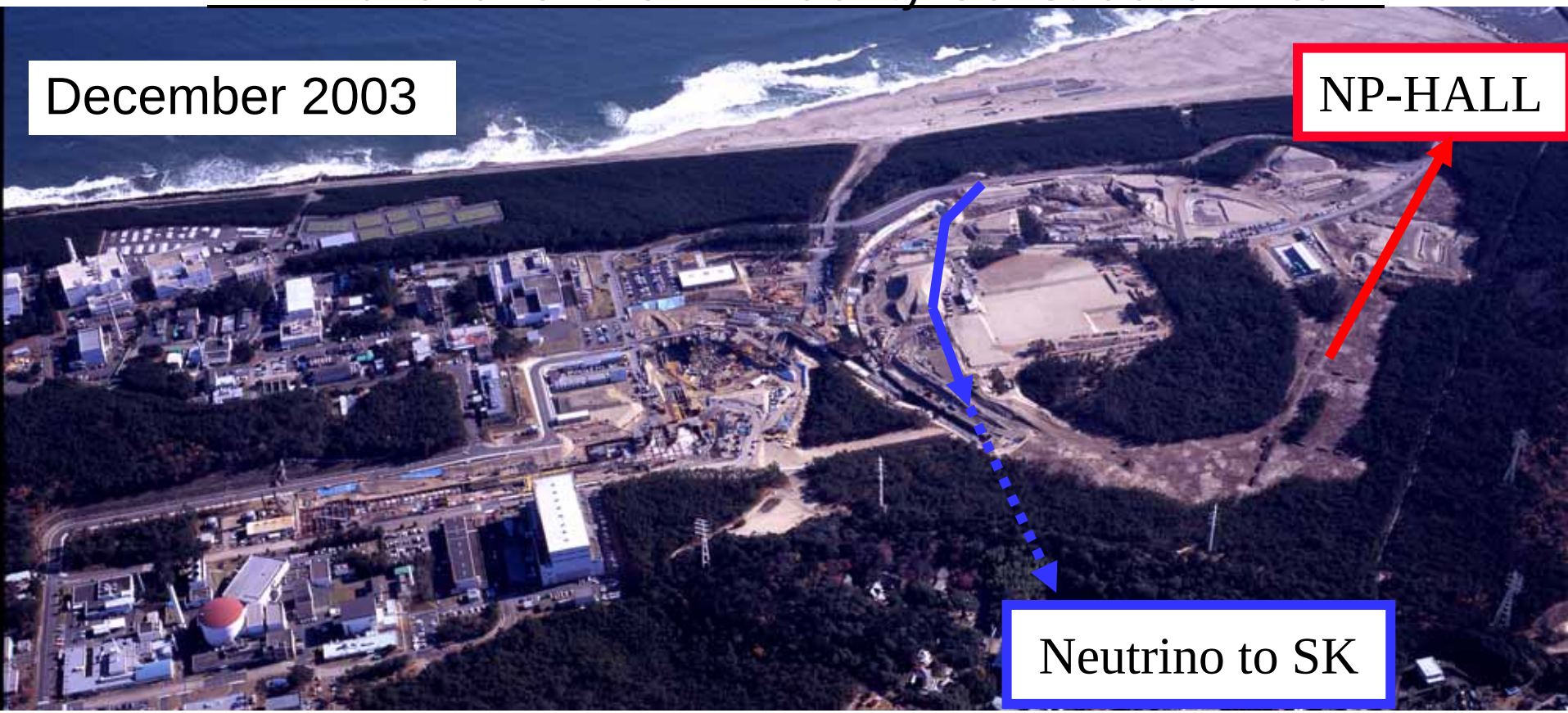
STATUS of the NP-Facility in J-PARC

K.H. Tanaka for the NP Facility Construction Team



- NP-Hall: Experimental Hall for 50GeV-15 μA Slow Beam
  - The First (Only One?) ***KAON FACTORY*** in the World
- Neutrino Beam Facility (JHF-ν) : Long Baseline Experiment

Beam Profile of JHF-50GeV PS (Phase 1$^-$)

- Beam Energy： 50GeV
  (30GeV for **Slow Beam**)
  (40GeV for Fast Beam)
- Beam Repetition: 3.4s
- External Beam Width： 0.7s (1.0s) **Slow Beam**
- Beam Intensity: 3.3×10^{14}ppp, 15μA
  (2×10^{14}ppp, 9μA)

E_{Linac} = 400MeV (180MeV)

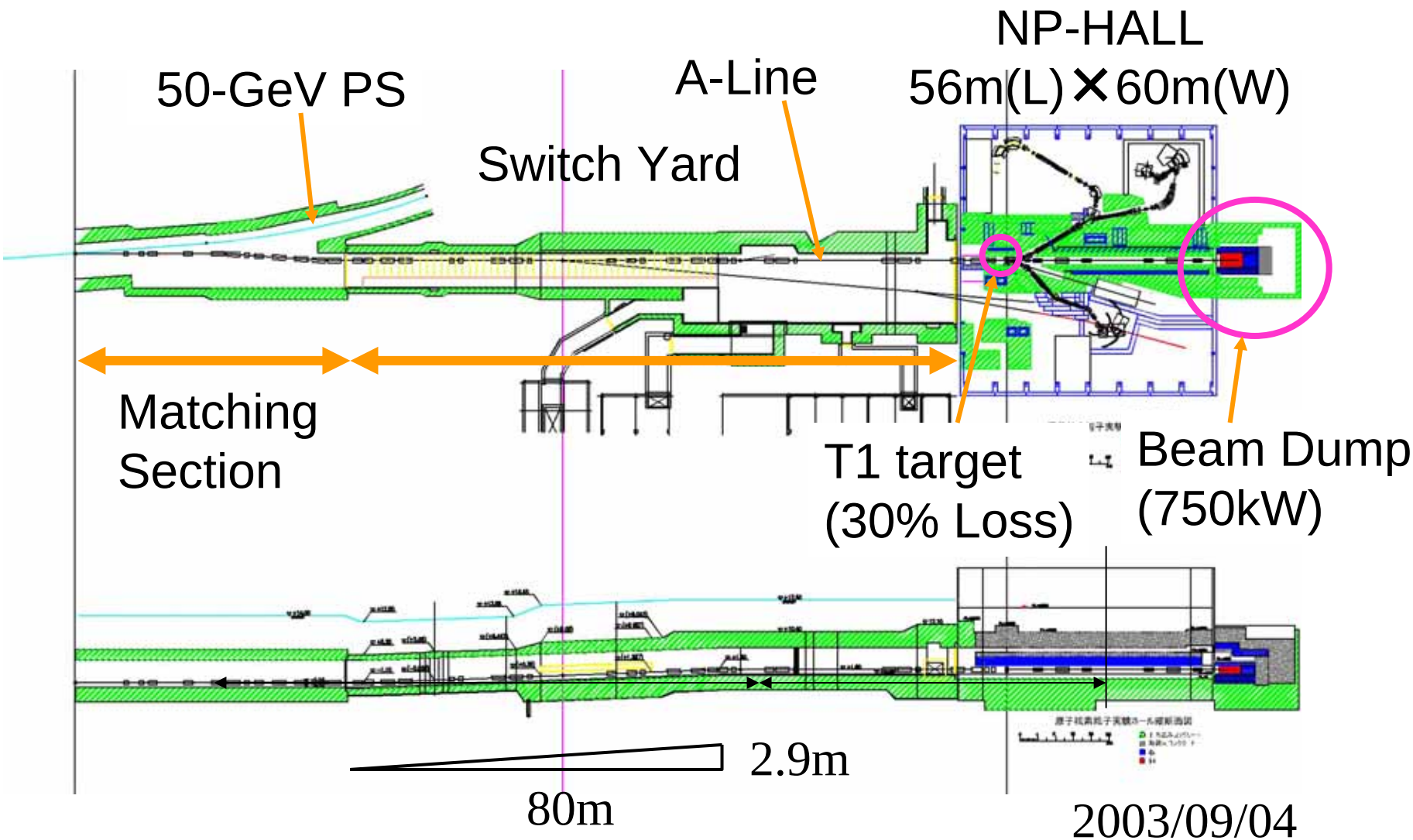
- Beam Power: 750kW (270kW)

Progress in JFY 2003 for NP-Hall Design

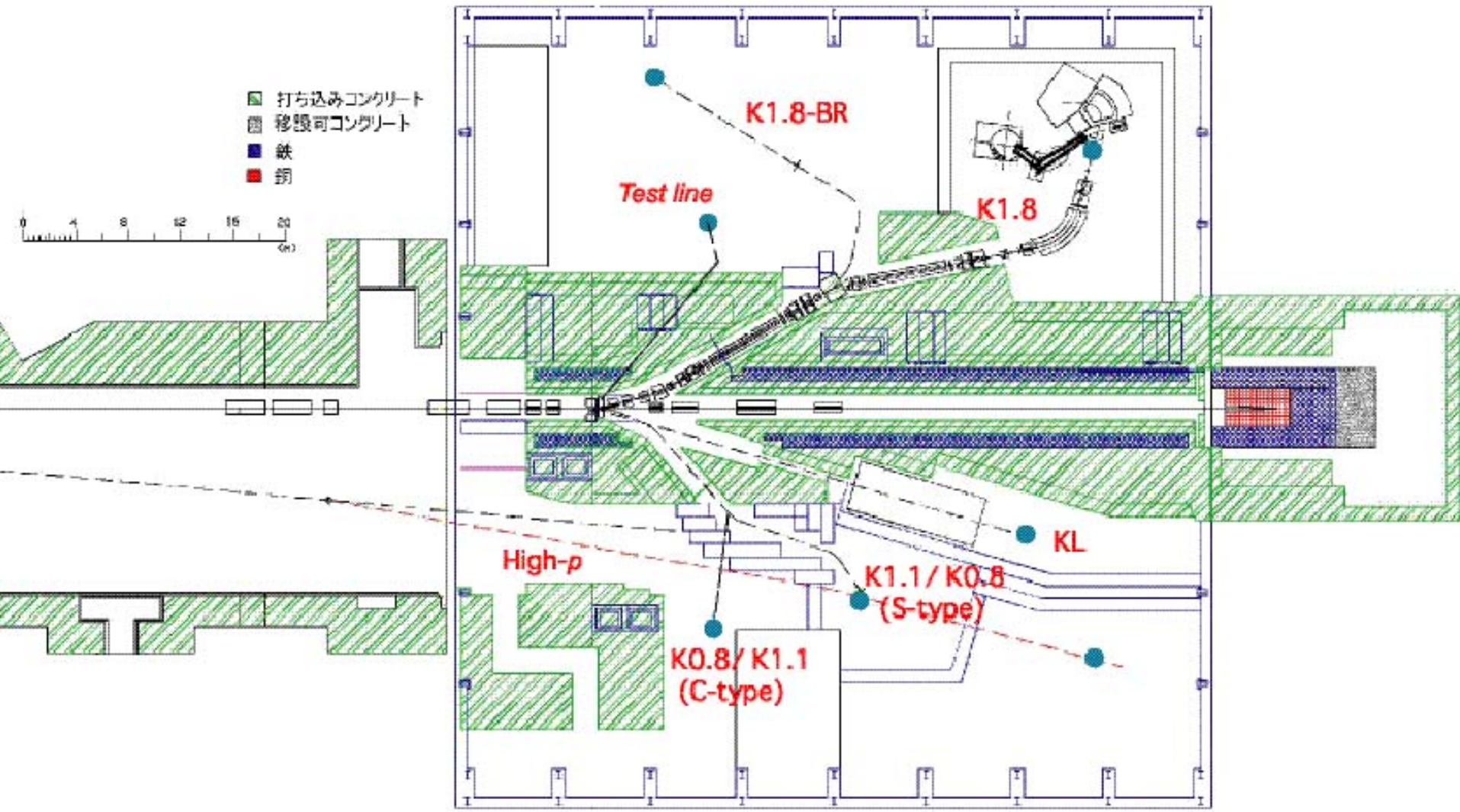
- ***NP-Hall Design & Beamlines***

  at Phase 1
- ***Radiation/Heat Resistant Beam Line System*** for SY/ν-line & NP-Hall
- ***T1 Target*** & its Related Parts
- ***Beam Dump***

