Gran Sasso National Laboratories

General information

Gran Sasso National Laboratories (LNGS) are one of the centre of experimental research centres operated by the National Institute of Nuclear Physics (INFN) in Italy. LNGS can eb divided into 2 main areas:

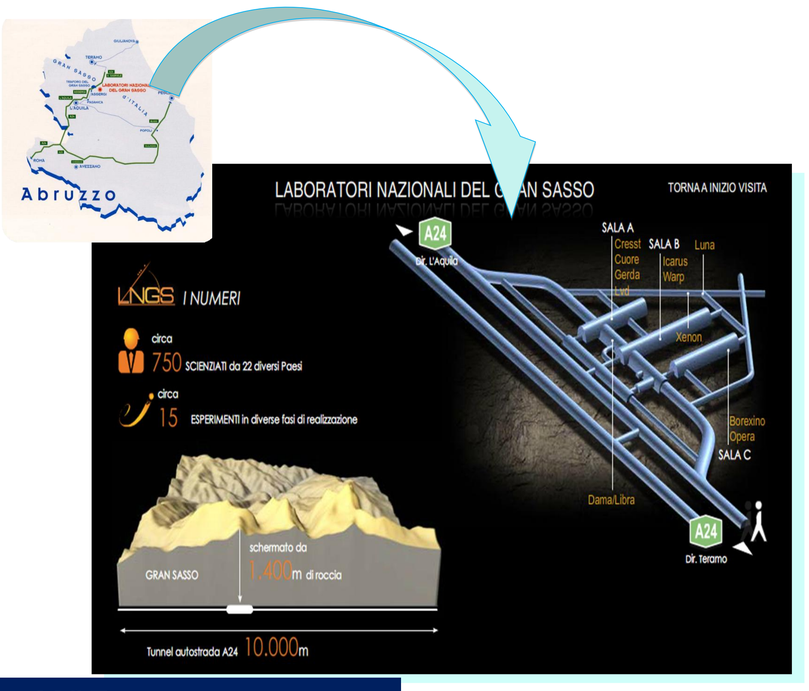
- External Operative Centre in Assergi, L'Aquila;
- Underground laboratories.

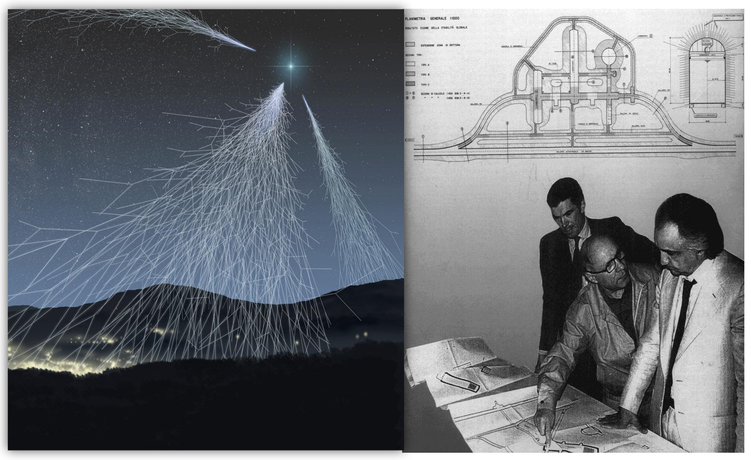
Both the external and underground structures are located inside the Gran Sasso and Monti della Laga National Park.
The underground Laboratories are situated in the middle of Gran Sasso highway tunnel, a public traffic motorway tunnel about 10,5 km long, connecting the Teramo (East) and L'Aquila (West) counties.
Research areas in which LNGS operate, or foresees to operate, can be classified into two main categories:

- Study of nuclear rare phenomena;
- Study of the penetrating components of cosmic rays

The experimental apparatuses are housed under the Gran Sasso mountain range of the Apennines, under a rock layer of about 1400m acting as a "shield" against cosmic rays. LNGS are structured into three experimental halls of about 100x20x18 m3: Hall A, Hall B and Hall C. The connection among the halls is made through appropriate galleries: car tunnel, truck tunnel, interconnecting tunnels.

