

**Test and Evaluation Contract (TEC)
Statement of Work (SOW)**

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1.0 Introduction

“The mission of WSTF is to provide the expertise and infrastructure to test and evaluate spacecraft materials, components, and propulsion systems to enable the safe human exploration and utilization of space.”

The Technical and Evaluation Contract (TEC), a Completion Form and ID/IQ contract, provides services for performance of the primary mission of the White Sands Test Facility (WSTF), which includes materials and components testing, propulsion testing, and depot activities. This Statement of Work (SOW) describes the general scope of the projects and processes critical to the fulfillment of WSTF's primary mission. Support functions that are necessary for supporting the delivery of products and processes are described with specific performance standards and requirements.

2.0 Operating Environment

WSTF is a Government-owned, Government-operated installation. Government-Contractor and Contractor-Contractor partnering is essential to the success of WSTF operations. Therefore, Associate Contractor Agreements (ACA's) shall be required between TEC and Facility Operations Support Contract (FOSC) Contractors (and with other support Contractors as needed).

NASA and Contractor personnel share the responsibility for ensuring that procedures and operations are performed safely and consistent with NASA, Federal, and State regulations to minimize hazards to personnel, property, and the environment. NASA and all current Contractors hold a VPP Star certification. At WSTF this safety focus takes on particular significance because of the hazardous operating environment.

3.0 Site-wide Operating Requirements

The Contractor shall perform this contract and all ordered work, furnishing all resources, labor, equipment, materials, and services required to meet the contract and project performance requirements, except where specifically stated as provided by the Government. The Contractor shall ensure all elements of this contract, whether performed by the Contractor or fulfilled through agreement with other parties, are fully integrated and maintained to meet WSTF's ultimate mission and objectives. Workload sizing data is listed in Section J-12.

3.1 Management Systems

WSTF has established a management system that ensures that products conform to specified requirements. This system is documented in the WSTF Management System documentation which consists of the Management System Manual (MSM) and the WSTF Document System (WDS).

Requirements under this element are Completion Form.

The MSM defines the top level management system policies and outlines the structure of the documentation used in the management system. It contains the WSTF Mission Statement and a description of the scope of registration for both ISO 9001 and 14001.

The WDS contains the procedures and instructions consistent with WSTF's stated management policy and used to carry out WSTF Operations. These are all linked through the MSM. The WDS consists of Product Processes, Infrastructure Processes, WSTF Standard Procedures (WSP's), WSTF Standard Instructions (WSI's), and WSTF Job Instructions (WJI's). The Product and Infrastructure processes are process diagrams that map the required activities necessary to satisfy WSTF policies and achieve product quality. There are 8 product processes including Component Refurbishment; Component, Fluid, and Material Testing; Hazard Analysis; Propulsion System Testing; Research and Development; Standard Testing; Training, Development, and Education; and White Sands Space Harbor Operations. There are 47 infrastructure processes which map the primary support functions to the product processes. The WSTF Standard Procedure (WSP) and WSTF Standard Instruction (WSI) are used to document internal requirements in the form of lists of rules or general instructions. WSP's and WSI's are listed as either site-wide or department requirements according to the numbering index used for the document and contained in Table 1 listed below.

Table 1

MSM Document Category	Category Descriptor
01	Management Responsibility
02	Quality System Requirements
03	Customer Agreements
04	Design Control
05	Document and Data Control
06	Purchasing
07	Control of Customer Supplied Product
08	Product Identification and Traceability
09	Process Control
10	Inspection and Testing
11	Control of Inspection, Measuring, and Test

MSM Document Category	Category Descriptor
	Equipment
12	Inspection and Test Status
13	Control of Non-conforming Product
14	Corrective and Preventive Action
15	Handling, Storage, Packaging, Preservation, and Delivery
16	Quality Records
17	Internal Auditing
18	Training
19	<i>Reserved</i>
20	Statistical Techniques
21	Software
22	Environmental Management System
23	<i>Reserved</i>
24	Security
25	Safety

The WSTF Job Instruction (WJI) is used to document work instructions which provide step-by-step directions for performing a specific job or task. Process and Infrastructure processes contain links to other WSTF documents such as WSP's, WSI's, or WJI's. A hierarchy of authority for this relationship can be found in Figure 3.2.a.

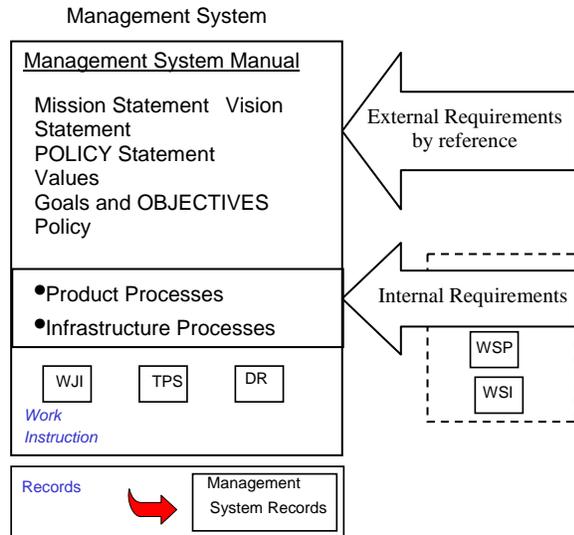


Figure 3.2.a. WSTF document structure showing hierarchy of documents and their uses

WSTF is a certified ISO 9001 and ISO 14001 site and WSTF Management System documents are consistent with the requirements of these standards. The scope of the 9001 certification is:

White Sands Test Facility provides engineering and scientific services to external customers for test, evaluation, and maintenance of materials, components, propulsion and power systems, and landing facilities.

The scope of the 14001 certification is:

The environmental management system of White Sands Test Facility located in Las Cruces, NM associated with the testing, evaluation, and maintenance of spacecraft materials, components, and propulsion systems

A Third-Party Registrar certifies WSTF to ISO 14001 and ISO 9001. This certification is currently a site certification inclusive of a joint Contractor-Government effort and supports integration of WSTF management and work processes.

One of the foundations of the ISO 9001 and 14001 certifications is the MSM and the associated WDS. Audits to certify to these ISO standards are to the MSM and WDS. Contractor and NASA policies, processes, and procedures necessary for these certifications are integrated in both the MSM and WDS. The WDS also contains the documents necessary to maintain and operate all institutional support functions, including many functions that are beyond the scope of this contract. The Contractor shall comply with all applicable instructions, procedures, processes, roles, and responsibilities defined in the MSM and WDS and shall manage and continuously improve these instructions, procedures, and processes.

The latest version of MSM and WDS are incorporated by reference and form a part of this SOW requirement.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Comply with all requirements in MSM and WDS.	MSM and WDS
b.	Maintain WSTF certification to ISO 9001 and 14001.	MSM and WDS Third party certification
c.	Perform internal audits with other WSTF-resident contractor and NASA representatives.	Internal Audit Performance and Reporting Infrastructure
d.	Respond to and implement corrective/preventive actions for deficiencies within this contract.	Corrective/Preventive Action Request Infrastructure Process

3.2 General Requirements

The Contractor shall provide appropriate management of personnel, data and data systems, equipment and property, schedules, projects, training, records, acquisitions, subcontracts, and business functions necessary to perform the statement of work, deliver all required DRDs and other deliverables, and meet all contract requirements including safety, quality, environmental, and energy conservation. This includes procurement of materials, supplies and other non-labor resources for all TEC activities. Logistics of receiving and shipment is an FOSC function including the warehousing of commonly used components and supplies.

Requirements under this element are Completion Form.

The following Performance Requirements and Standards are applicable to all functions within the SOW.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Ensure support agreements (e.g., ACAs, MOUs, contracts, purchase orders, et. al.) are in place to meet WSTF mission and objectives. Provide evidence of mission readiness as necessary to fulfill project requirements and customer agreements.	WSTF mission is not adversely impacted

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
b.	<p>Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis.</p> <p>In accordance with (IAW) DRD 001 Project Reporting</p>	<p>WSP 9-0014 Delivery Order(s)</p>
c.	<p>Ensure all Inspection, Testing, and Measuring Equipment (IMTE) is within calibration during data measurement.</p>	<p>Calibration Infrastructure Process</p>
d.	<p>Operate certified Pressurized Vessels and Systems (PV/S).</p> <p>Create and maintain documentation package for certification.</p> <p>Note: In accordance with the stated Infrastructure Process S&MA will perform the certification inspection and TEC will perform the annual configuration verification for the required PV/S.</p>	<p>Pressure Vessel systems Infrastructure Process</p>
e.	<p>Provide highly effective project management of ID/IQ projects.</p>	<p>WSP 9-0014 Project Management Body of Knowledge (PMBOK®)</p>
f.	<p>Maintain and develop Facility and System Baseline Documentation (~100-150 systems site wide).</p>	<p>WSP 25-0011</p>

3.3 Test System Safety Requirements

All activities at WSTF shall be performed in a safe and healthful manner in accordance with OSHA regulations (29 CFR 1910, 1926) and NASA WSTF Safety and Health Policies. In cooperation with NASA, adherence to 29 CFR 1960 is also required to ensure safety practices are consistent for all WSTF employees. Safety and health are the responsibility of each employee at WSTF and facilitated by effective regulatory management, WSTF leadership commitment, and the active involvement of the WSTF workforce.

System safety techniques and readiness review provisions are jointly conducted with NASA and Contractor to identify unique hazards associated with test and evaluation services. Because of the hazardous and complex nature of test and evaluation activities at WSTF, it is necessary to analyze for unique hazards using system safety disciplines.

3.3.1 System Safety Management

Qualified System Safety and Industrial Safety expertise is required to assure hazards are appropriately identified and mitigated and to provide coordination with project and FOSC Institutional Safety representatives to provide independent review of Hazard Analysis, System Safety Analysis and Readiness Review results. This expertise also provides assistance in resolving residual risks.

