Beryllium Real-Time Monitor Testing and Control of Aerosol Releases in the Workplace

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Be Realtime Monitor Tests

- Field tests of the LANL monitor during assessment of beryllium contamination in a space nuclear reactor
- Laboratory tests with well-characterized aerosols of beryllium materials
- Field tests in a beryllium machining facility
- Laboratory tests of a prototype commercial monitor

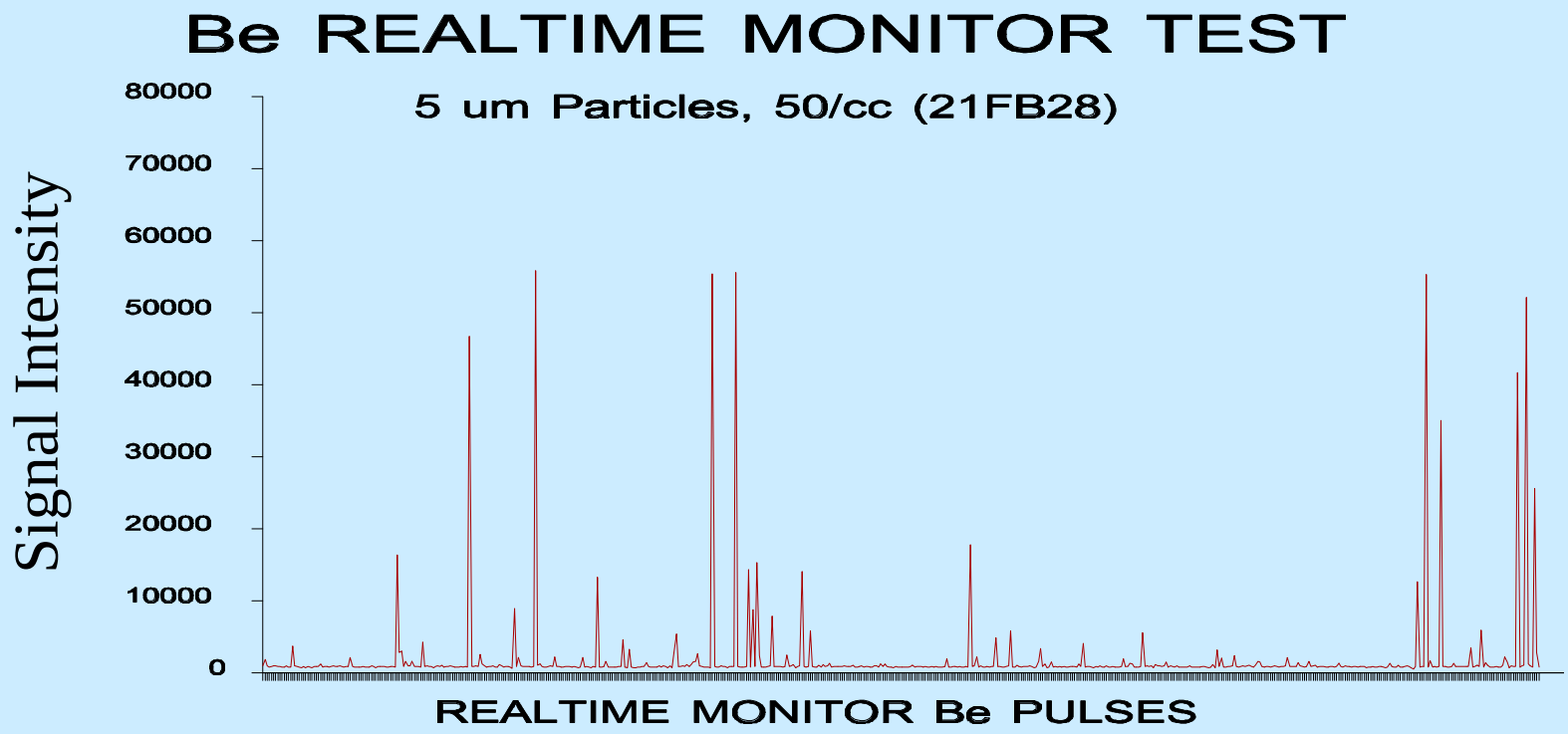
Experience with the Topaz Space Nuclear Reactor System

