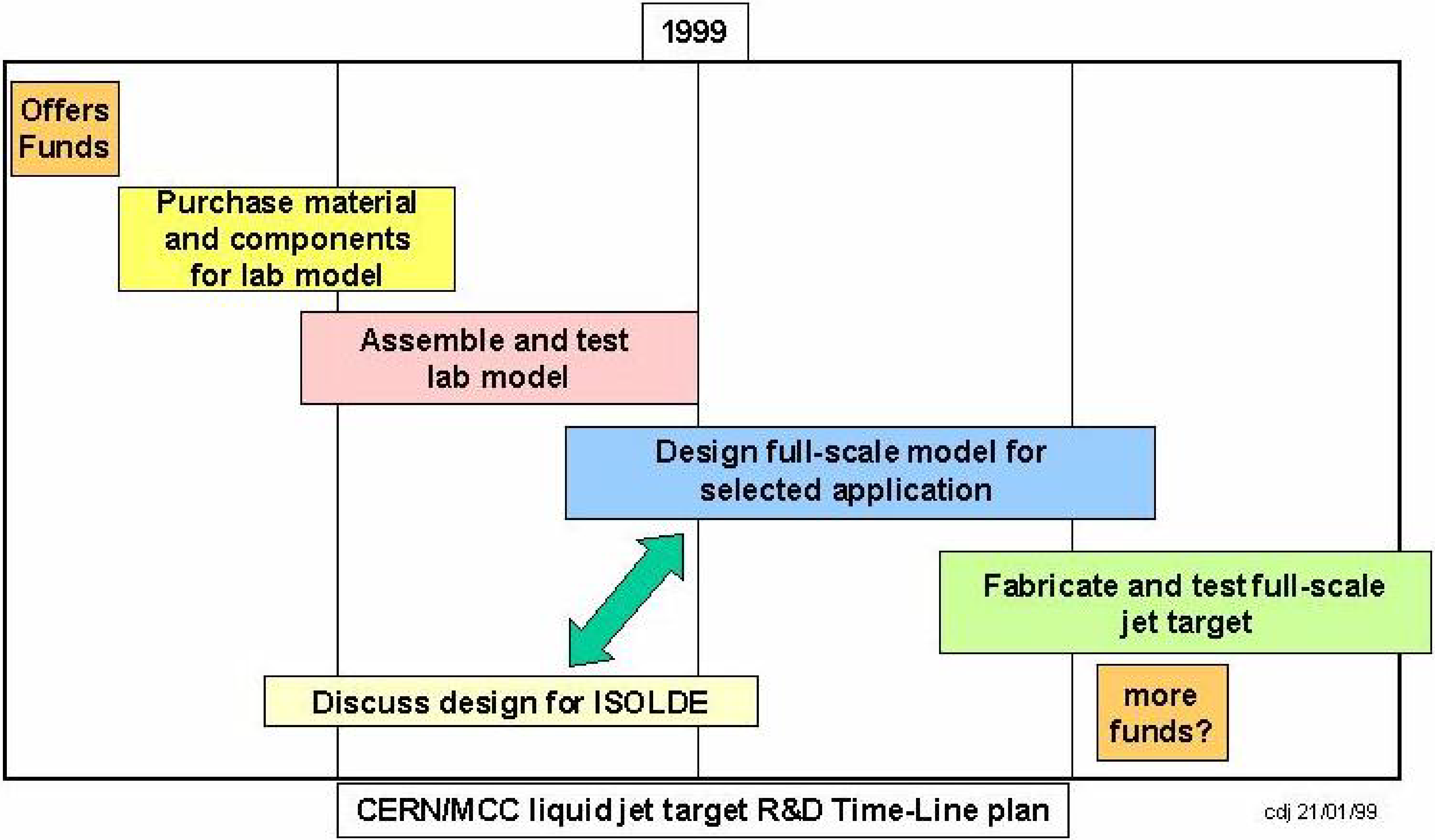
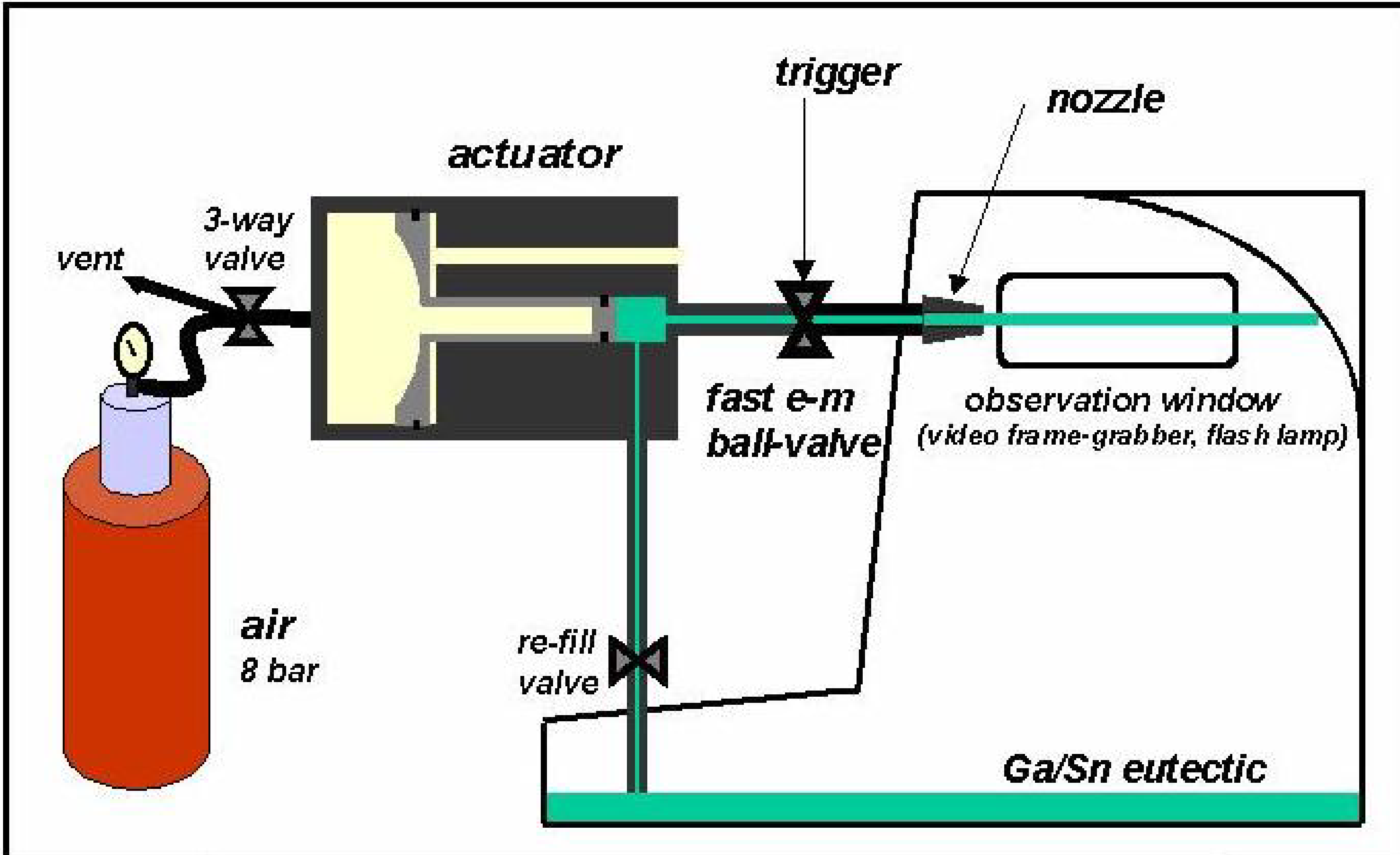
