

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001



DEC 23 2002

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TO: AA00/Director, Stennis Space Center

FROM: W/Assistant Inspector General for Audits

SUBJECT: Potential Safety Hazard with the Use of Monel Stem Plugs in High-pressure Liquid Oxygen Valves, Assignment No. A-02-020-00

During our audit of Controls Over Pressure Vessels and Pressurized Systems (PV/S) at Stennis Space Center (Stennis), we identified a potential safety hazard that could adversely affect the Center's propulsion test mission. Specifically, Stennis may have some high-pressure liquid oxygen valves in use that have stainless steel bodies and Monel (an alloy composed of nickel, copper, and iron with traces of other elements) stem plugs. Based on correspondence between Stennis propulsion test engineers and the valve manufacturer (Dresser Equipment Group), use of Monel stem plugs with stainless steel valve bodies in high-pressure liquid oxygen systems increases the risk of oxygen fires. Specifically, a Stennis engineer stated:

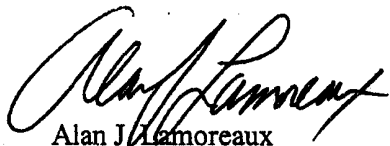
The added hazards associated with and introduced by other properties of Monel K500 as a stem-plug in a stainless steel valve body may or probably will actually increase oxygen fire hazards. A Monel K500 stem plug provides marginal, if any, benefits to resisting fires caused by frictional heating between stem plug and guide bushings.

Based on the recommendations from Dresser, Stennis modified the valve contract and allowed Dresser to substitute stainless steel stem plugs for the contract-specified Monel stem plugs.

The contract modification addressed the hazards associated with the valves acquired from Dresser. Even so, Stennis modified some of its existing stainless steel valves (not obtained from Dresser) to use Monel stem plugs and may have also obtained valves with Monel stem plugs from other NASA Centers for use in its high-pressure liquid oxygen systems. Although we could not determine from Stennis' PV/S inventory records which liquid oxygen system valves had Monel stem plugs, Center operations personnel verified that Stennis does, in fact, have valves in use with stainless steel bodies and Monel stem plugs.

We believe Stennis should determine whether it is safe to use valves with stainless steel valve bodies and Monel stem plugs in high-pressure liquid oxygen systems and, if they are not safe, should remove those valves from service to prevent potential safety hazards to the Center's personnel and test facilities.

If you need additional information or have any questions, please contact Ms. Sandy Massey, Program Director for Safety and Technology Audits, at (321) 867-4057, or Mr. Karl Allen, Program Manager, at (202) 358-2595.



Alan J. Lemoreaux

cc:

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