

# Fermi National Accelerator Laboratory

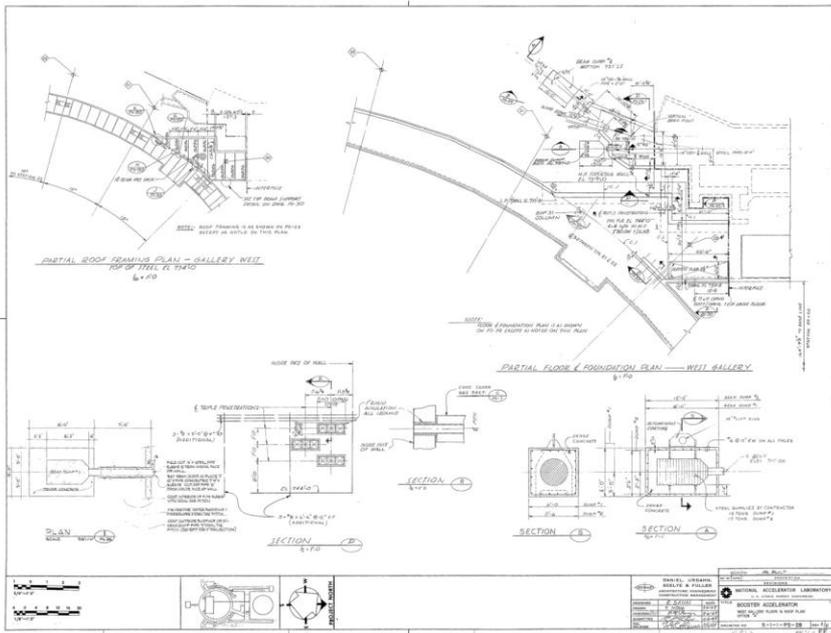
Proton Source Workshop  
Linac Momentum Dump

# Linac Momentum Dump

- Dump Installation 1969
- FESS & AD drawings 1969
- Vacuum degradation 2008
- Window installed 2008
- Photos 2008
- Borescope camera tour 2010
- Proposed solution
- Current status
- Future plans

# FESS/DUSAF Drawing

- Designed by Sahai/Noda 2/6/69, NAL release by Collins
- No photo records of the dump either before or during installation could be found.
- No purchase records of the dump could be found.
- May have been part of the responsibility of the construction contractor





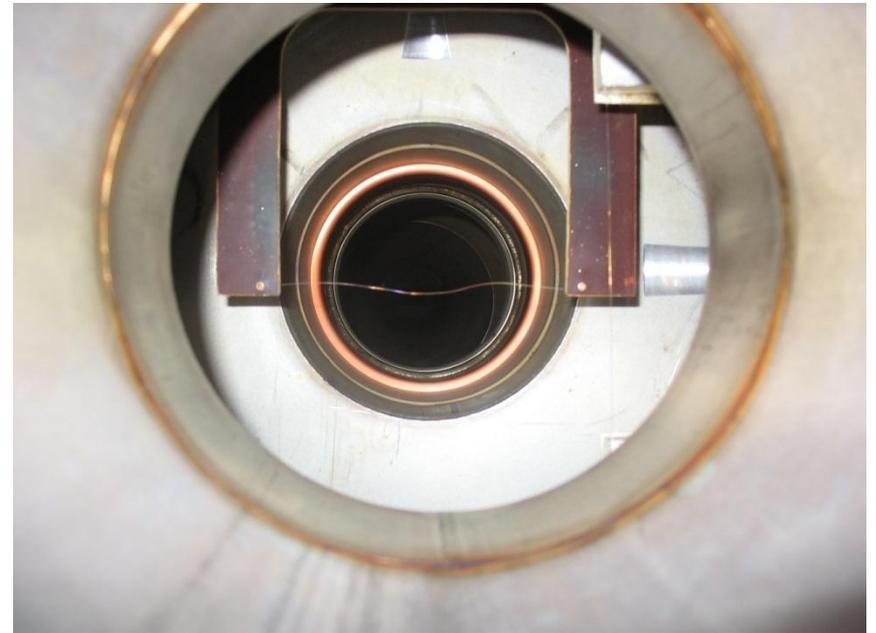
# Vacuum Degradation

- Vacuum becoming poor  
12/6/07
- High radiation in vicinity
- Plan to install titanium vacuum window



