



Progress on LIMITS Li flow Experiments

Jimmie McDonald, presenter
Tina Tanaka
Tom Lutz
Fred Bauer
Ken Troncosa
Dennis Youchison
Richard Nygren
Mike Ulrickson

ALPS Meeting, April 7-11, 2003

Grand Canyon

Sandia is a multi-program laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.





Outline

1. Conclusions from this series of tests
2. Physical changes to LIMITS
 - Heating
 - Pump
 - Magnetic flow meter
3. Video of Li Flow
4. Future Plans
5. Schedule



Conclusions For This Series of Tests

- 1. The repairs to the liquid metal pump appear to have stopped the galling.**
- 2. A liquid Li stream can flow through a magnetic field.**
- 3. Cool surfaces that come in contact with the liquid metal are still causing difficulties during testing.**
 - The magnet can not be heated above 80 Degrees C.**
- 4. An inline filter must be installed in the supply line.**



Heating

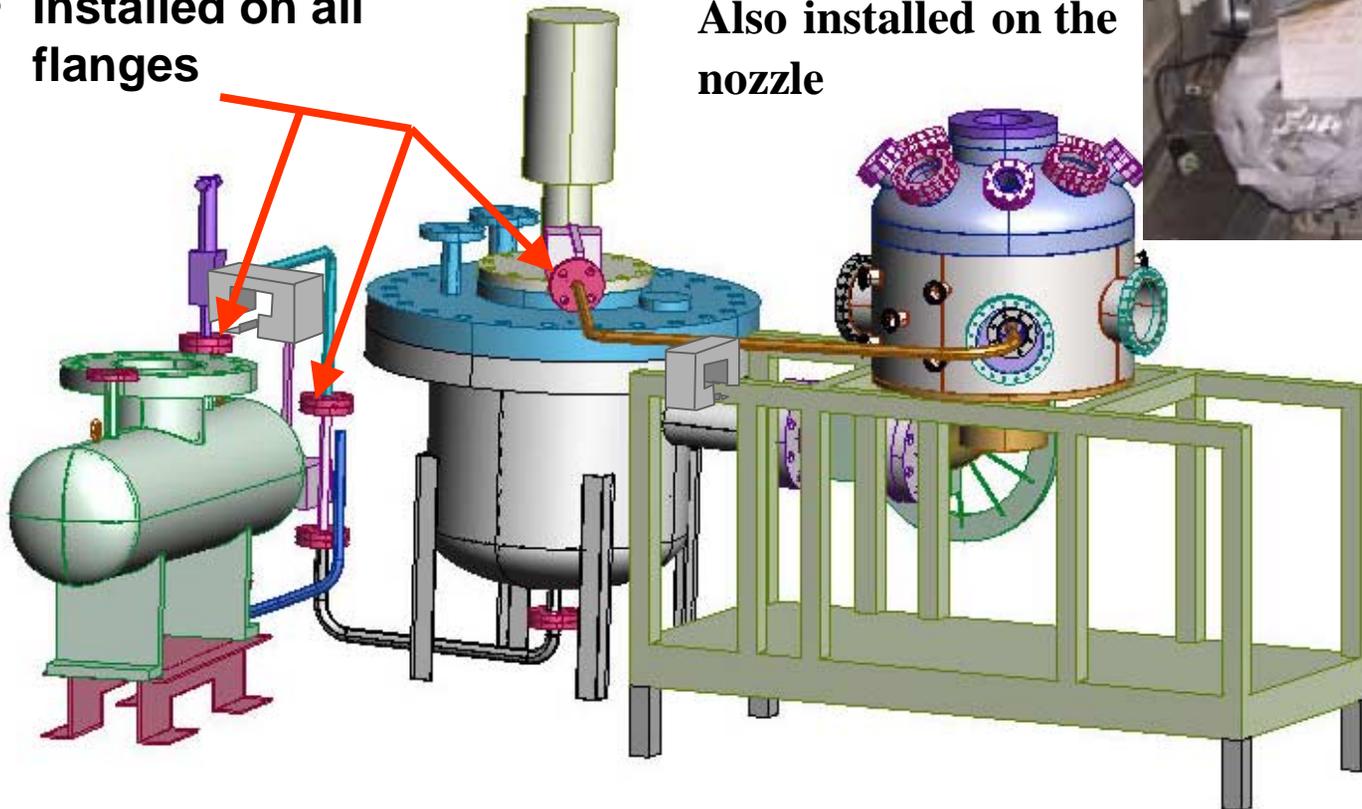
- 1. Band heaters installed**
- 2. Increased the number of thermocouples from 20 to 40**
- 3. Increased the number of heat control zones from 5 to 10**
 - Resulted in more accurate settings**
 - More even temperature distribution**

