Hg Delivery System Vacuum Discussion

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During Hg delivery system design review, consideration given to running delivery system under vacuum conditions

- Improve jet profile by eliminating trapped air in plenum and/or Hg supply tubing
- Performance of stream may improve in vacuum
- Confirmation of primary beam window integrity

Vacuum condition has implications related to both design and operations
Design Issues & Considerations

- Entire primary containment will be under vacuum
  - Hg supply & return lines
  - Sump tank & all connecting ports
  - Hg cylinder & bellows
Possible Design Issues

- Sump tank not designed for vacuum
  - Need to return to circular configuration
  - Cover plate may have to be SS rather than lexan

- Optical viewport disks' ability to withstand vacuum condition not known

- Vacuum pump inside secondary requires remote pump control, radiation-tolerant remotely-controlled isolation valve, and radiation-tolerant vacuum gage
  - Filter saturation must be considered

- Vacuum pump outside secondary may allow manual operations, but vapors become an issue

- Hg cylinder bellows probably not capable of withstanding vacuum, but will discuss with syringe vendor
  - Could vent to passive filter rather than sump tank
Operational Issues & Considerations

- Draining & filling
  - Sump outlet checkvalve allows air displaced during Hg fill to vent to filters
  - Sump inlet checkvalve allows air to enter tank while Hg is drained
- Current design will not allow vacuum operations
- Might eliminate inlet valve & attach hose to Hg inlet port during draining
Summary

- Configuring delivery system for vacuum operations possible
  - Requires modifications to sump tank
  - Porting may need changes

- Adding vacuum pump/valving inside secondary creates complications
  - Consider using vacuum system outside secondary but within a separate containment

- Testing at ORNL essential to determine filter effectiveness