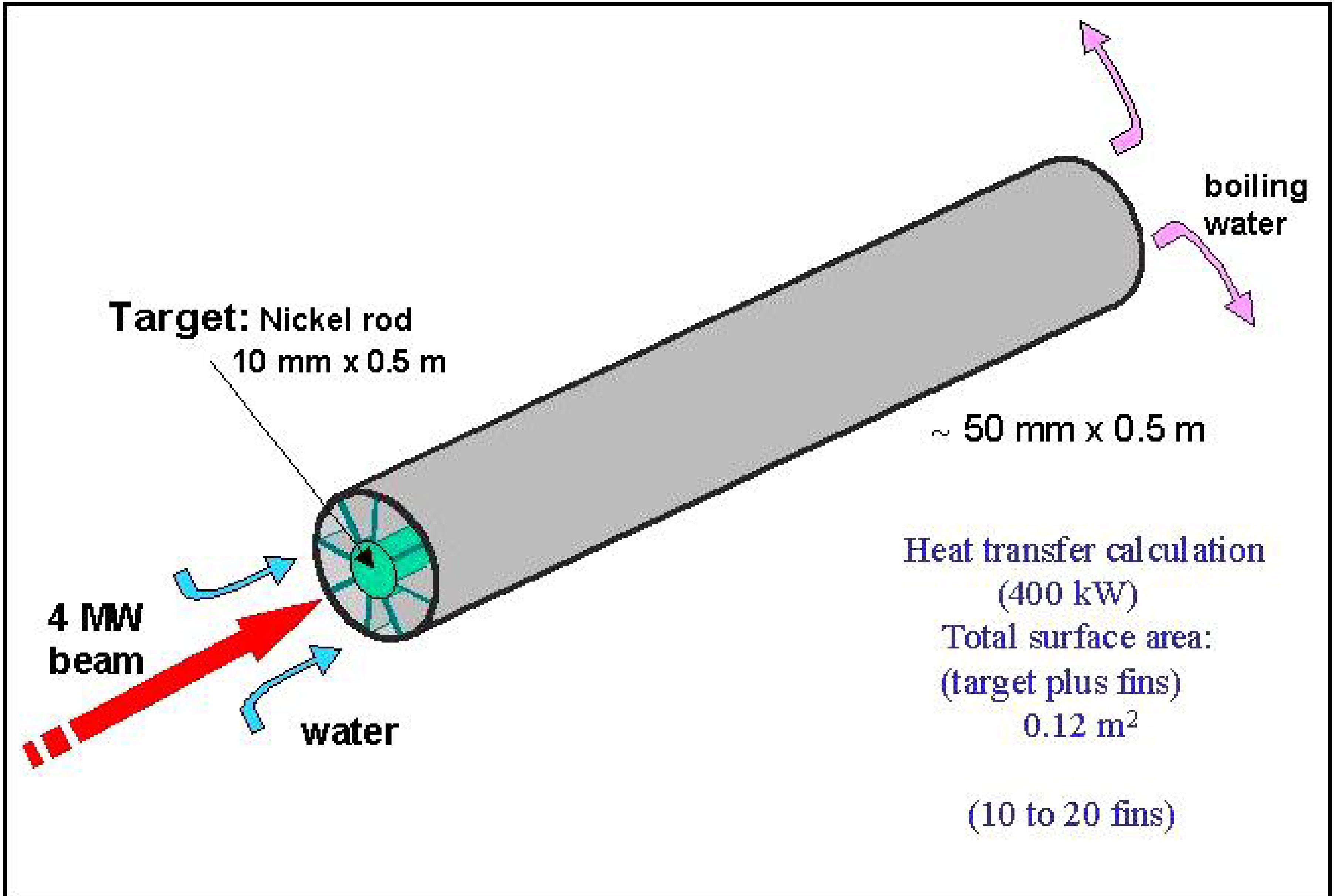