Requirements under this element are Completion Form.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Provide and coordinate performance of a Safety and Health plan IAW DRD 002 Safety and Health Plan.	29 CFR 1910, 1926, and 1960 NPR 8715.3 JPR 1700.1 WSP 25-0002 MSM 4.2.1.7 Safety and MSM 4.2.1.8 Emergency Management Injury rates below applicable BLS NAICS averages
b.	Review 80 to 100 hazard analysis, system safety analysis, and readiness reviews information for appropriate identification of hazards and acceptability of associated controls, each year.	29 CFR 1910, 1926, and 1960 NPR 8715.3 JPR 1700.1 WSP 25-0002 WSI 25-SW-0032 Safety and Readiness Review Infrastructure Process System Safety Analysis Review Infrastructure Process
c.	Investigate 75 to 100 potential hazards and system safety compliance issues and provide consultation to project personnel on options for compliance. Coordinate minimum weekly with FOSC Institutional Safety and NASA representatives as necessary.	29 CFR 1910, 1926, and 1960 NPR 8715.3 JPR 1700.1 MSM 4.2.1.7 Safety WSP 25-0002
d.	Assess WSTF compliance with Process Safety Management	29 CFR 1910.1450 29 CFR 1910.119

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	of Highly Hazardous Chemicals and OSHA Laboratory Standard.	WSP 25-0002 WSI 25-SW-0005

3.3.2 Project System Safety Implementation

The project community is required to ensure that hazards identified are effectively eliminated or controlled in accordance with the associated system safety and readiness review activities.

Requirements under this element are IDIQ.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Perform hazard analysis, system safety analysis, and readiness reviews to identify hazards and develop associated controls.	WSP 25-0002 WSI 25-SW-0032 Safety and Readiness Review Infrastructure Process System Safety Analysis Review Infrastructure Process WSTF customer agreements.
b.	Prepare hazard investigation reports assessing hazard potential and system safety compliance issues.	WSP 25-0002 WSI 25-SW-0032 Safety and Readiness Review Infrastructure Process System Safety Analysis Review Infrastructure Process WSTF customer agreements.
c.	Comply with Process Safety Management of Highly Hazardous Chemicals and OSHA Laboratory Standard.	29 CFR 1910.1450 29 CFR 1910.119 WSI 25-SW-0005
d.	Provide auxiliary resources for necessary training and emergency response to ensure availability of contingency assistance in event of a major emergency. Capabilities (minimum 4 personnel) must be available during hazardous test operations.	WSP 25-0002 OSHA 29 CFR 1910.120(q), 1910.146 and 1910.156 Capabilities must meet NFPA 1081 standards and augment NFPA 1500 and NASA-STD 8719.11 mandated functions.

3.4 Technical Training

Contractor personnel must be adequately prepared to meet the performance challenges faced at WSTF and to expand, develop, and advance processes and capabilities associated with the WSTF mission. The Contractor shall ensure that personnel performing specific assigned tasks are qualified on the basis of appropriate education, training, and/or experience. See Section J-10 for training requirements and description.

3.4.1 Training Management & Administration

The Contractor shall schedule, track, and report training status for training provided in support of TEC personnel.

Requirements under this element are Completion Form.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	Ensure training status is accurately reported to the FOSC Contractor. There are approximately 800 active training categories, with approximately 24,000 current training actions active (See Section J-10).	Accurate reporting of training status within one week of training delivery.

3.4.2 Training Development & Delivery

Development and delivery of training is supported by the projects requiring qualified employee performance. Training shall be made available for all WSTF-resident Contractors and NASA personnel associated with the technical activities performed within the scope of this contract.

Requirements under this element are IDIQ.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Ensure that TEC personnel are adequately trained and certified to perform assigned tasks. There are approximately 800 active training categories, with approximately 24,000 current training actions active (See Section J-10).	Component Refurbishment Product Process MSM Section 4.1.1 WSP 18-0001 WSTF Customer Agreements

b.	<p>Ensure that personnel are adequately trained and certified to perform special processes. Processes include soldering, crimping, harness/cabling, fiber optic splicing, welding, nondestructive testing, particle counting, and plastics application (potting). Additional special processes will be identified as subject to special process certification upon development of unique test capabilities or requirements.</p>	<p>18-SW-0002 MSM Section 4.1.1 WSP 18-0001 WSTF Customer Agreements</p>
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3.5 Quality Assurance

A quality assurance program provides for integration of product quality considerations, verification techniques, and objective evidence throughout the project planning, implementation, and product realization phases.

The Contractor shall provide quality plans, controls, systems, processes, and maintain objective evidence required to assure successful performance of WSTF activities. In addition, the Contractor shall provide services for the verification and acceptance of FOSC services integral to TEC product delivery, and documentation required to assure successful realization of WSTF products.

Requirements under this element are Completion Form.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	<p>Prepare and maintain a Quality Plan. IAW DRD 003 Quality Data Plan and Report.</p>	<p>ISO 9001 MSM 1.0 MSM Section 2.0 WSP 02-0001 WSP 02-0002</p>
b.	<p>Perform work document initiation, in-process control, and close-out actions. (3000 – 4000 documents processed annually [includes TPS’s, DR’s, and WJI’s])</p>	<p>WSP 02-0001 WSP 02-0002 Test Preparation Sheet Processing Infrastructure Process WSI 05-SW-0004 WSI 05-SW-0017 WSI 09-SW-0001 WSI QARSO-Q-0901 WSI QARSO-Q-0905 95% of in-process documentation will meet</p>

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
		requirements applicable for the individual process phase 99% of closed documentation will meet applicable document requirements
c.	Provide storage of and ready access to work documents/records to facilitate confirmation of systems configurations, research of past process and system developments, and objective evidence of product conformance.	WSP 05-0002 WSP 05-0011 WSI QARSO-Q-0901 WSI QARSO-Q-0903 WSI QARSO-Q-1601 Ensure records status and associated data is readily available to WSTF personnel within 24 hrs of request.
d.	Perform work document review and coordination. Review includes verification of all current deviations, revisions, and modifications. (3000 – 4000 documents processed annually [includes TPS's, DR's, and WJI's])	WSP 02-0001 WSP 02-0002 Test Preparation Sheet Processing Infrastructure Process WSI 09-SW-0001 WSI 05-SW-0017 WSI QARSO-Q-0901 Review must be completed within 2 hours of submittal or as necessary to meet milestone negotiated with project representatives.
e.	Perform pressure vessel/system (PV/S) surveillance and configuration verification for each active pressure system on an annual basis. (PV/S consists of approximately 250 systems totaling 8000 components of which 2000 are vessels.) Refer to Section J-11 for list of all PV/S	WSP 09-0015 WSI 09-SW-0005 Pressure Vessel Systems Infrastructure Process All surveillance and configuration verification shall be performed within one week of submission
f.	Maintain the Discrepancy Record system which is employed to document product nonconformance and corrective or preventive action. Verify status and closure of identified product nonconformance. (Approximately 2000 DR's are processed annually.)	MSM Section 3.11 Discrepancy Record (DR) Infrastructure Process WSP 13-0001 WSI 13-SW-0001 WSI QARSO-Q-0901

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
g.	Perform the QA functions associated with the project problem reporting systems.	Component Refurbishment Product Process Notification of NASA S&MA, project manager, and project leader shall be within 1 hour of flight hardware or customer-supplied hardware discrepancies identified.
h.	Maintain an automated document status, inventory, and archival system for site-wide access.	WSP 05-0002 WSP 05-0011 WSI QARSO-Q-0901 WSI QARSO-Q-0903 WSI QARSO-Q-1601 Document status reports shall be provided within 2 hours of request for formal pretest review, project planning, or audit/survey purposes
i.	<p>Perform project and process controls verification, non-destructive evaluation and inspection, and dimensional and volumetric acceptance of fabricated parts.</p> <p>Perform dimensional and volumetric acceptance of fabricated parts intended for flight or critical applications. (20 - 40 components fabricated annually with 20 to 200 dimensions each to verify.)</p> <p>Perform project and process controls verification.</p> <p>Perform non-destructive evaluation and inspection of critical product characteristics as stipulated in project plans and customer agreements. (Approximately 160 major repairs or test processes which require 100+ verifications and 4 to 24 hours of dedicated participation. In addition, a number of selected process characteristics occur on various smaller activities totally approximately 10,000 verifications.)</p>	<p>WSI QARSO-Q-0906, WSI QARSO-Q-1001 WSP 02-0001 WSP 02-0002 WSP 10-0001 WSP 09-0022</p> <p>Provide visual process verification within 30 minutes of request performed by individuals qualified for the activity</p> <p>Specialized NDE or dimensional verification tasks must be performed and completed to meet milestones negotiated with project representatives</p>

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
j.	<p>Prepare WSTF Data Packages (WDP) for each project when required by the customer to verify accuracy of project records, and assure resolution of product nonconformance. (60 – 100 WDP produced annually)</p>	<p>WSP 02-0001 WSI 16-SW-0001 WJI PAD-QA-0017 WDP will be completed within 3 working days of data compilation 100% of completed records will meet MSM, WDS, and customer specified requirements which reflect product acceptance data</p>
k.	<p>Perform audit of WSTF suppliers to assure they are capable of meeting customer requirements. (Approximately 10 vendor assessments performed a year.) Verify receipt and delivery of acceptable materials and products. Review procurement requests, orders, specifications and related documents for safety and quality assurance provisions applicable to the associated project requirements. Verify material, batch lot, or acceptance testing is performed to establish or confirm compliance with project specifications.</p>	<p>MSM Section 3.4 WSI 17-SW-0002 Surveyed Vendor List New Infrastructure Process Surveyed Vendor List Review Infrastructure Process PR/PO Infrastructure Process Supplier assessments must meet timeline negotiated with project representatives. Receiving inspection must be initiated within 1 hour of notification or as necessary to meet milestone negotiated with project representatives.</p>
l	<p>Provide quality verification of White Sands Space Harbor (WSSH) to assure operational readiness of WSSH navigational aids and runway conditions for Shuttle missions (~5 Shuttle missions per year). Designated verification will be accomplished daily by the FOSC to assure readiness of navigation aids and runway conditions for Shuttle Training Aircraft activities.</p>	<p>WSP 02-0001 WSI 24-SW-0001 WSSH Operations Product Process</p>

3.6 Environmental Requirements

Operations at WSTF shall be performed in accordance with existing permits, laws, and regulations (i.e., Clean Air Act, RCRA, Clean Water Act, etc.). The Facility Operations and Support Contract (FOSC) will manage the environmental compliance and restoration program at the NASA WSTF. However, the Test and Evaluation Contract will support FOSC by providing required permit data to FOSC and ensuring TEC operations comply with existing laws and regulations. FOSC will provide regulatory guidance and interpretation to TEC. The Contractor shall comply with MSM Section 4.2.1.6, Environmental Management System and WSP 22-0021, Legal and Other Requirements. These standards apply to all of the following performance requirements.

