KAPS as two more new reactors are to be commissioned. This will give confidence to the residents of South Gujarat region on operation of nuclear plant. The results obtained from this study would be helpful to Government of Gujarat and Department of atomic energy (Government of India) to manifest the safe and efficient operation of Kakrapar Atomic Power Station.
Obtained findings may also be useful as a baseline data for the other two reactors to be commissioned at KAPS in near future.