



# REMOTE-HANDLING OVERVIEW

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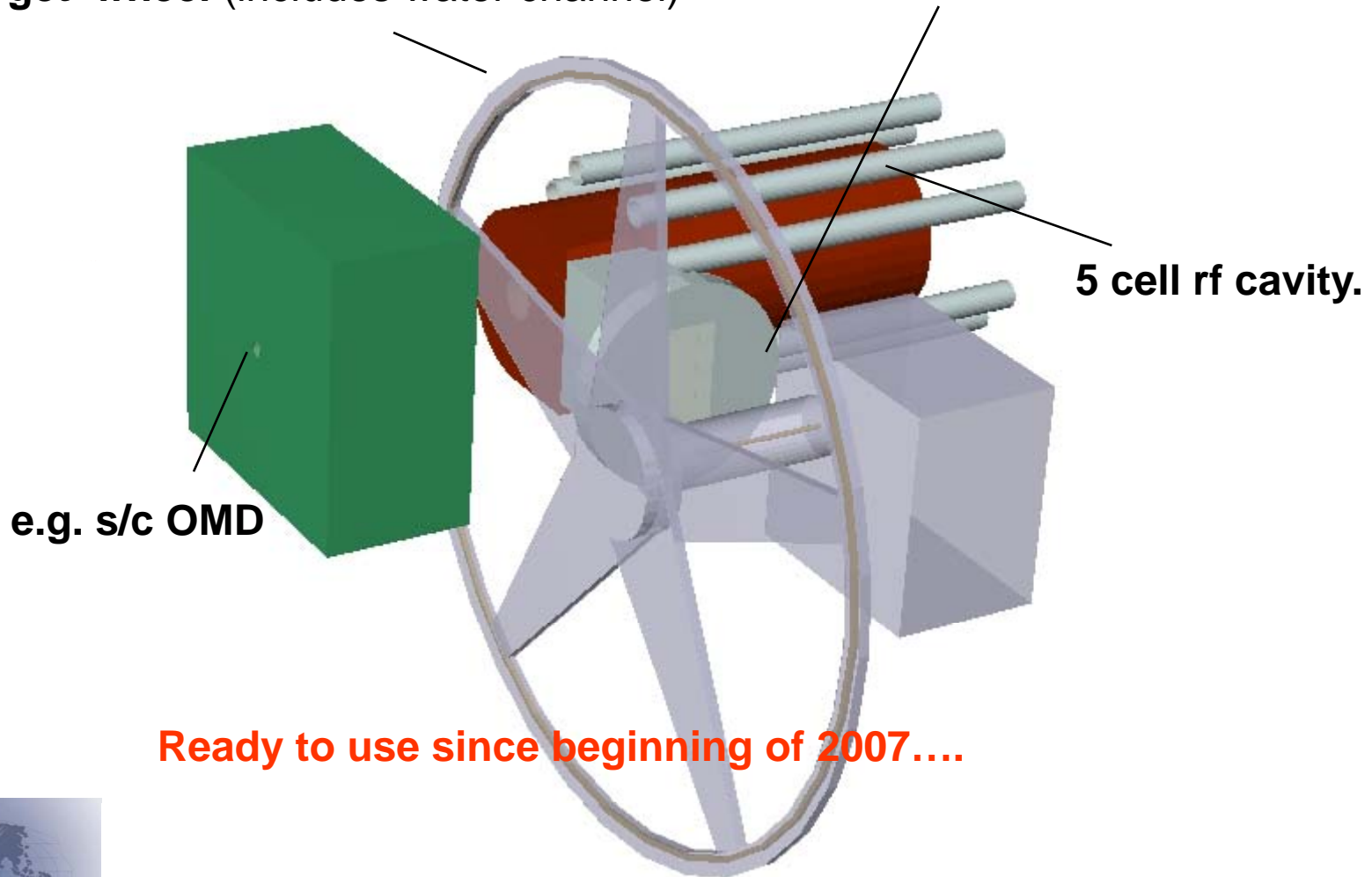
# Need for Remote-Handling

