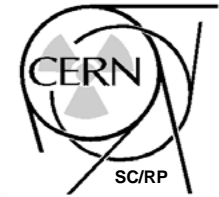


# Safety Issues for nTOF-Restart

Thomas OTTO,  
Radiation Protection Group,  
SC-RP,  
CERN

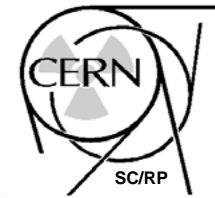
# n-TOF Restart Baseline



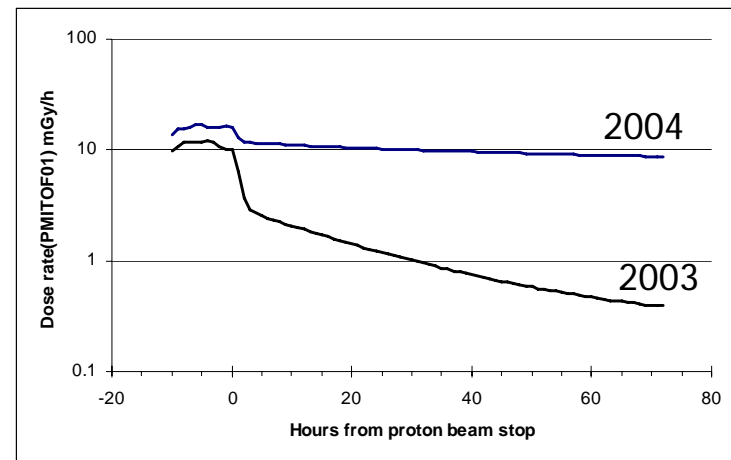
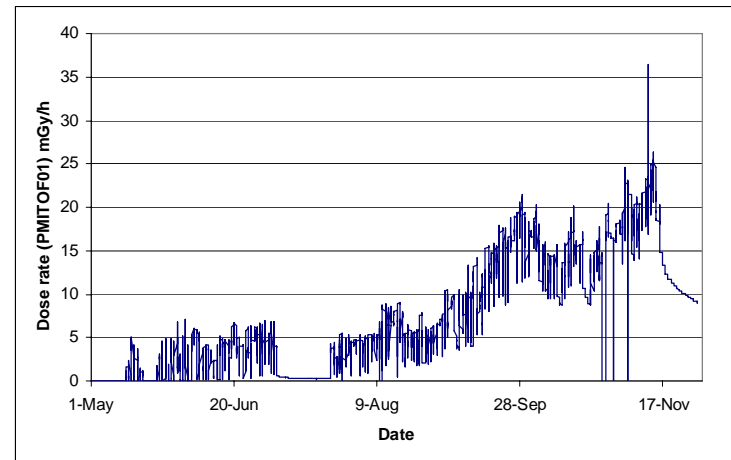
- Spallation target and proton beam similar to existing target, but cladded (covered with a non-reactive metal sheet, e.g. Zr-Alloy)
- BL 1, 185 m, existing experimental area EAR-1 without contamination control
- (a vertical beamline to EAR-2 potentially at a later stage)



# New n-TOF target

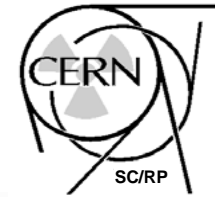


- N-TOF cooling water circuit contaminated by spallation products from lead target
- Action:
  - Remove present target, clean circuit as far as required (specific activity remaining must be lower than release limits)
  - New cladded spallation target is required, under study in AB-ATB (presentation Ans Pardons)



Build-up and decay of water contamination

# Ventilation in target area



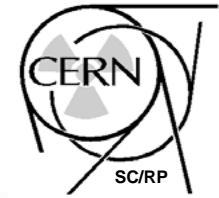
- N-TOF target dimension approx. one interaction length, no dump
- Intense hadronic cascade leaving target
- Consequence: Air activation

Isotope	Activity concentration	
	Door 203	Door 204
	Bq m <sup>-3</sup>	Bq m <sup>-3</sup>
<sup>7</sup> Be	860	27
<sup>24</sup> Na	290	4

- TT2a was a transfer tunnel, not a target area
- **Ventilation must be refitted.**
- Study in AB-ATB, TS-CV and SC-IE:
  - Minimize dose to critical group of public
  - Recirculation during operation
  - Monitored release before access to TT2a
  - Presentation P. Cennini



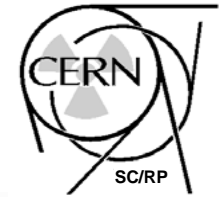
# n-TOF Experimental Areas



- EAR 1 in its present form can receive experiments with inactive targets
- For experiments with radioactive targets:
  - ISO 2919-certification of targets as “sealed radioactive source” by **officially authorised bodies**.
  - Construction of a worksector for handling unsealed radioactive samples in the experimental area (Examples available at Synchrotron Lightsources)

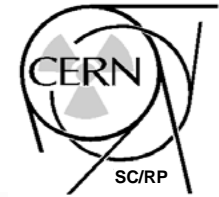
**Future**

# SC-RP Resources (1)



- At present:
  - Until 2004 n-TOF has been operated by CERN as an “insignificant activity” and no additional resources had been allocated
  - For ISOLDE, n-TOF and MERIT:
    - < 1.5 FTE RP engineers for monitoring
    - 0.2 FTE RP physicist for studies and authorisations
- Start of a new n-TOF physics programme
  - Additional manpower required for state-of-the-art radiation protection programme:
    - (part of) physicist/ senior engineer for studies and authorisations
    - (part of) technician/ tech. engineer for monitoring work with potentially dangerous radioactive targets

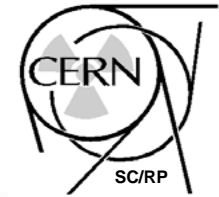
# SC-RP Resources (2)



- LHC start-up/ commissioning/ first years:
  - nearly all present RP physicist resources bound to LHC until at least 2011 (nominal intensity in LHC)
  - numerous additional RP technicians/ engineers are required for LHC operation
- APT:  
1 physicist/ senior engineer &  
1 technician/engineer requested for  
injectors and "low-energy" programme,  
shared with CTF-3, Linac-4, PS, PSB, East hall...
- Present SC-RP resources are insufficient for  
monitoring the operation of n-TOF



# Summary



## ■ n-TOF restart

- Essentially a new facility which can be built according to safety requirements (Target, cooling water circuit, ventilation)
- Open questions with respect to the experimental programme

## ■ Resources

- Additional resources are necessary in SC-RP during planning and operation, in parallel to LHC start-up and exploitation