

R.S. Augusto on behalf of the MEDICIS collaboration:

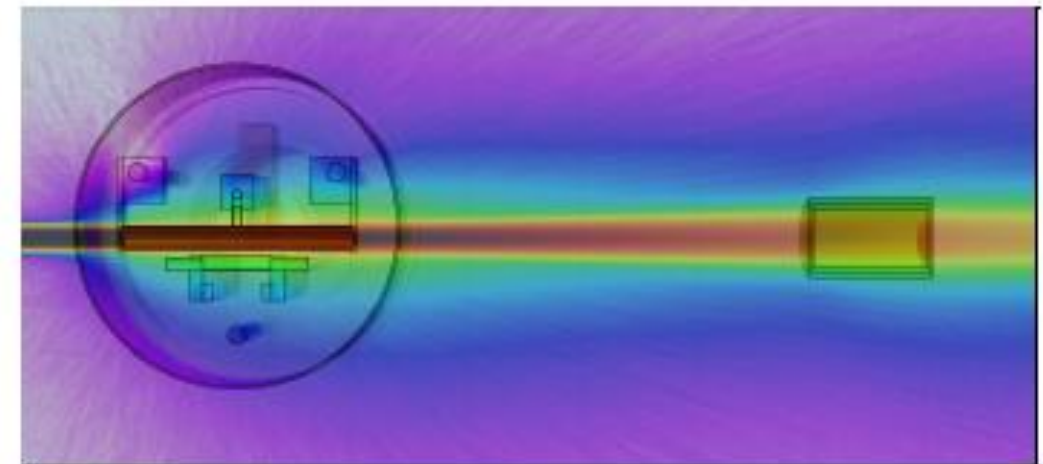
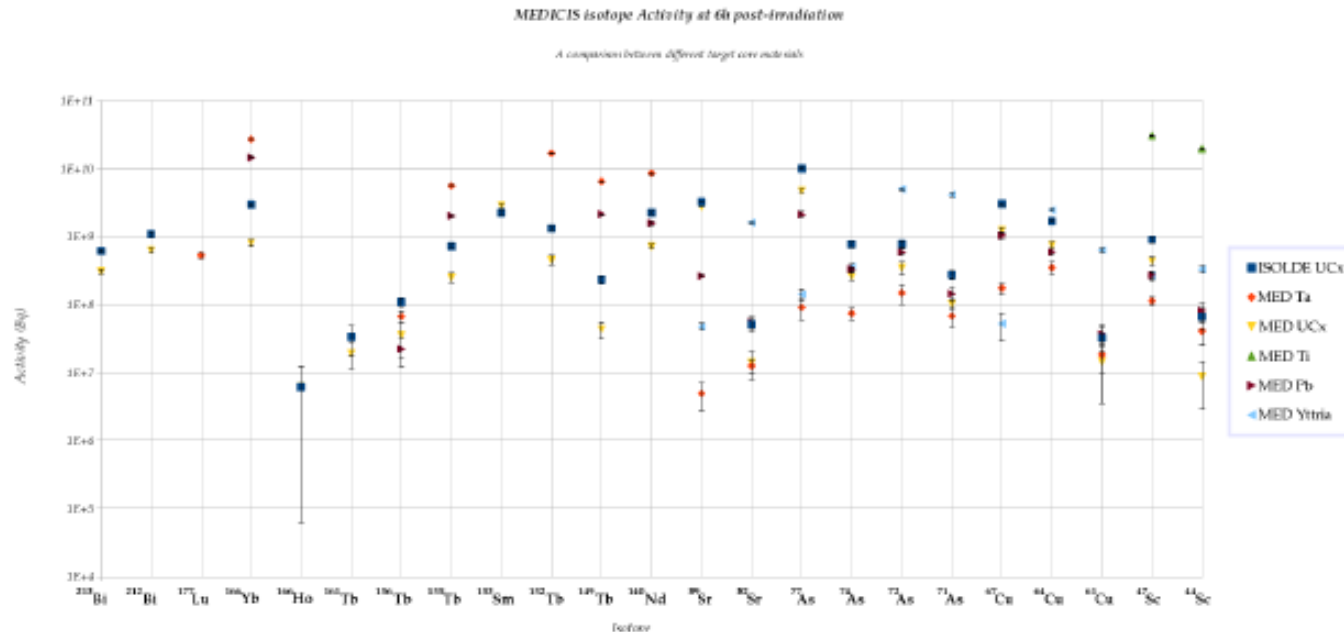
MEDical Isotopes Collected @ ISOLDE