- Numbers from Andriy Ushakov's talk given yesterday at this meeting.
- FLUKA simulations with simple target geometry.
- For undulator design, equivalent dose rate for a Ti alloy target wheel, 1 hour (**week**) after shutdown, after 5000 hours of running, 1m from wheel is ~250 (**90**) mSv/h
  - NB 70m of undulator assumed (~half of baseline length).
  - Dose rates for conventional source with WRe target ~630 (**470**) mSv/h
- EU exposure limit is 20mSv/year.
- FLUKA activation calculations for Ti were benchmarked at SLAC in '07.

# Target Geometry in SimpleGEO / FLUKA

Target wheel (includes water channel)

Drive shaft  
(includes water channel)



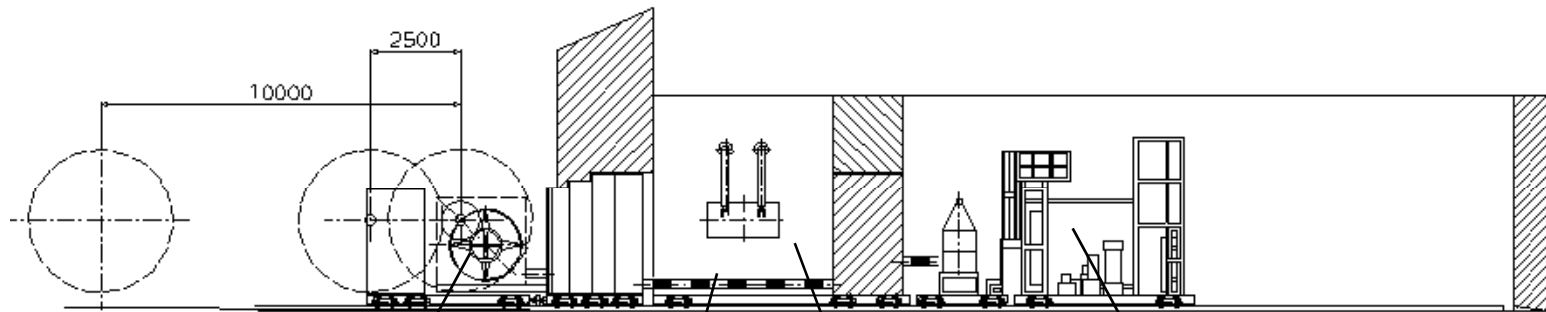
Ready to use since beginning of 2007....





