

Integrated Safety in "Saraf"

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As of the very early stages of the accelerator project at the Soreq Nuclear Research Center – "Saraf" [1], a safety group was established which has been an inseparable participant in the planning and design of the new facility.

The safety group comprises of teams responsible for the shielding, radiation protection and general industrial safety aspects of "saraf".

The safety group prepared and documented the safety envelope for the accelerator, dealing with the safety requirements and guidelines for the first, pre-operational, stages of the project. The safety envelope, though based upon generic principles, took into account the accelerator features and the expected modes of operation.

The safety envelope was prepared in a hierarchical structure, containing Basic Principles, Basic Guidelines, General Principles for Safety Implementation, Safety Requirements and Safety Underlining Issues.

The above safety envelope applies to the entire facility, which entails the accelerator itself and the experimental areas and associated plant and equipment utilizing and supporting the production of the accelerated particle beams.

The Basic Principles are generic statements including the need to plan the facility so that its nominal operation will impose no excessive risk to either the staff, the people outside the facility or to the environment. The Basic Principles demand that active measures should be taken and implemented so as to prevent endangering accidents and incidents, and that active measures should be taken and implemented to minimize the risk given that an accident had occurred. Another basic principle is that the structure in which the accelerator is located would provide passive shielding to prevent exposure of people and the environment surrounding the facility.

The basic standards include, for example, reference to National and International Safety Standards [2-5] that the facility has to meet, Procedures for the proof of safety before the facility becomes operational, and the terms in which the ALARA principle is to be implemented.

The general principles give mention, for example, to the fail-safe, two-person and the safety-in-depth concepts. The safety requirements relate specifically to the facility itself, based upon preliminary risk analysis which takes into account the accelerator's expected modes of operation and provisions for future expansion.

In preparing the Safety Requirements the Energy-Analysis Approach [6] was adopted for local risk identification and characterization. The idea that lies behind Energy-Analysis is that for an injury to occur, a person must be exposed to an injurious influence – a form of "energy". An injury occurs when a person is exposed to energy that exceeds the injury threshold. The purpose of the method is to obtain an overview of all energies in the installation which can cause acute injuries or may have long-term effects, for example, exposure to ionizing radiation.

The accelerator facility was mapped and divided into zones and sections. For each zone or section a risk-matrix was prepared, in which every form of potentially hazardous energy was assigned a "level of severity". Thus these matrices provide identification of risks which should be addressed in the safety design.

The forms of energy included, for example, radiation of all types (ionizing, electromagnetic, acoustical, etc.), chemical influence (poisonous, corrosive, contagious, etc.), electric shock hazards, heat and cold, moving parts, fire, explosion and miscellaneous.

The safety group of "Saraf" keeps on being involved and integrated in the project and to provide its inputs hand in hand with the advancement of the project from the design stage to its full scale operation.

References :

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