- Our first cooperative test of the LANL realtime monitor saved substantial time and prevented unnecessary concerns for inhalation or dispersion of beryllium
- It reduced the numbers of samples required as compared to numbers used in traditional retrospective sampling
- It minimized the unnecessary use of PPE

Laboratory Tests with Be Aerosols

- The monitor correctly shows Be in the presence of Be, and no positive signals in the absence of Be
- Some particle size dependence was noted in instrument response, but vaporization of particles may be limited to particle surfaces for larger particles
- A qualitative indication of Be aerosol is still very valuable

Typical RTM Response to Be



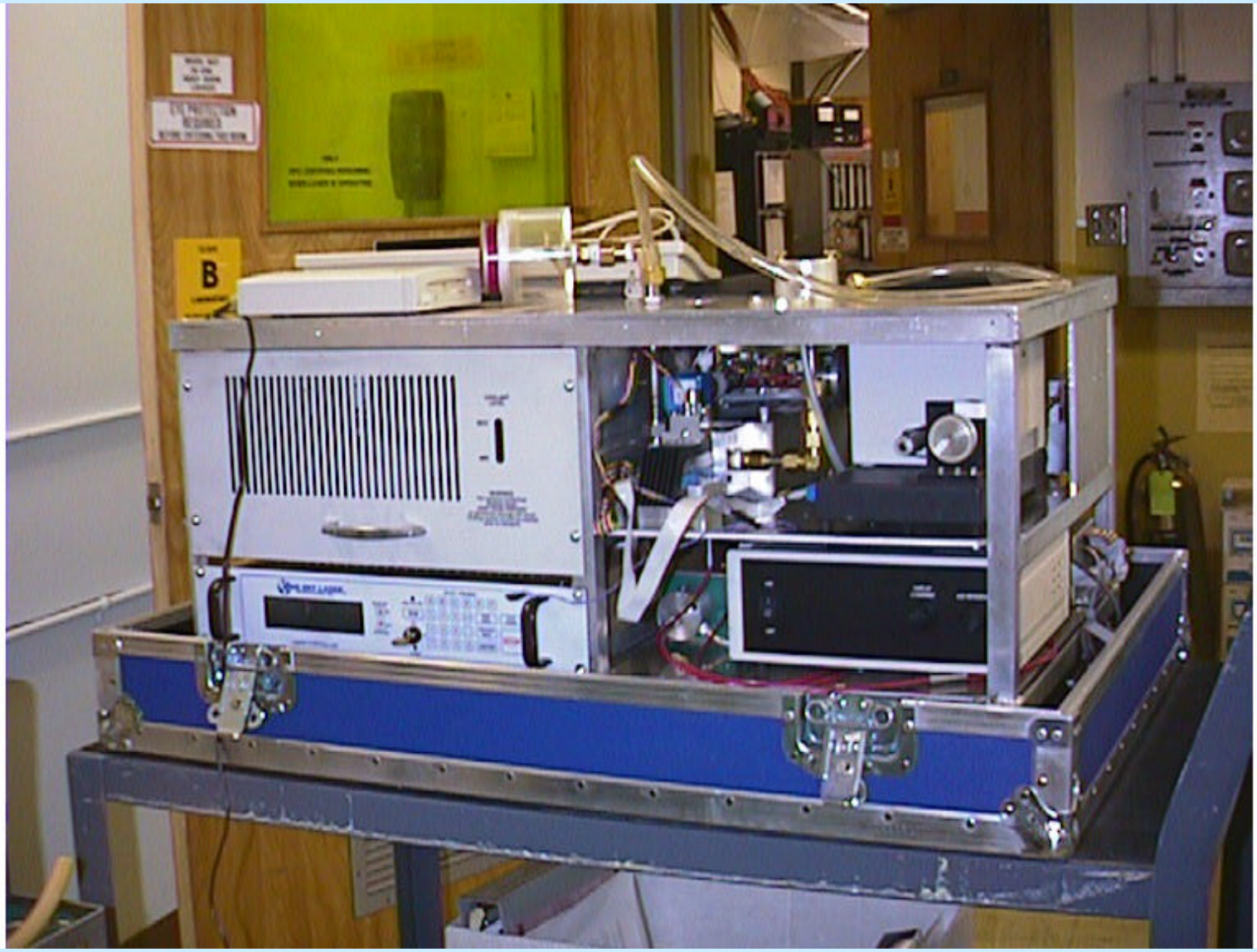
Field Tests in a Be Facility

- Dispersion patterns from grinding and milling machines are complicated
- Use of cutting and lubricating oils can reduce, but does not eliminate, aerosol dispersion
- Even submersed electrical discharge machining causes aerosols (probably from bubble bursting at the surface)
- Bubble bursting in acid etch tanks releases substantial aerosols of Be-contaminated liquids