Requirements under this element are IDIQ.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Provide required data to FOSC to fulfill compliance and regulatory requirements for air permits and discharge permits which enable TEC operations.	WSI 22-SW-0011 MSM 4.2.1.6 Environmental Management System
b.	Manage hazardous waste generated during TEC operations, maintain logbooks for satellite accumulation areas in TEC operation areas, and coordinate disposal of hazardous waste through FOSC	WSI 22-SW-0005 MSM 4.2.1.6 Environmental Management System Waste Management Infrastructure Process WJI ENV Series
c.	Coordinate hazardous waste transfers to Fuel Treatment Unit (FTU) and the Evaporation Tank Unit (ETU) with FOSC	MSM 4.2.1.6 Environmental Management System Waste Management Infrastructure Process WJI ENV Series
d.	Support site-wide recycling program and green purchases	WSP 22-0021 MSM 4.2.1.6 Environmental Management System
e.	Manage requirements for Above-ground Storage Tanks that support TEC operations	WSP 22-0021 MSM 4.2.1.6 Environmental Management System
f.	Comply with site wide National	MSM 4.2.1.6 Environmental Management

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	Environmental Policy Act (NEPA) requirements including initiating Records of Environmental Considerations, Permits to Excavate	System
g.	Report environmental spills to FOSC and submit information for preparation of spill reports and/or cleanup	WSI 22-SW-0005 WJI ENV Series MSM 4.2.1.6 Environmental Management System
h.	Participate in on-site internal and external environmental audits, inspections, and other functional reviews.	WSP 17-0001 MSM 4.2.1.6 Environmental Management System

4.0 Propulsion

Propulsion testing projects include a broad scope of activities. These activities include rocket engine and propulsion system tests at ambient and simulated altitudes with a variety of propellants and test articles. Fleet lead and special component tests support the Shuttle and International Space Station programs. These include flight and ground support equipment components testing, and analysis of functionality and fluid compatibility, anomaly analysis, development, qualification, and acceptance testing. New test systems are designed, installed and validated for use as required for WSTF customers. WSTF personnel conduct preventive and remedial maintenance on the test and support systems.

This section provides the scope and requirements for the management of propulsion testing projects. The requirements for personnel to conduct and support propulsion testing projects are also provided.

The propulsion testing projects are divided into the following four functions:

- Rocket Test Projects
- Related Test Projects
- System Maintenance and Repair
- System/Facility Upgrades

Each of these activities is described in the following sections.

Requirements under this element are ID/IQ.

4.1 Rocket Test Projects

WSTF engages in rocket engine and propulsion systems-related projects, which consist of altitude and ambient testing of liquid rocket engines, solid rocket motors, and integrated propulsion systems.

The Contractor shall design, operate, and maintain systems that employ the following propellant types: hypergolic propellants (e.g., dinitrogen tetroxide [NTO] and monomethylhydrazine), cryogenic propellants (e.g. liquid oxygen and liquid hydrogen), hydrocarbon propellants (e.g., oxygen and ethanol or RP 1), mixed gas propellants, cold gas propellants, and solid propellants.

This element includes engine level through propulsion system level preparation and test operations. Types of testing range from concept demonstration through qualification and acceptance testing. Propulsion tests range from static hot fire testing of up to 90-kilo-Newton (KN) thrust engines at simulated altitude and 270-KN thrust engines at ambient pressure, testing of an entire satellite propulsion system, or testing of a launch vehicle upper stage. The WSTF test specialty (designated by NASA) is systems implementing hypergolic propellants (the various hydrazines and NTO), and vacuum (simulated altitude) testing of non-hypergolic propellant engines below 111 KN.

The Shuttle Fleet Leader Orbital Maneuvering System (OMS), Aft Reaction Control System (ARCS), and Forward Reaction Control System (FRCS) test articles are subjected to hot-fire preparations, hot-fire tests, maintenance operations, and component functional tests that closely simulate mission and NASA Kennedy Space Center (KSC) turnaround activities, maintaining a duty cycle exceeding those of the flight vehicles. This enhances NASA's ability to detect, predict, and prevent OMS and RCS life-dependent failures and anomalies before they affect the Shuttle fleet. Comprehensive test article functional tests that simulate orbiter maintenance downtime period activities are performed every 6-7 firing cycles. The Contractor is also required to conduct special propulsion subsystem tests implementing any one of the Fleet Leader test articles or a stand-alone test system.

Other testing includes:

- AF Minuteman fourth stage aging and surveillance tests
- Next Generation propulsion system tests using alcohol and oxygen propellants.
- Periodic Shuttle APU qualification and fleet lead tests conducted in simulated flight pressure profiles.

All activities include building up the test article, developing and installing the instrumentation and controls, installing the test article in the test cell, conducting cold flow and hot fire tests, and supporting further test article development. Products provided by the Contractor include hardware and software design reviews, actual test hardware and/or test articles, hazard assessments, failure modes and effects analysis (FMEA), design verification, and safety and environmental reviews, and final a test report. Special process training and experiment design may be required for some projects. Test procedures are written and the test system is built and the system is

documented. The test system or test methodology is validated prior to conducting testing. A test readiness review (TRR) or other NASA management readiness review is required before approval is given for testing.

The Contractor shall perform a data review, in concert with NASA, during phased testing where complete evaluation of the data is required prior to the next phase of testing. The data review includes data reduction, analysis, and concurrence to proceed. The customer, prior to subsequent phases of testing, may request preliminary or interim data reports.

Upon the completion of testing, customer feedback shall be obtained and the test article or material shall be shipped or stored. The test system is normally deactivated, decontaminated, disassembled, and the test area brought back to its original configuration. Paperwork is closed out and project summary sheet variance analysis is completed. All project-related design notes, analyses, vendor information, sketches, copies of photographs, and test data are archived in accordance with the WDS.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis. IAW DRD 001 Project Reporting	Propulsion System Test Product Process Delivery Order(s)
b.	Perform development or qualification testing on rocket engines or propulsion systems using either liquid or solid propellant.	Delivery Order(s) Propulsion System Test Product Process
c.	Maintain a firing cycle lead over flight hardware for the fleet leader project as defined in the DO.	Delivery Order(s) Propulsion System Test Product Process
d.	Conduct special propulsion subsystem tests on any one of the Fleet Leader test articles, or in a stand-alone test system.	Delivery Order(s) Propulsion System Test Product Process
e.	Maintain test article configuration. Configuration tracking includes documenting number of test article tank cycles and valve cycles, documenting test article discrepancies, and	Delivery Order(s) WSI 5-SW-0011

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	maintaining an up-to-date list identifying test article instrumentation and components.	
f.	<p>Maintain familiarity with the OMS, RCS, and APU sections of the current revision of the Orbiter Maintenance Requirements and Specifications Document to accommodate potential process/hardware changes or investigations.</p> <p>Provide input to the NASA PM on issues such as system and process improvement, component performance evaluation, component failure analysis, and system and component repair.</p> <p>Support developing or qualifying a modification to hardware or procedures and anomaly investigations.</p>	<p>Delivery Order(s) Propulsion System Test Product Process</p>

4.2 Related Test Projects

The Contractor shall conduct testing and analysis of flight and ground support equipment components for functionality and fluid compatibility, including anomaly analysis, development, qualification, and acceptance testing. Projects included in this SOW include test system development, test method development, special process development, system and component development, qualification, and acceptance testing of components or sub-systems, material selection and propellant fluid hazards analysis, flight hardware and Type I Ground Support Equipment (GSE) development, failure analysis and anomaly investigation, propulsion expertise, and flight support.

Also, the Contractor shall operate several altitude simulation systems located in the 300 and 400 propulsion test areas. These systems are maintained in a ready to operate state and operated in support of the various test projects as required.

The Contractor shall maintain the propellant handling expertise to support operations at remote launch facilities, and supports KSC in systems level troubleshooting and development. WSTF is also called upon to develop special servicing tools or procedures to be applied to flight systems.

