



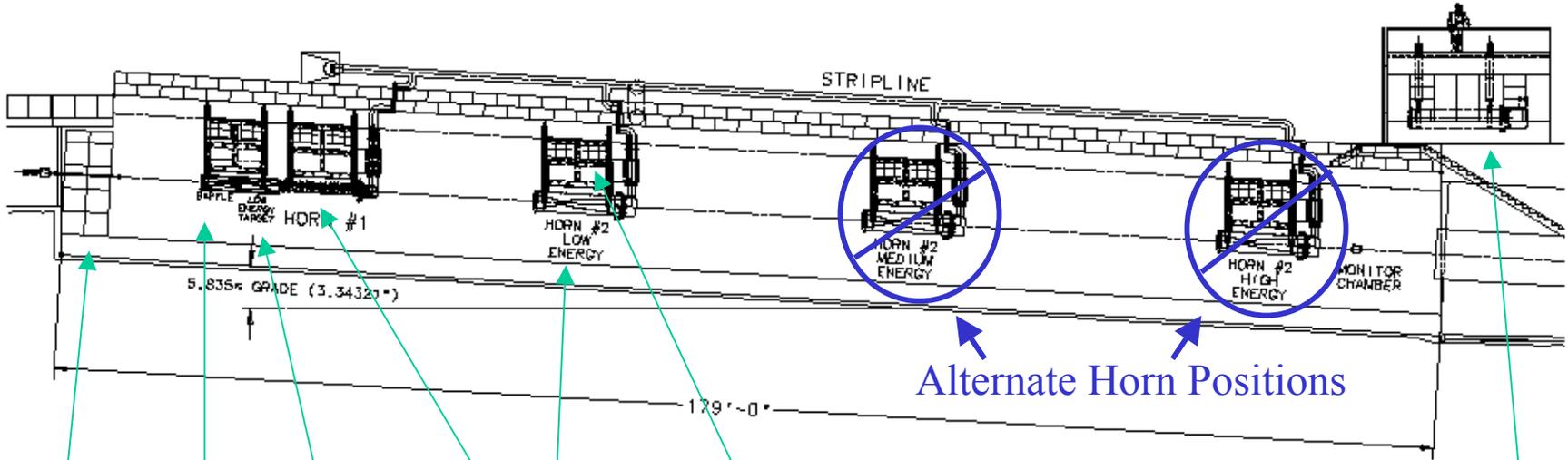
# Target Hall Installation

- 1) Scope of items to be installed
- 2) Special conditions for installation
- 3) Installation Schedule \*
- 4) “Prototype” installation exercises
- 5) What has changed since December Director’s Review -  
and what is left to do
- 6) Status of components to be installed \*

*\*in your packet, but not enough time to cover*



# WBS 1.1.2 Scope: Neutrino Beam Production Devices and Target Pile



Alternate Horn Positions

Beamline Component Positioning Modules

Two Types of Magnetic Focusing Horns

Pion Production Target (plus readout of target, vacuum pump)

Baffle to protect horn from beam accidents

Target Hall Radiation Shielding

Hot (Radioactive) Component Workcell and Hot Handling Procedures/Tooling

Shield Pile Recirculating Air Cooling System

Lifting fixtures, transportation carts, magnetic field probes, prototyping, test stand



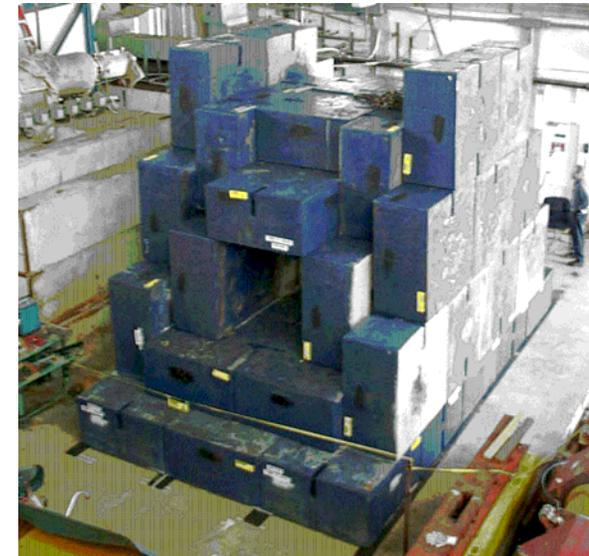
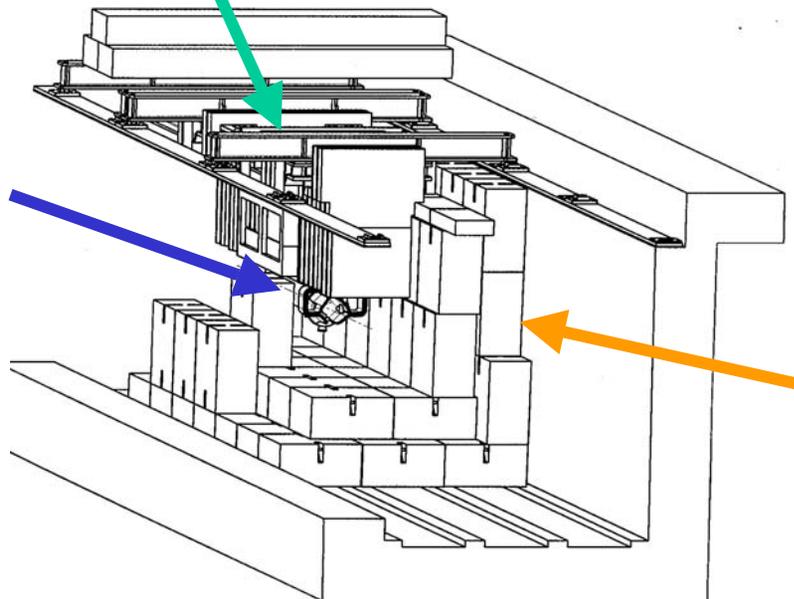
# Target Hall Installation