An ingenious ISOLDE spin-off that started this year.

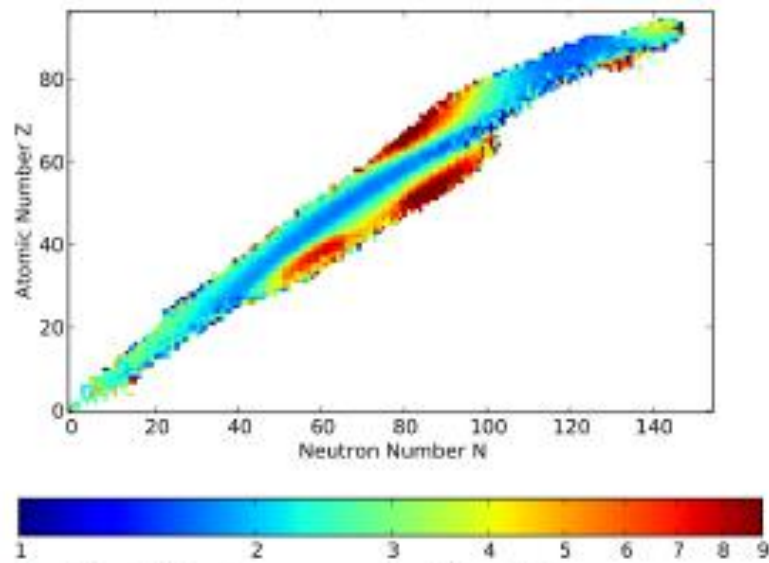
“About 50% of the 1.4 GeV proton beam at CERN is directed to ISOLDE targets. Of these, 90% are dumped.”

- ▶ New target station between the ISOLDE target and dump.
- ▶ Targets irradiated with a large fraction of the (otherwise dumped) 5×10^{18} protons.

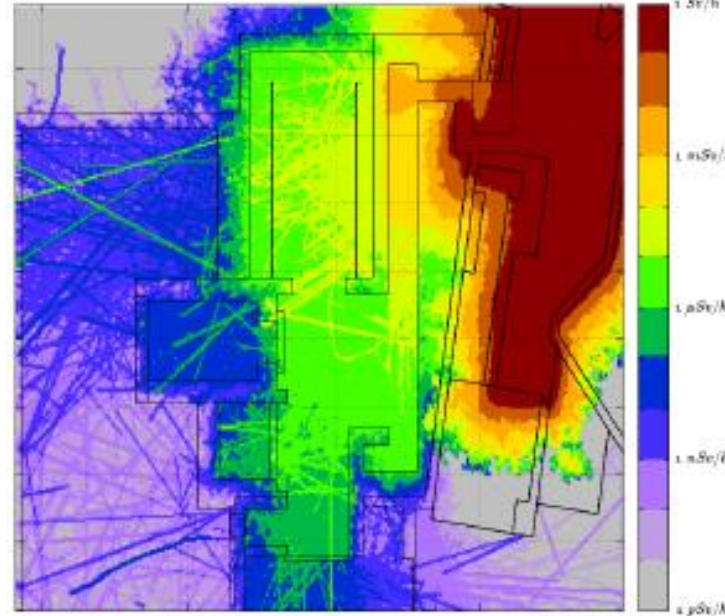
Isotope-of-interest production comparison with different targets.