The Contractor shall design, fabricate, develop, test, qualify, and certify flight hardware and Type 1 GSE in support of major NASA programs such as Space Shuttle and International Space Station (ISS), and other WSTF customers. These products are provided in accordance with Agency requirements and Customer Agreements.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	<p>Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis.</p> <p>IAW DRD 001 Project Reporting</p>	<p>Propulsion System Test Product Process Delivery Order(s)</p>
b.	<p>Conduct off site or remote customer flight operations requirements.</p> <p>Support the design of flight or GSE hardware, fabrication of hardware, design or construction of flight support facilities including launch or landing facilities, propellant handling at remote facilities, and flight vehicle servicing</p>	<p>Delivery Order(s) Propulsion System Test Product Process</p>
c.	<p>Provide hypergolic propellant expertise for WSTF customers.</p> <p>Support the development and conduct of aerospace fluid and propellant handling training classes for customers or customer interfaces.</p>	<p>Delivery Order(s) Propulsion System Test Product Process</p>
d.	<p>Support off site or remote customer test operations requirements.</p> <p>Analytically model, design, construct, install, and validate special test systems for conducting experiments at customer defined locations</p>	<p>Delivery Order(s) Propulsion System Test Product Process</p>
e.	<p>Provide prototype engineering development testing expertise for WSTF customers.</p> <p>Support engineering development testing of prototypes to qualification, acceptance, and</p>	<p>Delivery Order(s) Propulsion System Test Product Process</p>

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	life cycle testing, including off-limit and destructive testing.	
f.	Perform the flight hardware development phase activities. Research the applicable program specifications, complete mechanical and electrical designs, perform appropriate hazards analyses, and provide development hardware.	Delivery Order(s) Propulsion System Test Product Process
g.	Support Preliminary and Critical Design Reviews. Prepare and present complete documentation packages including development drawings in a customer-specified format, detailed manufacturing, assembly, and test instructions, material certifications and procurement information, and design calculations and analyses.	Delivery Order(s) Propulsion System Test Product Process
h.	Perform the test phase of flight hardware development project activities. Prepare detailed test plans and procedures, ensure that applicable test system meets program-specific flight hardware interface requirements, and conduct tests, analyze data, and report data.	Delivery Order(s) Propulsion System Test Product Process
i.	Ensure that all personnel (contractors and government) are trained and certified to perform work associated with the scope of this section.	WSP 18-0001 Customer agreements
j.	Manufacture flight and qualification hardware and perform qualification. Develop detailed qualification test plans and procedures, ensure	Delivery Order(s) Propulsion System Test Product Process NASA Program Standards and Customer Agreements

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	that all program requirements are met, prepare complete hardware qualification, certification, and acceptance data packages per program standards and customer requirements, and provide hardware and data.	

4.3 System Maintenance and Repair

Preventative maintenance shall be performed on a non-interference basis, which may lead to after normal hours or weekend scheduling. Maintenance tasks may require shift work or extended workweek operations as workloads fluctuate. Systems to be maintained are listed in Table A below.

Preventative maintenance is defined as the recurring day-to-day work necessary to preserve the test systems and equipment in such a condition that they may be used for their designated purpose over an intended service life.

Operations are defined as the work associated with operating test systems and equipment and includes such activities as:

- Starting up and shutting down of equipment such as data systems and cryo pumps
- Off loading of vendor-supplied fluids and gasses which are delivered to WSTF
- Maintaining hypergolic and other propellants, propane, boiler fuel, and other consumable liquids in the various areas to support projects
- Maintaining minimum pressures and quality on the nitrogen, helium, and breathing air systems
- Maintaining certifications on Pressure Vessels and Pressurized Systems (PV/S)
- Checking functionality of safety systems such as emergency showers and eye washes, and fire detection and suppression systems.

Repair is defined as the work required on test systems and equipment to return it to a condition necessary to perform its designated purpose.

Table A. Systems and Facilities to be Maintained

DESCRIPTION	LOCATION
300 Area Fuel Storage and Distribution System	300
300 Area Oxidizer Storage and Distribution System	300
300 Area Small Altitude Simulation System	300
Test Stand 301	300

DESCRIPTION	LOCATION
Test Stand 302	300
Test Stand 303	300
Test Stand 328	300
300 Helium Storage and Distribution System	300
400 Area Fuel Storage and Distribution System	400
400 Area Oxidizer Storage and Distribution System	400
400 Small Altitude Simulation System	400
Large Altitude Simulation System	400
Stand Support Building 416	400
Test Stand 401	400
Test Stand 402	400
Test Stand 403	400
Test Stand 405	400
Test Stand 406	400
LN2/GN2 Storage and Distribution System	200, 300, 400, 500
Breathing Air Storage and Distribution System	300, 400, 500
400 Helium Storage and Distribution System	400, 500

Repairs estimated to cost less than \$2500 per repair are considered to be “routine repairs” or “minor repairs”. In the event that repairs are estimated to cost more than \$2500, the Contractor shall notify the Government so that these repairs can be considered delivered services as described in Section 4.2, Related Test Projects.

The Contractor shall support manned space flight operations and critical customer test schedules. The test systems supporting these activities must be maintained in a high state of readiness and reliability. System down time during a critical flight operating or test schedule period is not acceptable.

In order to meet customer requirements within the resources that are allotted the Contractor shall maintain facilities and test systems in three readiness categories.

Ready – Maintenance provided so that the system or capability is immediately available for use for the intended function

Productive Standby – Limited maintenance provided to the system or capability, minimal effort required to bring to ready status (3-4 weeks)

Deactivated – Minimal maintenance provided to the system or capability to protect assets, substantial effort required to bring to ready status (1-3 months)

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Perform scheduled refurbishment, overhaul of systems and equipment, and replacement	OEM Specifications WSP 11-0001

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	<p>of assemblies to minimize the impact on WSTF test projects. Report the maintenance status monthly.</p> <p>IAW DRD 004 Monthly Maintenance Report</p> <p>Critical system maintenance down periods will be negotiated with the Government before they occur.</p>	<p>No more than four test operations per year will be delayed due to maintenance operations. Each delay will be less than one 9-hour shift.</p> <p>No Critical system maintenance down periods shall be acceptable without prior notification.</p>
b.	<p>Generate repair procedures, procure parts, perform the repair, and document the work performed, including verification of the repair. Minimize the impact to projects and other facility operations. Maintain spares for rapid resumption of testing.</p>	<p>OEM Specifications Delivery Order(s)</p>
c.	<p>Generate and maintain work instructions for routine or repetitive maintenance and operations tasks in order to ensure that tasks are repeatable and to improve cost effectiveness.</p>	<p>WSP 9-0001 WSI 05-SW-0004</p>

4.4 System/Facility Upgrades

WSTF facilities (shown in Table A) and capabilities often need to be upgraded, modified, or specialized to support a specific project or extend a capability. The Contractor shall perform test system development encompassing design, development, fabrication, and modification of mechanical, data acquisition, and control systems. This activity requires more than routine maintenance or sustaining of capability and range in scope from laboratory-scale to large-scale field systems.

The Contractor shall support a wide range of system development. The complexity of these types of projects can be as simple as modifying an existing system to accommodate a new test requirement, or as complex as designing and building a system from the ground up. All facility modifications and construction will rely on the close coordination and cooperation of the TEC and the FOSC contractors for both

definition of requirements and services. The Contractor shall deliver functional systems with complete documentation of the system and its capabilities.

Some activities such as test system upgrades, major repairs, new capability development, or new concepts of operation are initiated as projects and result in new Standard Processes.

Examples of system and facility upgrades include:

- Test Stand 406 is being designed, constructed and commissioned by WSTF Contractor personnel
- An oxidizer processing method was developed at WSTF, and several systems fabricated by WSTF personnel
- Building 413 was remodeled and the Next Generation Propulsion system test article is being fabricated, later to be moved to test stand 401
- The Contractor is frequently required to develop and evaluate special processes to improve GSE and Flight support operations at KSC. WSTF propulsion facilities are utilized as the test bed to reproduce KSC Space Shuttle operations

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Provide expertise to develop test systems. Test system operating in the following environments. <ul style="list-style-type: none"> • Temperature: -253 to 1500 °C • Pressure: 1 microPa to 138 MPa • Media: Aerospace fluids such as hydrogen, oxygen, inert gases and air, cryogenics (liquid oxygen, nitrogen, and hydrogen), hydrazine, MMH, UDMH, ammonia, ethanol, and nitrogen tetroxide • Control Function: Manual, semi-automated or automated control • Data Collection: Single data points to 100,000,000 samples per second 	Delivery Order(s) Propulsion System Test Product Process
b.	Fabricate and commission test systems with the required instrumentation, data acquisition and control	Delivery Order(s) Propulsion System Test Product Process

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	systems, and the requisite supporting software.	
c.	Design, buildup, and implement maintenance capabilities to support specific requirements.	Delivery Order(s) Propulsion System Test Product Process
d.	Develop WSTF applicable procedures and standardize the resulting processes.	Propulsion System Test Product Process
e.	Validate the developed methods.	Delivery Order(s) Propulsion System Test Product Process
f.	Evaluate defined processes for improvement potential for reducing ground processing time and cost. Identify, implement, evaluate, and recommend derived processes to KSC.	Delivery Order(s) Propulsion System Test Product Process
g.	Maintain the standards of operation compliant with KSC requirements.	Delivery Order(s) Space Shuttle Operations and Maintenance Requirements and Specifications Documents (OMRSD)

5.0 Materials and Components Testing

Materials and component testing projects are accomplished per individual customer requirements as negotiated by NASA and Contractor personnel. Projects range in scope from an Oxygen Hazard Analysis of a single component to the testing of flight APU subsystems. Testing may vary in complexity from a standard flammability test to operation of a 1-inch caliber 2-stage light gas gun. Safety hazards related to testing range from those associated with general industrial safety to operation of high pressure hydrazine or oxygen systems. The final product of any WSTF materials or component test or analysis project is the transfer of data to the customer using either a simple standard data report or a more in-depth test report.

Requirements under this element are IDIQ.

The Materials and Components Test Projects are divided into the following four functions:

- Materials and Components Test Projects
- Related Projects
- System Maintenance and Repair
- System/Facility Upgrades

Each of these activities is described in the following sections.

5.1 Materials and Components Test Projects

The Contractor shall perform materials and component testing projects using standard processes or as discrete projects using unique processes. Standard Processes are well established, defined and documented processes. Standard processes include:

- Testing to evaluate flammability, odor, offgassing, and compatibility of materials and components in accordance with NASA Standard 6001 and other applicable industry consensus standards.
- Testing to evaluate toxic hazards to personnel from offgassing from materials used on submarines per TP-WSTF-629.
- Hypervelocity impact testing to evaluate hazards of low-Earth orbit meteoroid and orbital debris environments to spacecraft hardware per TP-WSTF-922. Test articles include shields, stored energy systems, aerospace fluid systems, materials, and components.
- Chemistry and metallurgy testing and analysis in accordance with current NASA-approved procedures and American Society of Testing and Materials (ASTM), military specifications, Environmental Protection Agency (EPA), National Institute of Occupational Safety & Health (NIOSH), and other methodologies as appropriate.
- For the standard processes listed above, additional laboratory quality assurance functions are required as describe in WJI LQUALITY-0192 (Laboratory Quality Assurance) and WJI LQUALITY-0201 (Good Laboratory Practices). These activities are performed independently of activities specified in Section 3.5 of the SOW and are specific requirements to IDIQ tasks.
- Performance of oxygen and hydrogen component and system hazards analyses as described in NASA TM-104823 (oxygen) or NASA TM-2003-212059 (hydrogen).

