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# **Fatal Mishap Resulting from a Pressure System Operation in Government Laboratory**

**Leadership ViTS Meeting  
April 3, 2006**

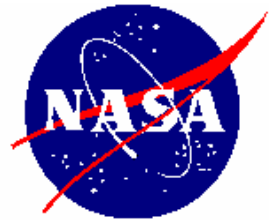
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# The Accident

- Early this year a pressure system failed during initial use in a government laboratory
- One worker killed
- Significant programmatic disruptions
- Possible personal legal consequences



This is a vessel that is similar in construction/size to the one involved in the accident -- stainless steel and approximately 20 inches in diameter



## History leading to event

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- The lab had need to calibrate transducers under pressure.
- To save money, a used vessel was selected
  - “it was here when we took over the facility in 1973”
- Unknowns:
  - vessel pressure rating
  - vessel quality
  - prior vessel application
- Nonetheless, the pressure vessel was integrated as part of the calibration system and put into service
- During initial pressurization the cover separated with great force from the body of the vessel, killing one worker.



## Vessel Information Developed during Accident Investigation

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- **Vessel at least 33 years old**
- **Unknown prior service, no nameplate, no drawings**
- **No pressure or temperature rating information**
- **Most welds on hold down bolts were cracked before being put into this service.**
- **A query near-completion of the mishap review by the government investigation board chairman identified the vessel as a vacuum chamber, and never intended for positive pressure**

# The Pressure Vessel





## Proximate Causes (Pre-decisional)

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- **Vessel design inappropriate for intended service**
  - Vacuum vessel put into service as a pressure vessel
- **Vessel not pressure checked prior to full use**
  - And no restricted access during initial pressurization
- **Critical welds on hold down bolts not inspected after 33+ years of existence**
  - Were not considered critical for a negative pressure (vacuum) application
- **Bolt welds were cracked and cracks exhibited corrosion prior to this use**
- **Vessel failed (chamber lid separated from chamber body) when all hold down bolt welds broke simultaneously.**



## Lessons for NASA

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- Only re-use equipment within known capabilities.
- Beware of fabricated systems bypassing the normal review process.
- Seek expert technical counsel when dealing with hazards resulting from potential energies like pressure.
- Inadequate (or non-existent) safety and engineering review procedures can lead to accidents, particularly in systems with significant stored energy.