*(plus recirculating air cooling, target, hot work cell, etc)*

1 of three  
27 ton support modules



1 of two focusing horns



(10% of) Shielding Blocks



# NuMI Target Hall

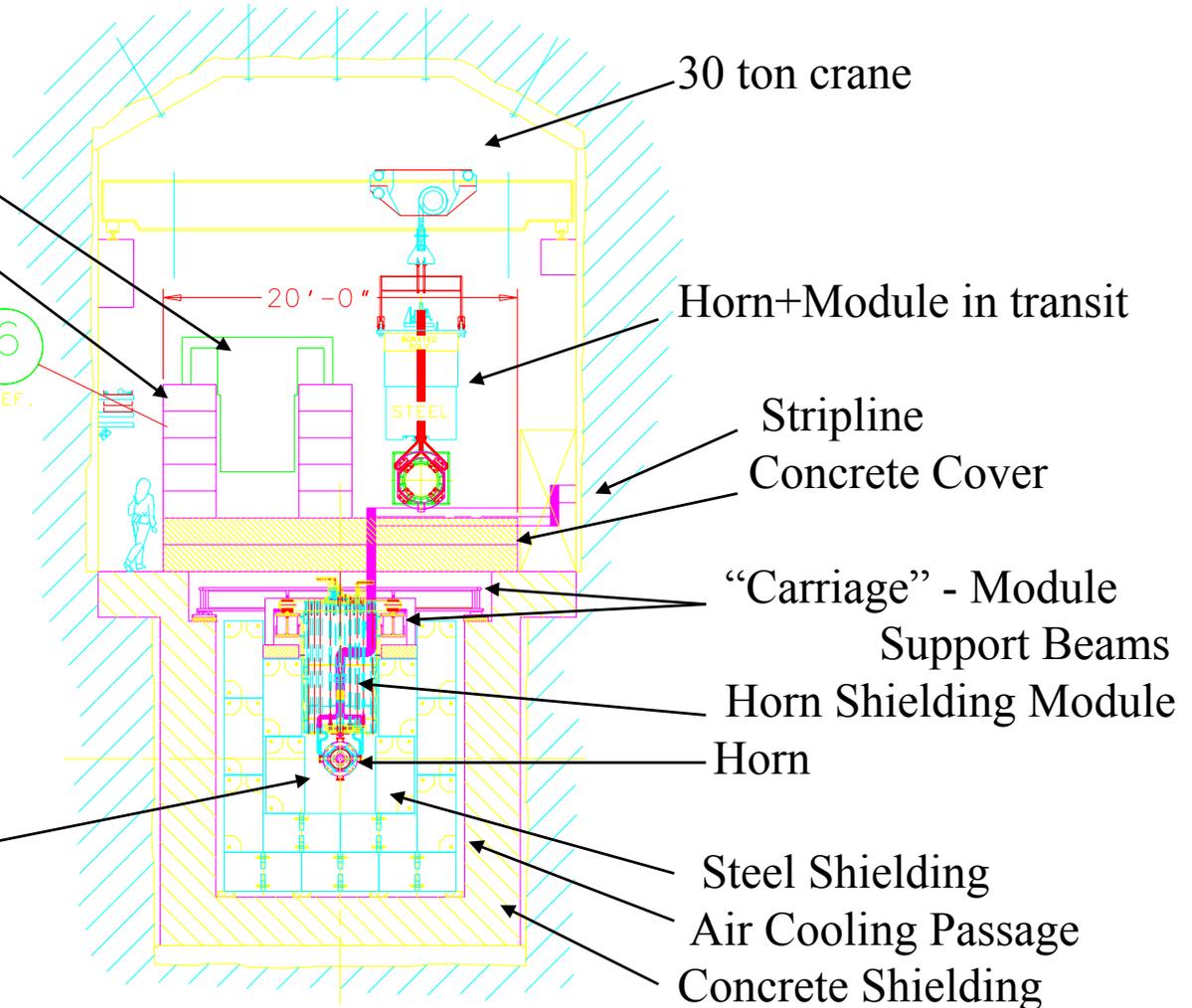
*general layout*

*Temporary Stackup  
of removed shielding*

Steel from module middle  
Concrete from over horn

6  
REF.

Beam passageway (chase)  
is 1.2 m wide x 1.3 high,  
forced-air-cooled

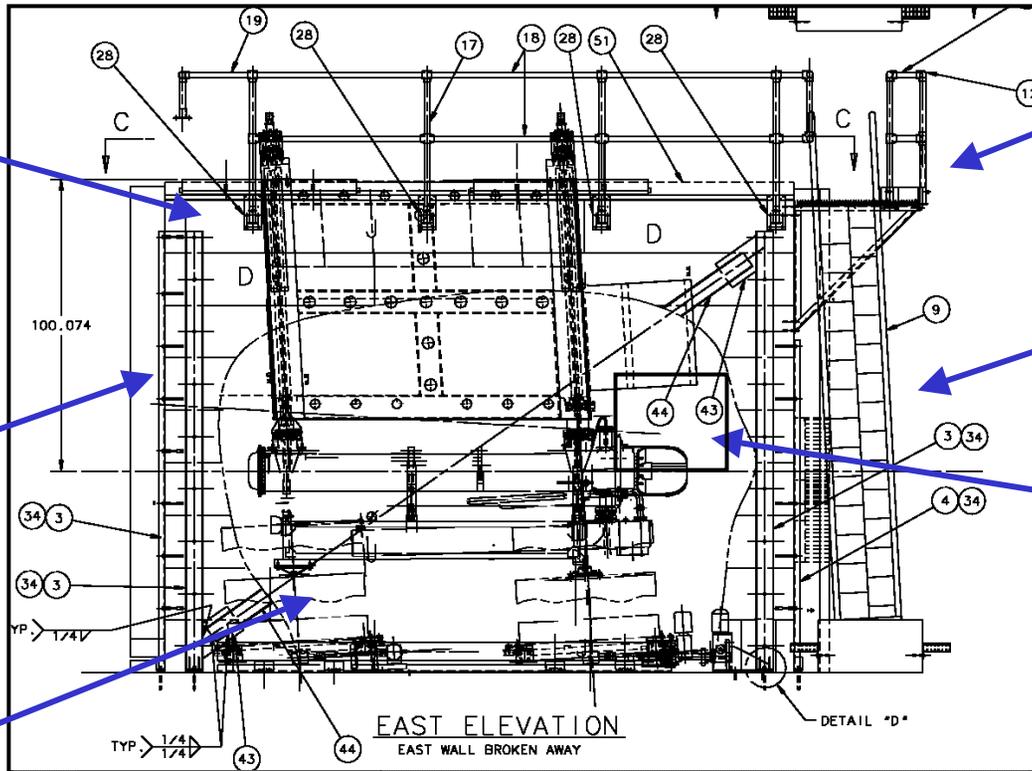


# Hot Work Cell for change-out of activated components

Concrete shield  
 block walls

Motorized  
 steel door

Component  
 lifting table



Railing,  
 platform

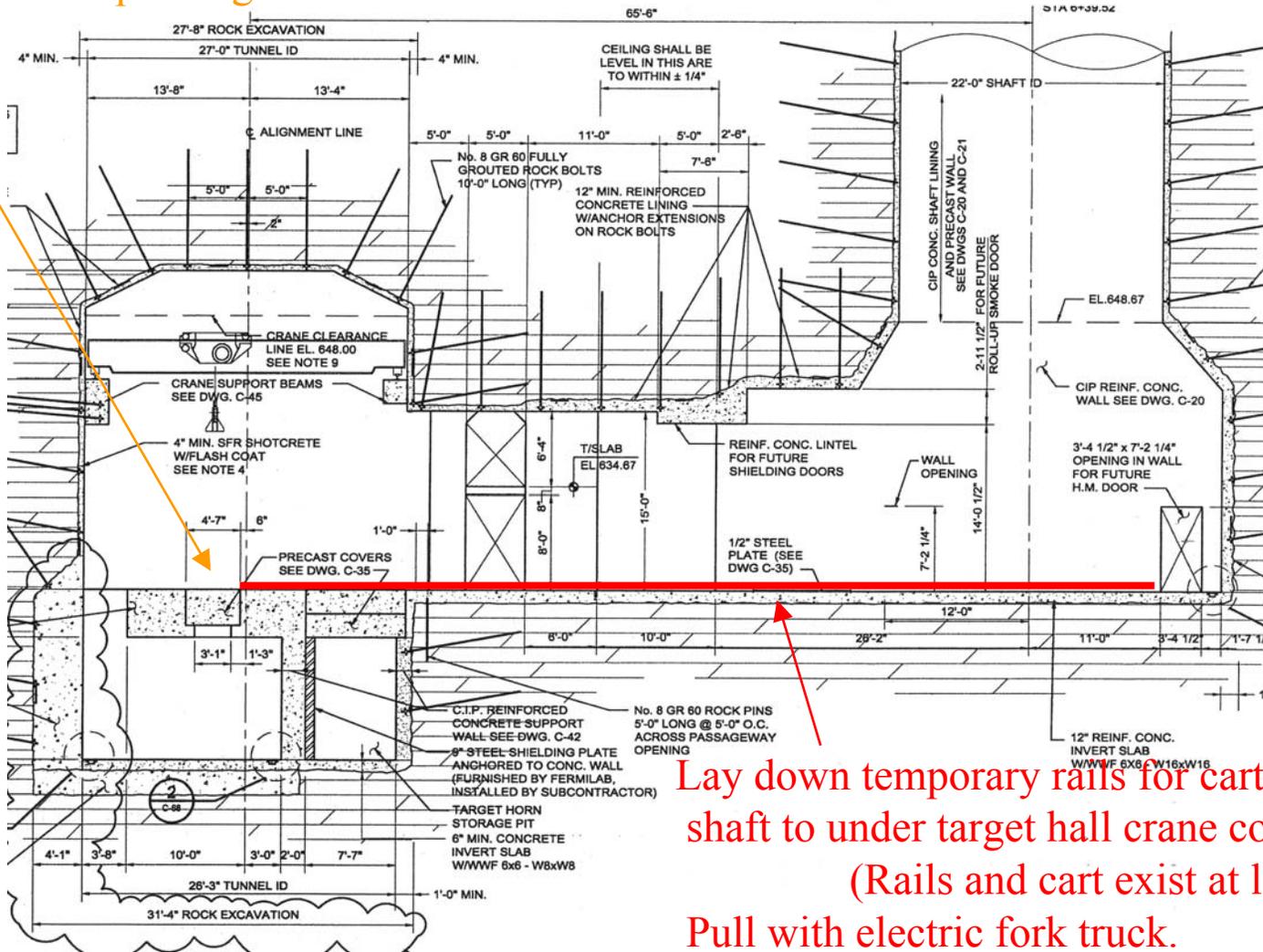
Stairs

Lead glass  
 window



# Installation - Rails and cart from drop shaft to target hall

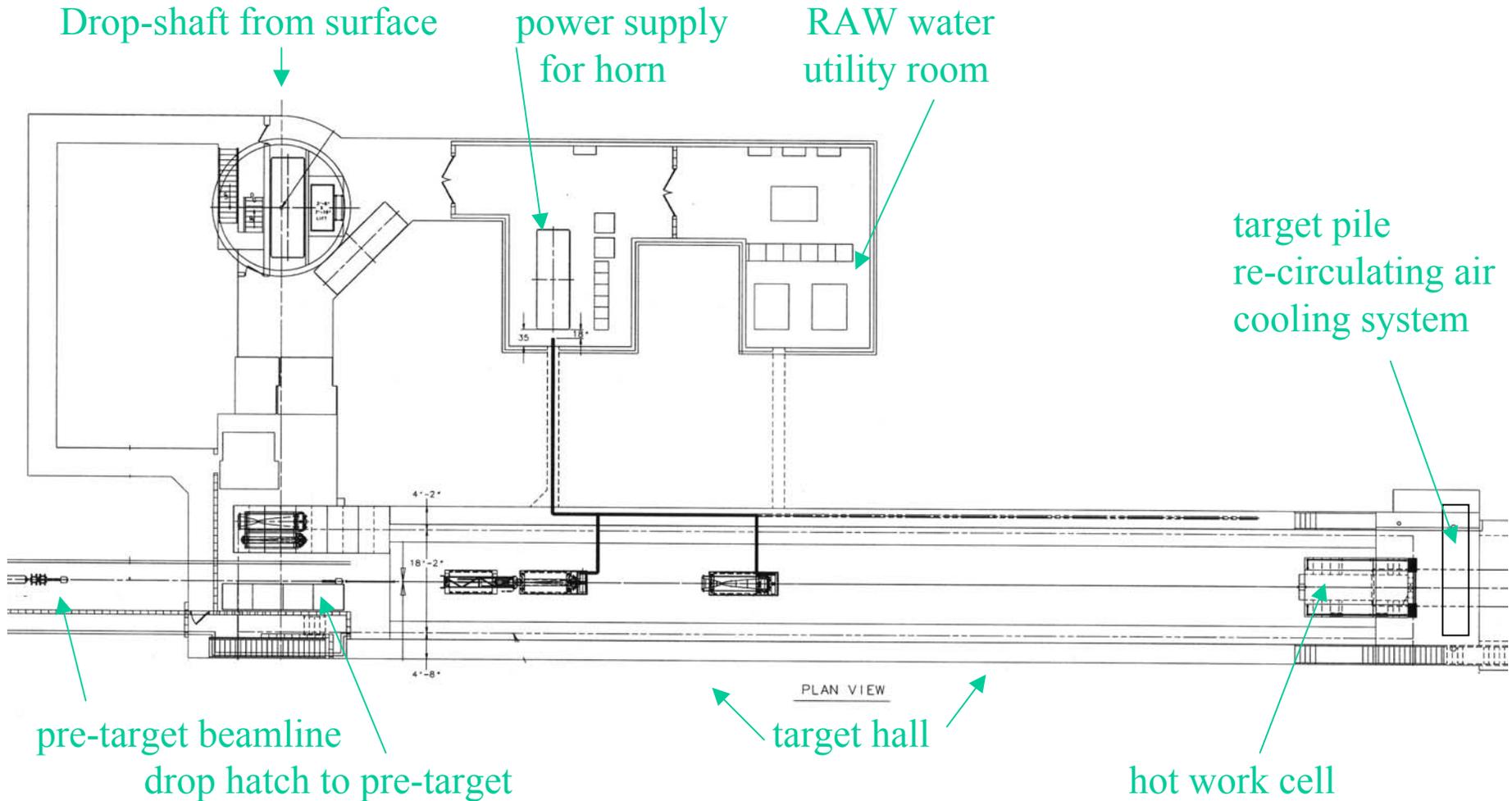
