



ALIST Issues and Plans for FY02

M. Ulrickson
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Outline

- **Status of activities**
- **Major remaining issues**
- **Plans for FY02**
- **Conclusions**



Status of Activities

- **Meetings with tokamak groups have been conducted in both the US and in Europe. Follow up discussions have been held with the majority of those groups.**
- **ORNL has completed conceptual sketches of modules for both NSTX and C-Mod.**
- **Most PMI issues are reasonably well resolved (temperature limits, hydrogen pumping, erosion rates). Scientific understanding of some results remains to be completed.**



Major Remaining Issues

- Advancement of the design beyond the cartoon stage requires knowledge of the trajectory of the liquid in the magnetic fields of a tokamak.
- Since the MHD models are still being perfected, we will need to do experiments to determine how the liquid streams will move. **This is the HIGHEST priority for the near future.**
- Nozzle design, heat removal capability testing, diagnostic development, and liquid quality monitoring equipment development must continue.



Major Remaining Issues

- **Need additional information from NSTX and C-Mod**
 - Range of operating parameters
 - Minor radius and major radius range
 - Range of beta, kappa, delta and internal inductance
 - Startup and shutdown sequence, time variation of fields, etc.



Plans for FY02

- **Design experiments in gradient magnetic fields to simulate the tokamak environment (ANL, ORNL, PPPL, SNL, UCLA, ...)**
- **Develop diagnostics needed to measure flow distortion, movement, etc. (SNL, ...)**
- **Conduct experiments using liquid Li, Sn, GaInSn, and ... (SNL, UCLA, ANL, ...)**
- **Provide data to MHD modeling groups and collaborate on interpretation (ALL)**
- **Revise designs for C-Mod and NSTX as needed (SNL, ORNL).**



Conclusions

- **All the major PMI issues have been addressed to the point where the limits on operation or capabilities of a liquid surface divertor system can be specified accurately enough for the design to proceed.**
- **The behavior of free surface conducting liquids in the 3D gradient magnetic fields in a tokamak cannot be specified accurately enough. Experiments are urgently needed to address this issue.**