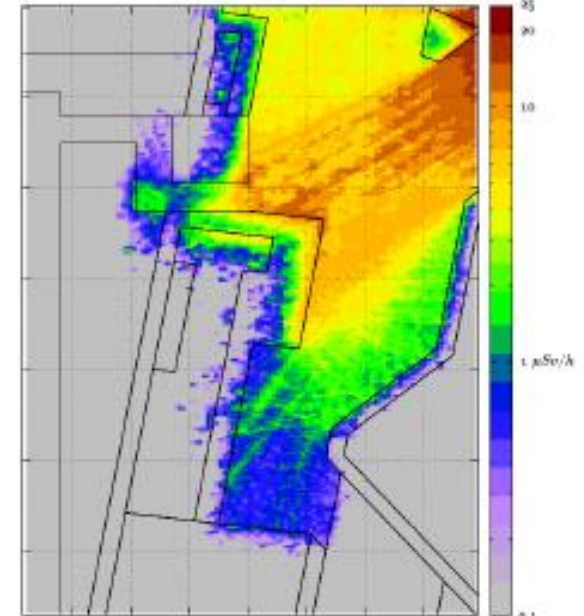
Simulation of the newly designed MEDICIS isotope production and building's shielding capability to withstand HIE-ISOLDE irradiation.



Ratio of isotope production between an ISOLDE and HIE-ISOLDE UC_x target.

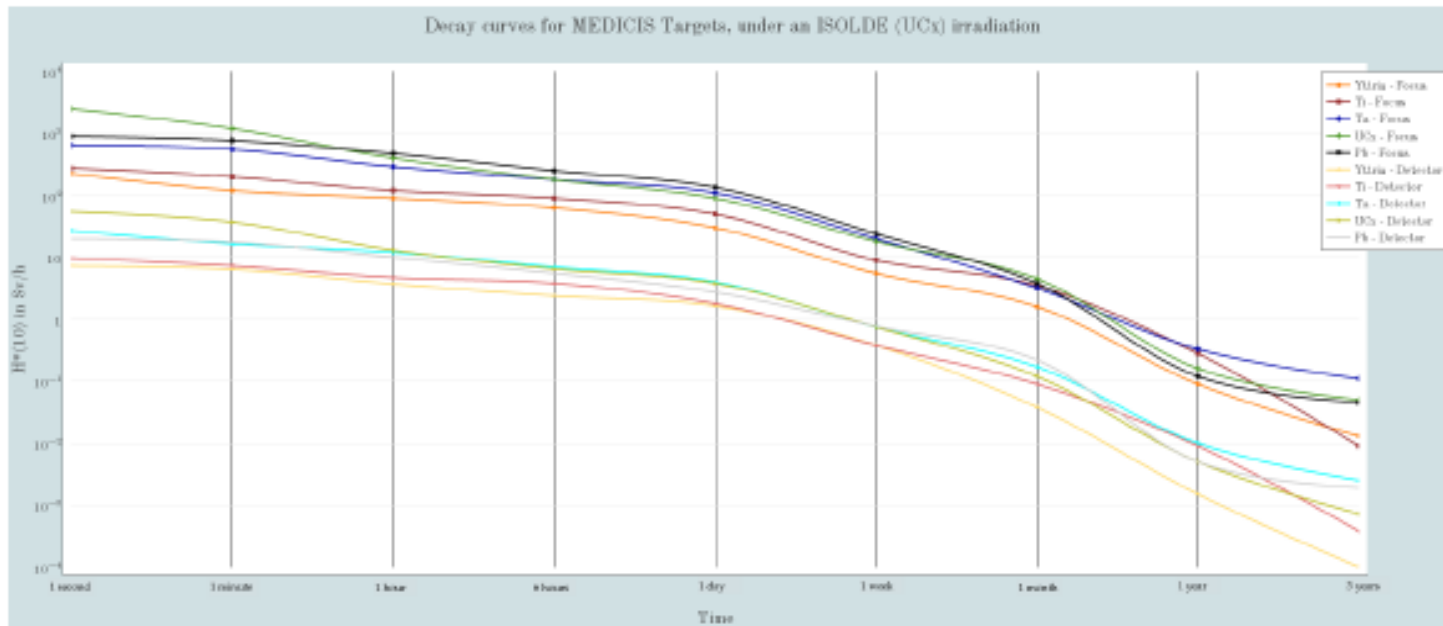


Prompt $H^*(10)$ reaching the LABOMEDICIS.



