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John C. Stennis Space Center
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John C. Stennis Space Center SSC Hot Work Program Procedure

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1.0 Purpose

This work instruction establishes the requirements and procedures for the Hot Work Permit Program at Stennis Space Center (SSC) whereby strict protocols are followed to reduce risk of fire injuries and damage to life and property.

2.0 Applicability

This instruction is applicable to all NASA/SSC organizations including civil service and support contractors, and is applicable to other tenants of NASA's John C. Stennis Space Center, to the extent formal agreement is reached between NASA and the tenant.

This document covers all hot work operations involving, but not limited to, electric arc welding, oxy-acetylene cutting/welding/heating operations, operations of electrical pneumatic or mechanical tools in hazardous classified areas that are not intrinsically safe, soldering torches powered by flammable gases, and open-flame-producing devices or devices that produce hot sparks during operations.

3.0 References

- 3.1. NPR 8715.3, *NASA Safety Manual*.
- 3.2. NASA-STD-8719.11 *Safety Standard for Fire Protection*.
- 3.3. Code of Federal Regulations 29 CFR 1910.252, Subpart Q, *Welding, Cutting and Brazing, General Requirements*.
- 3.4. Code of Federal Regulations 29 CFR 1910.253, Subpart Q, *Welding, Cutting and Brazing, Oxygen-fuel welding and cutting*.
- 3.5. NFPA 51B, *Standard for Fire Prevention during Welding, Cutting, and other Hot Work*.
- 3.6. NASA-STD-8719.12, *Safety Standard for Explosives, Propellants, and Pyrotechnics*
- 3.7. FOSC document ST-P-46 Employee Certifications
- 3.8. FOSC document ST-P-20 Hazard Assessment
- 3.9. FOSC document MT-P-03 Welding/Cutting/Brazing Operations
- 3.10. Form SSC-90, Process Plan
- 3.11. Form SSC-68, Flame "Hot Work" Permit

All references are assumed to be the latest version unless otherwise specified.

4.0 Responsibilities

4.1 NASA Center Operations

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The NASA Center Operations Fire Protection Program Manager has overall responsibility for development of this instruction, and approve all organizations requesting approval of facilities or construction sites for Hot Work without daily permits. Organizations requesting authorization to issue Hot Work Permits shall make formal requests in writing to the Fire Protection Program Manager.

4.2 Fire Protection Services

The SSC Fire Chief of the Facility Operating Services Contract (FOSC), and through the FOSC Safety Services, will provide support to the NASA Fire Protection Program Manager by reviewing, updating, implementing and maintaining the SSC Hot Works Program Procedure document.

4.3 Civil Servant Personnel

Civil Servant Personnel will not be assigned tasks that include potential exposure to “hot work.” If assignments are made in the future, civil servants will comply with this instruction.

4.4 Contractors, Tenants

Contractors and tenants will identify any hot work tasks and comply with this instruction.

5.0 Procedure/Process

Introduction: Hot Work Permits provide documented approval to conduct welding, cutting, brazing or other spark/flame/heat-producing operation.

- 5.1 Daily Hot Work Permits are required for all welding, cutting, brazing, and spark/heat/flame-producing operations in all areas at SSC, except those unique areas suitable for hot work operations that qualify for permanent and specific duration permits.
- 5.2 Hot Work permits issued are valid for the duration of the work shift unless otherwise limited by the Permit Authorizing Individual (PAI). Such limitations will be noted on the form in the expiration (date/time) block of Form SSC-68.
- 5.3 Requests for Permanent permits for welding or designated welding facilities will be processed through the SSC Fire Department, the FOSC Safety & Mission Assurance (S&MA) Office and approved by the NASA-SSC Fire Protection Program Manager. Requests shall consist of a copy of the written Facility Safety Plan and inspection criteria. Such welding or designated welding facilities will be

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issued permanent permits for a maximum of 24 months. These facilities must meet the following requirements as a minimum:

- a) A written Facility Safety Plan (as outlined in NPR 8715.3 and NASA-STD-8719.7A) shall be maintained and address the hazards in the area associated with hot work operations.
- b) The facility must be constructed and maintained in such a manner that hot work operations do not jeopardize the fire safety of the facility.
- c) Appropriate fire detection and fire alarm systems must be operational at all times as approved by the SSC Fire Department.
- d) The facility will be inspected at least annually to ensure compliance with the requirements of the authorization letter for operating the facility without a daily permit. SSC Fire Department will document and maintain inspections.
- e) The responsible supervisor for the unique facility shall ensure specific conditions, unique to the site and location, to remain in continual compliance with original permit requirements.