Materials and component test projects vary widely in both content and scope but in general fall into the following technical areas:

- Testing and analysis of propellants or other hazardous fluids to define ignition and combustion properties
- Testing of materials and components to determine compatibility testing with aerospace fluids to enhance safe use.
- Testing of components to determine life cycle issues to include acceptance testing and qualification testing of flight hardware.
- Design and development of flight components.
- Testing of low velocity and hypervelocity impact effects on spacecraft structures.
- Development of new and improved safety guides and standards for oxygen, hydrogen, and other propellants.
- Development and instruction of courses related to propellant safety.
- Test development activities in support of standard processes.

The Contractor shall conduct materials and component testing in support of a variety of customers including NASA programs, DOD, other government agencies, and private industry. WSTF is considered an industry leader in materials and component testing and directly supports NASA programs. The results of WSTF test and analysis activities are published within NASA and in external forums. WSTF Contractor personnel shall be active participants in the technical community and actively participate on consensus standards committees (ASTM, American Institute of Aeronautics and Astronautics [AIAA], Joint Army, Navy, NASA, and Air Force [JANNAF], et al.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis. IAW DRD 001 Project Reporting	WSP 09-0014 Delivery Order(s)
b.	Perform Test and Operations on materials and components to meet customer's requirements.	Components Fluid and Material Testing Product Process Hazard Analysis Product Process Research and Development Product Process Standard Testing Product Process Training, Development, and Education Product Process Delivery Order(s)

5.2 Related Test Projects

The Contractor shall be required to develop and implement standard or consensus (ASTM, MIL SPEC, etc.) test methodology new to WSTF, as well as design special test methods to meet customer requirements. Methods developed include material compatibility, propellant characterization, and space simulation studies.

The Contractor shall design, fabricate, develop, test, qualify, and certify flight hardware and Type 1 GSE in support of major NASA programs such as Space Shuttle and International Space Station (ISS), and other WSTF customers. These products are provided in accordance with Agency requirements and Customer Agreements.

The Contractor is required to maintain unique and WSTF developed expertise in the areas of hypergolic propellant hazards, oxygen hazards, hydrogen hazards, composite overwrapped pressure vessels (COPV) test and analysis. The Contractor is required to develop, revise, maintain, and instruct the contents of these courses.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	<p>Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis.</p> <p>IAW DRD 001 Project Reporting</p>	<p>WSP 09-0014 Delivery Order(s)</p>
b.	<p>Perform Test and Operations on materials and components to meet customer's requirements.</p>	<p>Delivery Order(s) Components Fluid and Material Testing Product Process Hazard Analysis Product Process Research and Development Product Process Standard Testing Product Process</p>
c.	<p>Perform the flight hardware development phase activities. Research the applicable program specifications, complete mechanical and electrical designs, perform appropriate hazards analyses, and provide development hardware.</p>	<p>Delivery Order(s) Components Fluid and Material Testing Product Process Hazard Analysis Product Process Research and Development Product Process Standard Testing Product Process</p>
d.	<p>Support Preliminary and Critical Design Reviews. Prepare and present complete documentation packages including development drawings in a customer-specified format, detailed manufacturing, assembly, and test instructions, material certifications and procurement information, and design calculations and analyses.</p>	<p>Delivery Order(s) Components Fluid and Material Testing Product Process Hazard Analysis Product Process Research and Development Product Process Standard Testing Product Process Training, Development, and Education Product Process</p>
e.	<p>Perform the test phase of flight hardware development project activities. Prepare detailed test plans and procedures, ensure that applicable test system meets program-specific flight hardware interface requirements, and conduct tests, analyze data, and report</p>	<p>Delivery Order(s) Components Fluid and Material Testing Product Process Hazard Analysis Product Process</p>

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	data.	
f.	<p>Manufacture flight and qualification hardware and perform qualification.</p> <p>Develop detailed qualification test plans and procedures, ensure that all program requirements are met, prepare complete hardware qualification, certification, and acceptance data packages per program standards and customer requirements, and provide hardware and data.</p>	<p>Delivery Order(s)</p> <p>WSI 09-SW-0014 General Flight Hardware Manufacturing Requirements</p>

5.3 System Maintenance and Repair

The Contractor shall perform materials and component testing using a variety of test systems which vary in both size and complexity from simple data analysis systems to full facilities. It is critical to the success of WSTF projects that required facilities, test systems, and information management systems are available and maintained in various states of readiness. The major information management system is the Material and Components Test (MCT) information management system to assure operation, backup, maintenance of reports, screens, and files as described in RD-WSTF-0018, "MCT Users Manual" and RD-WSTF-0019, "Systems Operations Manual."

The Contractor shall utilize critical facilities and test hardware in the conduct of materials and component test and analysis. In many cases facilities and test systems at WSTF are unique with-in NASA, government, and private industry. The availability of these resources is critical to accomplishing WSTF's and the Agency's mission. In addition, since WSTF conducts testing of hazardous fluids systems, maintenance and repair is essential to personnel safety. In order to meet customer requirements within the resources that are allotted the Contractor shall maintain facilities and test systems (See Table B below) in three readiness categories.

Ready – Maintenance provided so that the system or capability is immediately available for use for the intended function

Productive Standby – Limited maintenance provided to the system or capability, minimal effort required to bring to ready status (1 week)

Deactivated – Minimal maintenance provided to the system or capability to protect assets, substantial effort required to bring to ready status (1-3 months)

Table B Systems and Facilities to be Maintained

DESCRIPTION	LOCATION
South High Bay Facility	200
250, 800, 700 Area	
250 AREA LOX/GOX Storage System	250 Area
Facility GOX, NG System, Heat Exchanger - 250	250 Area
Flowing Promoted Combustion Test System	250 Area
H2 TUBE TRAILER T-101(6000 PSIG)	250 Area
H2 TUBE TRAILER T-106 (6000 PSIG)	250 Area
H2 TUBE TRAILER T-144 (6000 PSIG)	250 Area
HELIUM SUPPLY 250 H2 SYSTEM	250 Area
High Flow Gaseous Hydrogen Test System	250 Area
Hydrogen Dewar And Recharger System	250 Area
Hydrogen Storage & Test Facility (250 Area)	250 Area
Liquid Hydrogen Recirculation Pump Test System	250 Area
MICRO-GRAVITY TEST SYSTEM #2	250 Area
Oxygen Storage and Test Facility (250 Area)	250 Area
Sub-Sonic Particle Impact Testing Fixture	250 Area
Super-Sonic Particle Impact Test Fixture	250 Area
COPV Long Term Storage Test System	270 Area and Building 270A
700 Area Tower	700 Area
High Energy Blast Facility	700 Area
O2/N2 MIXING SYSTEM	800 Area
150 GALLON MOBILE LOX DEWAR T-151	800 Area
300 GALLON MOBILE LN2 DEWAR T-130	800 Area
800 GN2 SUPPLY, (HPF,HFF,CSA)	800 Area
800 GOX DISTRIBUTION SYSTEM	800 Area
Adiabatic Compression Test System - Cell 839	800 Area
AIT TEST SYSTEM (cart mounted)	800 Area
APU TANK TEST SYSTEM	800 Area
Bldg 802 - Mechanical and Electrical Fab Shop	800 Area
Bldg 804	800 Area
CELL 113, ARPCS-CONTROL PANEL	800 Area
Cone Calorimeter Facility	800 Area
Cone Calorimeter Gas Supply	800 Area
EMU ARC TEST SYSTEM CELL 131	800 Area
Facility Breathing Air System-HFTA	800 Area
Flammability Test System Cell 108	800 Area
Friction Rubbing Test System C-111	800 Area
FUEL ASPIRATOR SYSTEM - T-268	800 Area
FUEL IMMERSION TEST SYSTEM - C-841	800 Area
GN2 Powered Fuel Waste Water SYS #1	800 Area
GOX Index Test System	800 Area

DESCRIPTION	LOCATION
GOX Tube Trailer T-173 (10000 PSIG)	800 Area
Hazardous Fluids Test Area	800 Area
Hazardous Fluids Test Area FIREX System	800 Area
HFTA HELIUM DIST. SYSTEM-HFTA	800 Area
Hydraulic Pump Burst/Cycle Test System	800 Area TC860
High Pressure Test Area	800 Area
High Pressure Test Area FIREX	800 Area
HI-PRESS GOX FLOW TEST SYST C-110	800 Area
Hydrazine Decomposition Test System - Cell 839	800 Area
Hypergol Component Testing (Oxidizer) Cell 837	800 Area
IAPU TEST SYSTEM CELL 844/FUEL	800 Area
K-BOTTLE SYSTEM, HPTA	800 Area
LASER COMBUSTION TEST - TEST CELL 834	800 Area
Low Pressure Lab	800 Area
LOX DEWAR & RECHARGER SYSTEM	800 Area
Materials Prep Lab - Bonded Storage (bldg 803)	800 Area
MECH. IMPACT TEST SYS, GOX C-104	800 Area
MIT TEST - LOX / GOX (cell 105)	800 Area
MMH Fuel Storage System - HFTA	800 Area
N204 Immersion Test SYS., CELL 833	800 Area
OXID-Propane / Drain Burner SYS	800 Area
PARR CALORIMETER	800 Area
Pneumatic And Component Test C-107	800 Area
Portable, Inert Gas, Intensifier Cart	800 Area
Promoted Ignition Test SYS,C-832	800 Area
T-246 500 GALLON LOX DEWAR	800 Area
T-254 BREATHING AIR TRAILER	800 Area
Upward Flame Propagation - Cell 101	800 Area
Upward Propagation Rate Test System	800 Area
INERT GAS SUPPLY; Glove Box	800 Area
INERT GAS SUPPLY CELL 861	800 Area
Check Valve Leak Check Apparatus	800 Area
HFTA FUEL DRAIN MAINT SYSTEM	800 Area
PORTABLE WASTE PUMP SYSTEM#2	800 Area
CELL 860, INERT GAS SUPPLIES	800 Area
Portable Leak Check Apparatus	800 Area
Inert Gas Supply Cell 839	800 Area
Mechanical Impact Test Chambers	800 Area
Cylinders (K-BOTTLES) WSTF Owned	800 Area
4-Bolt Immersion Test Chamber	800 Area
T/C843 Helium Leak Check Panel	800 Area
LN2 PORTABLE DEWARS; T-263	800 Area
FLASH X-RAY GN2	800 Area
GASEOUS NITROGEN SUPPLY FOR 803 BLD	800 Area

