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**Report Recipients:**

SSC/AA00/Director, John C.  
Stennis Space Center

**STENNIS SPACE CENTER'S  
PRESSURE VESSEL AND  
PRESSURIZED SYSTEM  
PROGRAM NEEDS SIGNIFICANT  
IMPROVEMENTS**

**February 4, 2004**

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**cc:**

M/Associate

Administrator for  
Space Flight

Q/Associate

Administrator for  
Safety and Mission  
Assurance

O/Management

Systems



National Aeronautics and  
Space Administration

**OFFICE OF INSPECTOR GENERAL**

Released by: [original signed by]

David M. Cushing, Assistant Inspector General for Auditing

## **Stennis Space Center's Pressure Vessel and Pressurized System Program Needs Significant Improvements**

Stennis Space Center (Stennis) did not properly manage its pressure vessels and pressurized systems (PV/S) program. We found that Stennis did not follow NASA requirements and guidelines for recertifying, maintaining and repairing, and documenting its PV/S to ensure safe and reliable operation (Appendix B contains appropriate definitions including certification and recertification; Appendix D describes NASA's PV/S program policy and guidelines). Proper management of the PV/S program is important because of the risks associated with the pressurized and volatile contents used in the Center's aging systems. At least 175 of Stennis' 344 operating pressure vessels are more than 35 years old. Although it has had minor accidents with its PV/S, Stennis has had no major accidents. However, failure to perform adequate recertifications and maintenance and to make needed repairs puts Stennis at high risk for accidents that could result in loss of or harm to personnel, flight hardware, and vital test facilities and equipment. For example, an exploding pressure vessel could potentially propel metal shards and shrapnel in a variety of directions.

Because Stennis' first priority was to meet propulsion test schedules, PV/S users would not schedule systems outages to perform PV/S recertifications, maintenance and repairs. In addition, the organizational reporting structure limited the Pressure Systems Manager's ability to correct problems. Specifically, the Pressure Systems Manager reported directly to the Propulsion Test Directorate and lacked the authority to suspend propulsion testing to perform recertification, maintenance, and repairs. Finally, Stennis' use of numerous PV/S databases that often contained conflicting and unreliable data made effective PV/S management extremely difficult.

Stennis conducted an assessment of the PV/S program concurrently with our audit and confirmed the problems that we identified. As a result, Stennis is taking steps to address its pressure systems management structure and to determine other needed corrective actions. For example, in February 2003, the Stennis Center Director appointed a new Pressure Systems Manager within the Center Operations Directorate, and Stennis is developing a risk-based inspection approach to pressure vessel management.

### ***PV/S Recertifications Were Mismanaged***

Stennis recertified many of its cryogenic barge vessels and test stand run-tanks without performing required visual inspections and nondestructive tests on the inner pressure vessels (barge vessels and run-tanks are composed of an inner and outer vessel). Many pressure vessels were also being operated with expired certifications.

**Recertifications of Cryogenic Barge Vessels and Test Stand Run-Tanks Were Incomplete.** Stennis’ policy of partial recertification of its cryogenic barge vessels and test stand run-tanks eliminated required visual inspections and nondestructive tests that ensure the structural integrity of vessels and run-tanks used to support Space Shuttle Main Engine and other rocket engine tests. A recertification consists of a procedure by which a previously certified (documented status that qualifies a vessel or system to operate in the service for which it is intended) vessel or system, by appropriate tests, inspections, examinations, and documentation, is qualified to continue or be returned to operations at the designed pressure. To avoid rocket engine test delays from downtime required for a complete recertification of the outer and inner vessels of the barge vessels and run-tanks, Stennis adopted a policy of recertifying the outer vessels based on results of visual inspections and nondestructive tests, and only partially recertifying the inner vessels using engineering analyses (stress calculations, fracture mechanics, and operational load history). For example, the liquid hydrogen run-tanks at the “A” test stands require recertification every 5 years. Although Stennis was not always meeting the 5-year recertification requirement, Stennis had partially recertified the run-tanks based primarily on engineering analyses at various times since their installation in 1974.