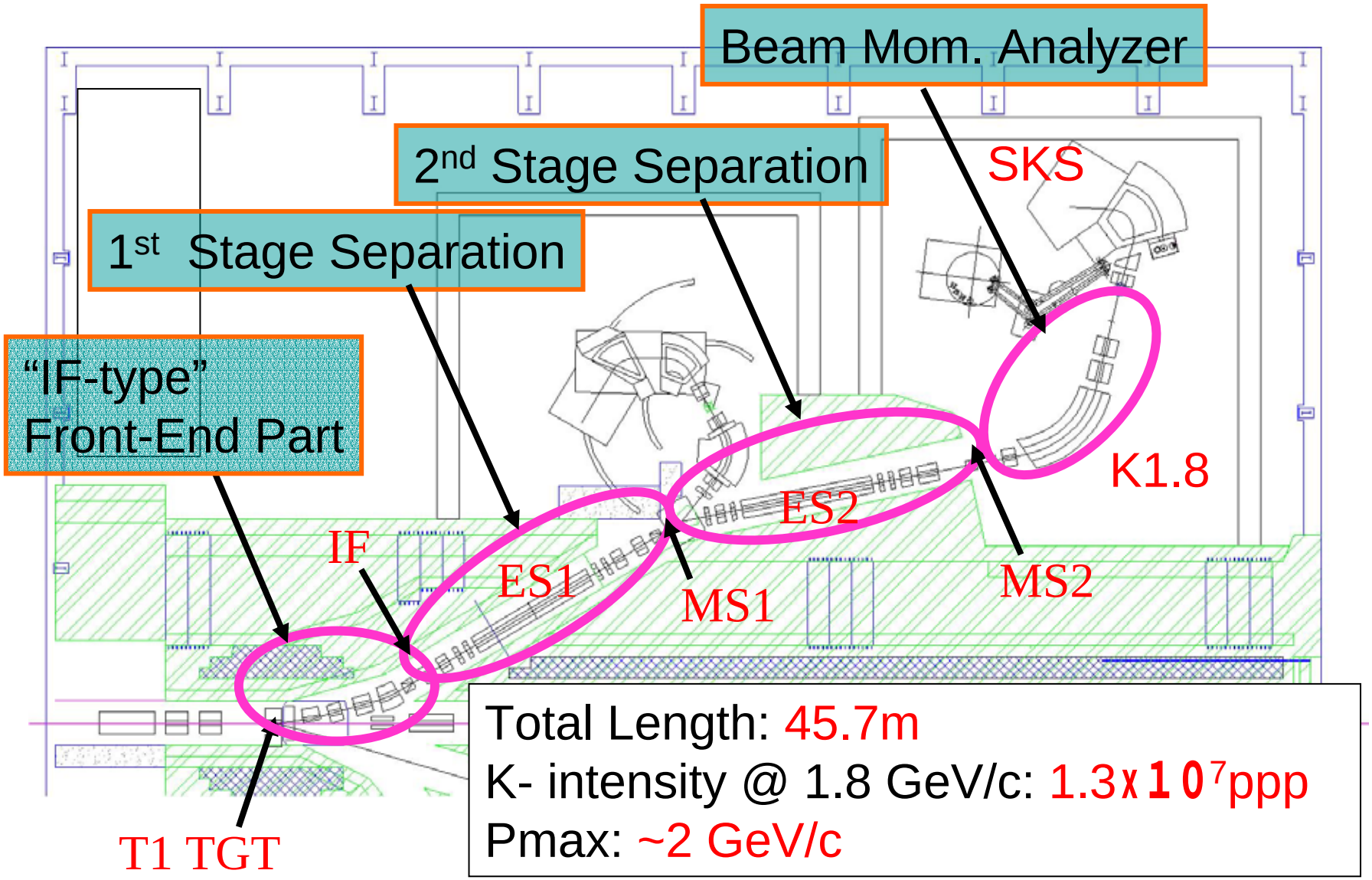
Slow Extraction Beam Line Facility (Phase I)



Phase-1 layout



K1.8 Separated Kaon Beamline

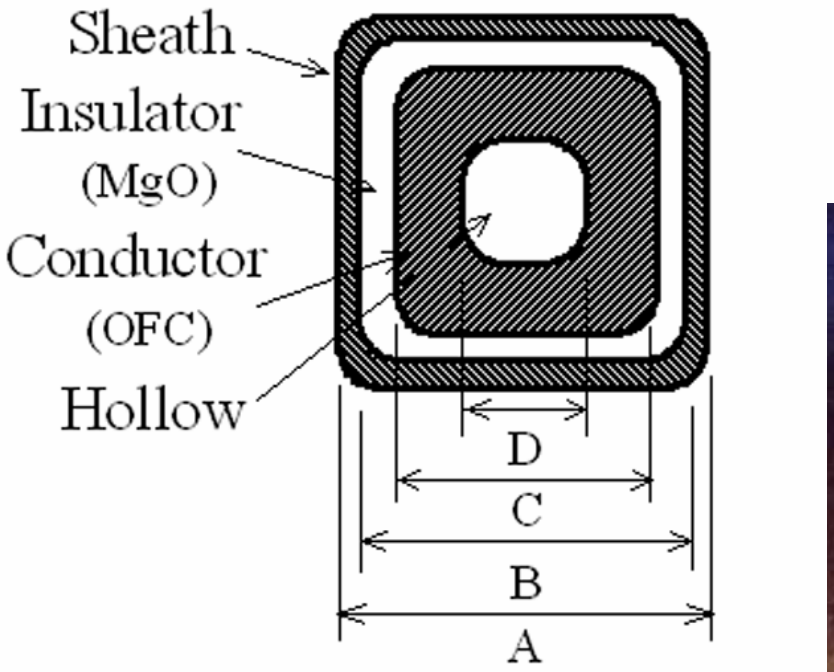


Total Length: 45.7m

K- intensity @ 1.8 GeV/c: 1.3×10^{7} ppp

Pmax: ~2 GeV/c

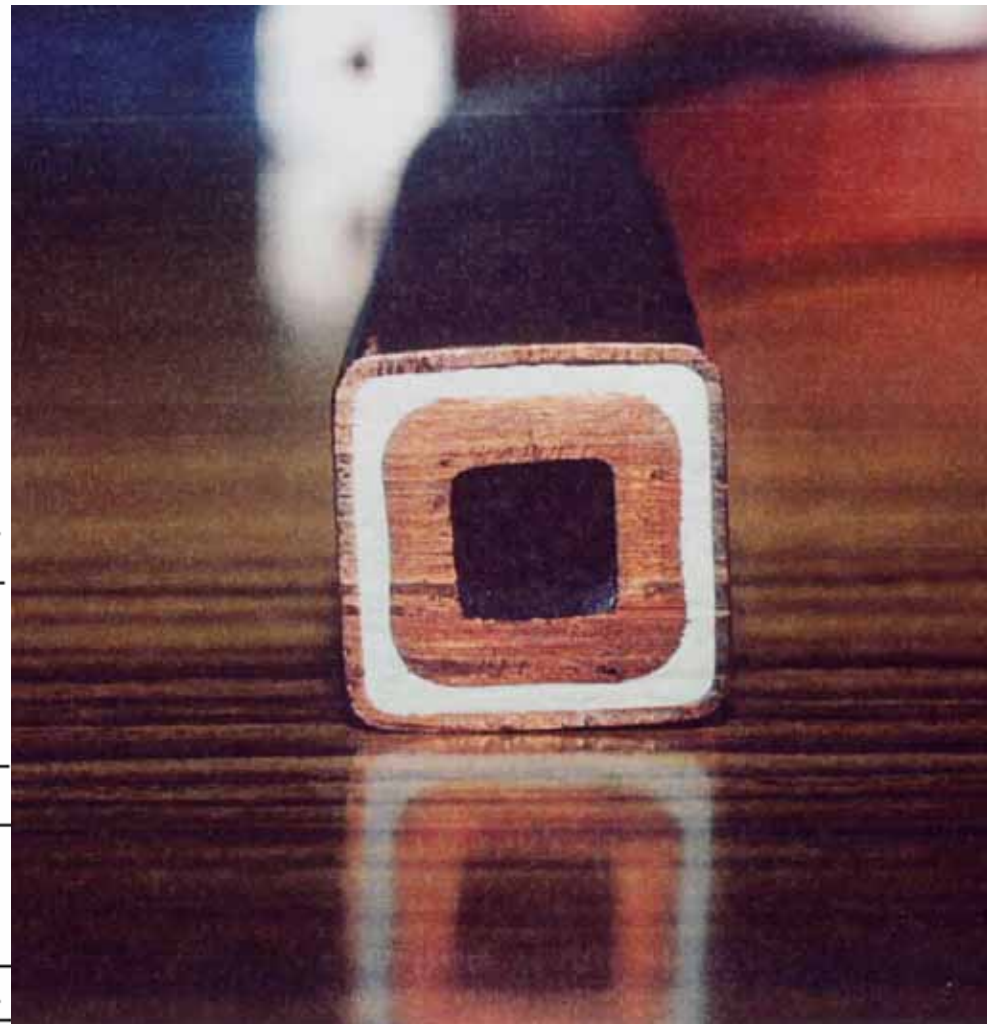
Radiation Resistant Beamline System



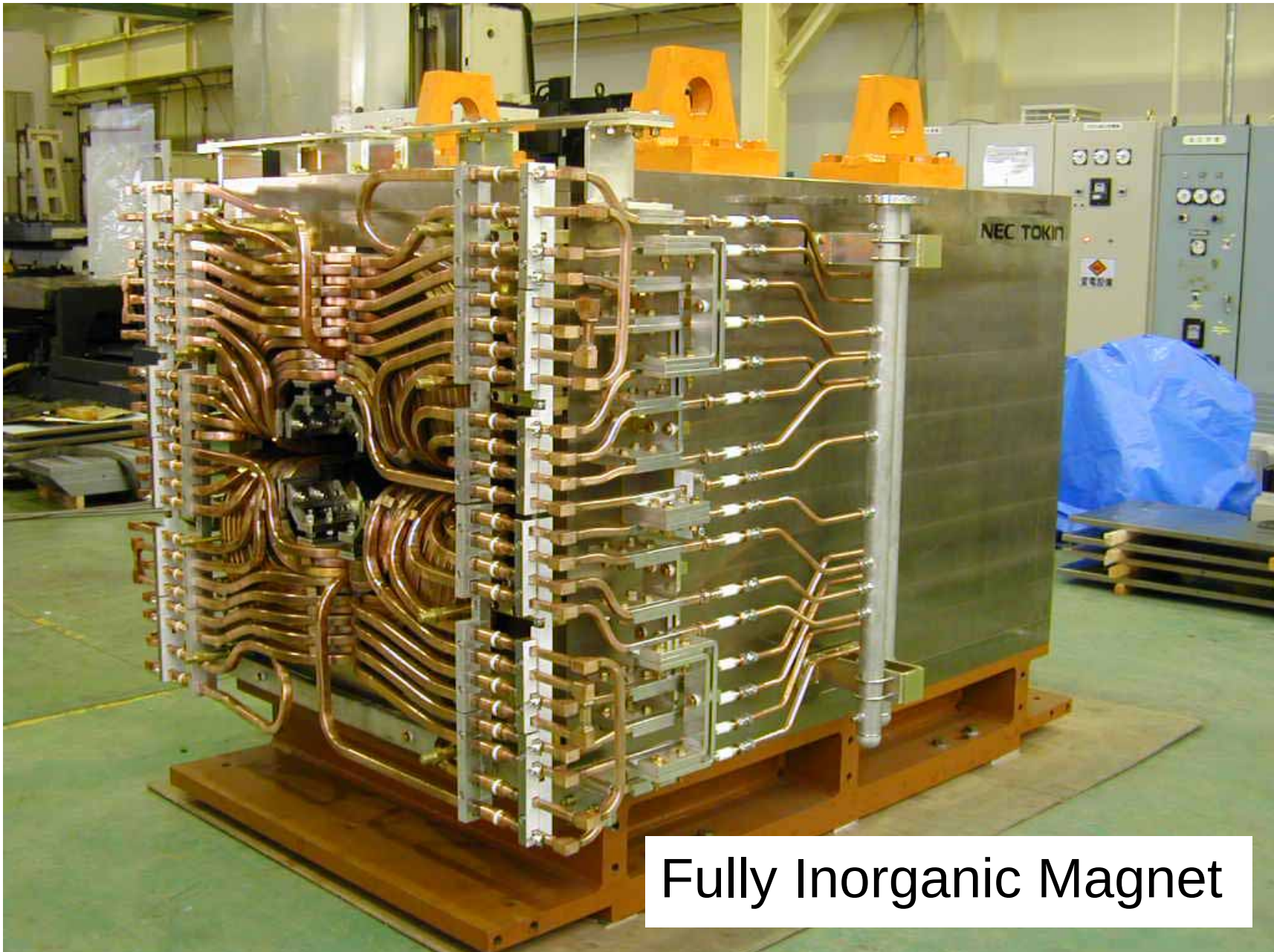
Nominal Current (A)	2000	2500	3000	1000*	2000*
Dimmensions (mm)					
A: Outward Size	20.0	23.8	28.0	18.0	14.0
B: Insulator Size	18.0	21.6	25.0	16.6	12.6
C: Conductor Size	14.6	18.0	20.0	13.2	9.2
D: Hollow Size	7.4	10.0	10.0	--	--
Cross Section (mm^2)					
Conductor	150.9	211.7	293.1	168.4	78.8
Insulator	117.7	153.2	227.4	106.6	79.4
Seath	73.4	95.3	150.6	47.8	36.6

* indicates Solid Conductor MICs. No hollow is in Cu conductor.