# CCLRC Single Target Station - Side View

C. Densham, RAL, Sep 2006



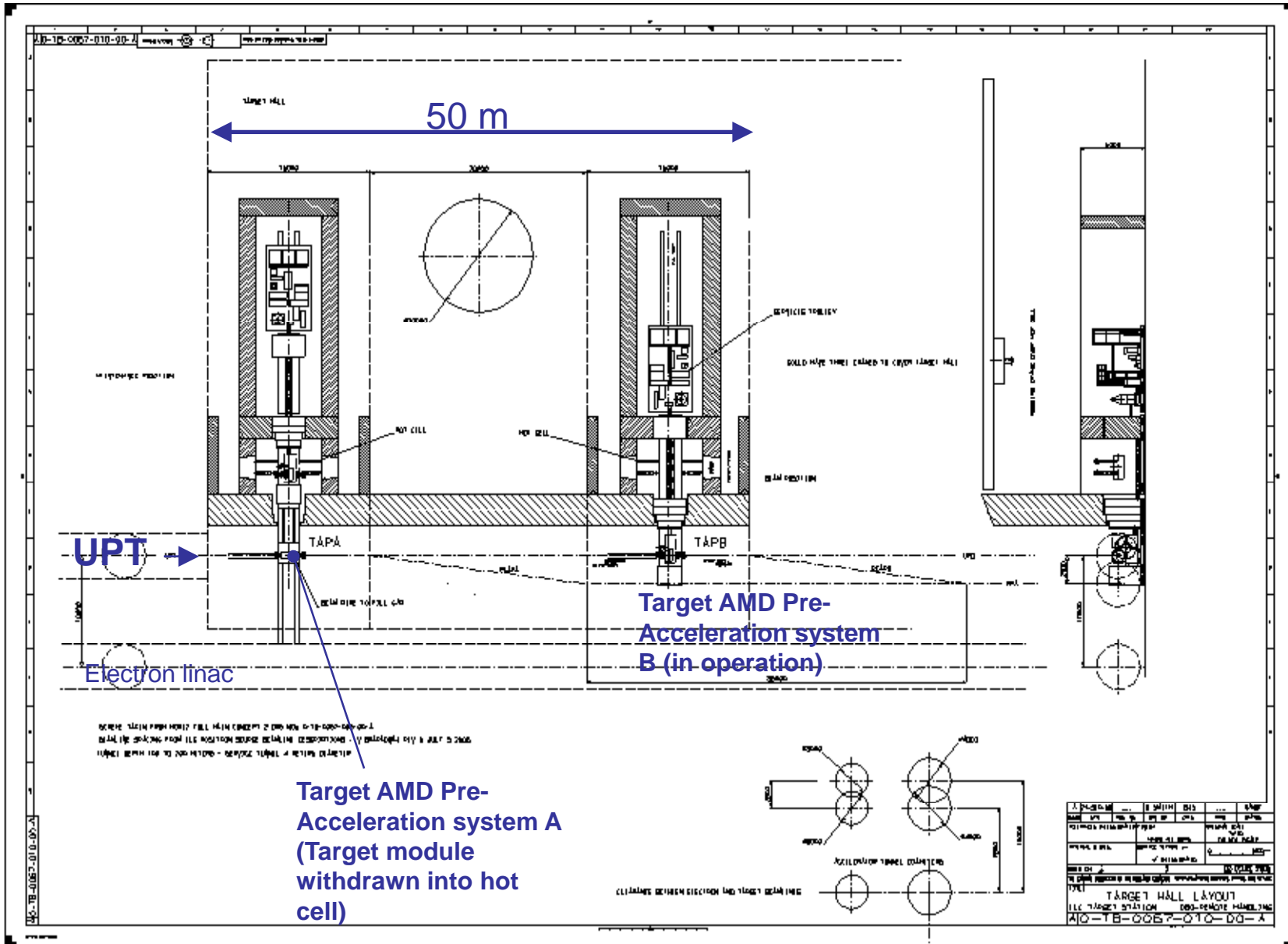
Target module

Service lines

Remote handling cell

Services trolley (target cooling, cryogenics for solenoids)