Stennis routinely used engineering analyses to partially recertify the barge vessels and run-tanks until systems outages made the inner vessels available for the visual inspection and nondestructive testing required for a complete recertification. However, because Stennis rarely took the barge vessels and run-tanks out of service, pressure vessel inspectors were unable to perform complete recertification. As a result of performing only partial recertification, Stennis is operating its barge vessels and test stand run-tanks with limited assurance that they are safe and reliable.

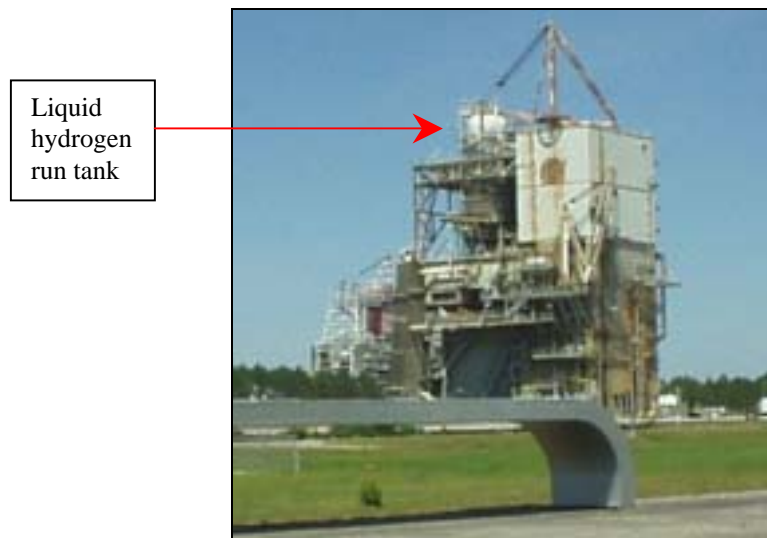


Figure 1. The arrow shows the liquid hydrogen run-tank on test stand A2.

During 2002, Stennis removed the A2 test stand from service for refurbishment. In December 2002, the PV/S inspector visually inspected the inner vessel of the liquid hydrogen run-tank and found darkened welds. Darkened welds are an indicator that

nondestructive (acoustic emissions) testing should be performed to determine the structural integrity of the run-tank. The Center Configuration Control Board did not initially approve the nondestructive tests. However, based on our audit observations that many of Stennis' PV/S were out of certification, the Board ordered that nondestructive tests be performed prior to putting the A2 test stand back in service. As a result, Stennis recertified the run-tank in May 2003 after performing acoustic emissions testing to determine that the tank was structurally sound.

Prior to a May 2002 inspection of liquid hydrogen barge vessel V-138, Stennis had not internally tested its three liquid hydrogen barge vessels (V-138, V-139, and V-140) for recertification since being placed in service in the mid-1960s. In 1990, Stennis waived the requirement to recertify the liquid hydrogen barges' inner vessels due to adverse impact to the Space Shuttle Main Engine test schedule. The waiver stipulated that Stennis could recertify the inner vessels during fiscal years 1991 and 1992 with minimum impact to the test schedule. However, Stennis did not recertify the inner vessels. Instead, Stennis changed its recertification procedure in September 1991 to exempt the liquid hydrogen barge vessels from the recertification requirements. The exemption allowed Stennis to inspect and recertify the vessels as prescribed by engineering analysis and at time intervals determined by the analysis. Stennis' justification for the change was that the liquid hydrogen barge vessels were critical systems to the Space Shuttle Main Engine program, and the time required to perform internal inspections for recertification was rarely available. Stennis did not recertify any inner vessels until May 2002 when it performed an internal inspection and acoustics emissions test on liquid hydrogen barge vessel V-138 while it was out of service for refurbishment. A final recertification report was issued in April 2003. The inner vessels of the remaining two liquid hydrogen barge vessels (V-139 and V-140) have not been recertified.



Figure 2. One of Stennis' three 270,000-gallon liquid hydrogen barges shown docked at the B1/B2 test facility.