## Drop hatch to pre-target





# Installation in pre-target and utility rooms proceeds in parallel with target hall *except share drop-shaft*

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# Notes on target hall installation

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Installation schedule: Resource loaded integrated with other target hall shaft users

## Special constraints:

- Share target hall drop shaft with primary beam line, utility rooms, decay pipe systems
- We install rails under shaft, but some underground utility room equipment (horn power supply, RAW skids, chiller for target pile air) easier with no-rails, so sequence
- Need survey network, and surveyors for some steps

## Uncertainties:

- Air recirculation system design is not finalized yet, thus can't plan installation in detail
- While blue block installation is repetitive and tested, much else is one-of-a-kind that we have not practiced, and estimates are necessarily more uncertain

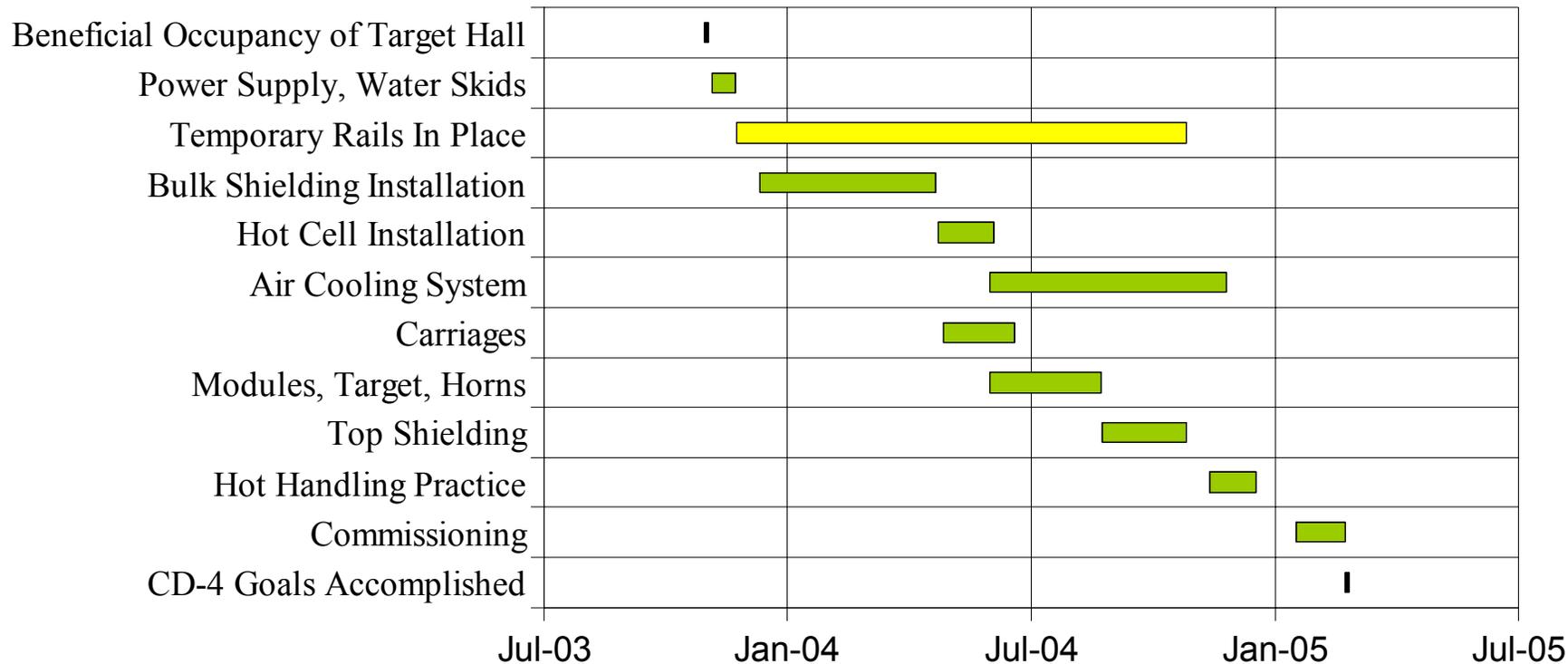
## Installation related design work just not done yet:

- Design of transportation fixture for hot cell door
- Drawings of link between transportation cart and battery powered fork truck
- Drawings of basket to carry two shielding blocks down shaft simultaneously

**Worry:** Need names of floor manager, task managers, now to do more detailed planning !!



# Target Hall Installation Schedule Overview











# Scope of WBS 113 (power supply) installation underground near target hall

(May delay horn power supply move; test horns in MI8 longer)