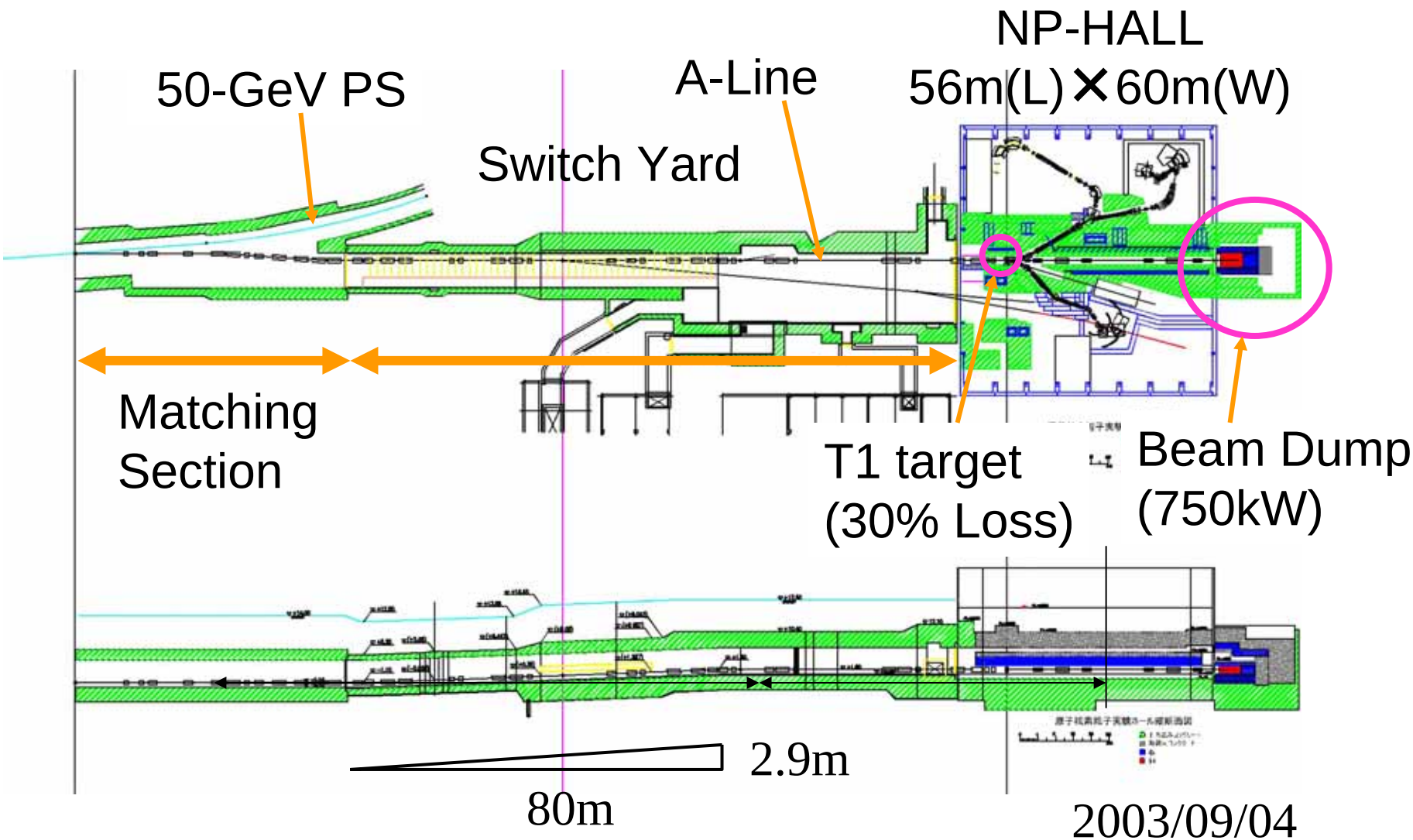
Mineral Insulation Cable



Construction of actual magnet Q440MIC

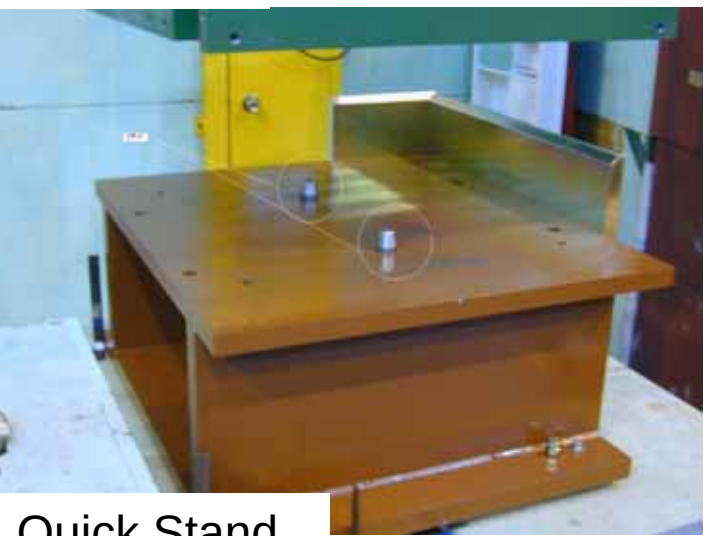


Slow Extraction Beam Line Facility (Phase I)

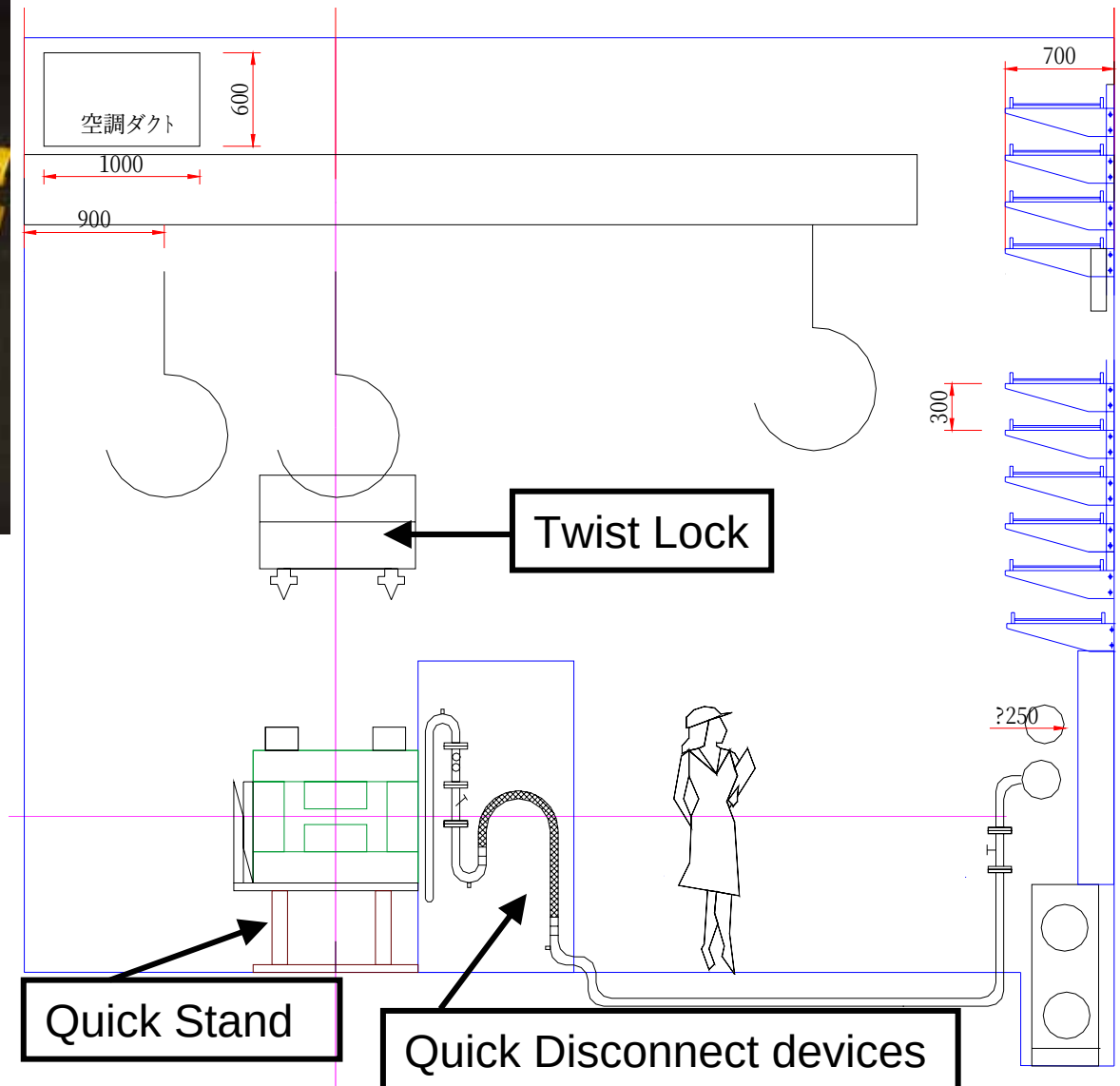


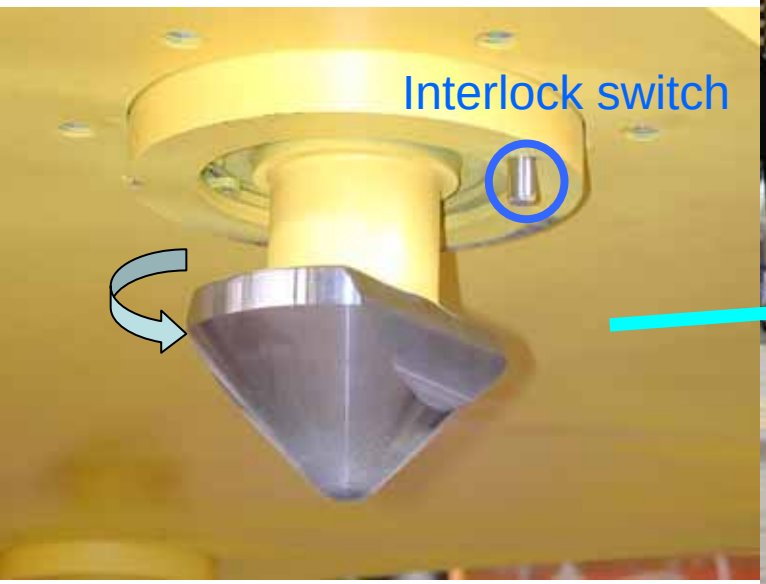
Development of remote alignment system for SY and ν-beam