DESCRIPTION	LOCATION
PRCS FUEL VALVE EXTRUSION-C-835	800 Area
Hypervelocity and Low Velocity	
Low Velocity Launcher- BLG 270	Building 270
Low Velocity Test Facility	Building 270
Walk-in Freezer	Building 270
T-270A/COPV Stress Rupture Testing	Building 270A
T-275A/COPV Sustained load testing	Building 270A
.17 Caliber Gun Range	Building 272
.30/.17 Caliber Gun Range	Building 272
.50 Caliber Gun Range	Building 272
1-inch (1.00 Caliber) Gun Range	Building 272
Breathing Air Supply, 272	Building 272
Hypervelocity Impact Test Facility	Building 272
Chemistry Laboratory	
Optics Lab	Chemistry Laboratory
T-115, LN2 Dewar Supply, 4000 GAL	Chemistry Laboratory
Fuel Rated Hoke Sample Bottles	Chemistry Laboratory
GAS SAMPLE BOTTLES	Chemistry Laboratory
Liquid Nitrogen Dewars - 11 EACH	Chemistry Laboratory
Oxidizer Rated Hoke Sample Bottles	Chemistry Laboratory
HE Supply to HP 5890 G.C. WATER LAB	Chemistry Laboratory
Water Lab G.C. Hydrogen System	Chemistry Laboratory
Water Lab G.C. Helium System	Chemistry Laboratory
Offgassing Laboratory Bonded Storage Room	Building 203
MDAL H.P. 5890 GC	Chemistry Laboratory
Analytical Chemistry Laboratory	Chemistry Laboratory
Cosmodyne Cryogenic Samp Containers	Chemistry Laboratory
Hydrogen Distribution System	Chemistry Laboratory
Hypergolic Fuel Lab	Chemistry Laboratory
Hypergolic Oxidizer Lab	Chemistry Laboratory
Hypergolic Propellant Vapor Lab	Chemistry Laboratory
Instron Universal Test Machine	Chemistry Laboratory
MDAL Hydrogen DIST. System	Chemistry Laboratory
Metallurgical Laboratory	Chemistry Laboratory
Self Heated Chamber	Chemistry Laboratory
Space Environment Simulation Lab	Chemistry Laboratory
High Energy X-ray Laboratory	Chemistry Laboratory
Low Energy X-ray Laboratory	Chemistry Laboratory
Materials Laboratory	Chemistry Laboratory
Surface Analysis Laboratory	Chemistry Laboratory
IPOV Vibration Water Test Portable	Portable- 800 IPOV
T-270 POV FLOW TEST TRAILER	Portable- 800 IPOV
Hypervelocity Barrel Fabrication System	South High Bay200

DESCRIPTION	LOCATION
COPV-Sustained Load Test System	T-275A

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Generate repair procedures, procure parts, perform the repair, and document the work performed, including verification of the repair.	Delivery Order(s) WSTF-RD-0042-001-05 WJI 800 HPF Series WJI 800 HFF Series WJI 250-0002 through 0005 WJI CHEMLAB Series WJI CHAMBLAB Series WJI LENVIRON Series WJI METLAB Series WJI LQUALITY-0192 and 0201 WSTF-RD-0004
b.	Generate and maintain work instructions for routine or repetitive maintenance and operations tasks in order to ensure that tasks are repeatable and to improve cost effectiveness.	Delivery Order(s) WSTF-RD-0042-001-05 WJI 800 HPF Series WJI 800 HFF Series WJI 250-0002 through 0005 WJI CHEMLAB Series WJI CHAMBLAB Series WJI LENVIRON Series WJI METLAB Series WJI LQUALITY-0192 and 0201 WSTF-RD-0004
c.	Perform maintenance and repair on facility infrastructure and test systems in order to accomplish materials and component tests. Maintain system and instrumentation calibration. Ensure that Analytical Instrumentation systems are maintained and repaired. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	Delivery Order(s) WSTF-RD-0042-001-05 WJI 800 HPF Series WJI 800 HFF Series WJI 250-0002 through 0005 WJI CHEMLAB Series WJI CHAMBLAB Series WJI LENVIRON Series WJI METLAB Series WJI LQUALITY-0192 and 0201 WSTF-RD-0004

5.4 System/Facility Upgrades

The Contractor shall upgrade, modify, or customize materials and component test systems and facilities (shown in Table B) in order to support a specific project, extend a capability, or due to antiquation. These activities encompass design, development, fabrication, and modification of mechanical, data acquisition, and control systems, which require more than routine maintenance or sustaining of capability.

The Contractor shall maintain the ability to support a wide range of system development upgrades. The complexity of these types of projects can be as simple as modifying an existing system to accommodate a new test requirement, or as complex as designing and building a system from the ground up. The Contractor shall deliver functional systems with complete documentation of the system and its capabilities. Some activities such as test system upgrades, major repairs, new capability development, or new concepts of operation are initiated as projects and result in new Standard Processes.

All facility modifications and construction will rely on the close coordination and cooperation of the TEC and the FOOSC contractors for both definition of requirements and services.

Examples of system and facility upgrades include:

- Hypergolic Fluids Laboratory
- 800 Area propellant supply system
- Liquid Hydrogen Recirculation Pump Test System
- Chemistry laboratory instrumentation
- Data acquisition systems
- Two-stage light gas gun systems

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Provide expertise to develop test systems. Test systems operating in the following environments include: <ul style="list-style-type: none"> • Media: Aerospace fluids such as hydrogen, oxygen, inert gases and air, cryogenics (liquid oxygen, nitrogen, and hydrogen), hydrazine, MMH, UDMH, ammonia, ethanol, and nitrogen tetroxide • Control Function: Manual, semi-automated or automated 	Delivery Order(s) Research and Development Product Process

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	control <ul style="list-style-type: none"> • Data Collection: Single data points to 100,000,000 samples per second 	
b.	Fabricate and commission test systems with the required instrumentation, data acquisition and control systems, and the requisite supporting software.	Delivery Order(s) Research and Development Product Process
c.	Design, buildup, and implement maintenance capabilities to support specific requirements.	Delivery Order(s) Research and Development Product Process
d.	Develop WSTF applicable procedures and standardize the resulting processes.	Delivery Order(s) Research and Development Product Process

6.0 Depot

The Depot operations function is responsible for performing preventative maintenance, refurbishment, repair, and acceptance testing of Space Shuttle and ISS flight hardware. It is critical that program level certification be maintained uninterrupted for the Depot processes performed at WSTF. The expertise, capabilities, and the specialization of the WSTF facilities results in additional projects related to the work that the Depot is certified to perform, such as designing and fabricating thruster mockups, fabricating flight piece parts that no longer have original equipment manufacturers (OEM), performing failure analysis, and analyzing certified operations for process improvements.

NASA has transitioned and continues to transition, when practical, the responsibility and capability for maintenance, overhaul, repair, and in some cases fabrication of numerous Space Shuttle and ISS components from the OEM's to various Depot facilities in support of NASA Logistics needs.

The Depot operations function is divided into the following four project categories:

- Flight Hardware Refurbishment and Repair Projects
- Related Projects
- System Maintenance and Repair
- System/Facility Upgrades

Each of these project categories is described in the following sections.

Requirements under this element are IDIQ.

6.1 Flight Hardware Refurbishment and Repair Projects

The Contractor shall refurbish and repair the Space Shuttle and ISS components listed below. The Depot is currently certified to work on the following Space Shuttle hardware:

- Primary Reaction Control System (PRCS) thrusters,
- PRCS pilot operated valves,
- Vernier Reaction Control System (VRCS) thrusters,
- VRCS direct acting valves,
- Orbital Maneuvering System (OMS)/RCS quad check valve,
- OMS engine,
- OMS engine series valve,
- OMS/RCS manual valve,
- OMS/RCS burst disk/relief valve,
- OMS/RCS AC motor valve,
- Space Shuttle Main Engine (SSME) hydrogen flow control valve,
- Atmospheric and Revitalization Pressurization Control System (ARPCS) control and supply panels.

The Depot is certified to work on the following ISS hardware:

- Oxygen Recharge Compressor Assembly
- Respiratory Support Pack

Space Shuttle and ISS Hardware currently being transitioned to the Depot include Shuttle Main Propulsion System (MPS) Liquid Hydrogen Recirculation Pump (cryogenic acceptance testing only), Shuttle OMS Future Craft components repair and acceptance testing, ISS Portable Breathing Apparatus and ISS Pre-Breath Hose Assembly refurbishment, repair and acceptance testing.

The Contractor shall develop component processing procedures using the Intermediate Depot Maintenance Requirements Documents (IDMRD) as a guide during the transition phase. The flight component preventive maintenance, refurbishment, repair, and acceptance test requirements are developed by the Space Shuttle Program, and formally documented in IDMRD. The IDMRD describes each component the Depot is certified to process. Following this phase, the procedures are approved by the NASA PM and the customer as standard processes. Prior to approval of WSTF as the certified repair agency for a specific piece of flight hardware, the Shuttle Program will review the procedures, facilities, test equipment and systems, personnel training and qualifications, and other institutional processes.