Uniq	Description	Start	Finish	Duration	Budget	2004														
						S	O	N	D	J	F	M	A	M	J	J	A			
73482	Relocate & Rig Horn PS Into PS Room	9/30/03	9/30/03	1 d	\$6,765															
74269	Install/Terminate Klaxon Cables in New Construction	3/15/04	4/9/04	20 d	\$903															
3220	Test PS in USSB & Power Supply Room	3/30/04	5/14/04	34 d	\$20,072															
533	Terminate PS Cables to the Pre-Target & Carrier Tunnel	4/8/04	4/13/04	4 d	\$6,505															
73471	Rig Transmission Line into PS Room & TH	4/9/04	4/13/04	3 d	\$6,765															
74815	Install Stripline in Target Hall	4/14/04	5/11/04	20 d	\$41,399															
3225	Terminate Stripline to Horn Power Supply	5/12/04	5/18/04	5 d	\$3,431															
27656	Power Test of TH Conventional PS & Magnets	7/6/04	7/9/04	4 d	\$4,529															
550	Terminate Stripline to Horns	7/14/04	7/23/04	8 d	\$5,147															
965	Pre-Commissioning of Horn PS (in Power Supply Room)	7/28/04	8/17/04	15 d	\$5,201															
3210	Checkout of Stripline	7/28/04	7/29/04	2 d	\$1,372															

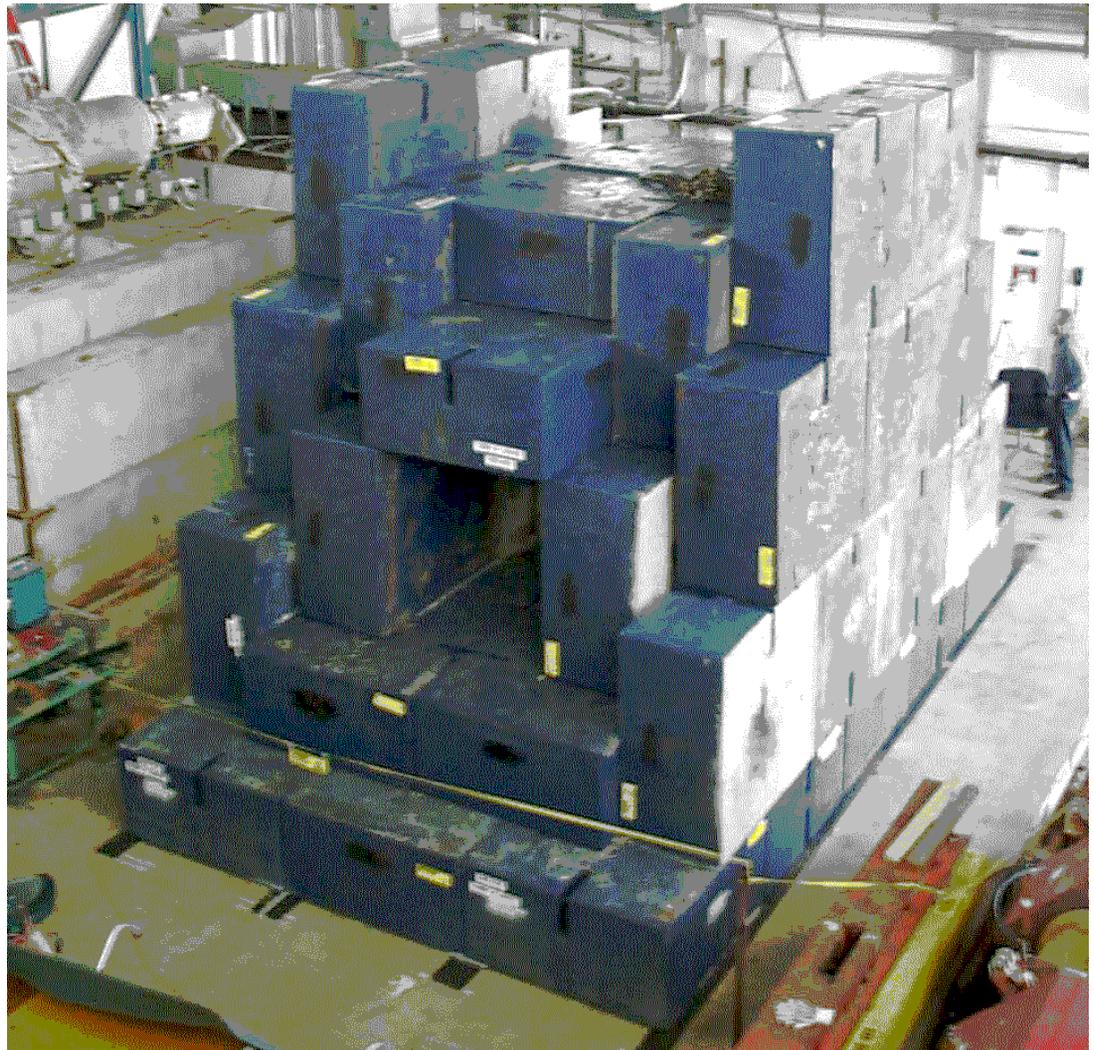
Since power supplies for pre-target magnets are above ground,  
underground effort is fairly modest