Facts and figures





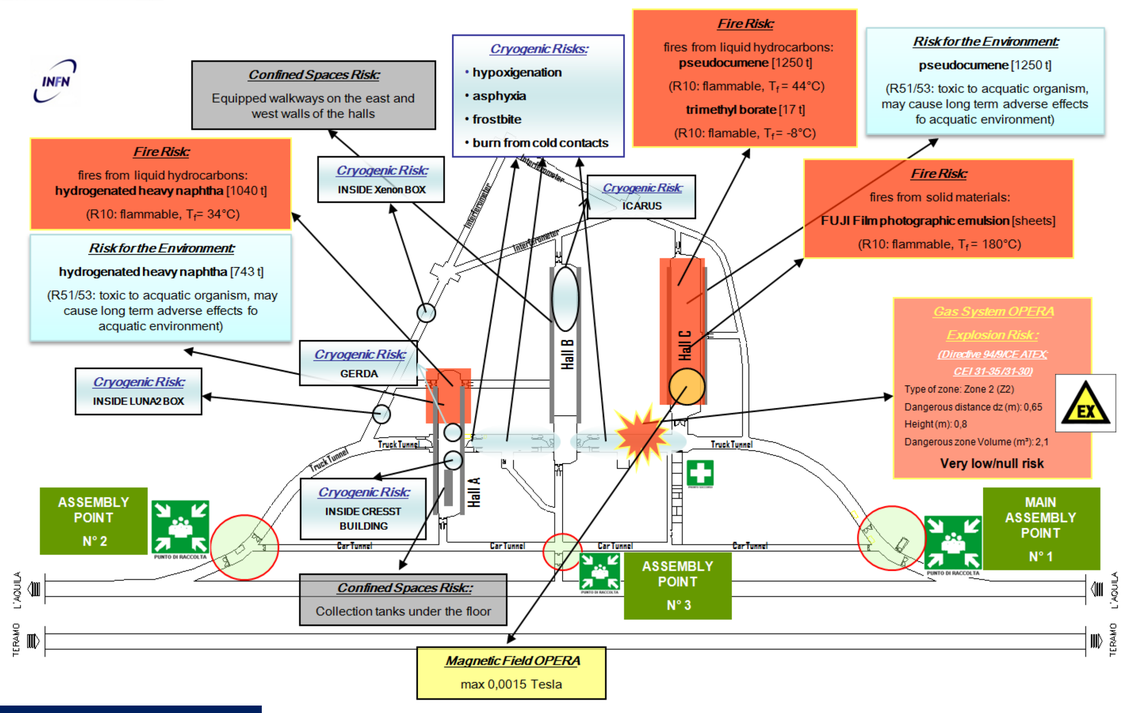
HSE

LNGS' priority and general target is the balance between the goals of scientific research goals and the need for protection of workers, population and environment.
Management of safety and emergencies is organized as follows:

- Prevention and Protection Service (SPP)
- Technical Division Services;
- Environment Service.

Safety hazards

The specific risks present in the underground LNGS are shown in the diagram.
Moreover, as regards the normal operating condition, several items should be taken into account:
- LNGS employees;
- third-party companies:
- general services: ordinary and extraordinary maintenance;
- use of lifting and transport equipment (cranes, forklifts , etc. ..);
- transit of heavy vehicles (eg discharge of cryogenic liquids).



Hazards

- Fire hazards
- Electrical hazards
- Chemical hazards,
- Falling materials;
- Risk from artificial optical radiation,
- Noise risk ...

Furthermore, given the dynamic and evolving reality of LNGS, with new installations and experimental apparatuses, there are several sites in different stages of completion which introduce additional risks within the structure. Particularly onerous is the coordination of the activities of the various subjects operating in the LNGS to mitigate and eliminate the risk of interference.

Seveso Directive and Safety Management System

Underground LNGS are also classified as a major accident hazard plant according to the European Directive 2003/105/EC due to the presence of hazardous substances for the environment (Pseudocumene in Borexino, hydrogenated heavy naphtha in LVD). The main risk for the use of these substances is related to their hazard for aquatic organisms.
LNGS adopted both a Safety Management System (SGS) and an Environmental Management System (ISO 14001) The SGS achieves its purpose using the System Manual Safety Management (MSGS) that refers to the System Procedures (known as SGS-XXX), describing the implementation of the system's elements. In turn, the SGS-XXX refers to the Operating Instructions (IO) that define the system implementation of the procedure and the detailed aspects that take into account the complexity of the activities, methods used, skills and the required training.
Among the various procedures is shown a schematic chart for the application of the procedure SGS-004 - "PRELIMINARY ANALYSIS OF DANGERS. ANALYSIS AND MANAGEMENT OF MAJOR RISK". It aims to explain the operating procedures needed to perform the Preliminary Analysis of Hazards and Risks of major accidents in LNGS. In order to ensure that the risks relating to the products and activities of the company are always recognized and that the laws relating to the protection of the health and safety of workers are respected.