

# ***A Brief Update on S&H Activities for APEX***

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*March 24, 2000 e-meeting*

**INTEL**

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# ***Outline***

- ***Safety of EVOLVE design***
- ***Mobilization and transport of Mo alloys; experiments and modeling***
- ***Status of Flibe mobilization experiments***

# ***The EVOLVE design provides some interesting safety questions***

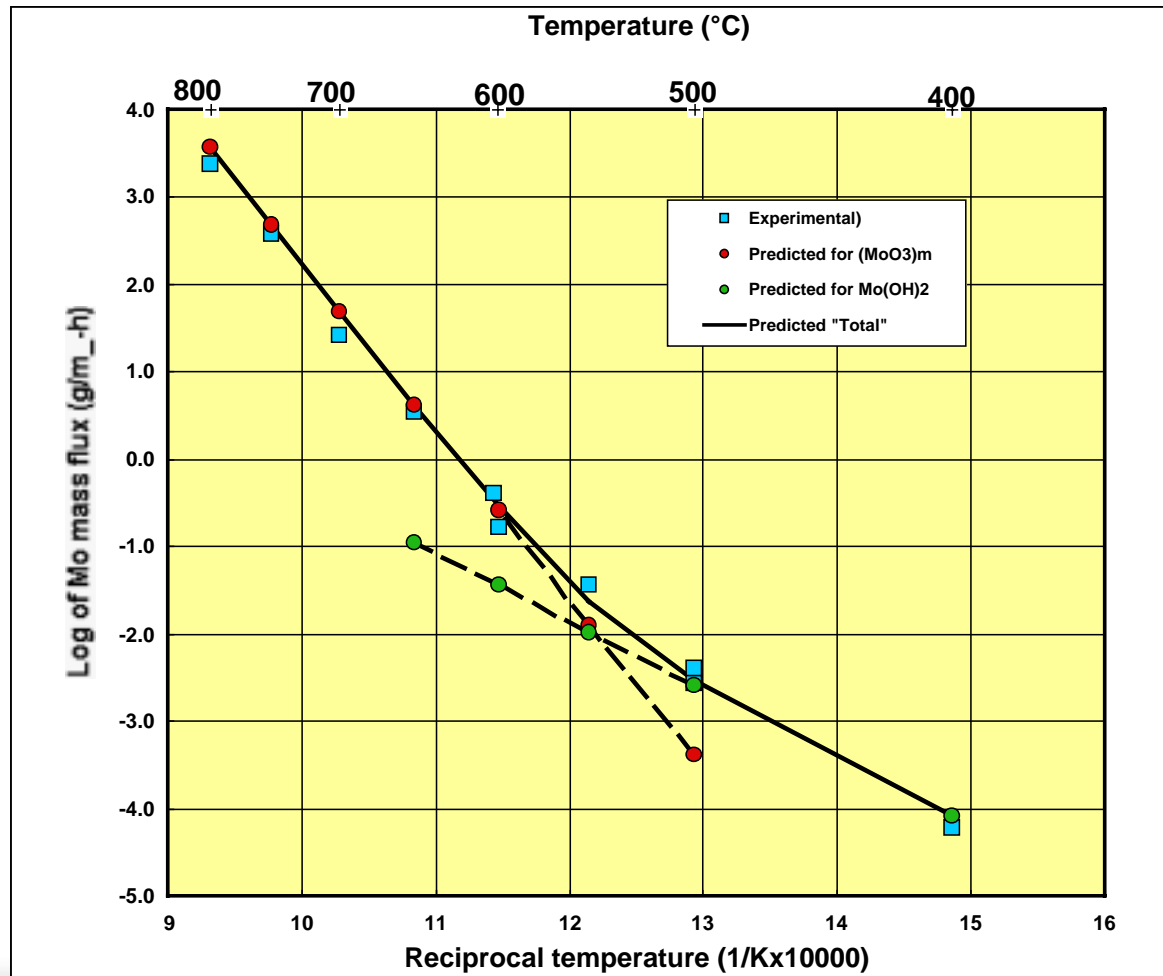
- ***During a LOVA (Loss of Vacuum Accident), implying air ingress, the Li will burn; under this accident condition, draining the Li is desirable***
  - ***This calculation will be done in the future***
- ***During a LOCA (Loss of Coolant Accident) without air ingress, the Li will evaporate, removing heat; under this accident condition, draining the Li is not desirable***
  - ***This calculation is currently underway***
- ***It may be desirable to have a system (active?) that drains the Li for LOVA conditions (and maintenance), however does not drain the Li under LOCA conditions***

## ***Mo mobilization tests and modeling were recently completed***

- ***Mo has a high propensity to oxidize and forms a highly volatile MoO<sub>3</sub> species that could transport during a postulated accident***
- ***We have investigated the oxidation and volatilization behavior of TZM alloy in various flow rates of air between 400 and 800°C and obtained oxidation rates and Mo mass flux volatilization rates***
- ***A vaporization mass transport model with thermodynamically derived vapor pressures of MoO<sub>3</sub> species and correction for saturation effects shows good agreement with experimental measurements***
- ***Composition of TZM***