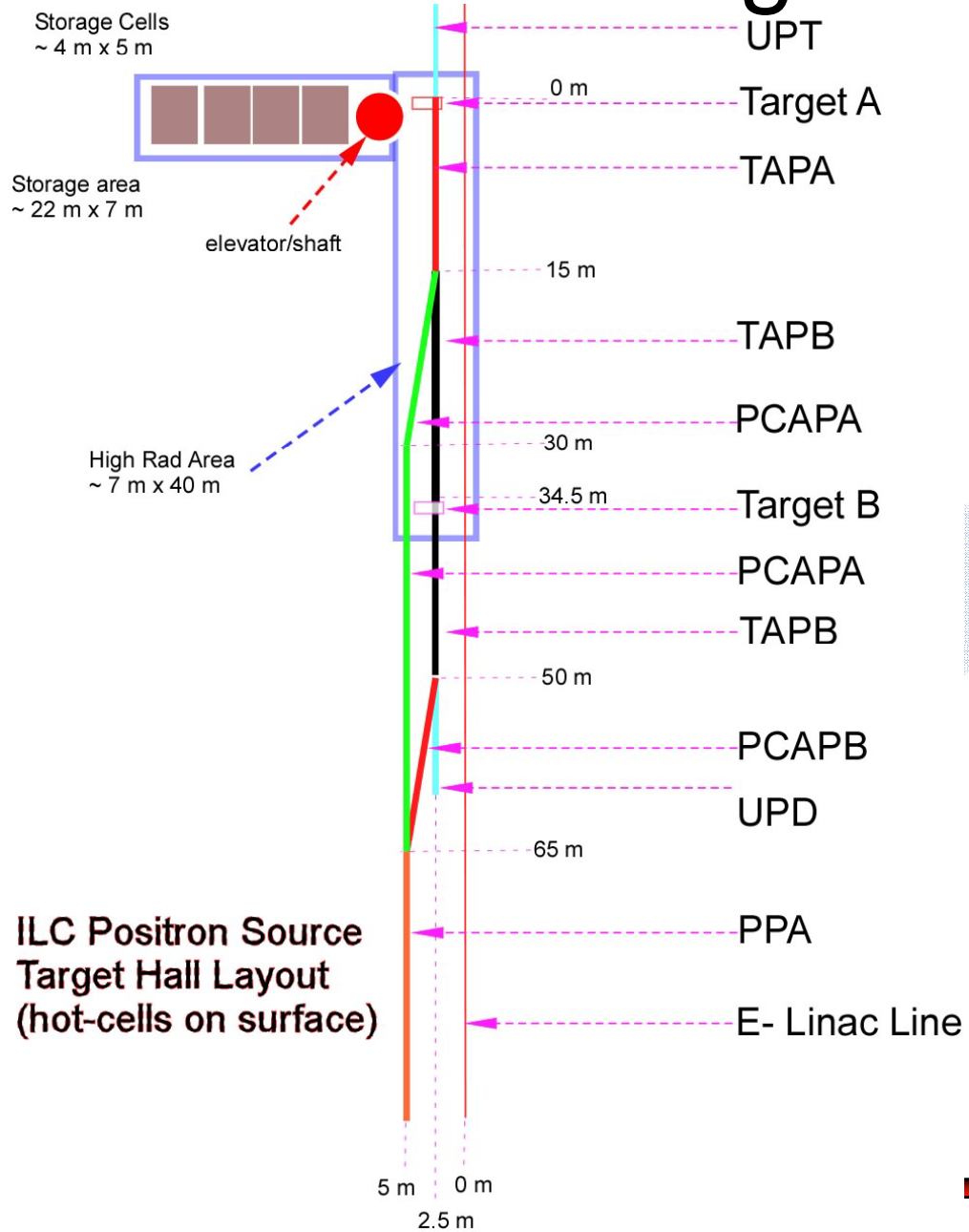
# Target hall layout



C. Densham, RAL, Sep 2006



# Alternative Target Hall Layout

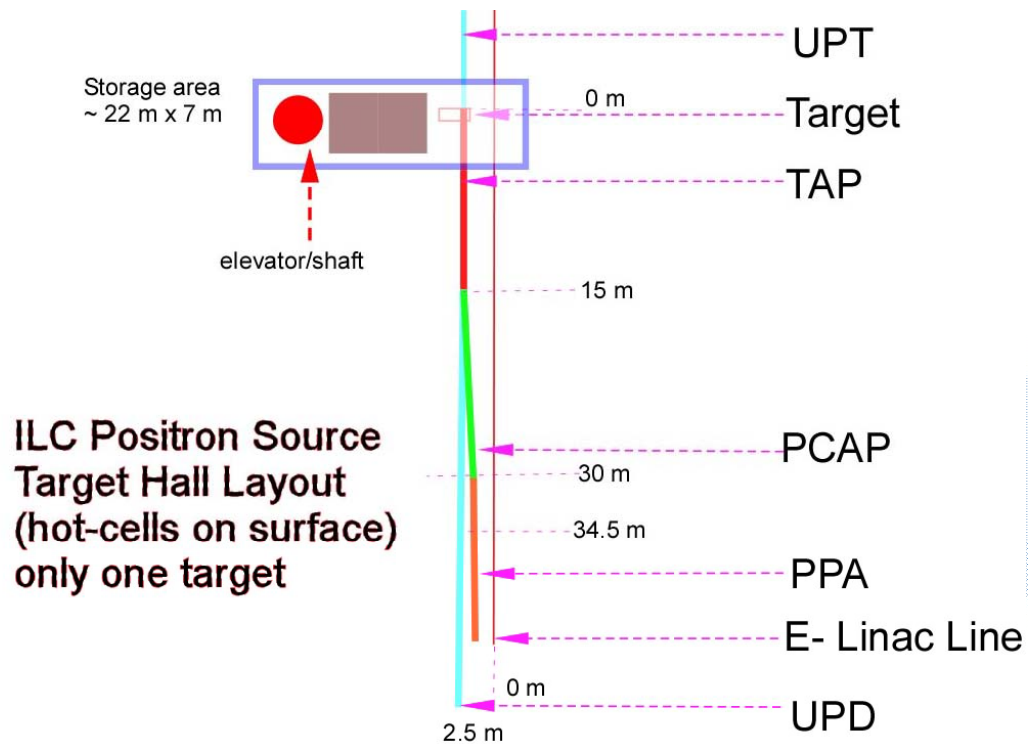


Mini target hall

- 2 target stations
- Surface reprocessing
- ~25% of full target hall size (~250m<sup>2</sup>)