- 5.4 The SSC Fire Department is responsible for controlling and issuing Hot Work Permits, and is thereby the Hot Work Permit Program Administrator.
- 5.5 The SSC Fire Department will maintain a list of Permit Authorizing Individuals (PAIs), as well as serve with FOSC S&MA as the PAIs issuing all SSC hot work permits. PAIs will be certified to issue Hot Work Permits per FOSC document ST-P-46 Employee Certifications.
- 5.6 The SSC Fire Department will brief SSC subcontractors on the Hot Work Permit Program and its requirements at all preconstruction briefings.
- 5.7 Facility managers or their designees shall approve Hot Work Permits for their assigned areas. If the facility manager or designee is unavailable, the person responsible for the system/facility area or hot work operation (such as Test Operations Engineer [TOE], construction engineer, leadperson) will approve the Hot Work Permit.
- 5.8 In Test Complex areas, the Test Operations Engineer (TOE) shall approve Hot Work permits for their assigned areas. TOEs will:
 - a) help identify potential flammable sources for safe atmospheric checks.
 - b) coordinate test stand activity around the hot work activity
 - c) Notify the leadperson listed on the Hot Work Permit and the PAI to void the permit if it is necessary to change configuration of the system involved.
- 5.9 All personnel engaged in welding, cutting, spark-producing, or heat-producing operation are responsible for knowing the exact locations of the nearest telephone and/or nearest fire alarm pull station to be used in case of an emergency.

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- 5.10 Welding, brazing, or cutting on lines containing pressure is prohibited. Operational requirements may dictate blanket purge pressures to be maintained. Slight inert purge(s) may be maintained during open system work for cleanliness, but shall not exceed an audible “hiss” level.
- 5.11 Welding, cutting, brazing, spark-producing or heat-producing operations are **prohibited at all times** (except with prior approval of the cognizant safety representative) within 100 feet of a propellant storage vessel, transfer or vent line, or vessels that contain a propellant or a flammable atmosphere. In the event heat/spark/flame operations are required within the 100-foot limit, the following precautions must be verified as in place before issuing a Hot Work Permit:
- a) Propellant system is in, and will remain in, a static mode configuration, with integrity established (no leaks). The system configuration shall be verified with the system owner.
 - b) System pressure relief (venting) will not be accomplished during the heat/spark/flame work. System will be monitored by a qualified operator for excessive pressure buildup. In the event that emergency venting is necessary, the heat/spark/flame work will be discontinued until the system is again in a static-mode configuration.
 - c) The affected area’s atmosphere will be evaluated to verify the absence of flammable/combustible vapors and hazardous chemical substances in the work area. Samples will be taken with approved portable gas (vapor) detectors. Periodic samples will be taken if the heat/spark/flame work is required for an extended period of time. All measurements will be recorded on the SSC Form 68, Hot Work Permit, and FOSC Form 161 Hazard Assessment.
 - e) Heat/spark/flame work will not be performed directly on propellant containers or on lines containing pressure. Containers or lines will be depressurized at near-ambient pressure.
 - f) Adequate fire extinguishers will be in serviceable condition and easily accessible in the work area for emergency use.
 - g) The welding, cutting, or brazing operations will be segregated to ensure limited access to area. Placards reading: “WELDING, CUTTING OR BRAZING OPERATIONS IN PROGRESS” will be prominently displayed for warning purposes at all approaches approximately 35 feet from the job being performed.
- 5.12 The Fire Department shall audit the Hot Work Permit Program annually and document the results of the audit(s). Audit points are listed in Appendix 2, Hot Work Permit Program Audit Points.
- 5.13 The authorization to work shall become invalid if the supervisor/lead person in charge of a heat/spark/flame producing operation fails to comply with the precautions listed on the permit.

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5.14 FOSC may make formal requests for “specific duration permits” (such as for specific duration construction sites) in writing to the NASA/SSC Fire Protection Program Manager. These “Specific duration permits” will allow hot work operations to proceed without requiring daily Hot Work Permits. These permits will be approved only under certain conditions depending upon location and will be addressed on a case-by-case basis. These areas will be subject to continual audit to ensure specific conditions unique to the site and location, and will remain in compliance with original permit requirements.

