

## Morocco CNESTEN-ICERR description

### CNESTEN

Established in 1986, the National Center for Energy Sciences and Nuclear Technology (CNESTEN) is a public institution possessing legal and financial autonomy. It's under the oversight of the Ministry of Energy Transition and Sustainable Development. The objectives outlined in its founding law include the promotion of nuclear science and technology within the country, participation in the development of infrastructure for the nuclear power program, serving as a Technical Support Organization and overseeing the management of radioactive wastes at the national level.

### ICERR facilities:

#### The MA-R1 TRIGA MARK II Research Reactor:

It is a standard design 2 MW<sub>th</sub>, natural-convection-cooled reactor equipped with a graphite reflector and different irradiation facilities. The reactor is located near the bottom of a water-filled aluminum tank which is 2.5 m in diameter and approximately 8.2 m deep. The control of the reactor is ensured by five separate control rods (B4C) that are mounted on a bridge structure at the top of the tank. The reactor uses solid, homogenous fuel-moderator elements (U-ZrH) developed by GA Technology. This zirconium hydride moderator is combined with 19.9% enriched uranium (LEU). The reactor reached initial criticality on 2 May, 2007. The operating license was given by the Ministry of Energy (Safety Authority at that time) on February 2009. The reactor is utilized to fulfill the requirements of various experimental programs, such as neutron activation analysis, the production of radioisotopes, educational and training activities, as well as research and development initiatives



*MA-R1 TRIGA reactor*

#### Radiochemistry Laboratory (Neutron Activation Analysis):

During the past years this laboratory contributed to many important innovations in NAA and gamma spectroscopy, including the k0-standardization, irradiation-site characterization, detector efficiency calibration and gamma spectroscopy. Two types of irradiation facilities are used to irradiate samples: Pneumatic Transfer System (PTS) for short irradiation and Rotary Specimen Rack (RSR) for Medium and long irradiations. For counting and analysis of spectra, the Radiochemistry laboratory has 03 Germanium Hyper Pure Detectors (GeHP) and an automatic 20-position auto sampler.





*Pneumatic Transfer System (PTS) terminal*



*Shielded cell to receive RSR capsules*

### Radioisotopes production laboratory

This production unit has been designed and implemented in accordance with radiological safety and security requirements, as well as good pharmaceutical manufacturing practices. It consists of two dedicated hot cell lines for the production of radiopharmaceuticals and a cleanroom for the production of cold kits and quality control laboratories.



*Radioisotope production laboratory*

### **E&T and hands-on training opportunities**

CNESTEN offers practical training for individuals specializing in research reactor operation and utilization. The training is developed in French and English and covers in addition to practical courses on TRIGA reactor, a range of activities, including the use irradiation facilities, radioisotopes production, neutron activation analysis (NAA). CNESTEN offers also regional and training courses in the frame of cooperation with IAEA.

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