V. Bharadwaj, 17<sup>th</sup> October 2006

# Alternative Target Hall Layout

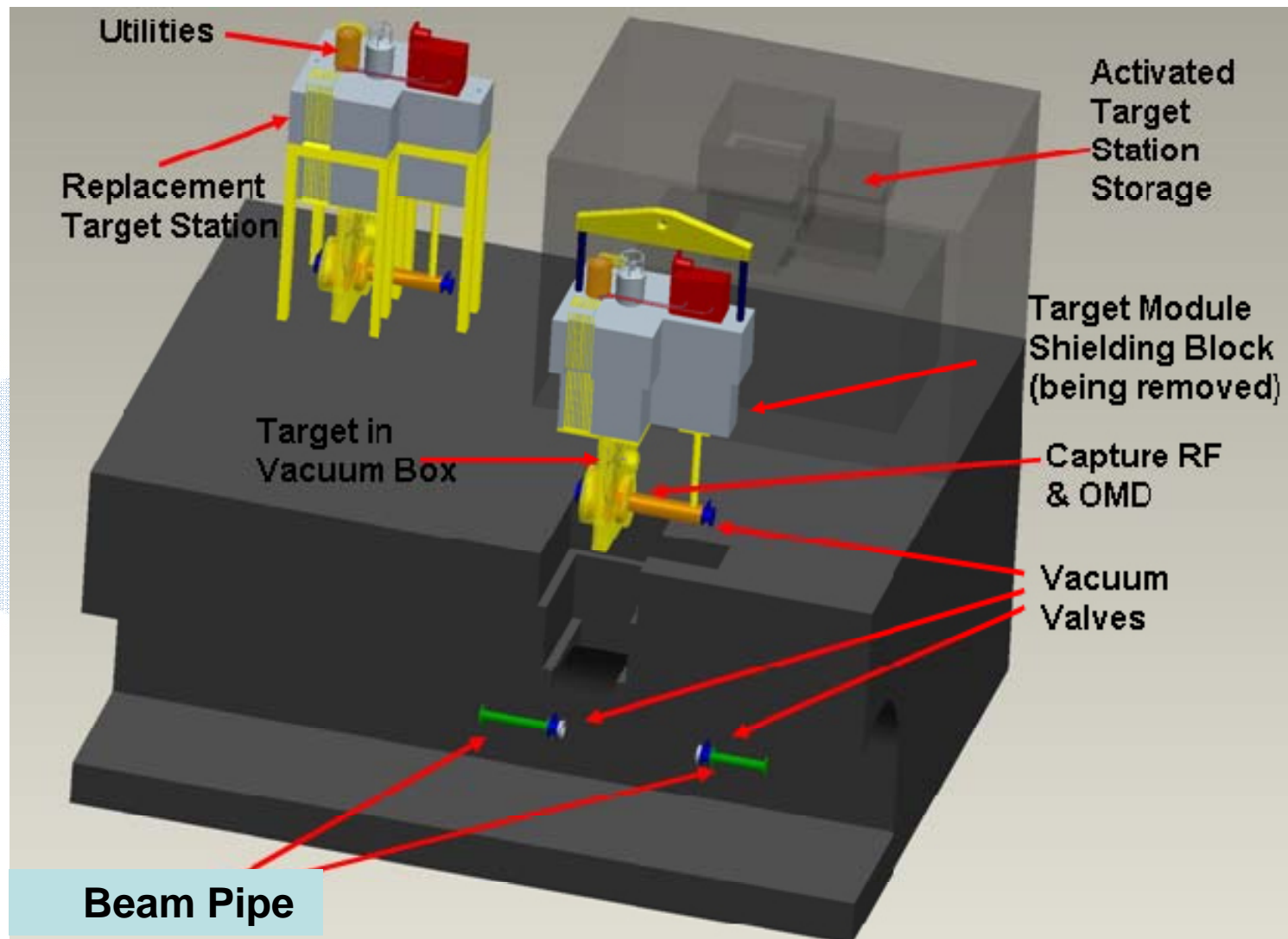


Micro target hall

- 1 target station
- Surface reprocessing