Twist Lock



Quick Stand

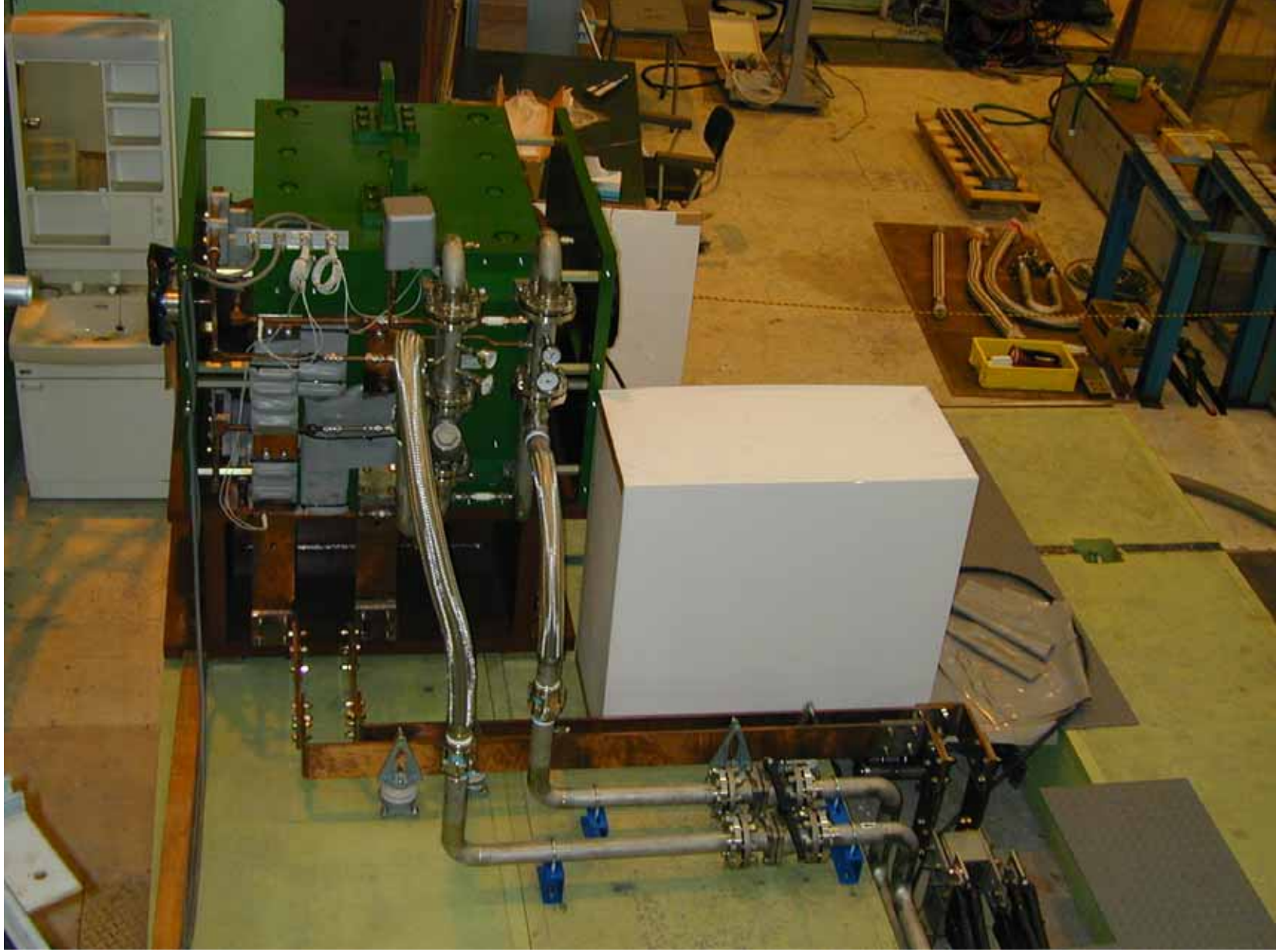




Twist lock

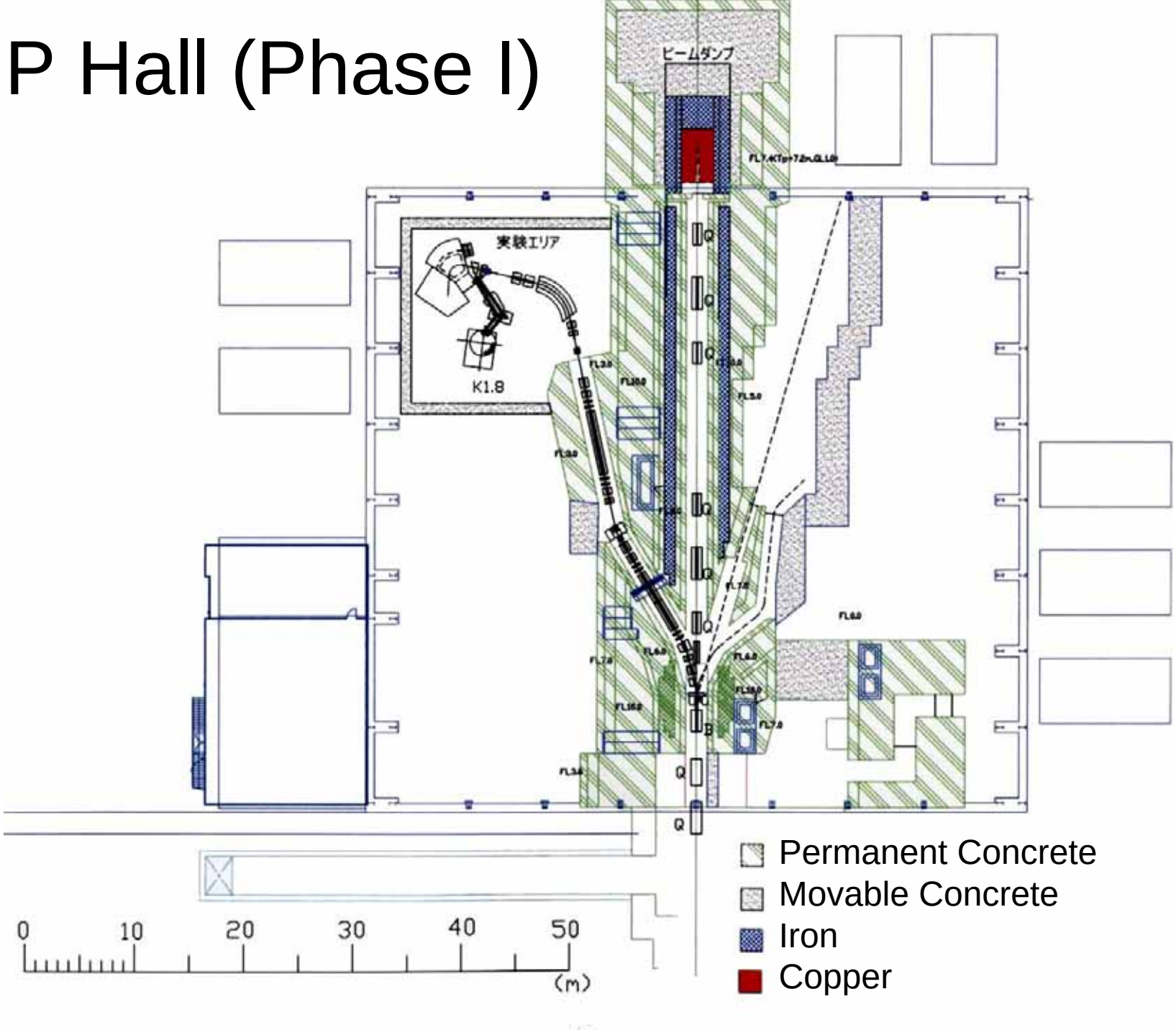
“Twist Lock” system for automated magnet lifting

Corner fitting

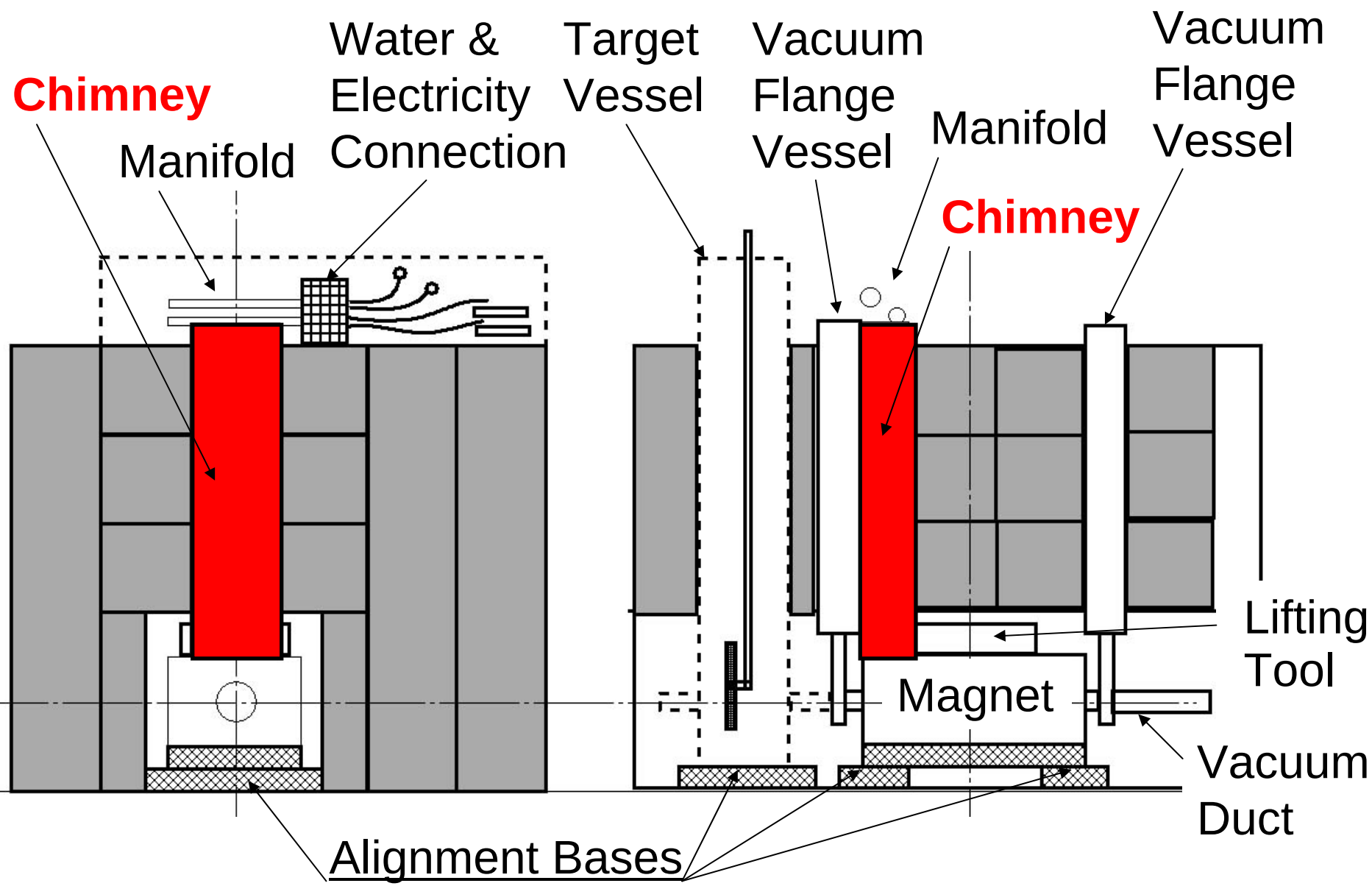


SY and ν line Mockup

NP Hall (Phase I)