6.0 Hot Work on Propellant Systems

- 6.1 Organization performing the hot work shall ensure before calling the SSC Fire Department to conduct a Hot Work Permit inspection that:
1. The job site is ready for inspection
 2. All signing authorities for the work are present
 3. All pertinent paperwork and tools are on site and ready for inspection
- 6.2 Before starting work, an event that requires heat/spark/flame operations on any propellant system or any component thereof requires approval from the FOSC Safety & Mission Assurance Office.
- 6.3 Performing organization shall introduce and maintain an inert gas purge in the unit/system to inert the system. (Use of portable atmospheric monitors is prohibited for final verification of inert atmosphere. Sample analysis by a qualified laboratory is required to verify inert atmospheres, with samples taken as close to the point of operation as possible and under FOSC supervision. Portable atmospheric monitors shall be used for continued checks of the system’s inert status.)
- 6.4 The performing organization shall notify all non-operating personnel in the vicinity of the heat/spark/flame work that the work is to be performed and precautions should be taken.
- 6.5 SSC Fire Department and FOSC Safety & Mission Assurance department, or other PAI shall:
1. Inspect the work site, review the Hazard Assessment, and ensure a safe atmosphere has been determined prior to issuing a Hot Work Permit. Record the findings information on the Hot Work Permit.
 2. Document the specific location and time period, required preparations, precautions and related permit requirements using Form SSC-68 Hot Work Permit.

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- 6.6 The PAI shall complete the Hot Work Permit with required information, giving special attention to the necessary safety precautions. Make notation on Form 161 Hazard Assessment of special instructions or precautions to be observed due to the nature of work to be performed, or the area in which the work will be accomplished.
- 6.7 Facility Manager or designee, the Performing organization, and the hot work operator shall Sign completed Form 68.
- 6.8 Performing organization shall:
1. Display at the work site a duplicate copy of the Hot Work Permit. At the end of each shift, or upon completion of the job, attach the Hot Work Permit to the Form SSC-90 Process Plan or Work Authorizing Document. The copy will become permanent record of the performing organization.
 2. Make fire extinguishers available for use during all welding, cutting, brazing, spark-producing or heat-producing operations. Select the type of fire extinguisher according to Appendix 1.
 3. Remove combustibles from the immediate vicinity (35 feet) of open flame/spark/heat work to reduce possibility of fire. Cover adequately with a fire retardant blanket any items that cannot be removed. (Remove fire retardant blankets from the site at the completion of each work project, unless otherwise instructed by the shop supervisor.)
 4. Ensure that cables from electrical welding machines and similar equipment to ensure they are in serviceable condition and that grounding cable(s) are adequately connected before starting operations.
- 6.9 Welding operations supervisors shall ensure cables are inspected and maintained in good working condition
- 6.10 Performing organization/individual shall:
1. Use fire retardant blankets or other suitable materials as catchments during operations producing hot slag, sparks, etc., to reduce potential fire hazard. This is especially important when performing welding/cutting/brazing operations overhead.
 2. Check areas where welding, cutting, spark-producing or heat-producing operations are performed after completion to detect smoldering fires that may have gone unnoticed.
NOTE: If a smoldering fire occurs, use the fire extinguisher at hand and notify the SSC Fire Department immediately.
 3. Protect nearby workers from welding “flashes,” especially in operations involving heli-arc. Flash panels are required in congested personnel areas.

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- 6.11 Hot work operations supervisor shall, if Heat/spark/flame work is interrupted, verify that no changes or other hazardous conditions have been introduced into the work operation before resuming work.
- 6.12 If work is in test complex area Lead person overseeing hot work shall notify TOE when hot work is complete

7.0 Records and Forms or Quality Records and Forms

The following records must be maintained in accordance with this instruction:

Record	Description	Responsible Individual or Organization	Media, Location, and Indexing Method	Minimum Retention Time	Disposition
SSC-68	Hot Work Permit Original	Fire Department	Hard copies on file for 45 days in captain's office, then transferred to chief's office	1 year	Destroy
SSC-68	Hot Work Permit Red Copy	Performing organization	Display on site	Duration of the project, then attach to Process Plan	N/A
SSC-90	Process Plan	Performing organization	Hard copy on file in administrative area	1 year	N/A

All records and forms are assumed to be the latest version unless otherwise indicated. Quality Records are identified in the SSC Master Records Index.