# Wire in Beam Line

- Vacuum let up, beam tube opened 12/6/07
- Wire in beam line
- Relaxed, no tension
- Changed vacuum seals



# Window Installation

- Vacuum still poor
- Opened 12/12/07
- Installed .003" thk. titanium window upstream of dump
- Installed pumpout port and ion gauge
- Separate vacuum from Linac



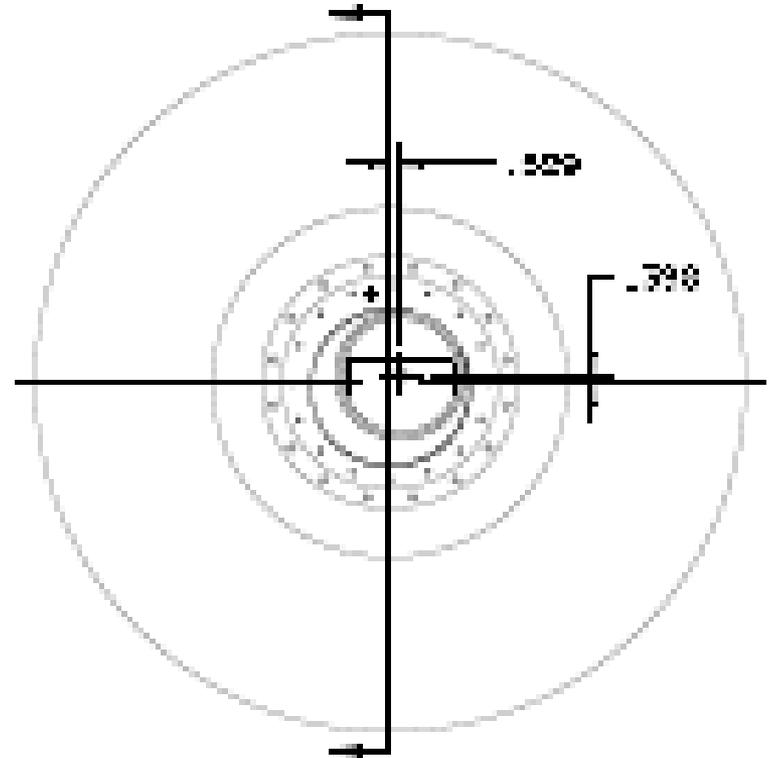
# What's in the Beam Dump?

- Photo taken 12/12/07
- Compare with AD dwg ME-2303
- Shield blocks A,B,C,D on dwg 2303 are not in dump
- Otherwise appears to conform to dwg 2303
- Steel casting with sand cored half-round wedge shaped internal cavity, tube welded on upstream end



# Additional Complication

- Dump is offset from beam line
- Don't know how well we can trust old drawings
- Possible defects inside such as casting lumps



# Borescope Camera Tour

- Opened pumpout port  
1/26/10
- Fed in borescope on long  
cable
- Video record saved 469Mb
- Y:\public\AUGUSTINE\LINAC  
Dump video 1-26-2010
- Confirms that we believe  
ME-2303 reasonably close  
to accurate
- Some casting lumps  
observed in cavity



# Evaluation of the Problem

- Believe tube rusting from outside, ground water contaminating vacuum
- Vacuum pump on chamber isolated by window can maintain adequate vacuum for the short term



# Ideas Evaluated

- Dig up dump and perform in-place repairs
- Inject sealant from berm or tunnel wall
- Dig up and replace dump
- Make a new dump in different place
- Backfill with helium
- Insert vacuum sleeve inside dump cavity
- Vacuum sleeve looks like the best solution to pursue







# Current Status

- Thermal stress analysis conducted by Ang Lee
- Radiation analysis conducted by Diane Reitzner
- Design evolving

# Future Plans

- Final solution will need installation plan, hazard analysis, reviews by Rad Safety and Operations