Chimney for NP-Hall Magnets

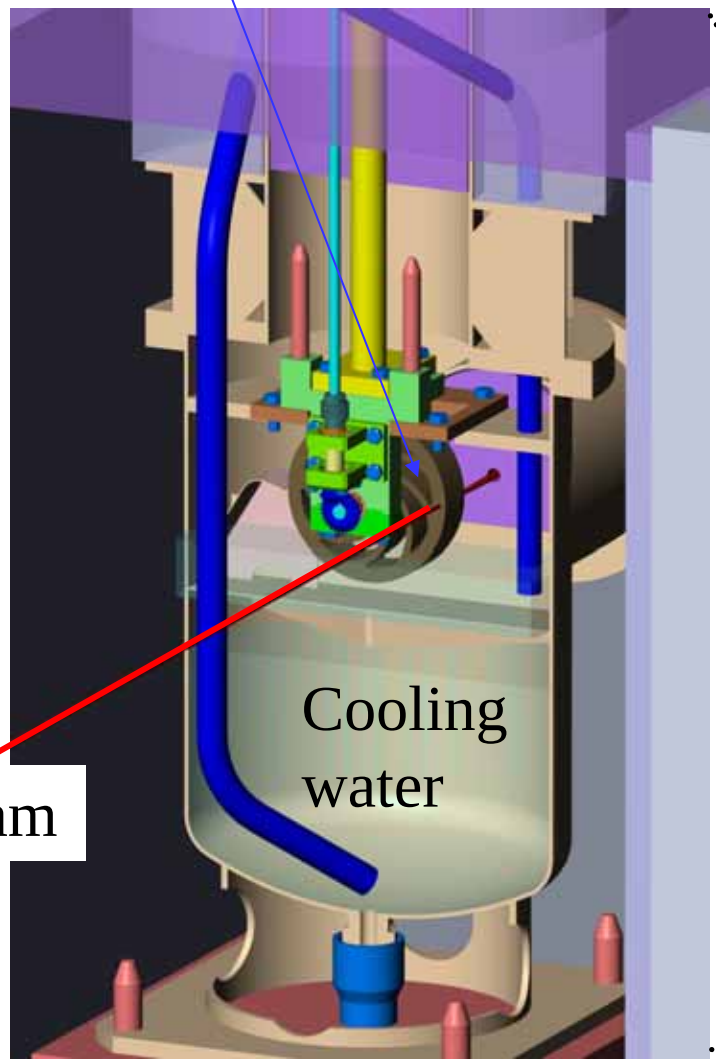


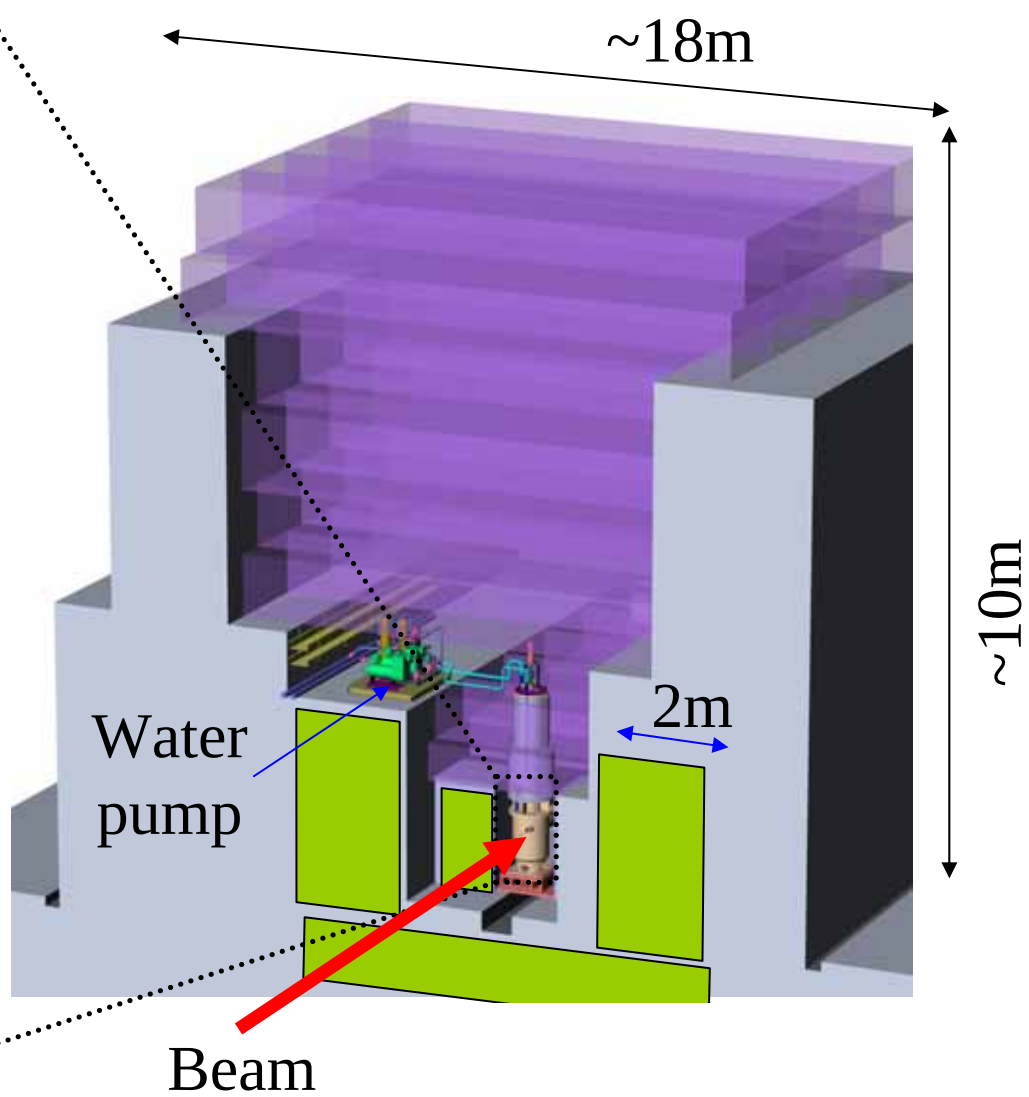
Chimney for NP-Hall Magnets

Magnet **Chimney** Prototype No. 0

T1 Target R&D (by Yamanoi)

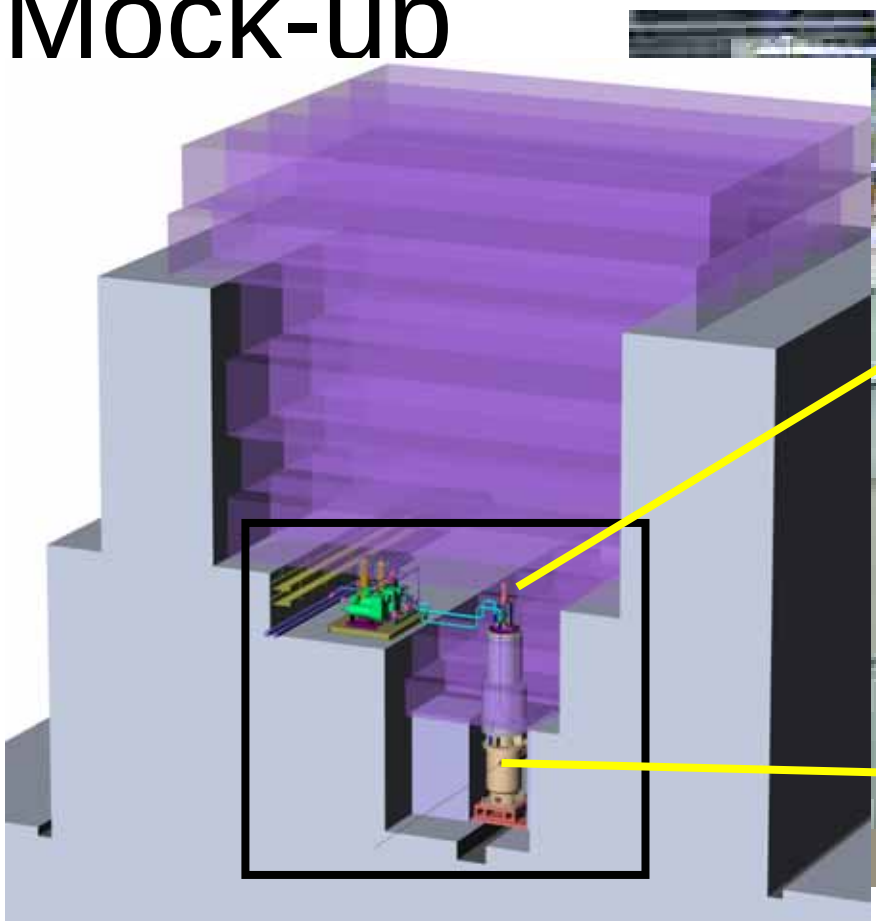
Ttarget disk
5.4cm Thick
50cm Diam.