Since being put into service in the mid-1960s, Stennis' six liquid oxygen barge vessels have been partially recertified using engineering analyses on the inner vessel. Unlike the liquid hydrogen barge vessels, Stennis did not waive the recertification requirement for the liquid oxygen barge vessels. Further, Stennis did not exempt the liquid oxygen barge vessels from the recertification requirements of its operating procedure for recertifying

pressure vessels. As a result, Stennis does not have adequate assurance based on inspections and tests that the six liquid oxygen barge vessels are being operated in a safe and reliable manner.

Stennis also discovered in 1969 that the liquid hydrogen barge vessels (V-138, V-139, and V-140) had sustained significant damage to the baffles that separate the inner vessel into three parts. The baffles were reversed in direction, which was considered major structural damage. A 1969 engineering evaluation by General Electric Company of vessel V-138 states “damage to the vessel is major and complete repairs including removal of the existing baffles and installation of new baffles will be necessary to return the vessel to a condition suitable for permanent use.” The report further states that with minor repairs, the vessel could be used on a temporary basis to complete the present testing program, preferably on a stand-by basis. Subsequent inspections of V-139 and V-140 identified that these vessels also had inverted baffles. Although it made some minor repairs to the vessels, Stennis never replaced the damaged baffles and has continued to use the damaged vessels on a regular basis. Stennis recertified V-138 in April 2003 after a comparison of 1969 photographs to photographs that were taken in May 2002 showed no further damage to the baffles, and acoustic emissions tests showed no significant findings in the structural integrity of the inner vessel. Although Stennis has not performed inspections and acoustic emissions tests to determine whether the inner vessels of V-139 and V-140 are structurally sound, the vessels continue to be used regularly.

**Pressure Vessels Operated Without Recertification.** Stennis did not recertify its pressure vessels within the intervals established by NASA guidelines. As of April 2003, Stennis was operating 117 (34 percent) of its 344 active pressure vessels in an uncertified condition. Past-due recertifications ranged from about 1 month to about 8 years. Of the 117 uncertified vessels, 24 were less than 1 year past due for recertification, 15 were from 1 to 3 years past due, and 78 were from 3 to almost 8 years past due.

From October 2000 through March 2003, Stennis inspected and tested some pressure vessels, but it did not prepare recertification reports that finalized the recertification process by notifying managers of vessel inspection and test results. For example, in October 2001, Stennis inspected and tested 60 of the 78 vessels that were more than 3 years past due for recertification. However, Stennis did not issue until June 2003 the required final recertification report verifying the inspection results. Stennis inspected and tested three additional vessels in 2002 for which final reports were issued in April and May 2003. NASA standards require that recertification reports be prepared immediately following inspections and tests of pressure vessels. Stennis management needs to have prompt knowledge of vessel inspection and test results so it can mitigate risks that could jeopardize safe and reliable operation of pressure vessels or discontinue operations.

Stennis has 55 other pressure vessel certifications expiring before October 2004. Consequently, Stennis faces a surmounting problem to ensure safe and reliable operation of its pressure systems. Stennis plans to address this problem by implementing a risk-

based inspection program to base pressure vessel recertification on risk rather than the current time-based approach to vessel recertification. With the risk-based program, Stennis can evaluate the circumstances of each of its vessels and tailor an inspection and test program accordingly.

### ***PV/S Maintenance and Repairs Were Not Performed***

Stennis had not adequately maintained or repaired its PV/S. PV/S inspectors reported deficiencies such as system leaks; corrosion; set pressures of relief devices beyond tolerances; paint breakdown; missing or disconnected ground wires; and missing identification, certification, and proof test tags. The general condition of PV/S showed that preventive maintenance and corrective actions were often not performed.

The primary reason maintenance and repairs were not performed was because PV/S program officials were unable to obtain systems outages from users. Also, PV/S problems were unresolved because the Pressure Systems Manager and the Pressure Systems Committee did not assign corrective actions for reported problems. Finally, the contractor responsible for repairs routinely cited Stennis' Allowable Leak Standard as justification for not making needed repairs for problems reported by inspectors. The standard allows Stennis to continue operations with leaks that do not pose a safety or operational hazard and are uneconomical to fix. However, the lead PV/S inspector told us that his primary concern is with the safety of continuing operations rather than the cost associated with loss of product and system repairs when he reports a problem on a discrepancy and correction report (document used to identify and control the disposition and correction of significant problems). For example, following an October 2001 inspection of a high-pressure air system, inspectors prepared a discrepancy and correction report for an audible leak from a severely corroded component that was caused by contact of dissimilar metals. In January 2003, we observed inspectors as they identified the same leak and corrosion reported in 2001. When the problem was reported in 2001, Stennis' contractor cited provisions of the Allowable Leak Standard as justification for continuing operations with the leak. Because the deficiencies were not repaired, Stennis risked system failure for more than 1 year. The lead PV/S inspector informed us that corrosion caused by dissimilar metals is an ongoing problem at Stennis and would eventually result in system failures if left uncorrected.