Changes to Limits

Band Heaters

- Installed on all flanges

Also installed on the nozzle



Band Heaters

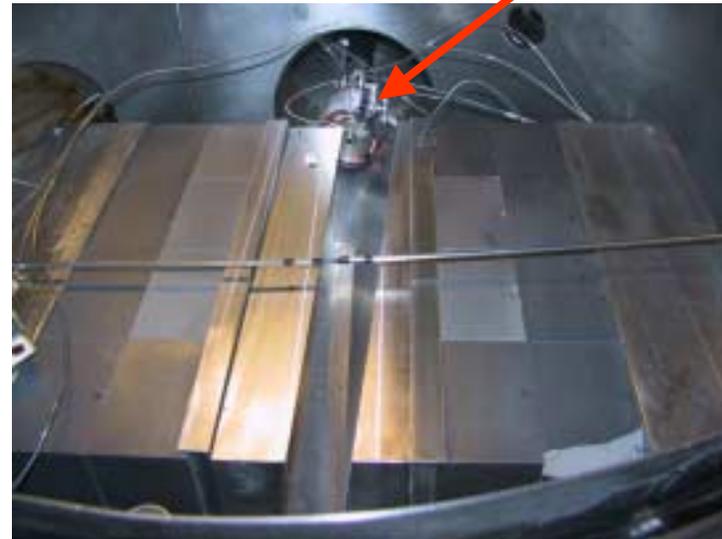


Unmounted Heater



Transfer line

On Nozzle



Band heater on 4" Ball Valve



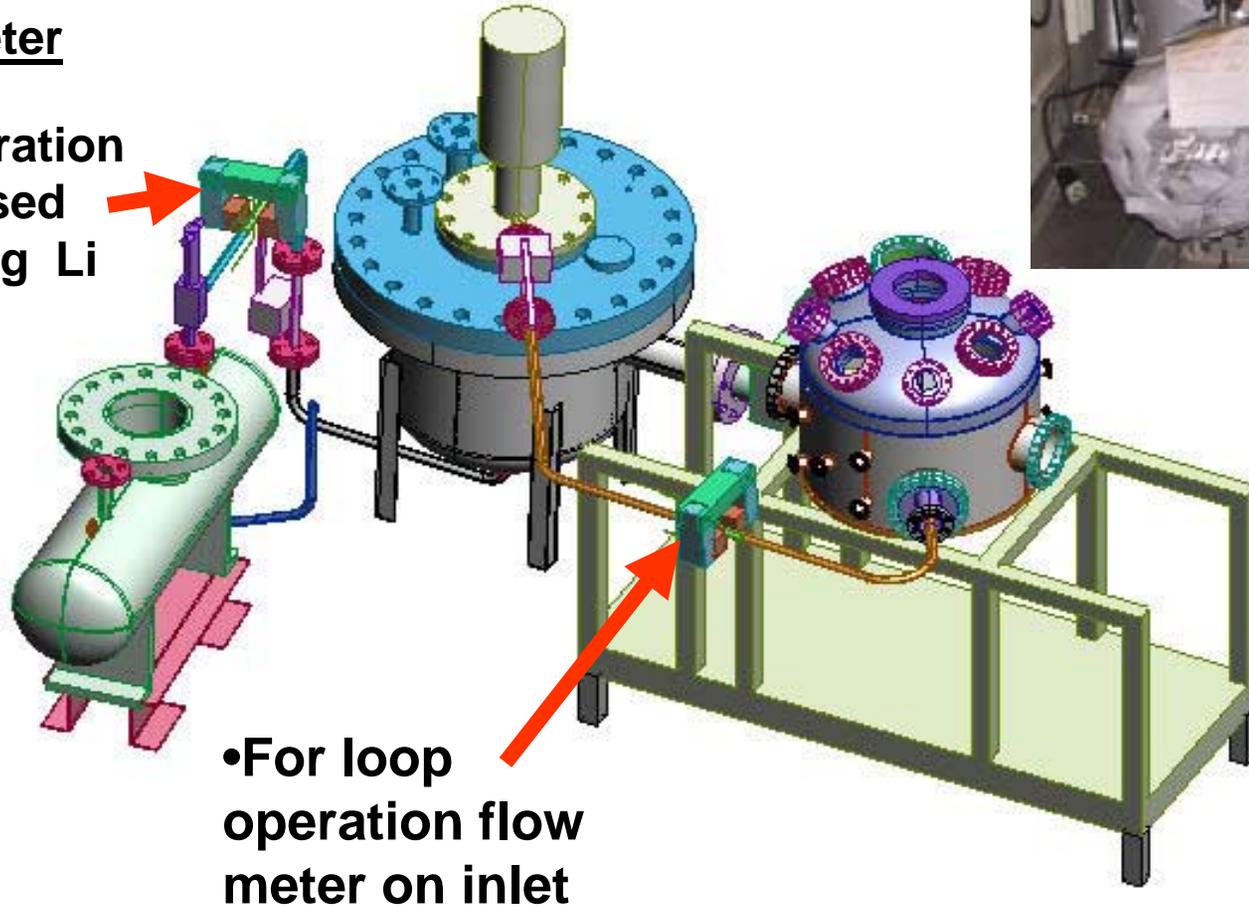
Magnetic Flow Meter

- 1. A magnetic flow meter was designed, built, installed, and calibrated.**
- 2. The details will be presented by Richard Nygren in his talk following this talk.**