$H^*(10)$ rates seen after 1 year of operation (16 irradiations on GPS and 16 on HRS). Obviously the result on air is highly conservative.

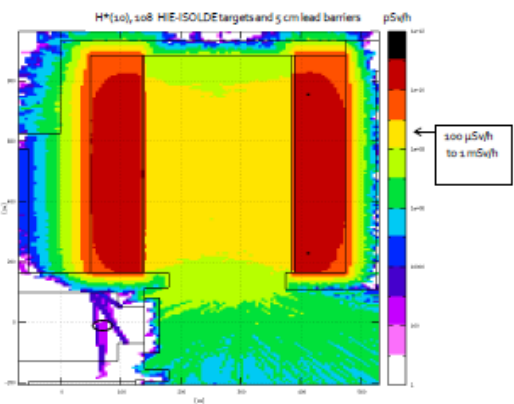
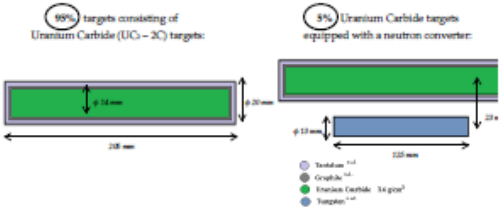
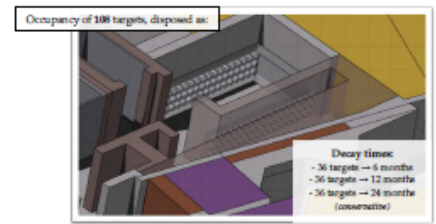
Cooling time evaluation to select appropriate disposal procedures.



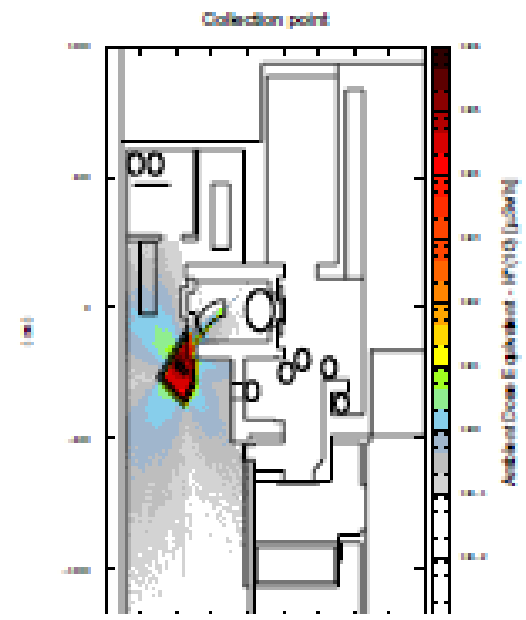
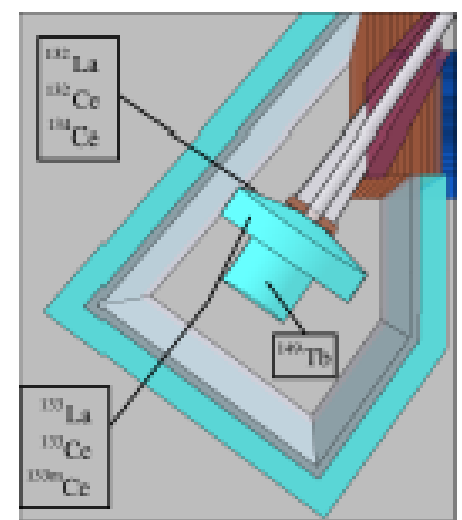
Isotope beams implanted, and shielding def:

Species	$t_{1/2}$	Activity (GBq)	$H^*(10)$ at 40 cm in air ($\mu\text{Sv/h}$)	β dose rate at 10 cm in air ($\mu\text{Sv/h}$)
^{138}Ba	10.84 y	2.6×10^{-2}	13	170
^{132}Ba	1.8 d	1.4×10^{-1}	14	0
^{138}La	1.9 h	30	8800	8800
^{132}Ce	1.62 h	9	4600	9100
^{132}Ce	4.9 h	8.3	2.7×10^{-1}	630
^{140}Eu	6.93 d	1.6×10^{-2}	780	0.89
^{140}Eu	93.1 d	7×10^{-2}	18	1500
^{140}Gd	9.28 d	0.38	180	0.02
^{140}Tb	4.12 h	1	1200	200
^{132}La	4.8 h	47	-	-
^{132}Ce	3.81 h	16	-	-
^{132}Ce	76.9 h	17.8	-	-
^{130}Tb	1.87 h	0.66	-	-
^{140}Tb	60 m	0.28	-	-
Total (~)	-	~ 126	12000*	18000*

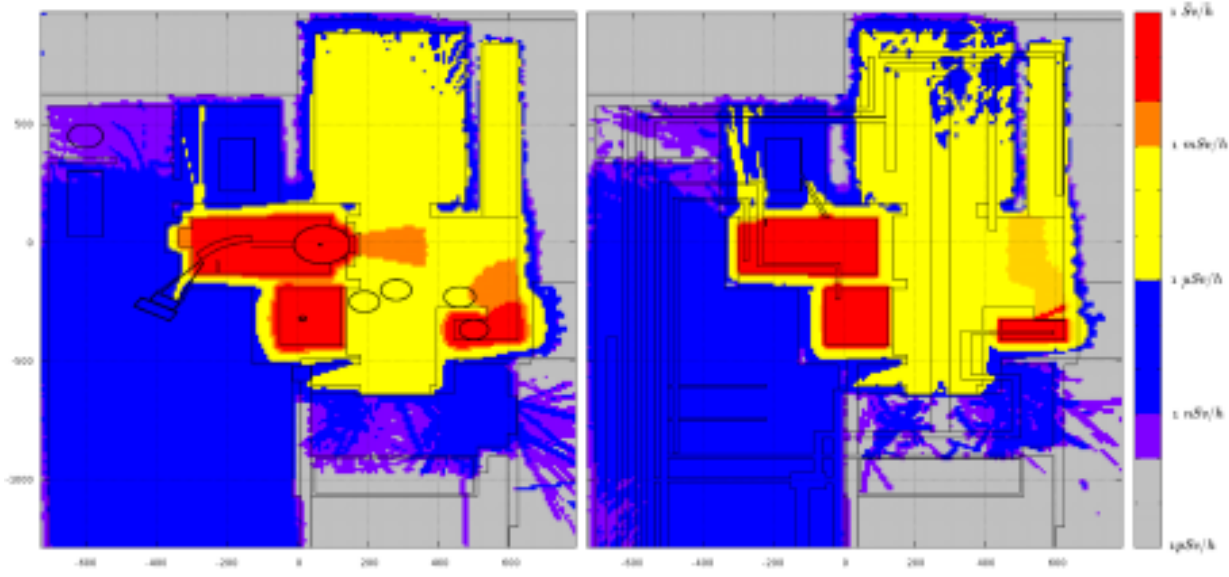
Studies performed for waste management optimization ...