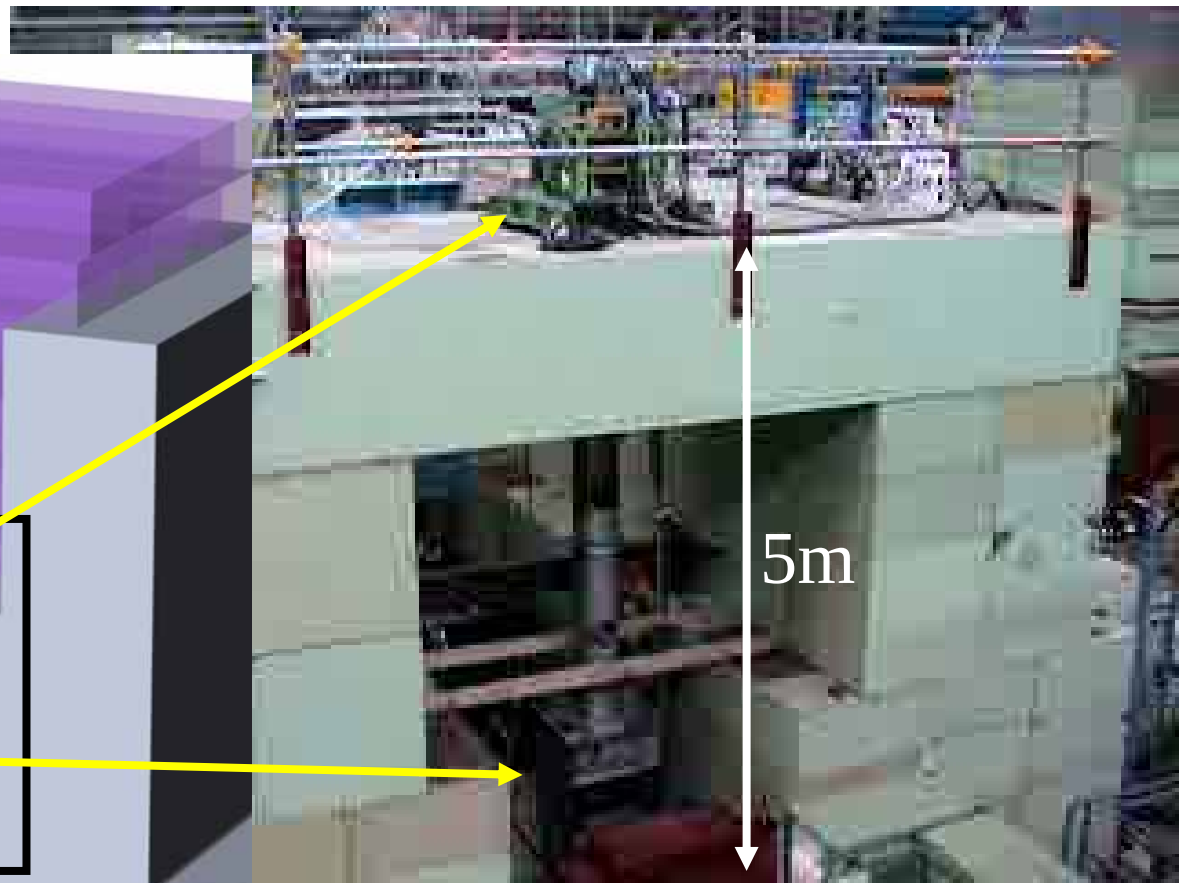




T1 Target Proto Type

East Hall
Mock-up

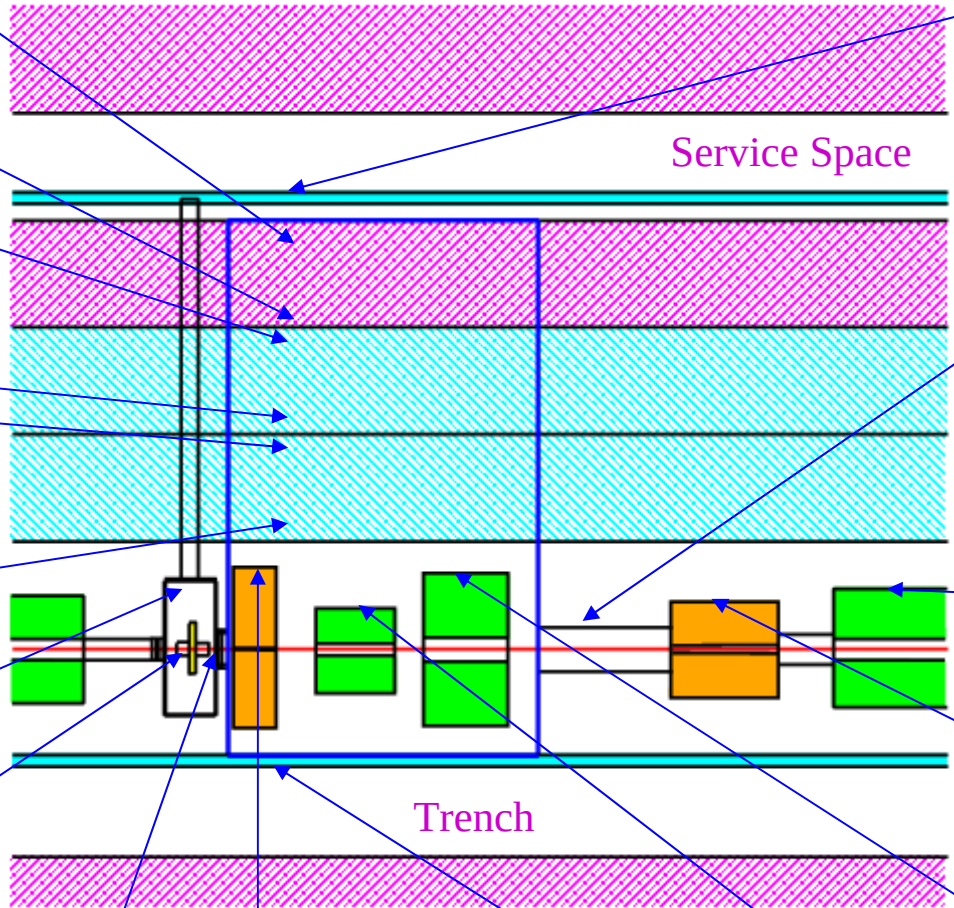




東カウンターホール

Residual Dose

30Days Operation/1Day Cooling
1Year Operation/Half Year Cooling



Concrete
7.9 μSv/h
0.03 μSv/h

Concrete
5.3 mSv/h
1.6 μSv/h

Iron
60 μSv/h
11 μSv/h

Iron
430 μSv/h
160 μSv/h

Iron
1.1 mSv/h
460 mSv/h

Iron
170 mSv/h
460 mSv/h

T1 Vessel
2.2 Sv/h
850 mSv/h

T1 Target
650 Sv/h
230 Sv/h

Vacuum Seal
30 Sv/h
11 Sv/h

Collimator
380 mSv/h
100 mSv/h

Iron Base
560 mSv/h
210 mSv/h

D1
530 mSv/h
270 mSv/h

Q1
62 mSv/h
33 mSv/h

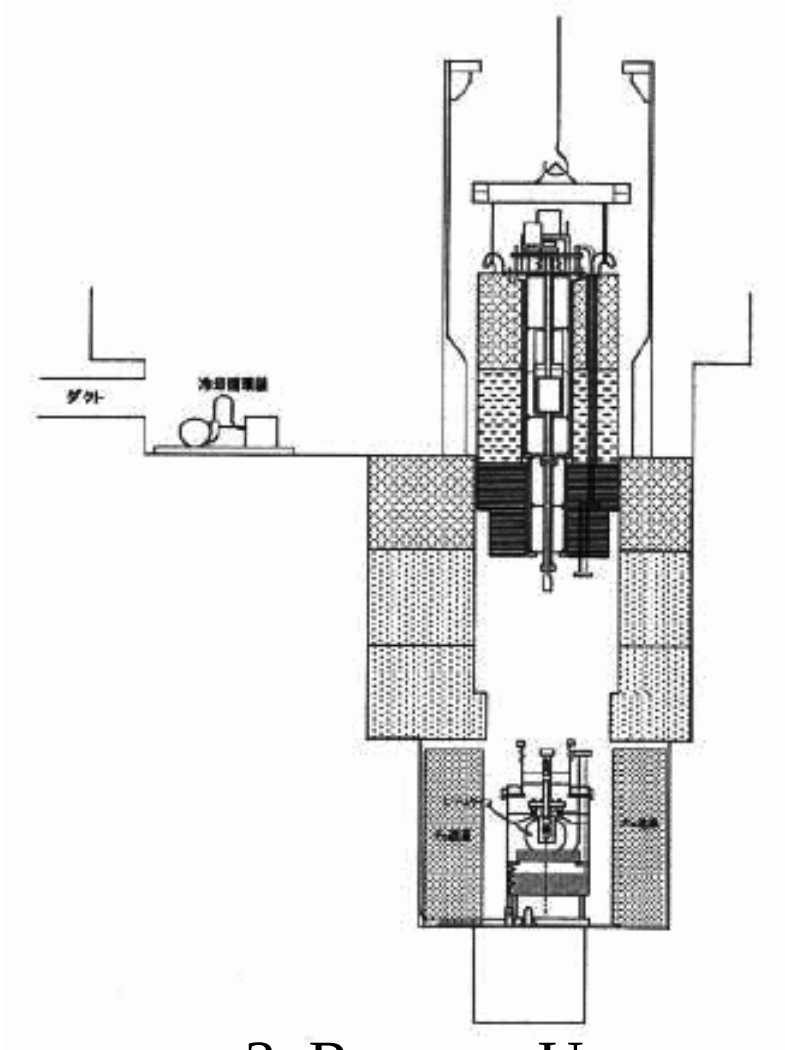
Collimator
710 mSv/h
420 mSv/h

q1B
110 mSv/h
49 mSv/h

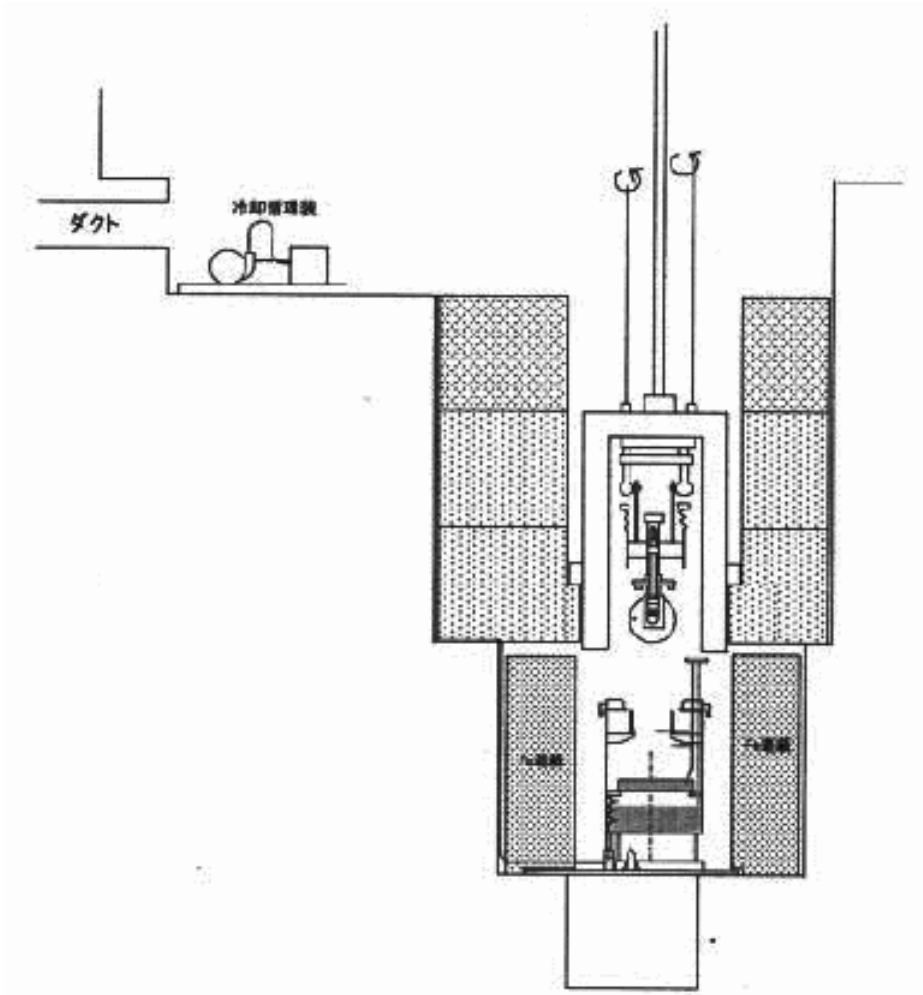
Vacuum Duct
SUS 3.2 Sv/h
1.2 Sv/h
Ti 1.1 Sv/h
97 mSv/h