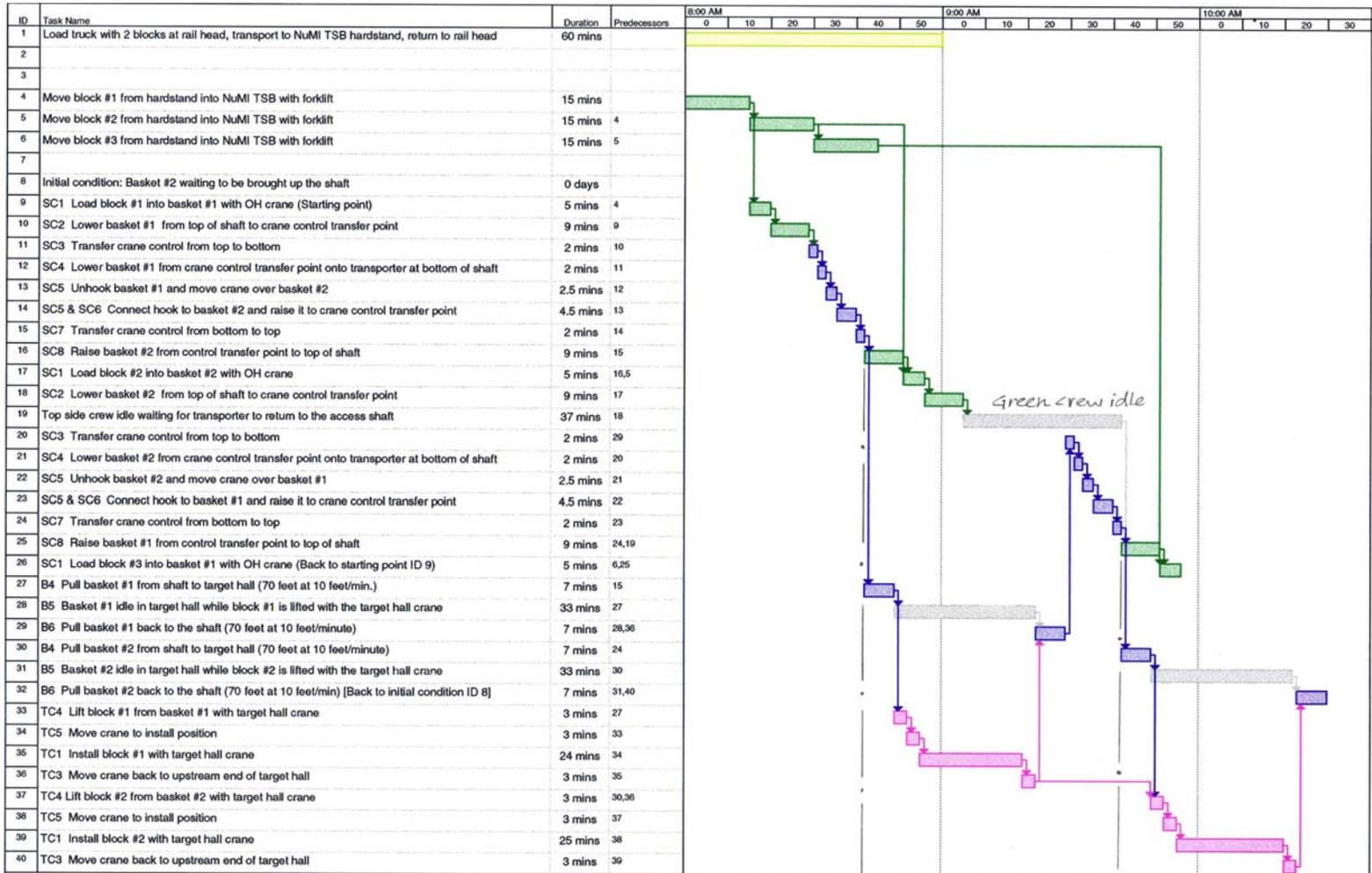
# Did test stack-up of shielding blocks

10% of the Target  
Pile Shielding Blocks





# Installation time per shield block (the repetitive part – 100 shifts)

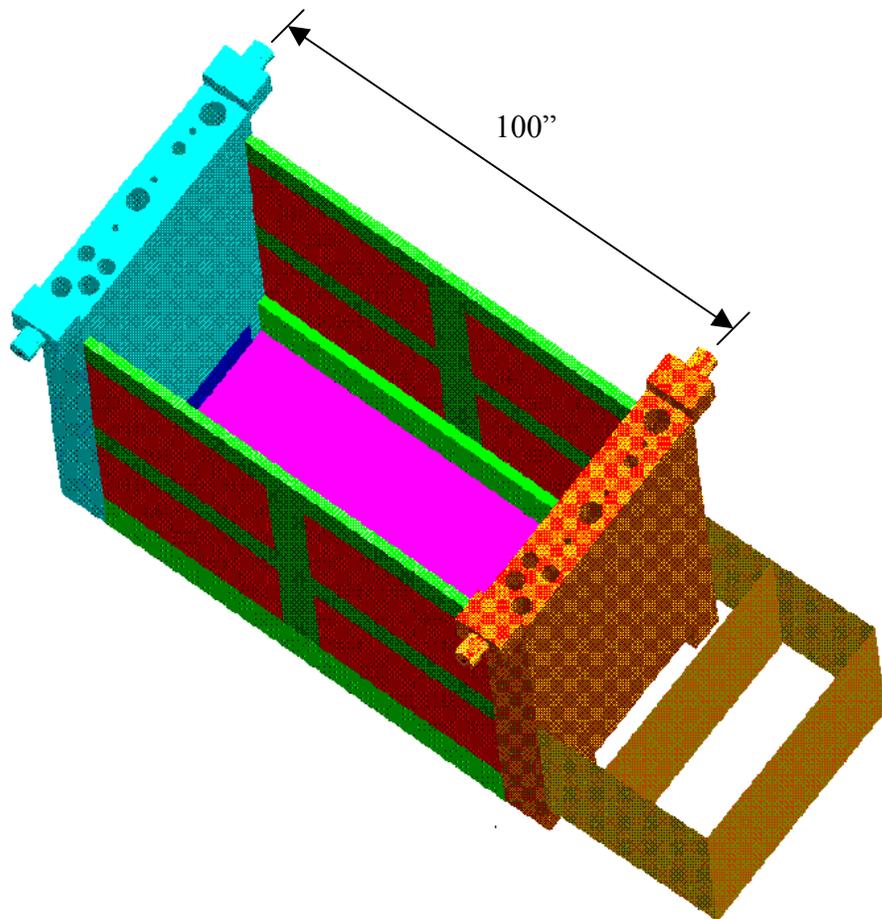


60 min  
Time per block



# The heaviest objects

1 of 3 Positioning Modules – nearly 30 tons each





# Lifting Fixture for Modules: Load Test

Try load from middle pick



Then try load with center of gravity near end



Gary measures 75,840 lbs!



Lifting fixture with  
adjustment for  
diff. C.O.G.  
passes test.

Status: done.



# Have built and tested lifting fixture for “T-block” top shielding

- *Built a T-block (inserts in module, but rests on shield walls).*
  - « *validate design*
  - « *cost estimate*
  - « *test remote handling*





# Horn Operational Power Supply

- have lifted it from one I-beam down center of unit -  
will be moved as single unit to power supply room





## What has changed since December Review?

- Test done with transportation cart side coupled to tugger
- Located fork truck to haul transportation cart
- Acquisition of steel for shielding has been completed – over 7,000 tons (now being cut up and welded – MAB through July)
- Component acquisition proceeding (horns, target, baffle, positioning modules, carriages, work cell lift table, instrumentation, remote power clamp, etc.)

Still lots and lots and lots to do –

final drawings of upstream shield wall, module assembly stand, assembly drawings of target/baffle carrier, horn water tank, etc.

but are on a schedule which we can maintain, with float before installation



## Can we reduce installation time?

Things we are working on to reduce installation time:

- Are trying to get some of the surveyor work done before beneficial occupancy - *several weeks are in current schedule for setting up survey network and measuring target hall floor*
- Plan to design basket which will carry two shielding blocks down the shaft at one time – *modest expense on baskets should improve installation time*

Very reluctant to go to double shift for remaining single shift activities:

- Transportation and hook-up of horns and target are kept to single shift so that only our trained techs who have practiced at MI8 will be involved. Same for hot handling practice. However, some overtime (Saturdays) may well make sense.