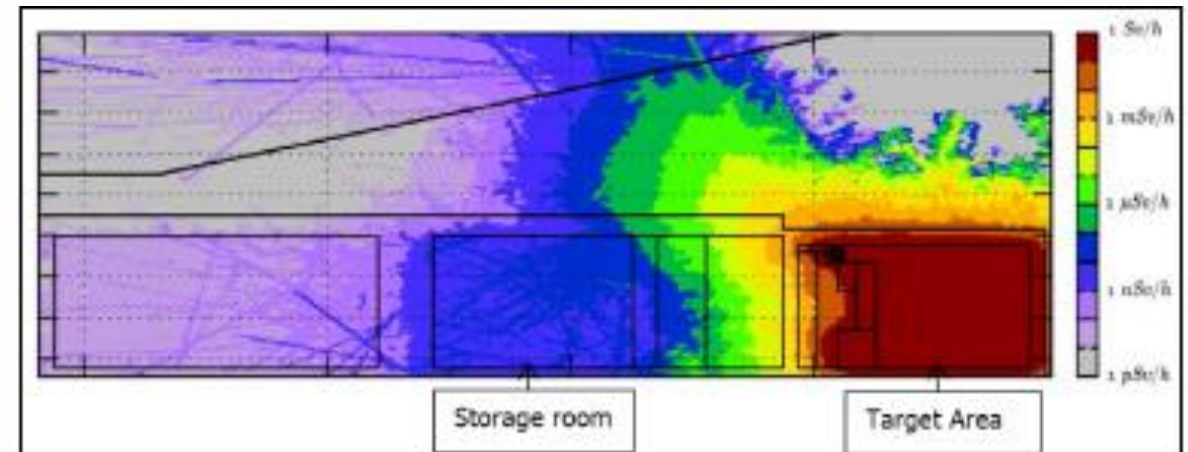
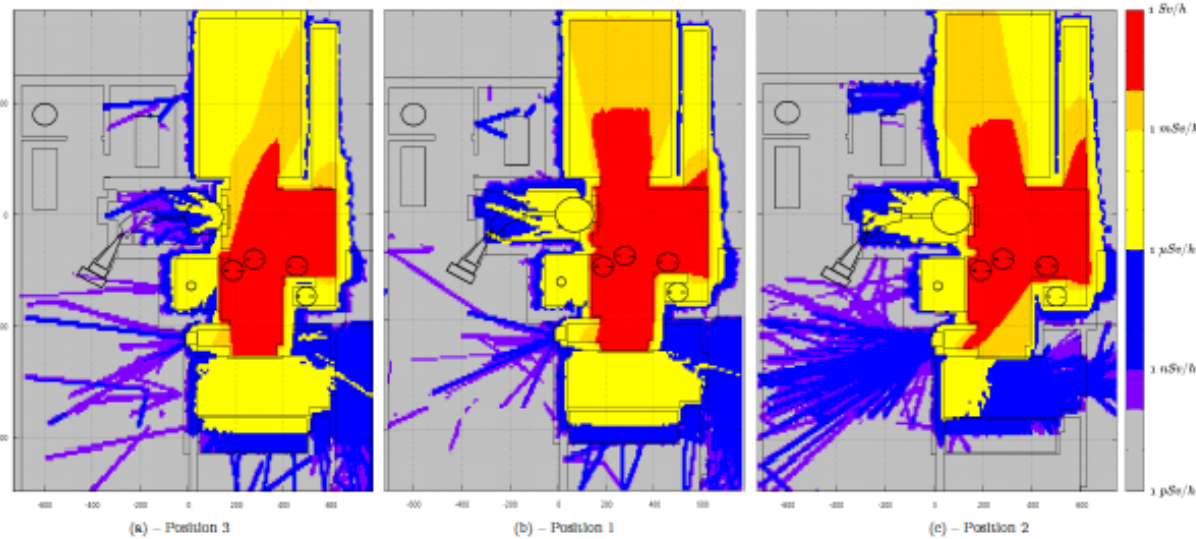
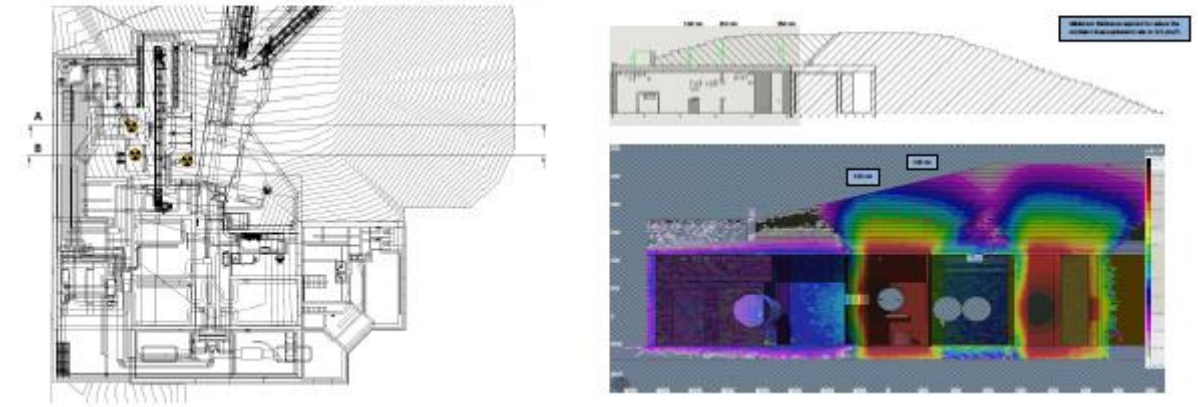
Radiation flow of 108 targets, at different decay times.