The Contractor shall deliver Flight Hardware with an Acceptance Data Package (ADP) to NASA Shuttle Program Logistics for future use. Flight hardware requires Depot processing either for scheduled preventative maintenance, for refurbishment, or for repair due to a failure. This work is conducted in accordance with MSM process "Component Refurbishment."

Each fiscal year, the Depot and NASA Shuttle Program Logistics negotiate the planned repair mix for a given fiscal year. These scheduling requirements and hardware repair mixes are reflected in the individual DOs.

The acceptance test requirements for ISS components are developed by the OEM and delivered to the ISS Program. These requirements are documented in individual hardware acceptance test procedures (ATP) stored in JSC's EDMS. Refurbishment, overhaul and repair requirements are developed by the OEM, the Subsystem Manager and the Hardware Manager. These requirements are then documented as part of the hardware certification in SSP 50276.

The Contractor shall perform ISS Program Depot Repair activities consistent with the scope, approach, and complexity of the Space Shuttle requirements discussed above. NASA ISS Program Logistics authorizes the Depot work via a Maintenance Action Request (MAR) on an as required basis.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	<p>Perform refurbishment, repair, and acceptance testing for Space Shuttle hardware. Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis. Report Project/Process Status.</p> <p>IAW DRD 001 Project Reporting</p>	<p>Space Shuttle Repair Mix Component Refurbishment Product Process Delivery Order(s)</p>
b.	<p>All personnel must be certified to perform work on flight hardware per the process, with the exception of on the job training.</p>	<p>Component Refurbishment Product Process</p>
c.	<p>Perform refurbishment, repair, and acceptance testing for ISS hardware Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis. Report Project/Process Status.</p> <p>IAW DRD 001 Project/Process Reporting</p>	<p>Component Refurbishment Product Process Delivery Order(s) Maintenance Action Requests (MARs)</p>

6.2 Related Projects

The Contractor shall perform a range of related projects including failure analysis, flight anomaly support, flight hardware piece part fabrication, new hardware certification, and ground support equipment development.

Examples of this work include:

- Confirming an anomaly such as leakage prior to thruster installation
- Troubleshooting anomalous behavior such as thrusters that are deselected during flight.
- Serving as an alternate production facility for several OMS engine piece parts for which the OEM is no longer available
- Developing the process for becoming authorized to produce additional parts

Since it was established, the WSTF Depot has expanded the number of certified hardware refurbishment, repair and acceptance testing processes and expects to continue increasing the number of these certified processes.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis. Report Project/Process Status. IAW DRD 001 Project Reporting	Component Refurbishment Product Process Delivery Order(s)
b.	Perform related project work to meet customer requirements. Ensure this work is scheduled to avoid delaying critical hardware priorities.	Component Refurbishment Product Process Delivery Order(s)

6.3 System Maintenance and Repair

The Contractor shall perform system maintenance and repair on a variety of facility test equipment and systems (See Table C below). Because of the Depot certifications, the test systems and equipment are controlled via the Shuttle and ISS Programs certified processes and procedures. The availability of the equipment and systems is essential to the Depot Operations. The readiness of particular test systems and equipment is managed based on the scheduled hardware work. Specific hardware and system readiness is documented in individual DOs.

The Contractor shall complete preventive maintenance, minor repairs, minor modifications, maintain spares, and perform general operational support required to

keep the Depot facilities operational. This task also includes maintenance of system and hardware documentation such as test processes, procedures, and hardware data for all maintenance and repairs.

Table C Systems and Facilities to be Maintained

Description	Location
Component Test Facility Orbital Maneuvering System	North High Bay
Component Test Facility Parker Valve	North High Bay
Component Test Facility Primary and Vernier RCS	North High Bay
Component Test Facility Quad-Check Valve	North High Bay
Component Test Facility Oxygen Recharge Compressor Assembly	North High Bay
Depot Bonded Storage Room	Building 200

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Perform scheduled refurbishment, overhaul of systems and equipment, and replacement of assemblies in accordance with the schedule established and documented in the associated computerized maintenance management and scheduling systems. IAW DRD 004 Monthly Maintenance Report	Delivery Order(s) WSI PROP-0020

6.4 System/Facility Upgrades

The Contractor shall perform system and facility upgrades (Systems shown in Table C) in response to process improvements, or the implementation of new test/repair capabilities. Specific work requirements are documented in DOs along with cost, schedule, and performance evaluation requirements. This project work usually increases the Depot’s capabilities of flight hardware processing. More of these capability enhancing projects are anticipated as the WSTF Depot continues to increase the number of certified hardware processes. All facility modifications and construction will rely on the close coordination and cooperation of the TEC and the FOSC contractors for both definition of requirements and services.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Perform project work to meet customer requirements. Ensure this work is scheduled to avoid delaying critical hardware priorities.	Propulsion System Test Product Process Delivery Order(s)
b.	Manage and report the technical, schedule, and cost performance for all ordered projects and processes on a periodic basis. Report Project/Process Status. IAW DRD 001 Project Reporting	Propulsion System Test Product Process Delivery Order(s)

7.0 Technical Service Centers

To enable successful completion of the ID/IQ projects (Sections 4.0, 5.0, and 6.0) and processes, technical services are required to be available, either on-site or off-site. These services are also available to other customers, including off-site customers and FOSC. WSTF currently operates these technical services in a full-cost environment such that all costs associated with providing a support function capability which provides services to the ordered projects and processes are paid for by the projects and processes that utilize them. These technical service centers are currently available on site, primarily because of the need to respond quickly to the needs of the projects and processes or because these services have not historically been available in the local area.

Requirements under this element are IDIQ.

7.1 Technical Editing

The Contractor shall provide technical editing services primarily for publishing reports, conference papers, presentations, bulletins, brochures, and electronic media. The Contractor shall also provide duplication services, electronic scanning of documentation, and archival of records as described by NASA requirements. Technical editors must work closely with the project personnel throughout the life cycle of the project. Project reporting requirements are defined in Delivery Order(s). These reports are required at the end of projects when results have been attained and are often required to be completed quickly and efficiently. The Contractor will transmit products generated to the Technical Library (part of the FOSC) for archiving purposes and for future retrieval.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Supply technical editing, publishing, and transmittal of scientific and technical information.	Delivery Order(s) Work Order(s)
b.	Transfer completed products to the Technical Library as they are produced.	Delivery Order(s) Work Order(s) Transfer to library as raw format and searchable electronic media within 3 working days of completion of product.
c.	Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	Delivery Order(s)

7.2 Photo and Video

The Contractor shall maintain full-service photography and video facilities for still picture, motion picture, video production, and video instrumentation. The Contractor shall provide Photo and Video imaging functions that include producing still photographic prints, motion picture, transparencies, and video productions. Services shall be available in-house and in field environments, including hazardous areas requiring use of personal protective equipment. The Contractor shall also operate the NASA/WSTF Video Teleconference System (ViTS).

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Process, develop, edit, and produce black & white and color photographic prints, negatives, positives, slides, viewgraphs, digital images, and videos.	Delivery Order(s) Work Order(s) Photo Lab/Motion Picture/Video Infrastructure Process
b.	Obtain photographs and video images in laboratories and at remote WSTF facilities in support of events such as engine firings, tests, documentaries, and quality control inspections.	Delivery Order(s) Work Order(s) Photo Lab/Motion Picture/Video Infrastructure Process

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
c.	Maintain Photo and Video equipment.	OEM Specifications Photo Lab/Motion Picture/Video Infrastructure Process
d.	<p>Maintain several existing ACCESS databases which contain information on all still photographs, videos, and other photo related work done at WSTF.</p> <p>The databases are used to quickly find photos and videos required by customers for reports, investigations, ongoing R&D work, and other activities.</p> <p>Databases must be kept current.</p>	Photo Lab/Motion Picture/Video Infrastructure Process Update weekly.
e.	Produce orthochromatic film for overlays, ScotchCals, and printed circuit board layouts.	Delivery Order(s) Work Order(s) Photo Lab/Motion Picture/Video Infrastructure Process
f.	Operate the WSTF NASA ViTS conference room and coordinate video teleconferences.	Photo Lab/Motion Picture/Video Infrastructure Process Availability to operate ViTS 95% of time.
g.	Perform borescopic photography and video imaging; nonvisible spectrum photography, and infrared video imaging; pulse (time-lapse), real-time, and high-speed cinematic imaging; and high-speed and fast-shutter video imaging.	Delivery Order(s) Work Order(s) Photo Lab/Motion Picture/Video Infrastructure Process
h.	Provide graphic art, slide, magnification/reduction, color duplication services, and graphic presentation services.	Delivery Order(s) Work Order(s) Photo Lab/Motion Picture/Video Infrastructure Process
i.	<p>Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly.</p> <p>IAW DRD 004 Monthly Maintenance Report</p>	Photo Lab/Motion Picture/Video Infrastructure Process

7.3 Electronic and A/V Systems M&O

The Contractor shall plan, assemble, and maintain public announcement systems, surveillance camera systems, and the NASA Select television systems in site conference rooms. Additionally the Contractor shall fabricate, maintain, repair, and replace electronic equipment for use in a variety of aerospace and special application systems as required. The Contractor shall maintain an electronic and A/V service to provide and repair small scale equipment.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Operate the WSTF NASA Select satellite television receiving and signal distribution systems.	Operational 95% of workday
b.	Repair or replace A/V systems and fabricate printed circuit boards.	Delivery Order(s) Work Order(s) OEM Specifications
c.	Fabricate control panels and overlays for test control panels using screen print and ScotchCal techniques.	Delivery Order(s) Work Order(s)
d.	Maintain the WSTF public announcement systems, surveillance camera systems and conference room audio and presentation systems.	Delivery Order(s) Work Order(s)
e.	Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	OEM Specifications