## Resources ?

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MI-8 tech crew has been / must be protected from other lab shutdown activities:

- Need them to finish assembly of horns, modules, hot cell equipment – they will also do installation of these items – they will be busy until Nov 2004

MAB tech crew is not protected

- Plan for them to finish all cutting, welding, assembly of special shielding pieces before summer '03 shutdown. There is still substantial time after the summer shutdown before the remaining pieces are needed, in case time estimate is low. But we do still need significant effort from this group.

Most importantly we need floor manager / task manager now:

- Hard stand areas? Pre-staging? Obtain quote for installing upstream shielding wall? Trucking shielding from rail-head? In general, next level of detailed planning.



# Transportation system between shaft and target hall



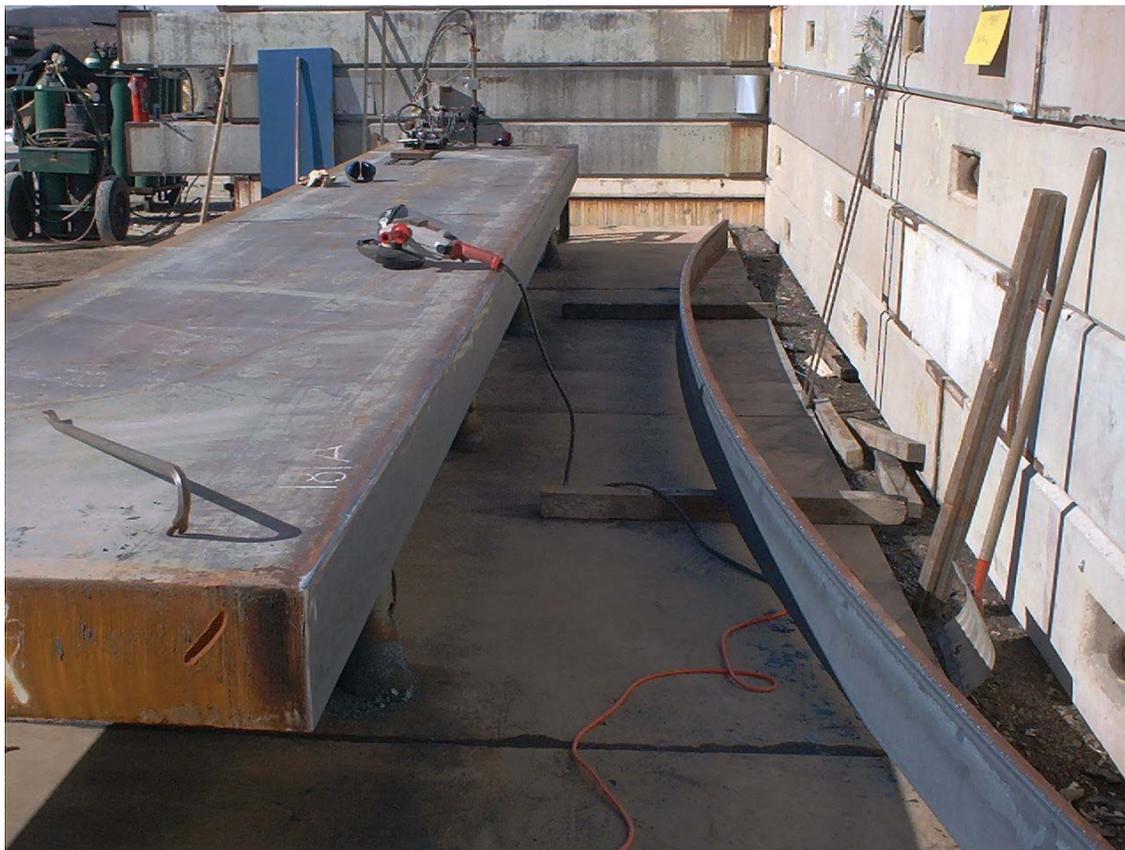
Test of side hitch concept for moving cart



Fork truck and charger reserved



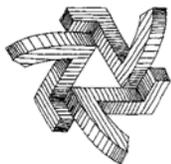
# Shielding steel being flame cut at railhead, assembled/welded at MAB





