CERN TECHNOLOGY NOTE

B53 THE ISOLDE-2 ELECTROMAGNETIC ISOTOPE SEPARATOR

The ISOLDE (Isotope Separator On-line) facility is constructed for nuclear studies of short-lived radioactive isotopes of the different elements. The principle of the installation is shown in Fig. 1. Nuclides produced by exposing a target to the external proton beam of the 600 MeV Synchro-cyclotron (SC) are removed as a gaseous stream. They are subsequently purified chemically, either before entering or when they are in the ion source of the electromagnetic isotope separator. An ion beam of one element is formed in an electrostatic lens system and then passed through an analysing magnet situated in a thick shielding wall. By means of an electrostatic switchyard, the isotopically pure ion beams are allowed to enter a beam-handling system for further transport through a second shield to the measuring instrumentation.

ISOLDE-2

The ISOLDE facility has been entirely reconstructed in conjunction with the SC shut-down. In the ISOLDE-2 machine, new techniques have been taken into account so that it differs considerably from the otherwise well-established isotope separator technology. Apart from the numerous small improvements made on the basis of the previous six years of on-line experience, the following special features should be emphasized:

i) the new target and ion-source system that has been developed and which is described in Technology Note B54;

ii) a remote-handling system by means of which the highly radioactive target and ion source unit can be connected, disconnected, as well as exchanged with any of three other units situated in a shielded target vault;

iii) the new electrostatic lens system and differential pumping chamber designed for easy cleaning and re-alignment of the radioactive lens;

iv) a switchyard based on a new beam-switching principle for isotope separators on-line. Pairs of cylindrical electrostatic deflection plates (Fig. 1), which can be moved independently along the direction of the deflected beam in order to intercept different isobaric beams, are used. This movement guarantees constant alignment with the lenses in the beam lines, and allows the experimenter to cover a range of 200 mm across the direction of the ion beam in the collector chamber. (This corresponds to 20 Hg isotopes being accessible without change of the mass spectrum.);

v) four secondary beam lines, up to 6 m long, equipped with electrostatic quadrupole lenses, allow for as many experiments to be performed simultaneously;

vi) finally, an oil-free vacuum system based on turbomolecular pumps is used.

Further information can be obtained from E. Kugler and S. Sundell, NP Division, CERN.

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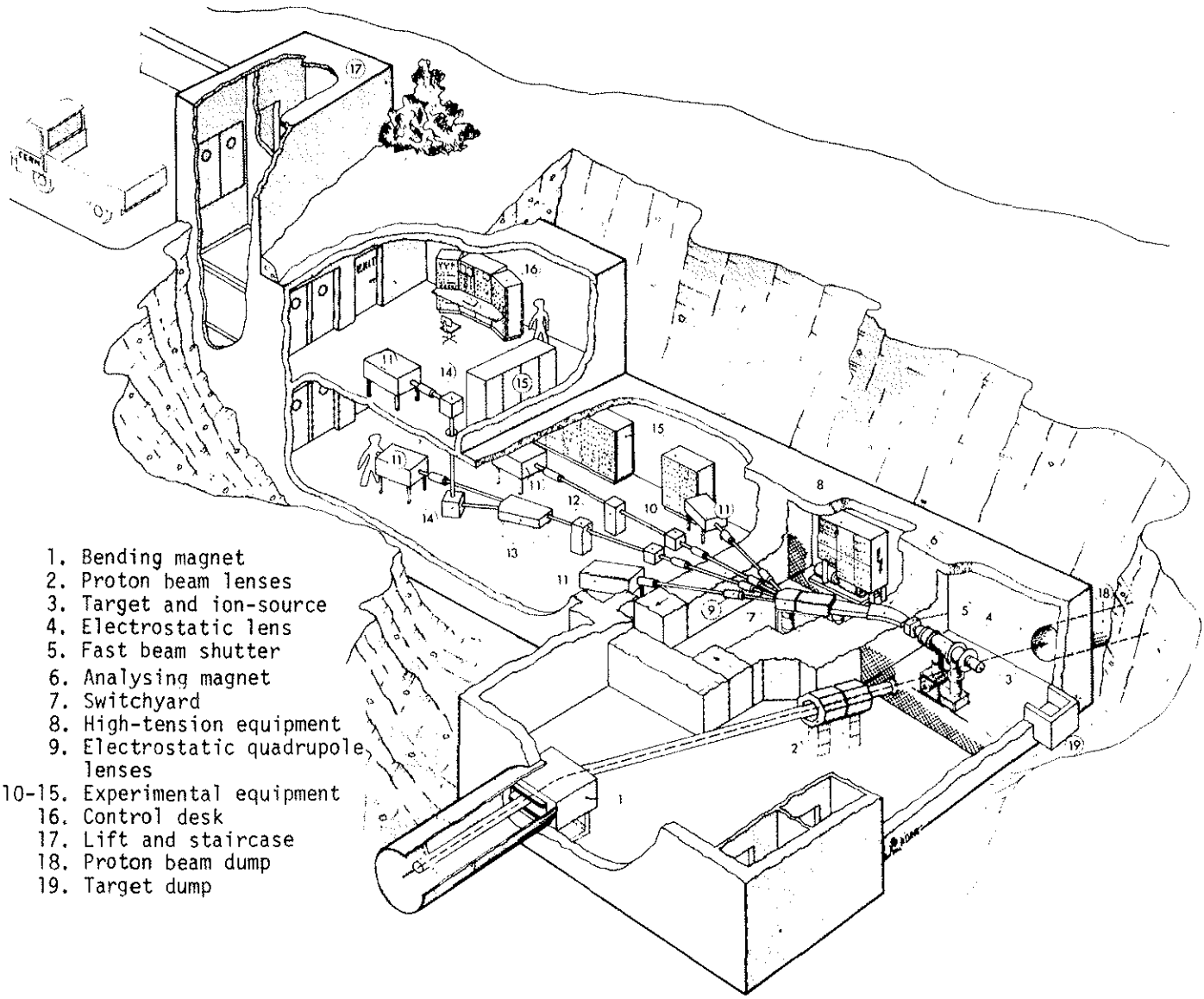

Fig. 1 Layout of ISOLDE-2