### ***PV/S Program Databases Were Unreliable***

Stennis did not effectively manage its PV/S program because Stennis used numerous independent databases containing similar data that was not shared and concurrently updated, and was not reliable. As a result, Stennis could not depend on its databases for complete and accurate PV/S information needed for scheduling and performing inspections and recertifications, and for overall PV/S program management. The NASA Safety Policy for PV/S requires that each Center establish a configuration management system for PV/S and update documentation for any new and modified PV/S. The policy further requires that the configuration management system ensure that the documentation always shows the most recent, as-operated configuration of the PV/S.

Stennis maintained the official PV/S configuration database (drawings) in the Sitewide Operation and Repair Documentation system maintained in the Central Engineering Files Office, but PV/S inspectors used systems drawings from a different database to perform in-service inspections. The Pressure Systems Design Engineer did not update the drawings in either database to reflect changes reported by inspectors. For example, in September 2001, inspectors reported that several valves and other components had been added to a liquid hydrogen system. Despite the reported changes, the Pressure Systems Design Engineer did not update either database. Consequently, databases containing the drawings of this liquid hydrogen system are inaccurate. The lead inspector informed us that drawings used to perform inspections were inaccurate for about 75 percent of the inspections performed.

Obtaining an accurate PV/S drawing was further complicated because Stennis maintained at least three other configuration management databases for drawings at the Component Test Complex, the High Pressure Gas Facility, and the “A” and “B” test stands. Modifications to PV/S drawings in these three databases were not always recorded in the Sitewide Operation and Repair Documentation system. Consequently, the accuracy of the official PV/S configuration management database was questionable.

Stennis also had other databases for managing requirements such as scheduling inspections of pressure relief valves, calibrating pressure gauges, managing inventories of spare parts, managing pressure vessel inspections and recertifications, and tracking discrepancy and correction reports. In many cases, Stennis used multiple databases to manage each requirement. In 2001, Stennis purchased a system software package to manage its PV/S program and to eliminate the use of some PV/S databases. However, PV/S officials could not use the software to effectively manage the program because they did not (1) plan for enough system users when acquiring the software license, (2) implement the software Centerwide, (3) use all of the data elements needed, and (4) validate system data and correct errors after the initial data input. Although the Pressure Systems Manager told us that the software could be a viable management tool, he had neither the resources to address system shortcomings nor the authority to require Centerwide system use. Stennis cannot effectively manage and operate its PV/S program without a system capability that provides ready access to reliable data supporting all PV/S requirements.

***Recommendations, Management's Response, and Evaluation of Management's Response***

**To improve PV/S management, the Stennis Center Director should:**

- 1. Plan and schedule systems outages for recertification of the inner vessels of the aging cryogenic barge vessels and test stand run-tanks that never received a complete recertification. Priority in scheduling the recertifications should be given to liquid hydrogen barge vessels V-139 and V-140.**

**Management's Response.** Concur. Stennis recertified all test stand run-tanks with the exception of the test stand A-1 run-tanks, which were taken out of service pending recertification. Stennis has identified all uncertified pressure vessels, established a recertification plan, and prepared a recertification budget. Pending recertification of the vessels, Stennis waived the recertification requirements until November 2004. Stennis will remove from service those vessels that have not been recertified by the waiver expiration date. The complete text of management's response is in Appendix E.

**Evaluation of Management's Response.** Management's planned actions are responsive to the recommendation. Although we did not evaluate Stennis' justification for waiving recertification requirements until November 2004, we will evaluate whether Stennis has complied with its recertification plan as part of the audit follow-up process. The recommendation is resolved, but will remain undispositioned and open for reporting purposes until corrective actions are completed.