Water Pipe (SUS)
8.4 μSv/h
2.4 μSv/h

T1 Maintenance Scenario



3, Remove Upper Parts with Shields



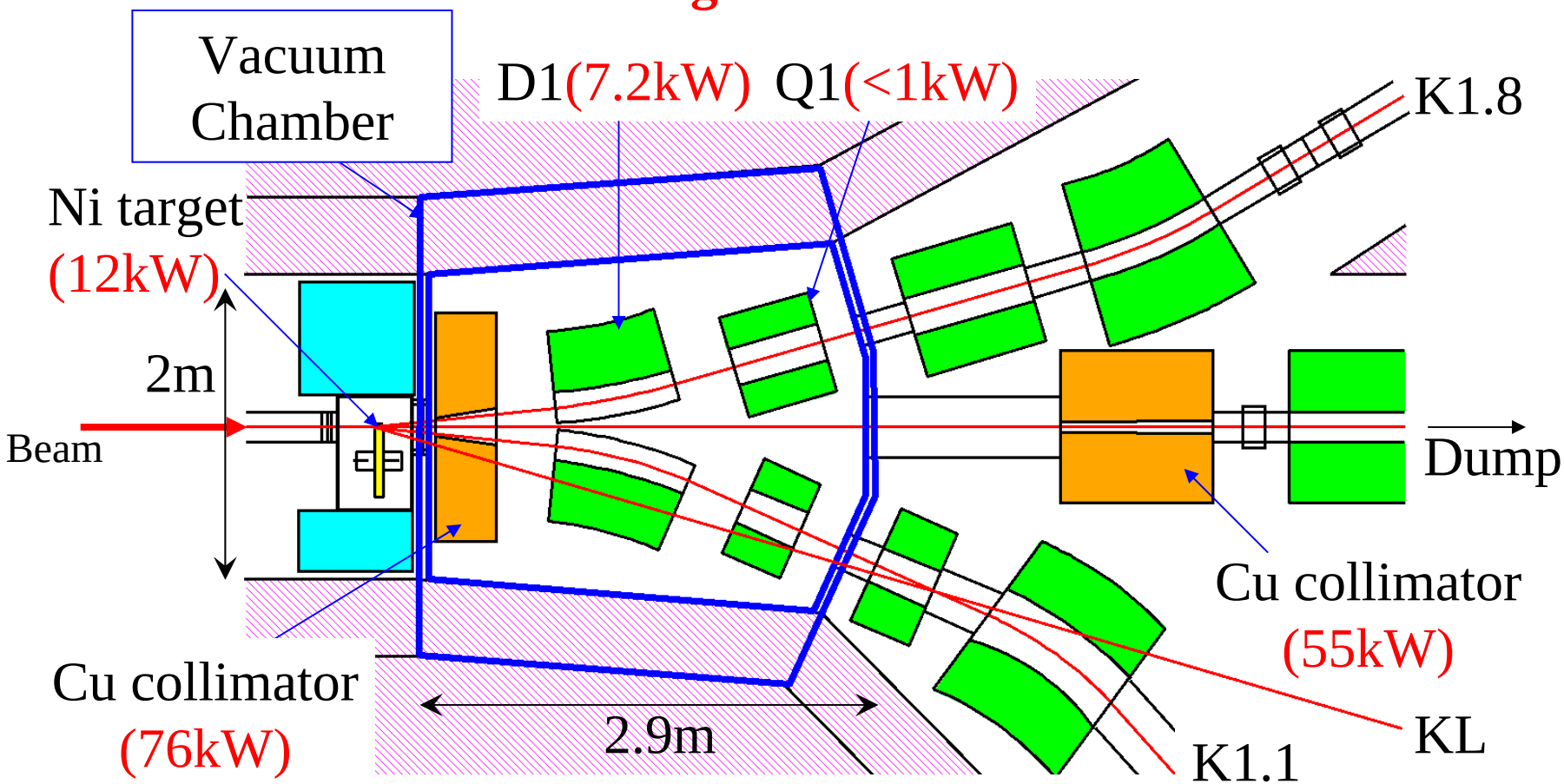
4, Remove Target Disk

Downstream of T1 Target

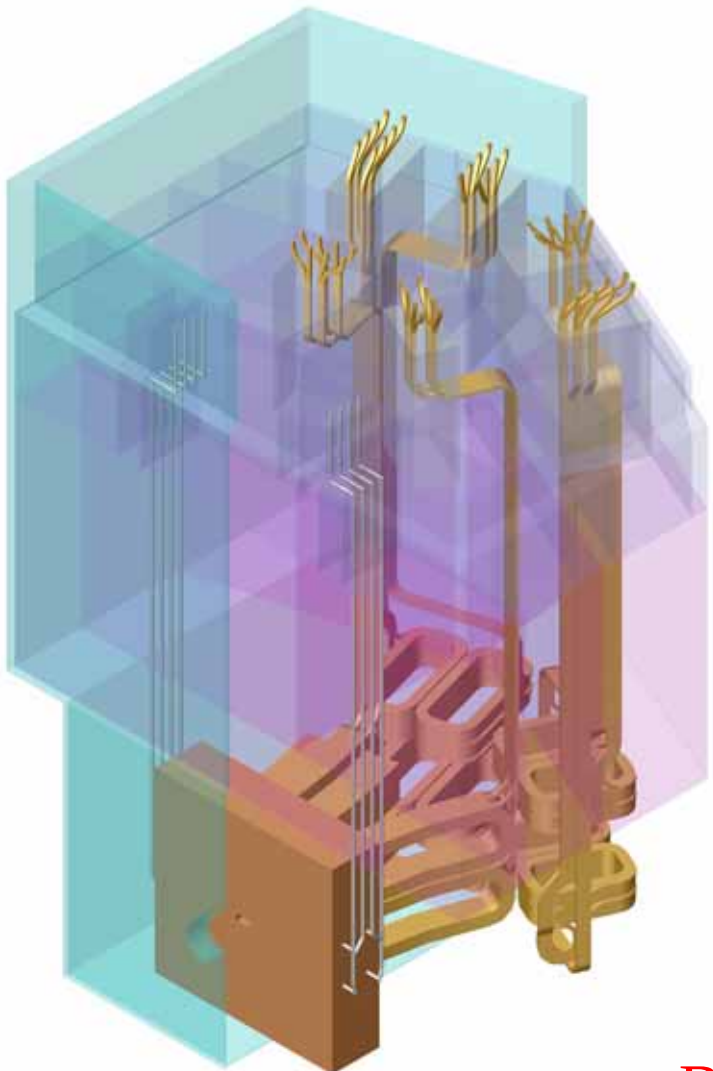
How to solve 200kW Hear Problem?

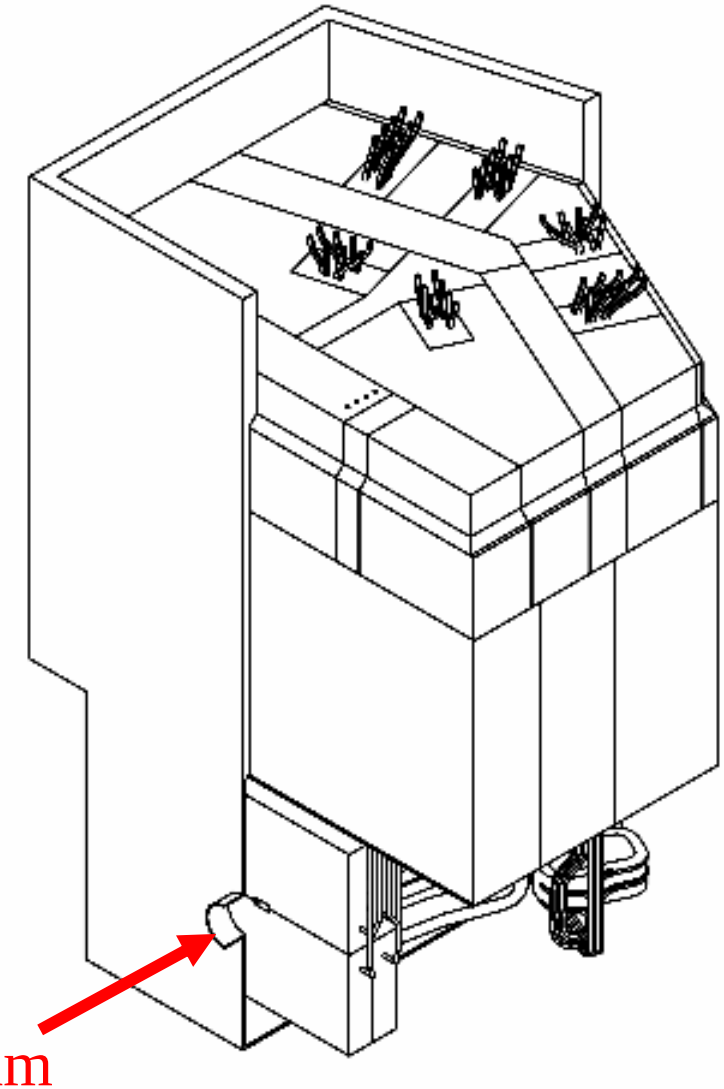
Magnets→ Upstream Collimator

Beam Ducts → Big Vacuum Chamber instear of Ducts



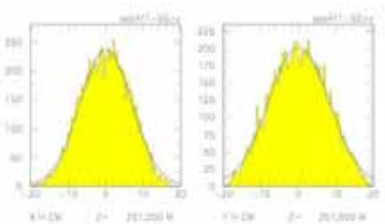
Big Vacuum Chamber!



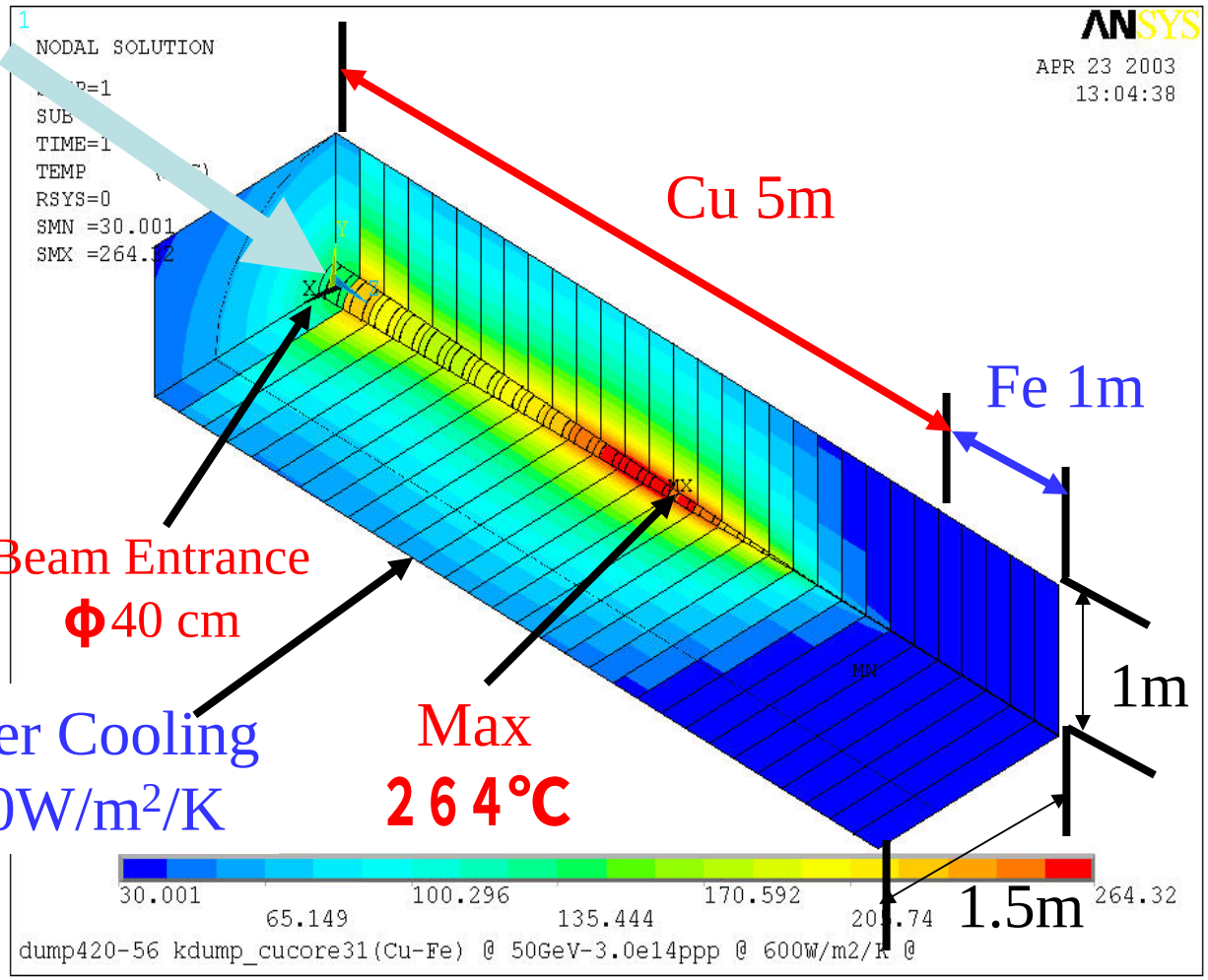


Beam Dump Design

Proton beam
50GeV-15μA
(750kW)
φ40cm



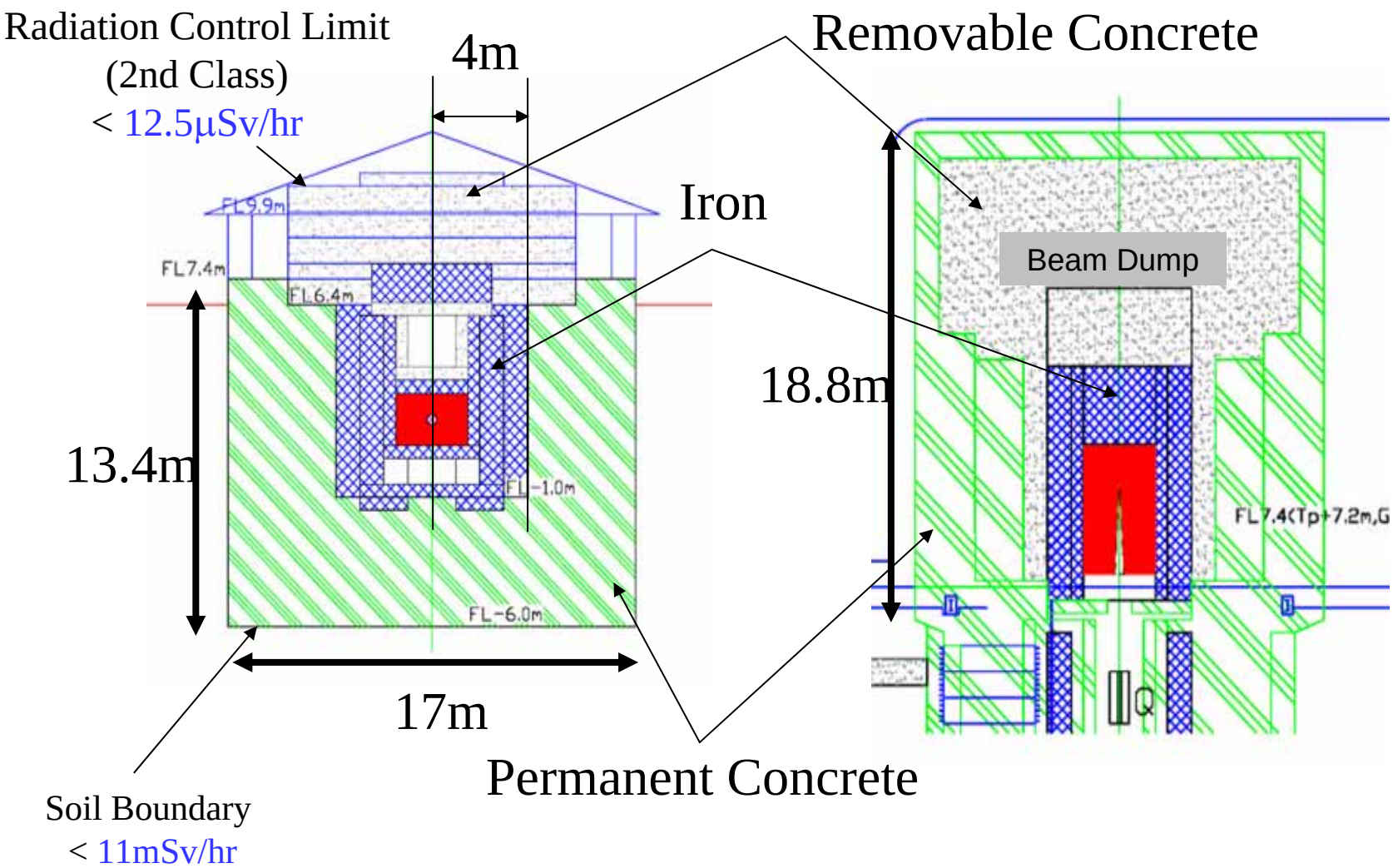
An Example of the Dump Core ¼ Model Calculation by MARS & ANSYS