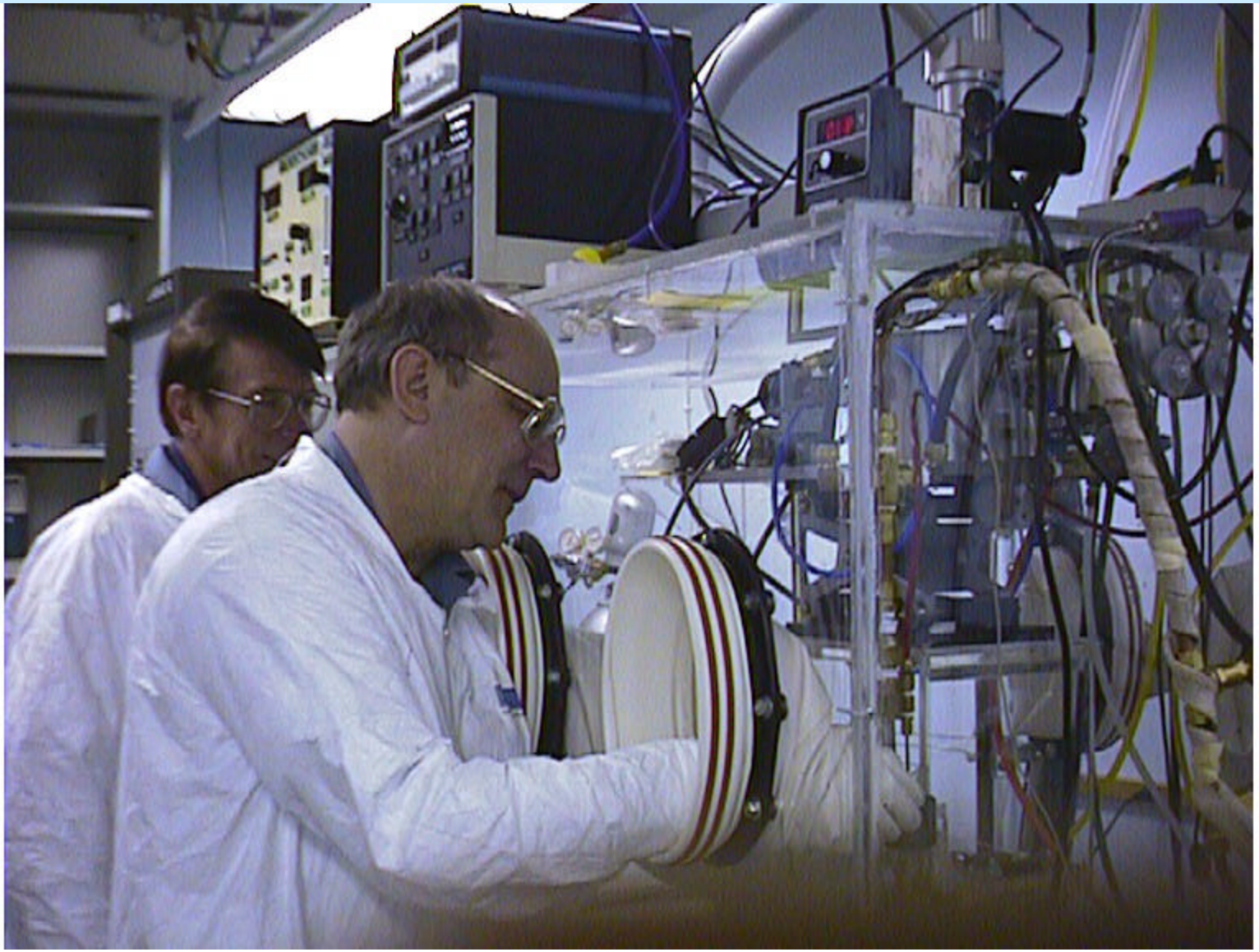
Tests of the Prototype Commercial Realtime Monitor