1999
Offers Funds
Purchase material and components for lab model
Assemble and test lab model
Design full-scale model for selected application
Fabricate and test full-scale jet target
Discuss design for ISOLDE
more funds?
CERN/MCC liquid jet target R&D Time-Line plan
cdj 21/01/99



CERN / MCC liquid jet model for design studies

cdj 21/01/99



Water cooled nickel target - discussed by Kirk McDonald

cdj 21/01/99

Proton flux: 3 10^{15} protons cm^{-2} s^{-1}	Si	old units
After 1 month of use the **specific activity** of a heavy metal fixed target (3 λ) would be:	= ~ **3 10^{13} Bq g^{-1}**	
And the **total activity**:	= ~ **5 10^{15} Bq**	1.3 10^{5} Ci
For a liquid target the specific activity would be greatly diluted.		
The **dose rate** at l m from the fixed target (1 day decay time)	= ~ **100 Sv h**	10^{4} rem h^{-1}
If the target is water cooled then the from a typical closed-circuit heat exchanger the **equilibrium dose rate** at 1 m would be	= ~ **1 to 3 Sv h^{-1}**	100 to 300 rem h^{-1}
The **total activity** of volatile spallation products (e.g. xenon, iodine) would be:	= ~ **10^{13} Bq**	270 Ci
These would have to be captured in the target enclosure air/vacuum system		

cdj 1/2/99

Pion target - induced activity, **from A. Sullivan**, based on measurements at the AA

The **extremely high induced activity levels** may well provide the overriding reason for the use of a mercury jet target.