- 2. Plan and schedule PV/S outages to recertify, maintain, and repair systems according to NASA requirements.**

**Management's Response.** Concur. Stennis will schedule pressure system outages in conjunction with each system's pressure vessel recertification outage. While systems are down, Stennis will perform maintenance, make repairs, and identify discrepancies that will be corrected during periodic inspections (see Appendix E).

**Evaluation of Management's Response.** Management's planned actions are responsive to the recommendation. The recommendation is resolved, but will remain undispositioned and open for reporting purposes until corrective actions are completed.

- 3. Update the official Sitewide Operation and Repair Documentation system to reflect the current as-operated PV/S status, require that all PV/S modifications become part of the official drawings, and direct Center officials to use these drawings for inspections and recertifications.**

**Management's Response.** Concur. Stennis chartered a Tiger Team to study the accuracy of the documentation associated with Test Stand Operational Systems,



including PV/S, and recommend to management how to improve the Configuration and Documentation Control Program. The PV/S Program will incorporate the team's recommendations and will require PV/S modifications to become part of the official drawings that will be used for all PV/S inspections and certifications (see Appendix E).

**Evaluation of Management's Response.** Management's planned actions are responsive to the recommendation. The recommendation is resolved, but will remain undispositioned and open for reporting purposes until corrective actions are completed.

**4. Select software for Centerwide PV/S management, and consolidate or electronically link databases when practical.**

**Management's Response.** Concur. Stennis has selected MAXIMO as its PV/S management software and will consolidate its PV/S databases into MAXIMO where practical for maintenance, inspection, and certification management (see Appendix E).

**Evaluation of Management's Response.** Management's planned actions are responsive to the recommendation. The recommendation is resolved, but will remain undispositioned and open for reporting purposes until corrective actions are completed.

## **Appendixes**

Among the appendixes, note Appendix B, which contains background information on Stennis PV/S including applicable definitions and Appendix D, which identifies the NASA requirements for managing PV/S.

## **List of Appendixes**

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Appendix A – Status of Recommendations

Appendix B – Background

Appendix C – Objectives, Scope, and Methodology

Appendix D – NASA Policy, Procedures, and Guidelines for Pressure  
Vessel and Pressurized Systems Management

Appendix E – Management’s Response

Appendix F – Report Distribution

### **Acronym Used in the Report**

PV/S – Pressure Vessels and Pressurized Systems

## Appendix A. Status of Recommendations

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<b>Recommendation No.</b>	<b>Resolved</b>	<b>Unresolved</b>	<b>Open/ECD*</b>	<b>Closed</b>
1	X		11/07/2004	
2	X		11/07/2004	
3	X		04/30/2004	
4	X		05/31/2004	

\* ECD – Estimated Completion Date.

## Appendix B. Background

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The Stennis Space Center (Stennis) Propulsion Test Directorate mission is to provide safe, efficient, and responsive rocket propulsion test services to NASA, other Government agencies, and the commercial propulsion development community. These services include testing and flight certifying rocket propulsion systems for the Space Shuttle and future generation space vehicles at Stennis' three test complexes. Stennis uses various pressure systems to handle the gaseous and/or liquid materials (such as hydrogen, oxygen, nitrogen, helium, air) needed for its testing program. Stennis' pressure systems, by the very nature of their contents and operating parameters, create hazards to people and the surrounding environment. For example, liquid hydrogen, an asphyxiant, can cause severe burns at cryogenic temperatures, is highly flammable, and easily ignited. Liquid oxygen, also an asphyxiant that causes severe burns, is not flammable, but accelerates the ignition of materials that are normally considered noncombustible. Liquid and gaseous nitrogen are asphyxiants that can cause death if inhaled.

The Propulsion Test Directorate relies on a Pressure Systems Manager, a Pressure Systems Committee, and other NASA and contractor experts to manage the Center's pressure vessels and systems according to Agency policy, procedures, and guidelines. To ensure structural integrity of its pressure systems and prevent mishaps from occurring, Stennis is required to certify and periodically inspect and recertify its systems.

