



# Langley Research Center Safety Alert

SA-08-94

Date: July 15, 1994

**TO:** All Facility Safety Heads  
All Facility Coordinators

**FROM:** 421/Acting Safety Manager, Deputy Director of OSEMA

**SUBJECT:** Lessons Learned -- Use of Electronically Scanned Pressure  
(ESP) Systems in LaRC Facilities

One of our research facilities recently had a mishap involving its ESP system. The "lessons learned" from this incident are being disseminated across this Center so that all potential users of this type of equipment benefit from the recommended corrective actions, hopefully, precluding another mishap. A synopsis of the incident and recommendations follows:

The accident was caused by a failed tube connecting a 15 psi ESP sensor to a model orifice. The tube passed through a high pressure water-cooling passage and failed at a solder-joint located inside of the water jacket. Upon failure of the solder-joint, high pressure water entered and over-pressurized an individual sensor in a 32-sensor ESP module and allowed water to flood the reference cavity of the ESP module (which contains exposed miniaturized electronics). The reference cavities for all ESP modules are connected to a common vacuum source; this common vacuum source became contaminated with moisture from the initial ESP module failure which, in effect, destroyed all remaining ESP modules. This accident resulted in several weeks of downtime to repair or replace the affected modules (financial costs were also considerable).

The ESP system was analyzed to locate other possible causes or methods of over-pressurizing the system and recommendations were made to reduce the probability of over-pressurizing the ESP system.

Recommendations which could be useful to other facilities are as follows:

- Ensure that high pressure tubes are correctly connected to the proper high pressure module ports. The probability of success can be improved by:

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- ◆ Maintaining thorough tube labeling (examine the practicality of using different colored tubing for identification of calibration, reference, and control pressures);
- ◆ Verifying that tubes are labeled correctly after every instrumentation change.
- When initially configuring a particular test article, examine tubing paths between measurement orifices and sensor ports, looking for potential interfaces with fluids other than dry, clean, inert gas (Stay away from water!)
  - ◆ If problem areas are found, use individual transducers and/or re-route the affected tubing to eliminate the potential for over-pressure or contamination. The use of continuous tubing, if at all possible, will eliminate the problem of failed joints.
- Always leak check sensors with vacuum only.

Please keep these recommendations in mind as we continue to conduct safe and cost-effective research at this Center. Thank you for your continued excellent support.



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