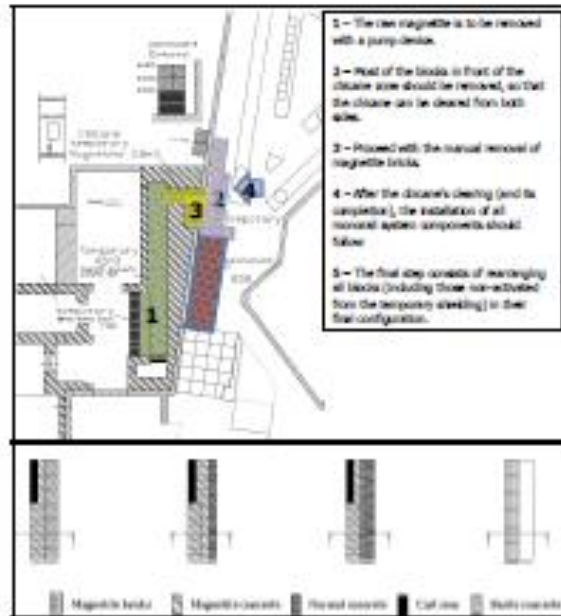
Identification of leaks and shielding flaws due to the proximity to the irradiation site or presence of radioactive sources.



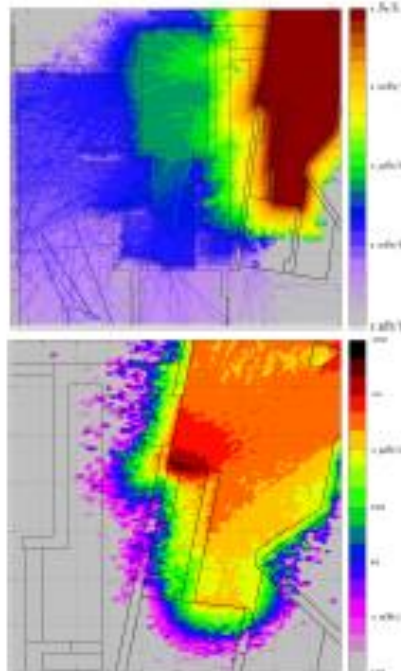
Technical drawing interpretation, including topographic drawings. A result of intense collaboration with co-workers from technical design teams, civil engineering and mechanical design.



Shielding design for the construction site between hot and cold zones, ensuring workers safety — respecting strict budget conditions. Choice of materials based on the inventory and novel shielding materials (raw magnetite, magnetite concrete ...).



Defining workplans with technical design and RP.



Prompt & Decay scenarios. (courtesy of A.P Bernardes).



Final shielding assessment