NASA Policy Directive 8710.5, "The NASA Safety Policy for Pressure Vessels and Pressurized Systems (PV/S)," requires that PV/S be operated, inspected, maintained, repaired, and certified/recertified in accordance with applicable codes, standards, and regulations. NASA Procedures and Guidelines 1700.6A, "Guide for In-service Inspection of Ground-Based Pressure Vessels and Systems," defines certification, in-service inspection, and recertification as follows:

- Certification – The documented status that qualifies a vessel or system to operate in the service for which it is intended.
- In-service Inspection – Inspection performed after a system has been initially put into service. These inspections are necessary to ensure that a system maintains its certification status.
- Recertification – The procedure by which a previously certified vessel or system, by appropriate tests, inspections, examinations, and documentation, is qualified to continue or be returned to operations at the designed pressure.

## **Appendix C. Objectives, Scope, and Methodology**

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### **Objectives**

The audit objective was to determine whether Stennis Space Center (Stennis) effectively managed its pressure vessel and pressurized systems (PV/S) program to ensure safe and reliable operation of its pressure systems.

### **Scope and Methodology**

We reviewed NASA and Stennis policy, procedures, and guidelines for managing PV/S. We interviewed representatives from Stennis' Propulsion Test Directorate, Center Operations Directorate, and Safety and Mission Assurance Office; the facility operating services contractor; and the test and technical services contractor. We performed visual PV/S inspections, researched inspection and recertification reports, and accompanied Stennis inspectors during an in-service inspection of a high-pressure air system. We determined that computer-processed data were unreliable as a result of data errors and inconsistencies; therefore, we did not rely on computer-processed data during the audit.

### **Management Controls Reviewed**

We considered Stennis' failure to adequately recertify, maintain, and repair its PV/S to be a significant management control weakness.

### **Audit Field Work**

We performed audit field work at Stennis from July 2002 through October 2003 in accordance with generally accepted government auditing standards.

## **Appendix D. NASA Policy, Procedures, and Guidelines for Pressure Vessel and Pressurized Systems Management**

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NASA and Stennis Space Center (Stennis) have policies, procedures, and guidelines for managing the Agency's pressure vessels and pressurized systems (PV/S). NASA Policy Directive 8710.5, "NASA Safety Policy for PV/S," March 17, 1998, outlines NASA's program policy for ensuring the structural integrity of PV/S and minimizing associated mishap potential. NASA Procedures and Guidelines 1700.6A, "Guide for In-service Inspection of Ground-Based PV/S – with changes 1-8," July 13, 2000, establishes an outline of in-service inspection and recertification procedures for ground-based, unfired PV/S; provides baseline inspection and recertification time intervals; and identifies documentation requirements for PV/S certification and recertification.

**NASA Policy Directive 8710.5.** The directive requires that NASA Centers:

- Establish a certification/recertification process for all ground-based PV/S to ensure their safe and reliable operation.
- Ensure that all pressure vessels, pressurized components, and pressurized systems are operated, periodically inspected, maintained, repaired, and certified/recertified in accordance with applicable codes, standards, guides, and Federal and State regulations.
- Prepare and periodically update the certification documentation for each PV/S in accordance with an established schedule.
- Establish a configuration management system for PV/S, and maintain and update PV/S documentation as modifications are made and as new systems come online. The configuration management system shall ensure that the documentation always reflects the current as-operated configuration of the PV/S.

The Directive assigns responsibility to the Pressure Systems Manager for (1) implementing the requirements of NASA Policy Directive 8710.5; (2) establishing and maintaining cognizance of all requirements and activities for PV/S in-service inspection and analysis, certification, and recertification; (3) establishing requirements for PV/S in-service inspection and analysis, certification, recertification, repairs, modifications, and configuration management; and (4) serving as the authority and technical expert for all PV/S matters.

**NASA Procedures and Guidelines 1700.6A.** The guide states that through surveillance and correction of in-service deterioration, NASA will maintain a safe working environment for Agency and contractor personnel, safety for the public sector, and protection against loss of capital investment.

