

# MODERNIZATION OF THE RADIOISOTOPES PRODUCTION

*Incorporating advanced concepts of*



**1** A radioisotopes and radiopharmaceuticals production laboratory was established in Chile in the 1960s for research activities. From 1967 until January 2012, it was dedicated to the manufacturing of radioisotopes and radiopharmaceuticals for medical diagnosis and treatment purposes. In 2012, modernization of the facility's design and technology began as part of the IAEA technical cooperation project, Modernizing the Radioisotopes Production Laboratory of La Reina Nuclear Centre by Incorporating Advanced Concepts of Safety and Good Manufacturing Practices, (CHI4022).



**2** The laboratory's modernization was justified by the need to improve radiation protection structures and pharmaceutical grade cleanliness and to be compliant with nuclear and health regulations. This included renovating the small lead glass windows, the old telemanipulators (hand-like mechanisms for remote handling of hazardous radioactive materials by workers) and the laboratory's eight hot cells. Hot cells are shielded containment chambers designed to protect workers as they work with radioactive materials. It is essential that the cells are well-constructed to ensure high safety standards.



**3** The building was partially demolished in order to build new walls and slab reinforcements that can support the weight of the new hot cells. A specialist company was hired to construct the concrete pillars. This stage of construction also included the assembly of the supporting structure for lead bricks.



**4** The supporting structure for the hot cells was made from steel plates welded and bolted together and anchored to the floor. The inner and outer walls of the hot cells were constructed from lead bricks. Lead is a preferred material for the construction of hot cells because lead has a high density and is able to block harmful radiation.

# LABORATORY OF THE LA REINA NUCLEAR CENTER IN CHILE

*safety and good manufacturing practices*



**5** The hot cells for producing technetium-99m and iodine-131 radiopharmaceuticals were constructed with lead glass windows and interlocking frames for mounting the telemanipulators. The IAEA supplied the lead glass windows and telemanipulators, which were installed by technicians who worked alongside staff from the Chilean Nuclear Energy Commission (CCHEN).



**6** Lead walls and lead doors were installed to ensure that the 'hot zone' of the facility, the area where radioactive materials are present, was safe and secure. The 'hot zone' is also the area where raw radioactive materials are brought in and from which, after processing in hot cells, finished products (i.e. radiopharmaceuticals) are brought out.



**7** The new hot cells for production of technetium-99m were in compliance with the relevant good manufacturing practice requirements. The exterior of the cell was made of stainless steel with the walls, floor and ceiling meeting required pharmaceutical cleanliness.

At the end of the corridor, a transfer hatch (window) connects to another laboratory where iodine-131 is produced.



**8** A sophisticated ventilation system with pre-filters, high efficiency particulate air (HEPA) filters and active carbon filters were installed with the new hot cells and were designed with a double filter system to improve safety.

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