- ~8% of full target-hall size (~100m<sup>2</sup>)

Current baseline.

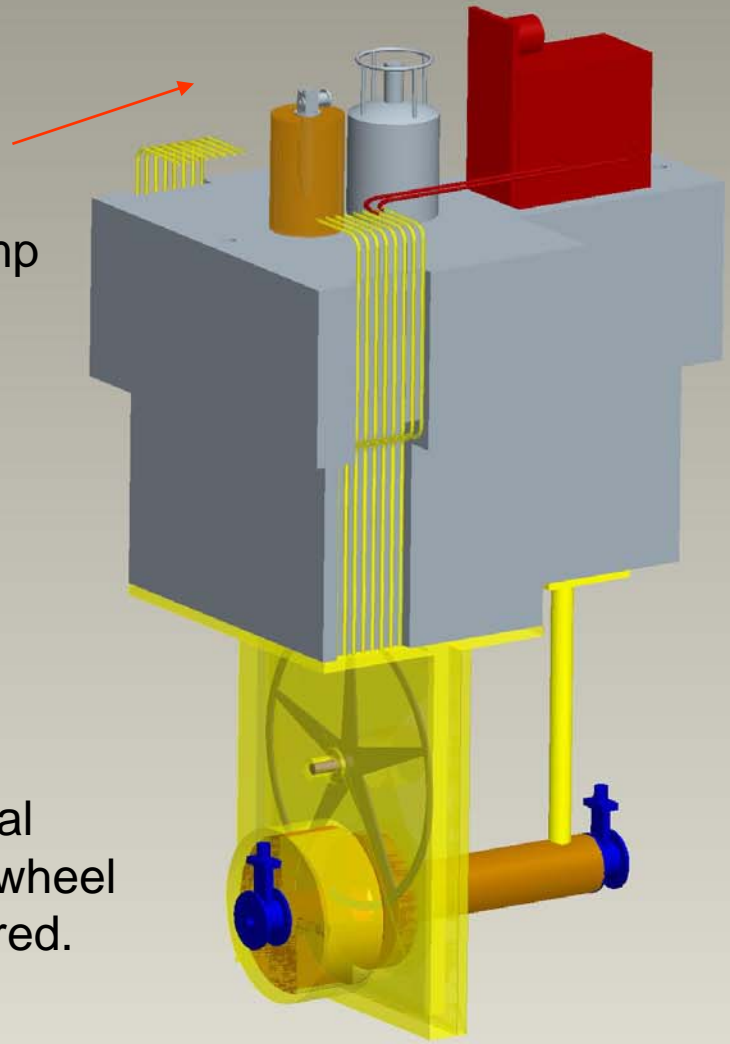
# Target Removal/Replacement Showing Storage Cell