## Appendix E. Management's Response

National Aeronautics and  
Space Administration  
**John C. Stennis Space Center**  
Stennis Space Center, MS 39529-6000



December 10, 2003

Reply to Attn of: AA00

TO: Office of the Inspector General  
Attn: W/Assistant Inspector General for Auditing

FROM: AA00/Interim Director

SUBJECT: Draft Audit Report, Assignment Number A-02-020-01  
Stennis Space Center's Pressure Vessel and Pressurized System Program  
Needs Significant Improvements

Thank you for the opportunity to provide comments on the subject draft audit report. The following addresses the recommendations provided in your audit report no. A-02-020-01:

### Recommendation 1

**Plan and schedule systems outages for recertification of the inner vessels of the aging cryogenic barge vessels and test stand run-tanks that never received a complete recertification. Priority in scheduling the recertifications should be given to liquid hydrogen barge vessels V-139 and V-140.**

### Response

SSC concurs with the recommendation.

All test stand run tanks have been recertified with the exception of the test stand A-1 run-tanks which are being scheduled for recertification in the next three months for a new test article. In the meantime, the A-1 tanks have been tagged out until they are recertified.

All remaining uncertified pressure vessels have been identified and a plan established to recertify the vessels. After each vessel was evaluated for continued safe operation based on several criteria, the Center waived recertification requirements until November 7, 2004. A budget has been prepared and submitted to management to fund the recertification of the vessels with a planned completion date of November 7, 2004. Contingent upon the availability of the funding, a schedule will be prepared and a program implemented to recertify all vessels by November 7, 2004. Vessels not recertified by the expiration of the waivers will be tagged out of service. When completed, recertification packages will be available for review.

Estimated Completion Date – November 7, 2004

Recommendation 2

**Plan and schedule PV/S outages to recertify, maintain, and repair systems according to NASA requirements.**

Response

SSC concurs with the recommendation.

As uncertified vessels identified in Recommendation 1 are scheduled for recertification outages, the corresponding systems will also be scheduled for outages. During these outages, the systems will be maintained, repaired and discrepancies identified. These discrepancies will be corrected during Periodic Inspections. When completed, corrective maintenance packages will be available for review.

Estimated Completion Date – November 7, 2004

Recommendation 3

**Update the official Sitewide Operation and Repair Documentation system to reflect the current as-operated PV/S status, require that all PV/S modifications become part of the official drawings, and direct Center Officials to use these drawings for inspections and certifications.**

Response

SSC concurs with the recommendation.

SSC Center Operations Director has chartered a Tiger Team to study the accuracy of the documentation associated with Test Stand Operational Systems and provide recommendations to management for improvements in the Configuration and Documentation Control Program. As a part of this study, the Tiger Team is also examining documentation associated with the PV/S Program. When the team's report is released, the PV/S Program will incorporate their recommendations. This will include requiring all PV/S modifications to become part of the official drawings, and direct Center officials to use these drawings for all PV/S inspections and certifications. When completed, updated procedures will be provided for review.

Estimated Completion Date - April 30, 2004

Recommendation 4

**Select software for center-wide PV/S management, and consolidate or electronically link databases when practical.**



Response

SSC concurs with the recommendation.

The PV/S Committee has determined that MAXIMO is the software best suited for PV/S management. All PV/S databases will be combined where practical and input into MAXIMO for maintenance, inspection, and certification management. Evidence the PV/S data is in the database will be available for review.

Estimated Completion Date - May 31, 2004

The cooperation of your team in assisting NASA/SSC in identifying these issues and strengthening our processes with regard to pressure vessels is sincerely appreciated. If we can be of further assistance, please contact Marina Benigno, Director, Center Operations Directorate at (228) 688-2004.

