Joint ILC/CLIC Safety document

- Incentive for this document:
  - Share effort to define a coherent safety protocol for future linear colliders.
  - Insure that both projects use a common set of safety assumptions for their cost study.
- Scope of this document:
  - General safety of the site and its installation (not only tunnel safety compliance).
  - Go beyond national regulations but still identify them whenever relevant.

Sites and installations

- Safety and access to the sites:
  - Access for staff (inc. associate institute), for suppliers, for visitors;
  - Site protection : fencing, access control and supervision;
  - Access conditions to special buildings: workshops, storage of dangerous material (chemical, radioactive, flammable gas, ...);
  - Access conditions to installations (surface and underground): during installation, during commissioning and check-out, during operation and during maintenance;
  - Prevention and safety training;
- Safety intervention on sites:
  - Fire brigade & rescue team;
  - First aid workers: presence, identification and training;
  - On-site physician and nurses;

Hazards identification and Safety regulations

- **Electrical**: qualification required, standards and electrical safety code, emergency stops, secured powering systems.
- **Fire**: standards and safety codes, detection and alarms, fire resistant material, smoke extraction, safe pressurized areas, emergency exits, fire fighting systems.
- **Chemical**: classification, labeling and medical examinations of personnel handling chemical material - rules concerning purchase, storage, transport, use and disposal.
- **Flammable gas**: classification, recommended practices, design and operation of systems.
- **Cryogenic fluids**: safety instructions for storage and set to work, leak detection and oxygen deficiency alarms.
- **Ionization and radioactive materials**: classification of radiation areas and dose limits, guidelines, monitoring (individual, material, areas and sites), radiation alarms, handling of material, traceability, disposal ...
- **Non ionizing radiation** (laser, magnetic fields, X-ray ...): classification, precautions for use, mark out and interlock.

Hazards identification and Safety regulations

- **Pressure vessels**: design codes, test, installation, regular inspections.
- **Heavy handling**: regulation, certificates, reception and control procedures, maintenance, regular tests, qualifications of drivers.
- **Flood**: surface (thunderstorm, heavy rain or snow) early warning, prevention, shaft protection – underground geological leaks or rupture of a cooling system, detection, alarm and pumps.
- **Earthquake**: risk quantification and consequences, practice and safety margin applied on structures, anchoring.
- **Noise**: levels, prevention (sound-insulating casing, dampers, ...), environmental issue – over half the cases of occupational illness recognized at CERN correspond to hearing impairments.
- **Pollution and protection of the environment**: waste collection and treatment, practice, retention basins, admissible levels for rejection in air and/or water.

Safety systems

- Detection: locations & requirements of detectors for smoke, ventilation failure, flammable gas leaks, ODH, radiation, emergency power stops and power failure, emergency call system (“red telephone”), flood, etc...
- Alarms: triggering of evacuation sirens and flashing lights, alarm communication and management, actions resulting of abnormal situations which places or is likely to place lives in danger (“Level 3” alarms);
- Secured systems: requirements for uninterruptible power system, diesel, anti-panic lightning, hard-wire & fail-safe communication, emergency exits;
- First-aid equipment: locations & requirements for medicine chests, fire extinguishers and fire hose stations, electrical safety kits;
- Individual safety equipment and training: oxygen mask, dosimeter, GSM (?), helmet, light, etc... ; General and specific safety training.