The specific activity is greatly reduced compared to a fixed target (the 'band-saw' target is somewhere between the two).

In addition, as proposed by Helge Ravn, the mercury would be distilled to remove most non-volatile spallation products. Volatile products would also be removed from the target area into filters or tanks.

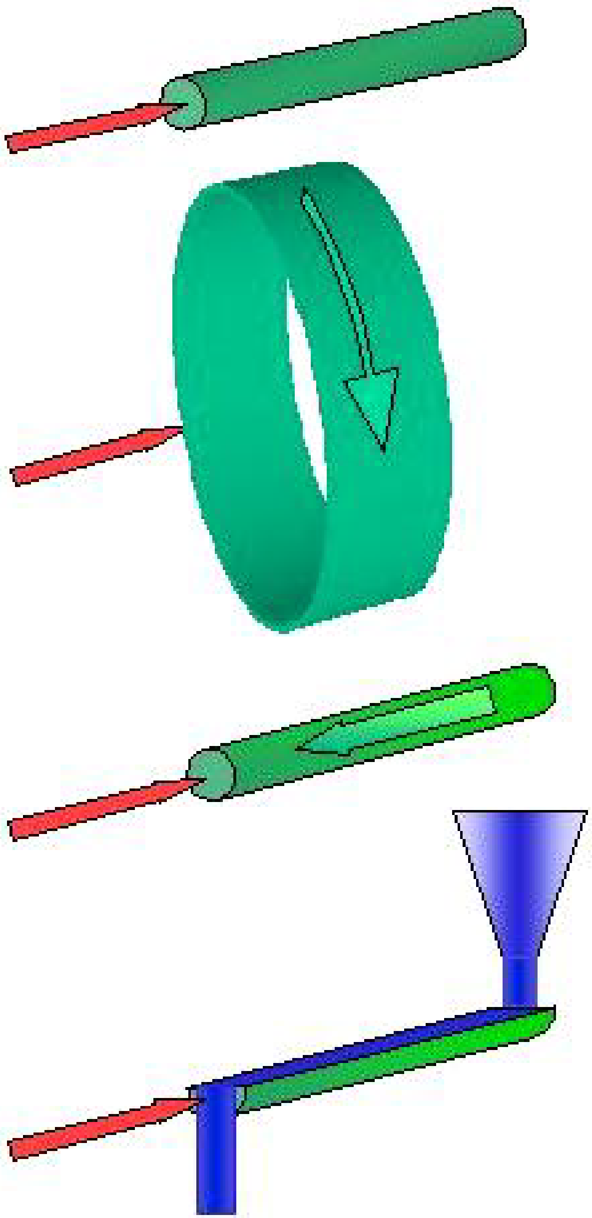
This would leave open the possibility of manual intervention in case of catastrophic failure of the target or magnet system in the production area.

Note: In 1985 CERN AA was testing rhenium production targets in air-cooled steel containers. The beam fluence was 4.2 10^{12} protons s^{-1} (500 times less than that proposed for the muon collider pion source) Two containers failed after a few days of use distributing spallation products into the Target Area (maintained under reduced pressure for containment). After a 20-day cool-down period the area was decontaminated under the supervision of radiation protection specialists (a cine film was made). The total personnel radiation dose was **6.5 rem** distributed between **92 persons** participating in the clean-up.

cdj 1/2/99

Pion target - induced activity - the case for using Mercury (Helge Ravn)

Target options



Rod - water cooled ?
High specific activity
Easiest to exchange
Shock damage ?

Band-saw - radiation cooled
Medium specific activity
Difficult to exchange
Constrains geometry
Shock damage ?

Liquid metal jet (Hg)
Relatively low specific activity,
Can be distilled to remove spallation products
No exchange needed (except nozzle) but
contamination of container may be an issue
Effect of B-field ?

Flowing metal powder (W)
Low effective (mean) density
Relatively low specific activity
But no way to separate spallation products

Pion target for the Neutrino Factory (proposed by Bruno Autin)