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Appendix A – Criteria for Fire Extinguishers

TYPE OF POTENTIAL FIRE	EXTINGUISHING AGENT
CLASS A – Combustibles (wood, paper, rubbish, grass, etc.)	Water, foam, Multipurpose Dry chemical
CLASS B – Volatile flammables (oil, grease, paint, etc.)	CO ₂ , Foam, Dry Chemical
CLASS C – Electrical	CO ₂ , Dry Chemical
CLASS D – Combustible Metals	Dry Chemical – Purple K Powder

Appendix B – Hot Work Permit Program Audit Points

1. Review of completed Hot Work Permits to ensure accuracy of form completion
2. Review of listing of designated PAIs to ensure adequate training and certification is in place.
3. Review of unique facilities (those not requiring daily permits) to ensure facility conditions are in compliance with authorization letter.
4. Review of “specific duration permits” and “Construction Site Permits” to ensure compliance with established requirements.

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Appendix C– Sample Form, SSC 68 Hot Work Permit

 National Aeronautics and Space Administration John C. Stennis Space Center		<h2>SSC Hot Work Permit</h2>	
		No. _____	
Date and Time Issued	Expiration (Date and Time)	Exact Location Permit is issue for:	
Issued by (Company)	Work Organization (Department)	Project Number	
<div style="font-size: 48px; opacity: 0.5; pointer-events: none;">SAMPLE</div>			
<input type="checkbox"/> Mark-painting <input type="checkbox"/> Welding <input type="checkbox"/> Other Open Flame-producing Devices (Explain)	<input type="checkbox"/> Grinding <input type="checkbox"/> Grinding <input type="checkbox"/> Internal Combustion Engine Used Within a "Hazardous (Classified) Area"	<input type="checkbox"/> Ox-Cutting <input type="checkbox"/> Soldering <input type="checkbox"/> Benzomatic Torch	
Type of Operation <input type="checkbox"/> (Non-Flame Producing) but Occurring within a "Hazardous (Classified) Area" and Requiring Safe Atmospheric Verification (Explain Below)			
— ATTENTION — Before approving any cutting, welding, grinding, brazing, soldering, open flames, or other type of hot work, the responsible Permit Authorizing Individual (PAI) for the area shall inspect the proposed work area and identify the precautions taken. Any special instructions required will be addressed on the back of this form.			
— Site Preparation — Yes No N/A <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is installed sprinkler system in service? If no, Fire Department must be notified and sign permit <input type="checkbox"/> <input type="checkbox"/> Is a safe atmospheric check required? If yes, complete Safety Engineer to record %LEL section and sign permit.		— Safe Atmospheric Verification — Percent (%) LEL Instrument Reading: _____ %LEL Time Area Was Checked: _____ AM/PM Frequency Required <input type="checkbox"/> Initial <input type="checkbox"/> Continuous <input type="checkbox"/> Hourly	
— Precautions Within 35 ft of Work —			
Fire extinguishers available: <input type="checkbox"/> Multipurpose <input type="checkbox"/> Water <input type="checkbox"/> CO ₂ <input type="checkbox"/> Dry Chemical			
Known location of nearest phone: _____			
<input type="checkbox"/> Floors cleaned of combustibles and combustible materials removed. <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Combustible materials wet down or covered with fire resistant shields. <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Wall and floor openings, cracks, holes, etc. covered. <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Cable trays and/or nonmetallic wire covered with fire-resistant shields. HVAC ducts/chutes covered with fire-resistant shields. <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Combustible materials removed or covered on other side of walls, ceilings, roof, or partitions to prevent heat transfer via conduction or radiation.			
<div style="font-size: 48px; opacity: 0.5; pointer-events: none;">SAMPLE</div>			
Enclosure must be cleaned of all combustibles and removed. Contact person of fire department to be notified. To prevent fire, all fire extinguishers must be available. All fire extinguishers must be inspected and certified.		Primary name and signature of individual responsible for fire watch: _____ for Hot Work:	
Safety Eng. printed name and signature (if required)		Fire Department printed name and signature (if required)	
Facility Manager or Construction Engineer printed name and signature (I permit this work to be performed in the location noted.)			
Printed name, signature, date and organization of Permit Authorizing Individual issuing Permit (I verify all proper precautions have been taken and the area is ready for Hot Work.)			
In Case of Fire—Call 911 or Use Your radio to Notify SSC Security Dispatch by Depressing the Emergency Alarm on Top of the Radio SSC-68 (05/2004) Previous Versions Shall Not be Used.			