# Shielding steel has arrived – yet to acquire concrete blocks



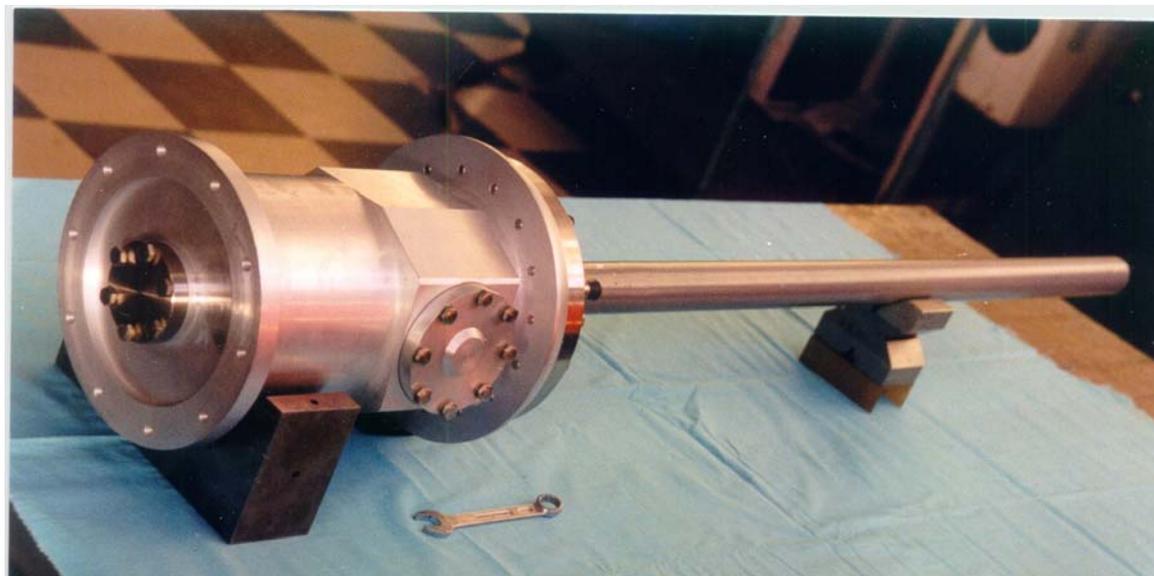


## Target has been acquired

Water cooled  
graphite core



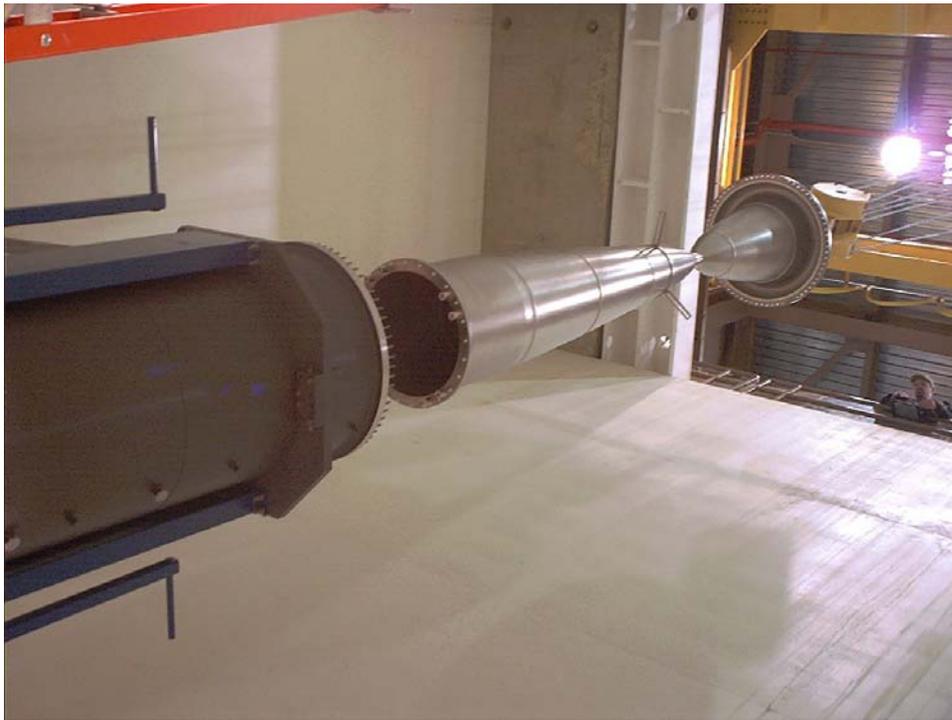
Encased in  
vacuum / helium can  
with beryllium windows



~ 4 kW beam power  
deposited in target



# Production Horns



Horn 2 assembled,  
will be ready to test in about a month

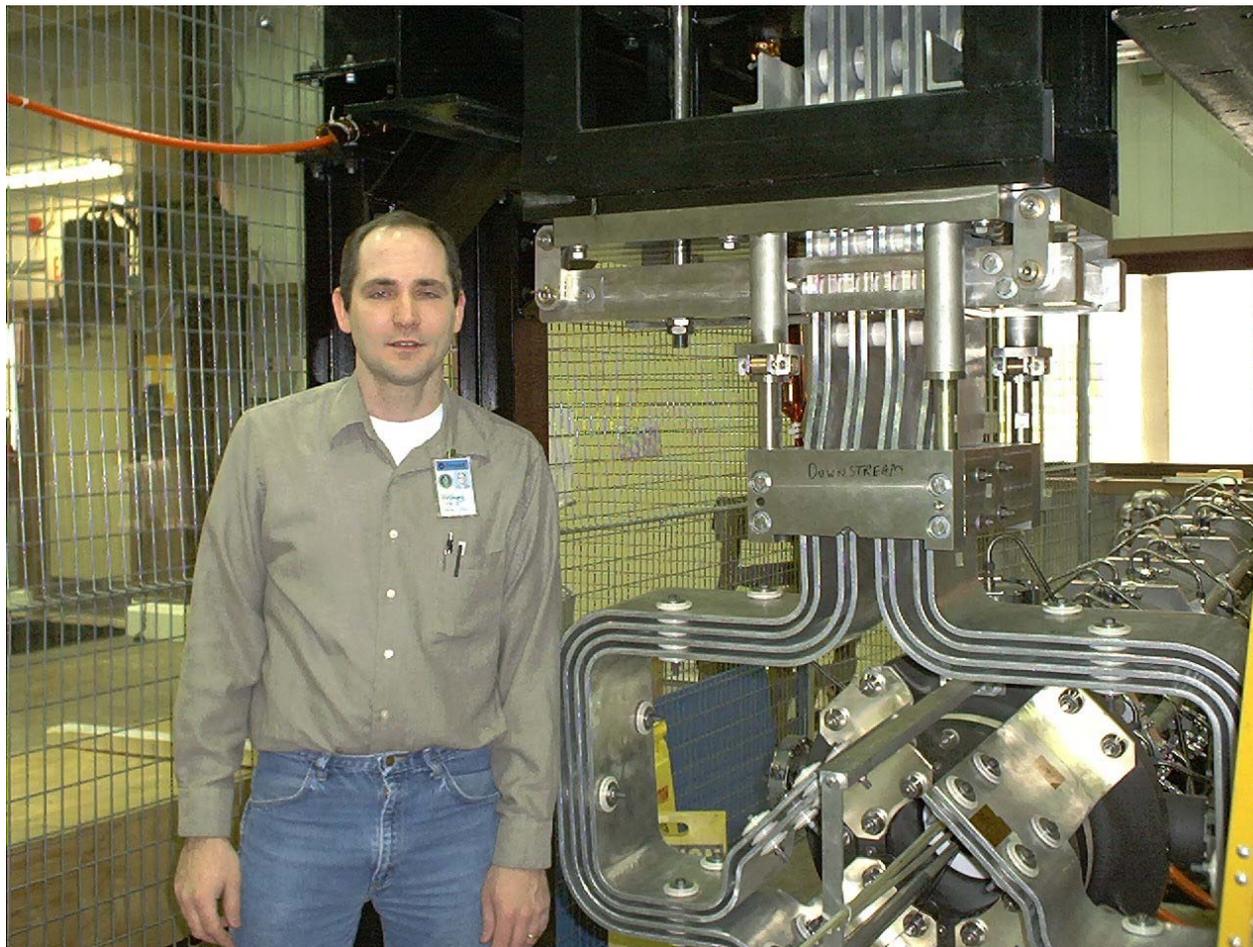
Horn 1 welded,  
nearly ready for assembly





# Remote stripline clamp prototype test

370,000 horn pulses  
taken so far  
at 200,000 Amps



Hook and unhook horn from power stripline remotely in radiation area



# Schedule for Major Beam Components

*- note completion is after beneficial occupancy  
but still with float before installation*

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