Changes to Limits

EM Flow Meter

• Initial calibration location - used while flowing Li transfer





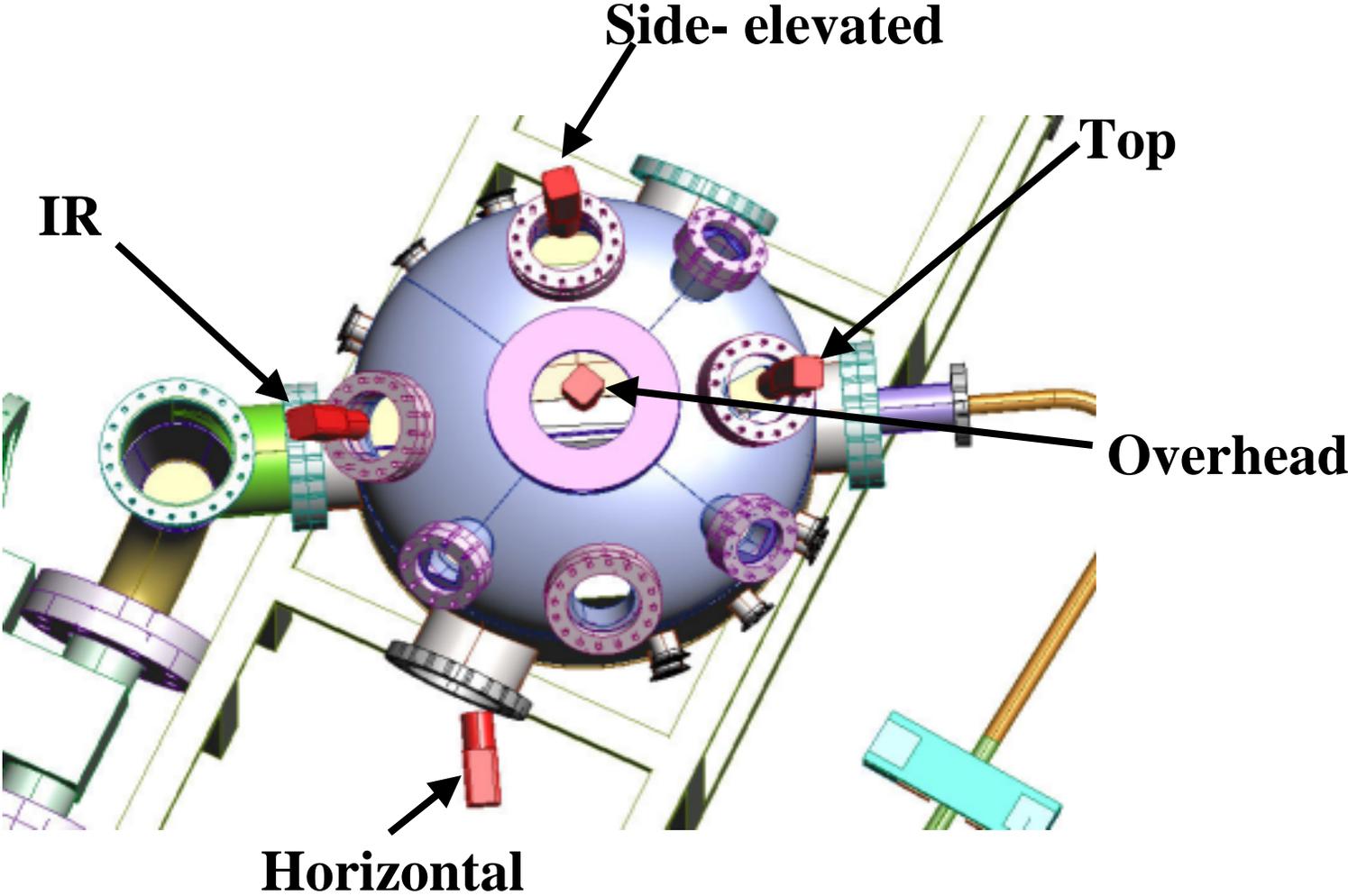
Pump

The liquid metal pump has been repaired and reinstalled

- Two bands of molybdenum 10 mm wide and .5 mm thick were plasma sprayed onto the top and bottom edge of the impeller



Camera Layout





Video of Liquid Li with and without a magnetic field



Future Plans

- 1. Obtain smooth stream**
 - **Install inline filters**
- 2. Test different shaped Nozzles**
 - **Flat ribbon stream – different widths and thickness**
- 3. Install different pole pieces on test magnet**
- 4. High Heat Flux testing on flowing stream**
- 5. Apply an electrical current to a flowing stream**
 - **Without a magnetic field**
 - **With a magnetic field**



Schedule

Milestone	Date	Status
Repair pump	4 Jan 2003	Complete
Flow without magnet	Oct 2002 April 2003	On going-awaiting the repair of a vacuum pump More tests coming.
Tests with Li flow between magnets	April 2003	One run complete- others to follow!
Magnet testing	April –May 2003	
High heat flux test on Li	June – July 2003	



Questions?