- Problems with response and data logging are being solved
- Response to Be and non-Be signals was proper
- Data are being reduced to validate the instrument response to particle size and concentration

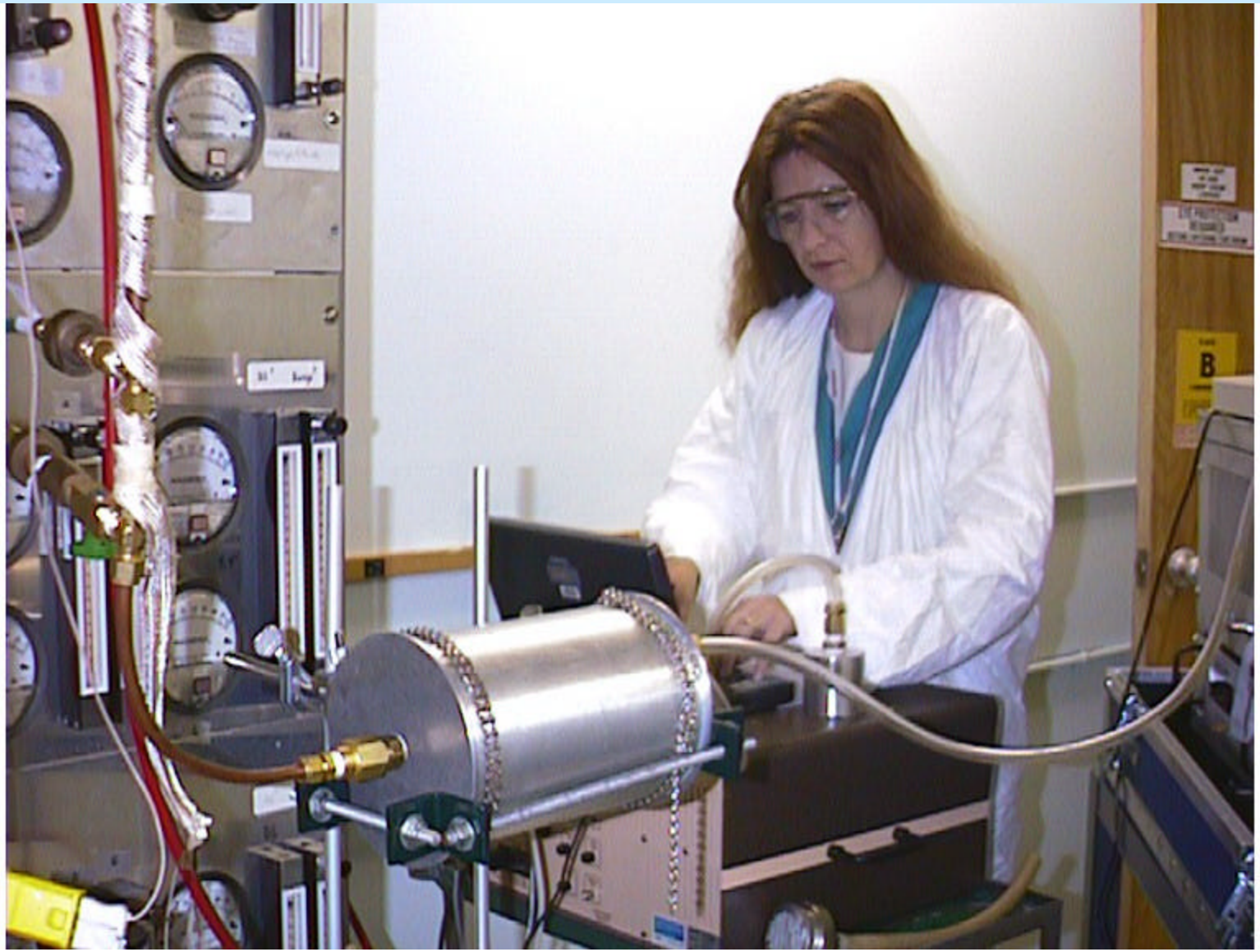
Interior View of the ADA Tech RTM



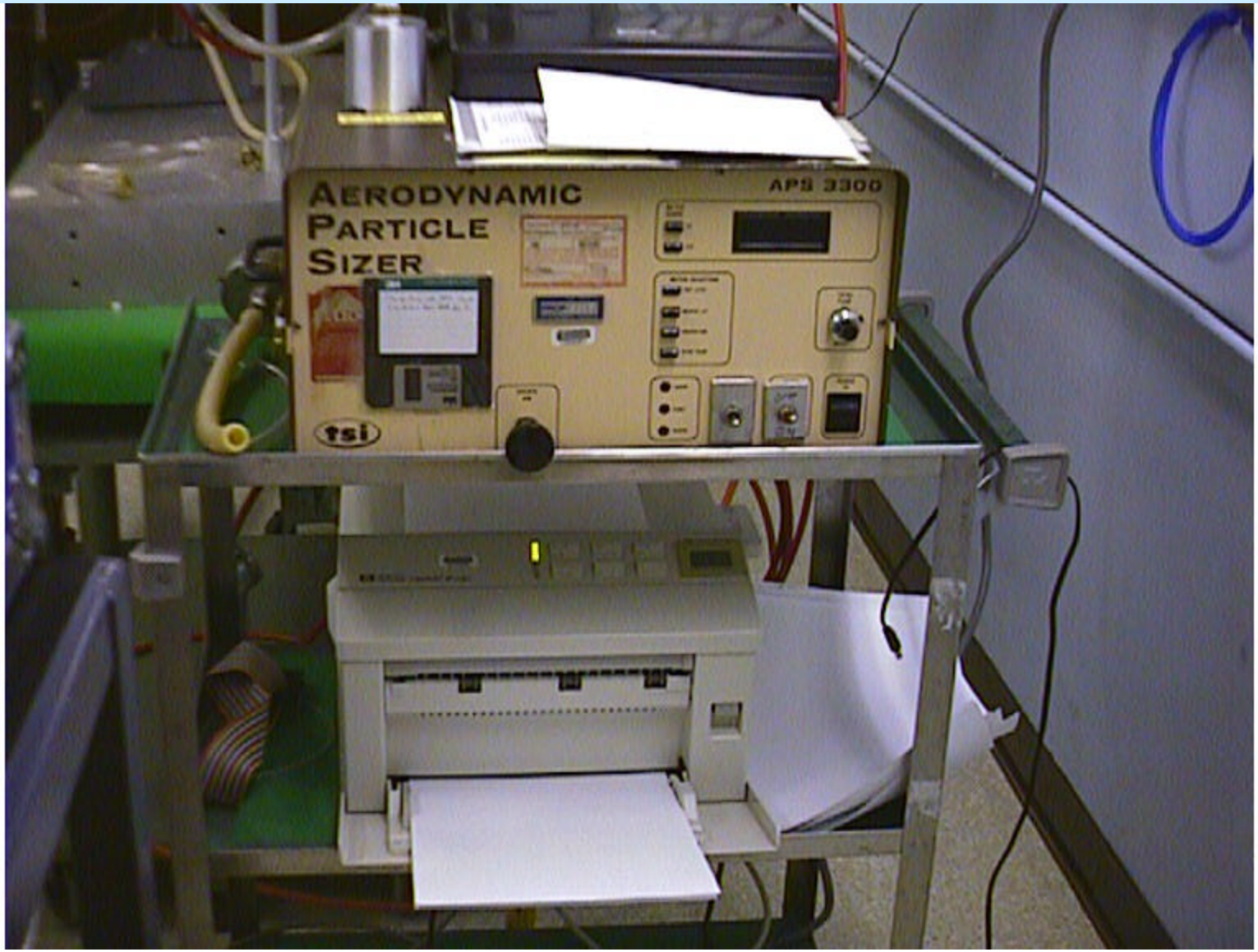
A Be Aerosol System at LRRI



Be Aerosol Mixing and Distribution



APS for Particle Sizing and Counting



Operational View of the ADA RTM

Recommendations

- Realtime monitor technology should be made available to operational industrial hygienists (with appropriate technical support)
- A portion of the instrument use should be directed by workers for self-diagnosing of problems (perhaps without management present)
- A number of lessons learned are still pending for aerosol dispersion and control:
  - Effectiveness of local exhaust
  - Effectiveness of wet cutting techniques
  - Dispersion from bubble-bursting processes