OFC
ρ =8.9[g/cm³]
Thermal
Conductivity
390 [W/m/K]

(calculated by Y. SATO & M. MINAKAWA)

Beam Dump Structure

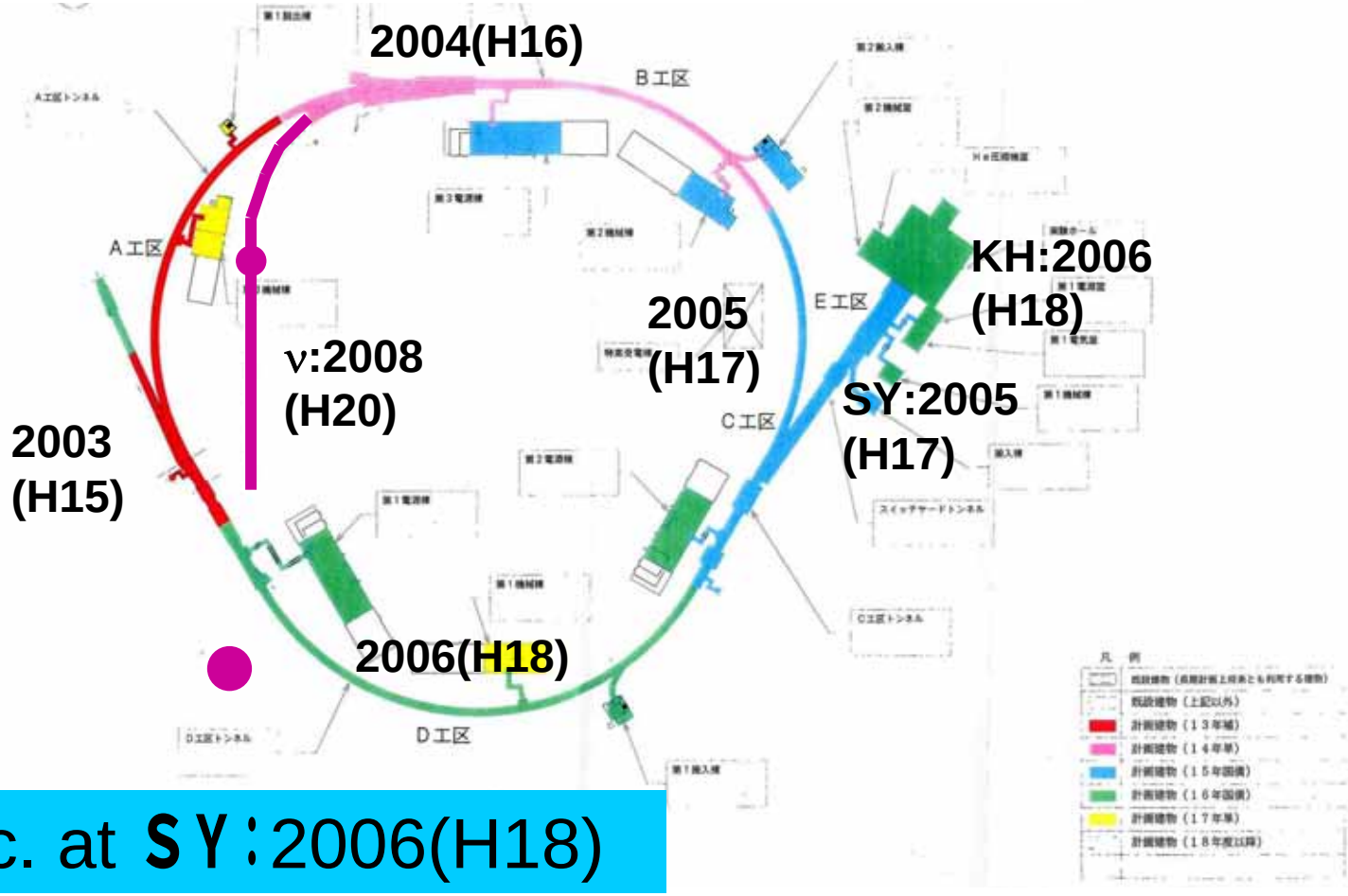


Summary & Status

- Facility Design & Beam Line Layout
  - Almost Completed
- High Intensity Beam Handling System
  - Almost Ready.
- Most Serious Parts,

  i.e. Target & Beam Dump
  - Final Stage of Design/R&D.

Construction Schedule



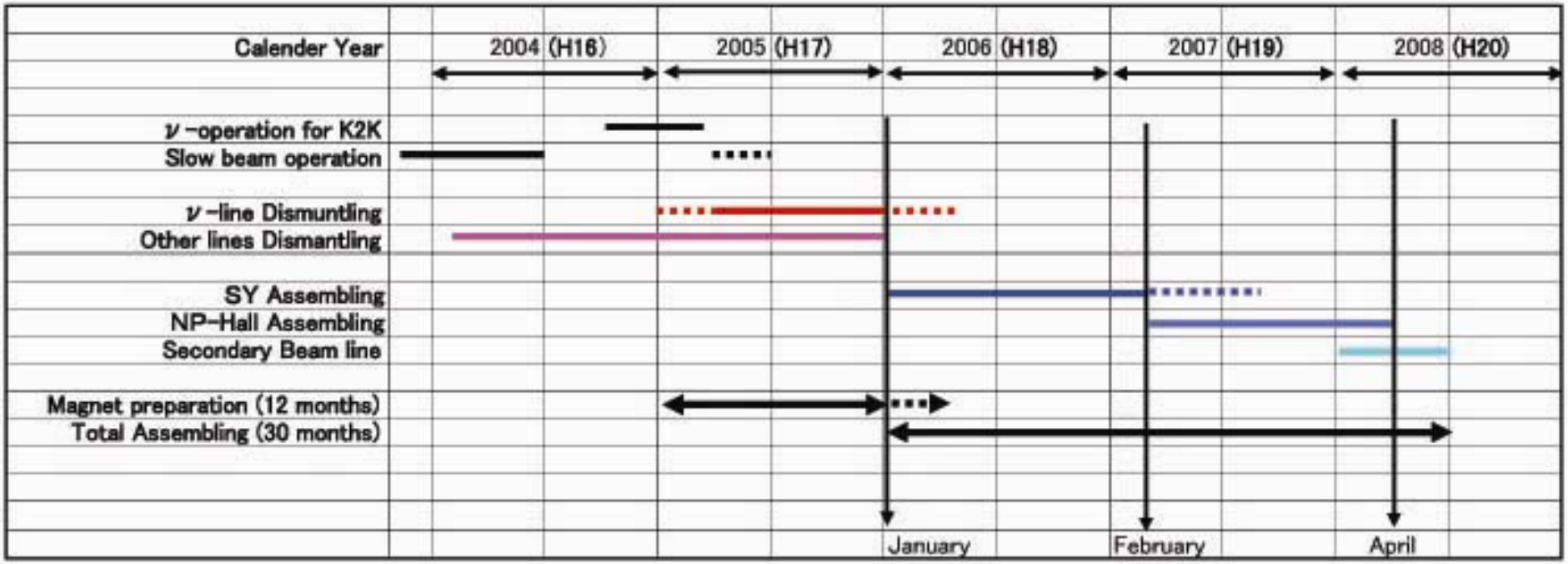
Magnets etc. at ＳＹ：2006(H18)

Magnets etc. at NP-Hall：2007(H19)

The first Beam to NP-Hall：2008(H20)?

ν-Beam：2009(H21)

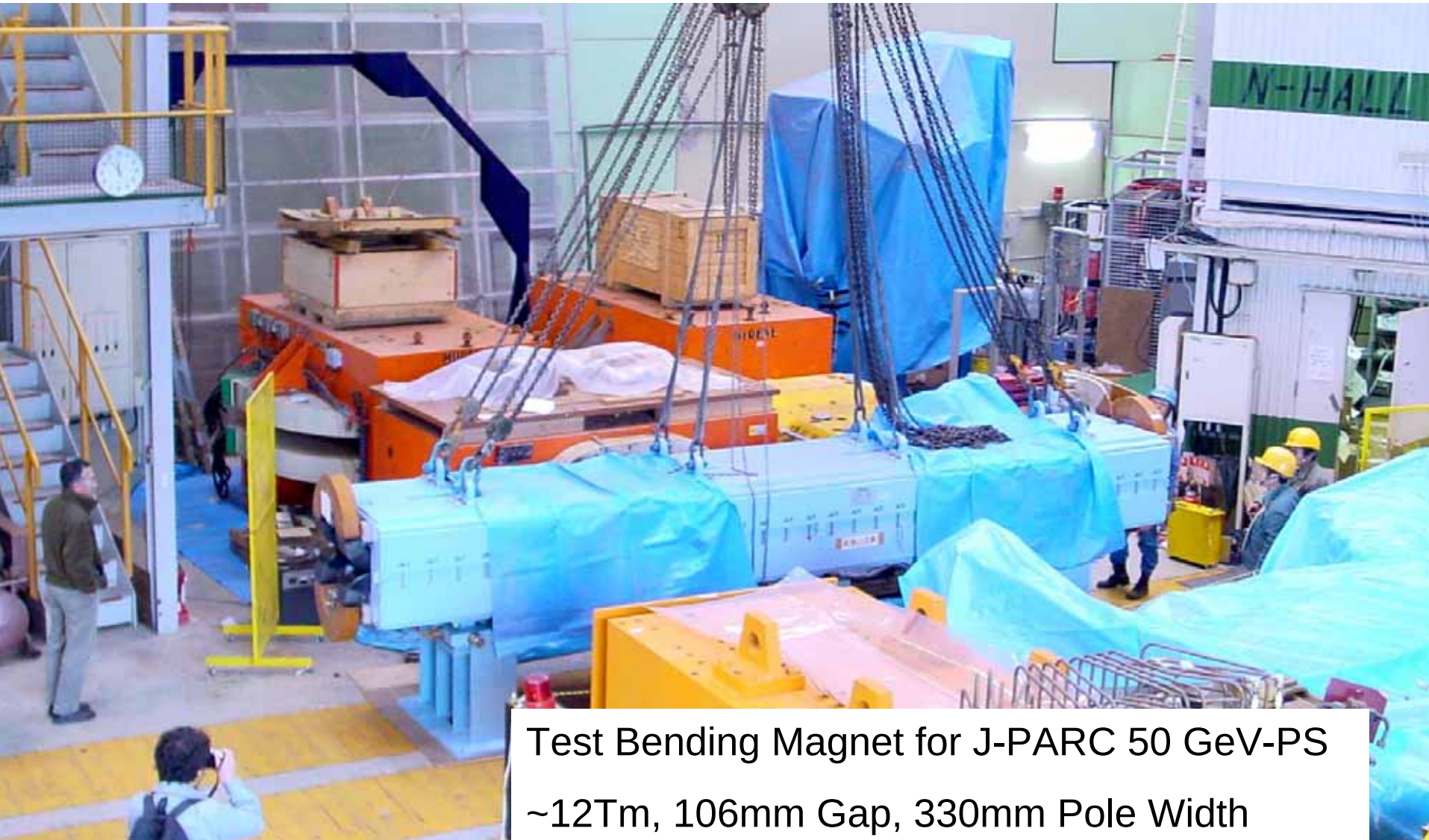
Dates of Remember



- January 2006: We can start SY settings
- January 2006: The most magnets should be ready
  - **January 2005**: We would like to start recycling magnets
  - **January 2005**: K2K should be shut down, ***please!***
    - Now **March 2005**: K2K shut down
    - Now **June 2005**: KEK-PS shut down
    - Till **June 2005** the most of construction team should take care of the external beam lines of the KEK-PS.
- February 2007: We can start NP-Hall settings
- April 2008: The construction should be completed (officially) & the first beam!

Magnet Collection Project

Our Latest Acquisition!



Test Bending Magnet for J-PARC 50 GeV-PS

~12Tm, 106mm Gap, 330mm Pole Width

Hadron Beam Sub-Group