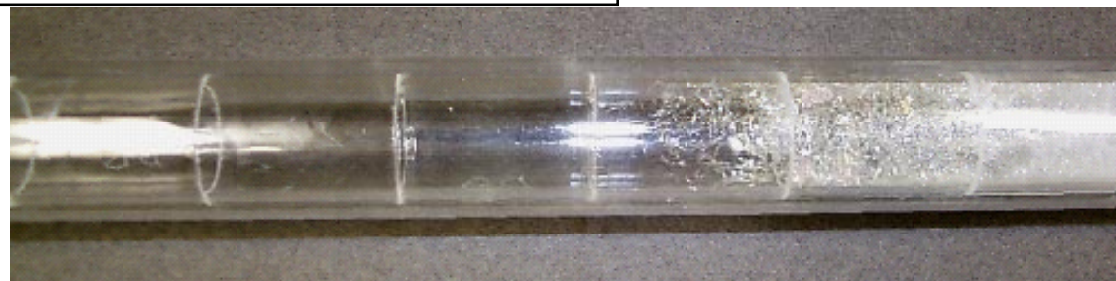
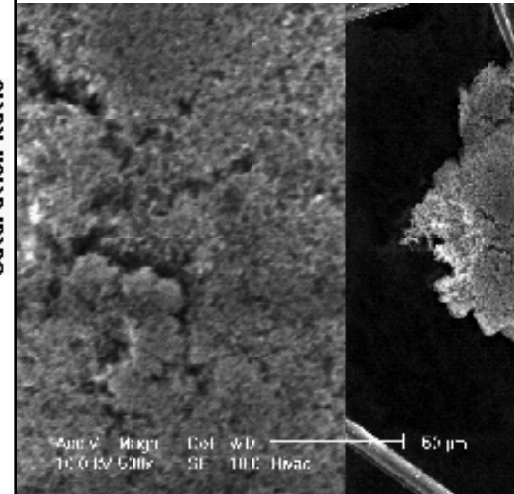
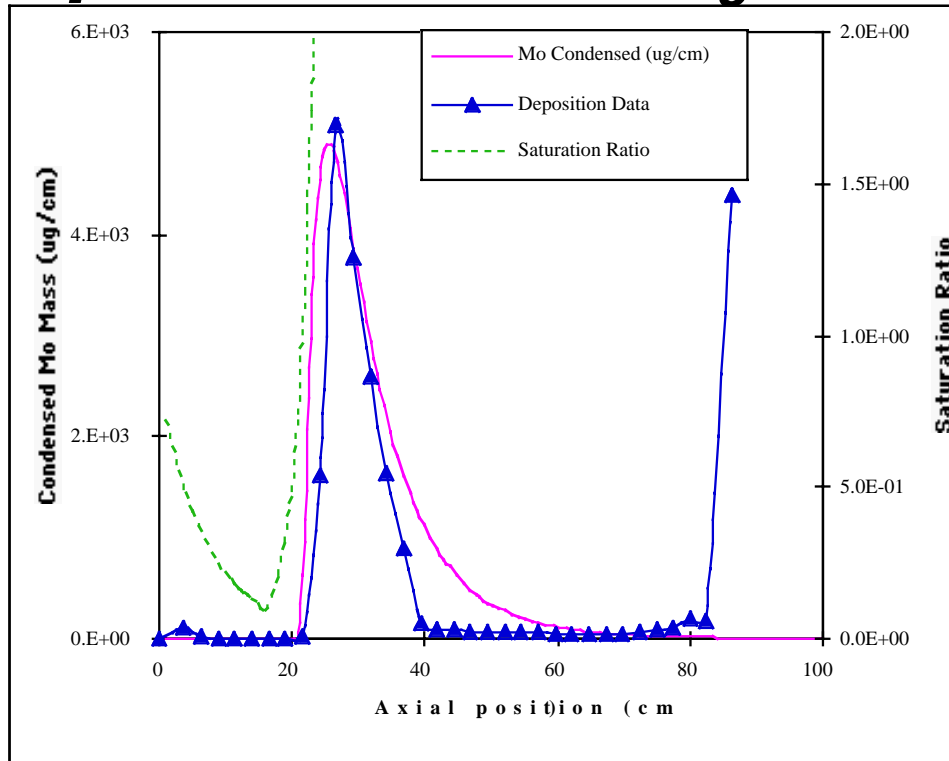
<b>Mo</b>	<b>Ti</b>	<b>Zr</b>	<b>C</b>	<b>Si</b>	<b>Fe</b>	<b>Ni</b>	<b>O</b>	<b>N</b>
99.25	0.50	0.102	0.018	0.0034	0.001	0.001	0.0009	0.0005