7.4 Calibration

The Contractor shall calibrate and maintain Inspection, Measuring, and Testing Equipment (IMTE) in accordance with NASA Policy Directive 8730.1, "Metrology and Calibration." IMTE includes all test and measuring equipment and safety instruments associated with the following functions:

- Acceptance testing (determining that a part, component, or system meets specifications)
- Inspection, maintenance, or calibration
- Flight hardware qualification

- Measurement of processes where test equipment accuracy is essential for the safety of personnel or the public
- Telecommunication, transmission, and test equipment where exact signal interfaces and circuit confirmations are essential to mission success
- Development, testing, and special applications where the specifications, end products, or data are accuracy sensitive, including instruments used in hazardous and critical applications
- Other equipment as negotiated through delivery order

IMTE measurements include, but are not limited to, force, pressure, vacuum, torque, gas flow rate, liquid flow rate, temperature, humidity, length, flatness, mass, angularity, DC Voltage, AC Voltage, resistance, DC Current, AC Current, capacitance, inductance, frequency, phase modulation, power, and microwave attenuation.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Calibrate equipment.	Delivery Order(s) Work Order(s) Calibration Infrastructure Process
b.	Maintain the MetTrack database system in a current state. Administer a calibration recall program. Provide calibration status reporting. IAW DRD 003 Quality Data Plan and Report.	Calibration Infrastructure Process 99% accuracy for MetTrack status within 48 hours of equipment calibration
c.	Maintain the calibration systems and processes. Calibration must be traceable to national, intrinsic, or internationally recognized standards.	Delivery Order(s) Calibration Infrastructure Process Work Order(s) OEM Specifications
d.	Maintain transfer, working, and reference standards and calibration equipment and systems. Calibration must be traceable to national, intrinsic, or internationally recognized standards.	Delivery Order(s) Work Order(s) Calibration Infrastructure Process
e.	Ensure stability of reference standards. Maintain measurement assurance programs, statistical process	Calibration Infrastructure Process

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	control, and/or comparison to properly maintained intrinsic standards.	
f.	Perform incidental maintenance and repair of equipment submitted for calibration.	Delivery Order(s) Calibration Infrastructure Process Work Order(s) OEM Specifications
g.	Prepare presentations for and participate in the Metrology and Calibration Working Group activities.	Delivery Order
h.	Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	OEM Specifications

7.5 Precision Cleaning and Fluid Component Refurbishment

The Contractor shall perform precision cleaning and component refurbishment to stringent specifications to ensure system safety and reliability for fluid components and systems used in a wide variety of aerospace and special application systems. JSC-SN-C-0005, "Contamination Control Requirements for the Space Shuttle" contains contamination control requirements applicable to space vehicles and Ground Support Equipment (GSE) from design concept through procurement, fabrication, assembly, test, storage, delivery, launch/ground operations, and maintenance for the Space Shuttle Program (SSP).

The Contractor shall provide precision cleaning and fluid component refurbishment services primarily to the test and evaluation functions at WSTF, to other NASA facilities, and other government agencies. Contamination control garments, used in Class 100 clean rooms, must be laundered to comply with industry standards. JPR 5322.1, "Contamination Control Requirements Manual," establishes the requirements and criteria for coordinated contamination control activities. The manual provides the minimum controls necessary to establish and maintain an effective contamination control system. The WDS provides additional contamination control procedures and hardware cleanliness levels for WSTF hardware.

The Contractor shall perform disassembly, decontamination, precision cleaning, reassembly and testing of components that are used in high-pressure and/or high-temperature gaseous oxygen, liquid oxygen, gaseous and liquid hydrogen, hydrazine and its derivatives, nitrogen tetroxide, fluorine, and inert fluids systems. These activities are currently performed in on-site facilities having numerous clean rooms, pre-cleaning

stations, hydrostatic and pneumatic pressure test equipment, and reassemble test areas. A work order may involve disassembly of component, cleaning piece parts, sampling and inspection for required cleanliness level, reassembly of component followed by a functional test.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Perform disassembly, precision cleaning, and reassembly of components, tubing, vessels, or other parts.	Delivery Order(s) Component Services Infrastructure Process Work Order(s) JSC-SN-C-0005, "Contamination Control Requirements for the Space Shuttle" JPR 5322.1, "Contamination Control Requirements Manual"
b.	Maintain the systems and processes to perform precision cleaning and refurbishment of components, cleaning of piping, and in-place cleaning of storage vessels and systems.	Delivery Order(s) Component Services Infrastructure Process Work Order(s) OEM Specifications JSC-SN-C-0005, "Contamination Control Requirements for the Space Shuttle" JPR 5322.1, "Contamination Control Requirements Manual" All systems must be fully operational unless downtime for maintenance or repair has been negotiated with NASA and meet operating specifications when used.
c.	Provide and maintain an existing ACCESS database which contains an inventory of available replacement parts for components processed through the laboratory. The database includes part number, count, inventory of softgoods, and list of soft good kits. It also contains number of available repair kits.	Delivery Order(s) Maintain 95% of parts identified in the program.
d.	Provide technical assistance and training in contamination control processes and the selection of fluid components.	Delivery Order(s)
e.	Provide hydrostatic and pneumatic pressure test services for pressurized components.	Delivery Order(s) Work Order(s) Component Services Infrastructure Process

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
f.	Safely decontaminate components that have been used in hazardous fluids such as hydrazine and nitrogen tetroxide.	Delivery Order(s) Work Order(s) Component Services Infrastructure Process
g.	Perform functional testing and repair of valves, intensifiers, regulators, compressors, filters, vacuum pumps, and other fluid handling equipment to ensure proper operation.	Delivery Order(s) Work Order(s) Component Services Infrastructure Process
h.	Wash and maintain contamination control garments.	WJI SVC CSS 0070 OEM Specifications
i.	Provide nondestructive testing of filter assemblies to establish integrity and define filtration characteristics.	Delivery Order(s) Work Order(s) Component Services Infrastructure Process
j.	Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	OEM Specifications

7.6 Machining and Welding

The Contractor shall provide machining and welding services in support of facility, test, and flight hardware processing. These services involve fabrication of structures, pressure vessels, sheet metal housings and ducts, flexible hoses, valves, and sabots. Commonly used materials are carbon and stainless steels, aluminum and aluminum alloys, titanium, copper and nickel alloys, and synthetics.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Provide mechanical fabrication and modification including cutting, milling, bending, swaging, turning, engraving, and assembling of test related equipment and complex flight hardware.	Delivery Order(s) Work Order(s) Fabrication Shop Infrastructure Process Rework of flight hardware shall be done in such a way that project schedule is not compromised

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
b.	Provide welding (on location and in shop) using the materials listed above.	Delivery Order(s) Work Order(s) Fabrication Shop Infrastructure Process
c.	Provide preventative maintenance on all machines and fabrication equipment.	Delivery Order(s) Perform preventative maintenance on 100% of machines and equipment OEM Specifications Maintenance shall be performed on all machines within 30 calendar days of scheduled maintenance date.
d.	Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	OEM Specifications

7.7 Special PPE

Special PPE (Personnel Protective Equipment) such as chemical protective suits (referred to as Totally Encapsulating Suits or TES) and self-contained breathing apparatuses are used in a wide variety of aerospace and special application systems. The Contractor shall service, maintain, and repair Special PPE including TES suits, self-contained breathing apparatuses, and contamination control garments. A TES suit servicing consists of cleaning a TES suit inside and out, inspecting the suit for damaged valves, zippers, and seams, repairing damage, testing the suit for integrity, and maintaining a record of results. The Contractor shall properly train users on the use of the PPE.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Decontaminate, maintain, and repair PPE such as chemical protective suits and self-contained breathing apparatuses and provide engineering investigation and hazard analysis testing for PPE failures.	Delivery Order WSI 25-SW-0007 OEM Specifications
b.	Provide and maintain an existing ACCESS Database containing an inventory of all available PPE (TES and SCBA)	Delivery Order(s) OEM Specifications Records shall not be more than one week out-of-date

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
	Replacement Parts and Configuration Control data.	
c.	Maintain an existing ACCESS database that contains all pertinent information on all Special PPE used on site.	Delivery Order(s) OEM Specifications Records shall not be more than one week out-of-date
d.	Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	OEM Specifications

7.8 Ordnance

Ordnance operations are required at WSTF primarily in support of the programmatic activities. These activities include testing of pyrotechnics, arming of facility and test hardware containing explosive devices, performing ordnance calibrations for test areas. Additionally, ammunition for the local guard force is treated as part of the ordnance program. Some of WSTF facilities were designed to operate using pyrotechnic devices. Additionally, WSTF’s mission of hazardous testing periodically requires the use of pyrotechnics and explosives. A small centralized storage facility and several satellite magazines are located on the facility. The Contractor is required to provide trained personnel that are certified to perform ordnance handling and operations in accordance to State, Federal, and NASA regulations. The Contractor is also required to maintain and control a supply of specific ordnance for the purpose of supporting project test requirements. In addition the Contractor is required to perform and report all ordnance present at WSTF. Disposal of ordnance will be managed under the environmental element of the FOSC.

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
a.	Maintain inventory supply of ordnance and provide ordnance inventory report. IAW DRD 005 Ordnance Inventory Management Report	WSI 25-SW-0014 Quarterly report of inventory supply at locations (central and satellite magazines) Annual inventory report 100% accuracy
b.	Receive and issue ordnance.	WSI 25-SW-0014
c.	Install, arm, and detonate ordnance in support of test programs and perform post-test safing.	WSI 25-SW-0014

	PERFORMANCE REQUIREMENT	PERFORMANCE STANDARDS
d.	Develop, review, and maintain procedures.	WSI 25-SW-0014
e.	Train test personnel and maintain records.	WSI 25-SW-0014
f.	Perform maintenance and repair on facility infrastructure. Report the maintenance status monthly. IAW DRD 004 Monthly Maintenance Report	WSI 25-SW-0014

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