# Target Module and Plug with Support Services

Cryocooler  
(if required)  
+ vacuum pump  
+ water pump



Details of vertical  
drive for target wheel  
not yet considered.

# Estimated Target Changeover Times

Remove		
1.	Switch off and isolate electric power to magnets (overhead cable system)	8
2.	Switch off and isolate power to Target Wheel motor	8
3.	Stop Target Wheel coolant pump	
4.	Blow out Target Wheel	
5.	Remove/disconnect water supply	
6.	Close actuated vac valves on beam line each side of target station.	1
7.	Close actuated vac valve on AMD side of target station	2
8.	Close actuated vac valve on NC Accelerating Cavity side of target station.	
9.	De-pressurise both pillow seal units	2
10.	Attach lifting rods	4
11.	Attach lifting beam	
12.	Lift target station complete with shielding, vac pump running and cryocooler running	2
13.	Place into parking enclosure	
14.	Disconnect from crane	1

**~28 Hours Removal**

M. Woodward, 24<sup>th</sup> Jan 2007

# Estimated Target Changeover Times

~25 Hours Replacement

Replacement		
15.	Connect lifting rods and beam to new unit with shielding, vac pump and cryocooler running – already under vacuum and cold	2
16.	Lower into position – locate	2
17.	Pressurise and activate both pillow seal units	4
18.	Open actuated vac valve on NC Accelerating cavity side of target station	2
19.	Open actuated vac valve on AMD side of target station	2
20.	Test target station vacuum for leaks	1
21.	Open actuated vac valves on beam line each side of target station	2
22.	Replace/reconnect water supply	1
23.	Reconnect power to target wheel motor	1
24.	Test wheel motor. Test water flow through target wheel	2
25.	Connect electric power supply to magnets	8
<b>TOTAL REMOVAL + REPLACEMENT</b>		<b>53</b>

M. Woodward, 24<sup>th</sup> Jan 2007

# Outstanding Action Items

- Include material absorption effects in FLUKA simulations - Andriy (DESY)
- Get feedback on impact of 53 hour changeover on availability - ??
- Evaluate need to include photon collimator in remote-handling module - Lei (Liverpool)
- Evaluate activation of water in water-cooled systems - Andriy (DESY) / Lei (Liverpool) ??
- Evaluate shielding requirements compatible with 53 hour remote-handling schedule - Andriy (DESY)??
- Evaluate achievable vacuum. Assess need to evolve pillow seal design. ??
- Does ILC plan to have a central hot cell facility - ??
- Integration of target design with vertical remote-handling concept -??
- Develop detailed remote-handling scenarios - ??
- Assess need for remote-handling for KAS - ??
- Assess need for remote-handling in Compton source(s) ??

# Current Status

- No resources to refine remote-handling design...
- This is / will be a significant problem.
  - RAL have staff available after Summer '08, but no funding for ILC.
  - ORNL / SLAC have no funding for ILC.
- No ILC-related remote-handling activities in Japan.
  - However, possible test of BN windows at KEKB envisaged.
  - Also, possible KAS test facility as part of STF (Superconducting Test Facility) at KEK.

M. Kuriki