  
David A. Throckmorton

cc:  
BA10/Ms. Mosteller  
RA00/Ms. Benigno  
RA20/Mr. Harris  
RA20/Mr. Heitzmann

## **Appendix F. Report Distribution**

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### **National Aeronautics and Space Administration Headquarters**

A/Administrator  
AD/Deputy Administrator  
ADI/Associate Deputy Administrator for Institutions and Asset Management  
ADT/Associate Deputy Administrator for Technical Programs  
AA/Chief of Staff  
AB/Associate Deputy Administrator  
B/Deputy Chief Financial Officer for Financial Management  
B/Deputy Chief Financial Officer for Resources (Comptroller)  
BF/Director, Financial Management Division  
G/General Counsel  
H/Assistant Administrator for Procurement  
HK/Director, Contract Management Division  
HS/Director, Program Operations Division  
J/Assistant Administrator for Management Systems  
JM/Director, Management Assessment Division  
L/Assistant Administrator for Legislative Affairs  
M/Associate Administrator for Space Flight  
Q/Associate Administrator for Safety and Mission Assurance

### **NASA Advisory Officials**

Chair, NASA Aerospace Safety Advisory Panel

### **NASA Centers**

ARC/D/Director, Ames Research Center  
DFRC/X/Director, Dryden Flight Research Center  
GRC/0100/Director, John. H. Glenn Research Center at Lewis Field  
GSFC/100/Director, Goddard Space Flight Center  
JPL/Director, NASA Management Office  
JSC/AA/Director, Lyndon B. Johnson Space Center  
KSC/AA/Director, John F. Kennedy Space Center  
KSC/CC/Chief Counsel, John F. Kennedy Space Center  
LaRC/106/Director, Langley Research Center  
MSFC/DA01/Director, George C. Marshall Space Flight Center  
SSC/AA00/Director, John C. Stennis Space Center

## **Appendix F**

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### **Non-NASA Federal Organizations and Individuals**

Assistant to the President for Science and Technology Policy  
Deputy Associate Director, Energy and Science Division, Office of Management and Budget  
Branch Chief, Science and Space Programs Branch, Energy and Science Division, Office of Management and Budget  
Managing Director, Acquisition and Sourcing Management Team, General Accounting Office  
Senior Professional Staff Member, Senate Subcommittee on Science, Technology, and Space

### **Chairman and Ranking Minority Member – Congressional Committees and Subcommittees**

Senate Committee on Appropriations  
Senate Subcommittee on VA, HUD, and Independent Agencies  
Senate Committee on Commerce, Science, and Transportation  
Senate Subcommittee on Science, Technology, and Space  
Senate Committee on Governmental Affairs  
House Committee on Appropriations  
House Subcommittee on VA, HUD, and Independent Agencies  
House Committee on Government Reform  
House Subcommittee on Government Efficiency and Financial Management  
House Committee on Science  
House Subcommittee on Space and Aeronautics

### **Congressional Member**

Honorable Pete Sessions, U.S. House of Representatives

## NASA Assistant Inspector General for Auditing Reader Survey

The NASA Office of Inspector General has a continuing interest in improving the usefulness of our reports. We wish to make our reports responsive to our customers' interests, consistent with our statutory responsibility. Could you help us by completing our reader survey? For your convenience, the questionnaire can be completed electronically through our homepage at <http://www.hq.nasa.gov/office/oig/hq/audits.html> or can be mailed to the Assistant Inspector General for Auditing; NASA Headquarters, Code W, Washington, DC 20546-0001.

**Report Title:** Stennis Space Center's Pressure Vessel and Pressurized System Program Needs Significant Improvements

**Report Number:** \_\_\_\_\_ **Report Date:** \_\_\_\_\_

*Circle the appropriate rating for the following statements.*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
1. The report was clear, readable, and logically organized.	5	4	3	2	1	N/A
2. The report was concise and to the point.	5	4	3	2	1	N/A
3. We effectively communicated the audit objectives, scope, and methodology.	5	4	3	2	1	N/A
4. The report contained sufficient information to support the finding(s) in a balanced and objective manner.	5	4	3	2	1	N/A

*Overall, how would you rate the report?*

- Excellent       Fair  
 Very Good     Poor  
 Good

*If you have any additional comments or wish to elaborate on any of the above responses, please write them here. Use additional paper if necessary.* \_\_\_\_\_

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**How did you use the report?** \_\_\_\_\_  
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**How could we improve our report?** \_\_\_\_\_  
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## **Major Contributors to the Report**

Kevin J. Carson, Director, Office of Audits (OA) Safety and Security

Sandy Massey, Associate Director, OA Safety and Security

Lamar Brickhouse, Auditor

Gene Lindley, Auditor

Ron Yarbrough, OA Safety and Occupational Health Manager