# Experimental and predicted mass flux of TZM exposed to air agree well





# Re-Deposition of $\text{MoO}_3$ in Collection Tube

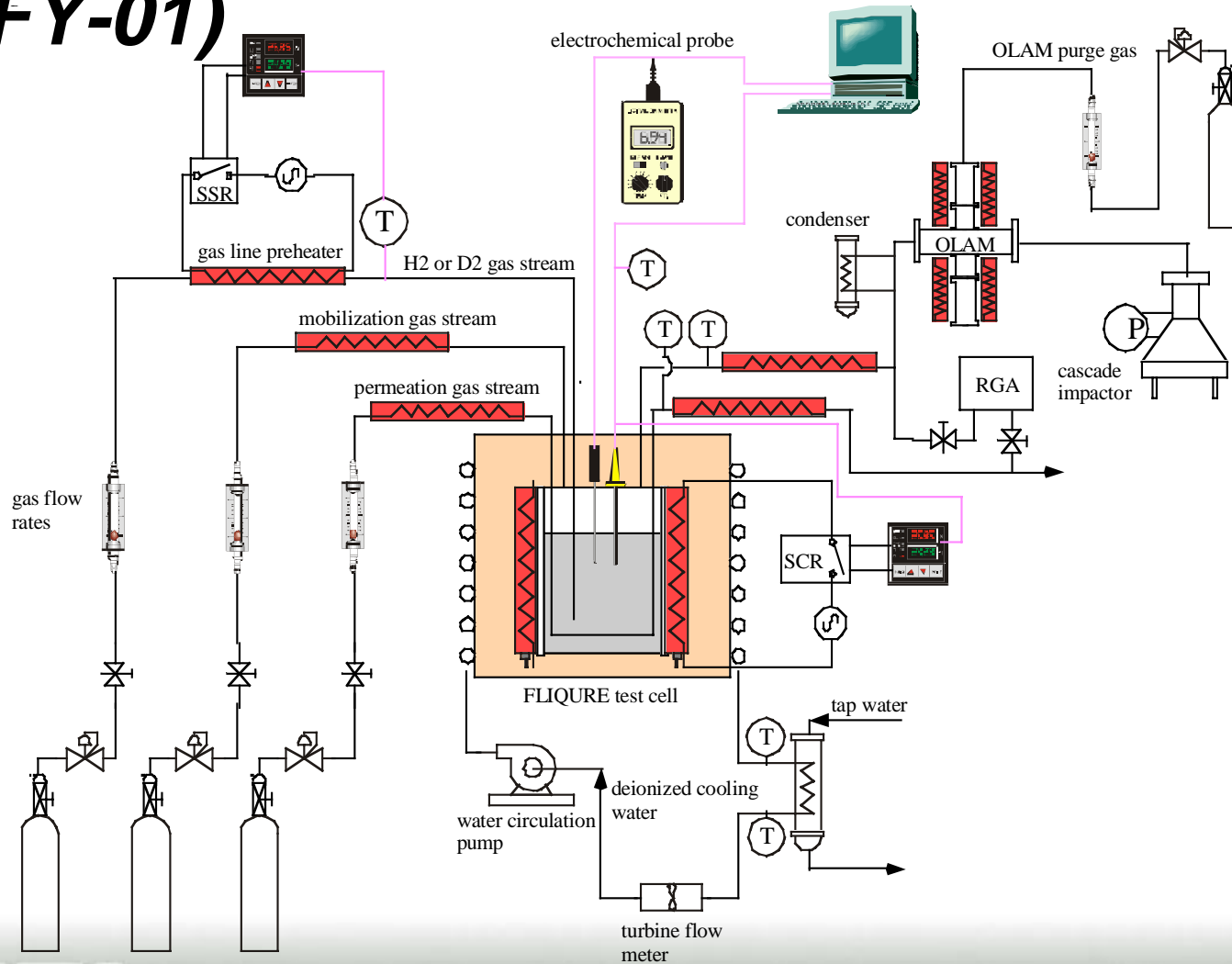


Temperature: 700°C Time: 2 hours Flow: Air (0.5 liter/minute)

# ***We are on schedule to begin cold Flibe experiments this summer***

- ***These experiments will measure Flibe mobilization under vacuum, air, and steam***
- ***Some aerosol characterization will be done***
- ***Safety paperwork is under revision***
- ***Final design changes are being made***
- ***Glovebox has been purchased and is being readied for experiments; instrumentation has also been purchased***
- ***Two Japanese scientists will participate in the experiments***

# ***Instrumentation for the cold Flibe tests (FY-00) will be similar to that used for hot tests (FY-01)***





# ***Future Work***

- ***Complete EVOLVE LOCA calculations***
- ***Begin cold Flibe experiments this summer***
- ***Complete SnLi experiments vapor pressure and vapor species measurements (safety paperwork is under review); Flibe vapor pressure and vapor species measurements will follow SnLi***
- ***UW is beginning SnLi/water chemical reactivity experiments***