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Space Administration

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Lyndon B. Johnson Space Center
Houston, Texas 77058

**REPLACES
NSTS 60575
BASELINE**

SPACE SHUTTLE

SPACE SHUTTLE PROGRAM TRANSITION AND RETIREMENT ENVIRONMENTAL PLAN

REVISION LOG

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CHANGE SHEET

FOR

NSTS 60575 - Space Shuttle
Space Shuttle Program
Transition and Retirement Environmental Plan

REVISION A - CHANGE NO. 2

Program Requirements Control Board Directive No. S100107Q/(1-1), dated 5/23/11 and SSP DOC-685.(1)

June 20, 2011

Eddie L. King
Secretary, Program Requirements
Control Board

CHANGE INSTRUCTIONS

1. This is Revision A to NSTS 60575, dated June 20, 2011, which replaces the Baseline Issue dated June 15, 2007. Please discard the Baseline to NSTS 60575 and utilize this Revision A in its place.
2. This Revision A includes the contents of NSTS 60575, Baseline Issue as amended by Change 1 and this Change 2.
3. Subsequent changes to NSTS 60575 will be processed against this Revision A.

Signature of person incorporating changes

Date

NSTS 60575 - Space Shuttle
Space Shuttle Program
Transition and Retirement Environmental Plan

*Revision A (Reference PRCBD No. S100107Q, dated 5/23/11 and SSP DOC-685)

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SPACE SHUTTLE

**SPACE SHUTTLE PROGRAM
TRANSITION AND RETIREMENT
ENVIRONMENTAL PLAN**

Approved by:



Kevin C. Templin
Transition Manager, Space Shuttle Program

Date

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PREFACE

Efficient management of the Space Shuttle Program (SSP) dictates that effective control of program activities be established. Requirements, directives, procedures, interface agreements, and system capabilities shall be documented, baselined, and subsequently controlled by SSP management.

Program requirements, specific to transition, controlled by the Manager, Space Shuttle Program, are documented in NSTS 07700, Volume XX - Book 1, Space Shuttle Closeout Requirements, Transition and Retirement. Changes to the Transition and Retirement Environmental Plan are approved at the Program Requirements Control Board (PRCB), which is chaired by the Manager, Space Shuttle Program.

This Transition and Retirement Environmental Plan addresses environmental requirements and provides more detailed guidance. This plan addresses the environmental requirements associated with the SSP Transition and Retirement (T&R), supplements the SSP Transition Management Plan (TMP) (NSTS 60576, Space Shuttle Program Transition Management Plan), provides guidance on meeting these requirements, and discusses environmental interfaces with the Constellation Program (CxP), other programs, Headquarters (HQ), and the responsible centers.

All elements of the SSP must adhere to these baselined requirements. When it is considered by the Space Shuttle program element/project managers to be in the best interest of the SSP to change, waive or deviate from these requirements, an SSP Change Request (CR) shall be submitted to the Program Requirements Control Board (PRCB) Secretary. The CR must include a complete description of the change, waiver or deviation and the rationale to justify its consideration. All such requests will be processed in accordance with NSTS 07700, Volume IV - Book 1, Configuration Management Requirements, Requirements, and dispositioned by the Manager, Space Shuttle Program, on a Space Shuttle PRCB Directive (PRCBD).

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1.0 INTRODUCTION

1.1 BACKGROUND

The Space Shuttle Program (SSP) is scheduled for termination in 2011. The SSP controls and maintains a number of capabilities that must be identified, assessed, and retired or transitioned to the Constellation Program (CxP), other programs, or responsible center organizations. As part of the close out and transfer of the SSP assets and infrastructure, potential environmental risks, liabilities, and associated requirements must be identified and addressed.

1.2 PURPOSE

The purpose of this document is to provide technical guidance for SSP Transition and Retirement (T&R) Environmental Management.

This plan addresses the environmental requirements associated with the SSP T&R; supplements NSTS 60576, Space Shuttle Program Transition Management Plan; provides guidance on meeting these requirements; and discusses environmental interfaces with CxP, other programs, Headquarters (HQ), and the responsible centers. The plan builds on the SSP risk management process to identify, communicate, and mitigate the environmental risks associated with the SSP T&R. The plan also builds on existing environmental processes and requirements and is integrated and consistent with other transition processes.

Initially identified categories of environmental risks to the SSP associated with T&R are described; additionally, a process to identify and mitigate specific environmental risks is outlined.

1.3 SCOPE

This document focuses on the environmental management function of the SSP T&R. It also describes important interfaces and stakeholders involved in environmental T&R activities. SSP program and elements/projects are responsible for implementing the environmental requirements.

1.4 CHANGE CONTROL

The Program Requirements Control Board (PRCB) has baseline authority for this plan. All changes will be coordinated through the SSP Configuration Management process, and submitted to the PRCB on the most current version of an SSP Change Request (CR) form.

1.5 GOALS AND OBJECTIVES

The SSP T&R goals have been stated as follows (NSTS 60576):

- a. Take no action that will impede the ability to safely and effectively complete the fly out of the SSP.
- b. Perform T&R in a cost-effective manner.
- c. Provide an interface to other programs and institutional elements for capability transition.

To meet these goals, the following environmental objectives have been identified:

- a. To enable mission success by managing environmental responsibilities, identifying and mitigating environmental risks, providing adequate resources and technical support, and working with mission stakeholders.
- b. To comply with all applicable federal, state, and local laws and regulations properly applicable to federal entities, as well as all applicable NASA requirements.
- c. To honor all agreements with other agencies, industries, organizations, and entities that are relevant to NASA's ongoing environmental responsibilities.
- d. To include environmental considerations in the program and project management processes, with emphasis on prevention, conservation, compliance, and restoration.

1.6 APPROACH TO SSP T&R

1.6.1 T&R Processes

The SSP T&R is being managed and implemented using an approach tied to the existing agency and SSP organizational structures, communicating with functions of the CxP, other programs, HQ, and responsible center organizations. As part of the T&R implementation, organizations and forums exist to provide guidance, to support management decisions, and to facilitate coordination and communication during the SSP T&R.

The SSP elements/projects control boards provide the first review of disposition decisions for SSP capabilities. Element/Project control boards report decisions to the Transition Integration Working Group (TIWG) which provides a program level integration function. Decisions that are beyond the element/project authority are elevated to the PRCB. Transition issues can be elevated to the Transition Control Board (TCB),

a HQ board jointly chaired by the Space Operations Mission Directorate (SOMD), the Exploration Systems Missions Directorate (ESMD), and the agency Institutions and Management Office.

Further details regarding these boards and processes, as well as other aspects of the Human Space Flight Transition, are located in NSTS 60576. The SSP has identified T&R requirements in NSTS 07700, Volume XX - Book 1, Space Shuttle Closeout Requirements, Transition and Retirement.

1.6.2 T&R Environmental Management

NSTS 07700, Volume XX - Book 1 identifies cross-cutting functions that are common to all projects and are best supported through a centralized management approach. An Environmental Management cross-cutting function was established to facilitate the environmental activities for T&R.

Environmental issues associated with SSP T&R are being identified and addressed through the following activities:

- a. Establishment of environmental requirements in NSTS 07700, Volume XX - Book 1
- b. Environmental Planning and Guidance described in this document
- c. Establishment of an Environmental Support Team (EST) (reference Subparagraph 5.1.5 for details)
- d. Application of a risk management approach built on existing agency, SSP and center processes (reference Paragraph 4.0)
- e. Development of a document that provides information about SSP operations and environmental activities conducted at the major SSP-related centers and facilities

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2.0 APPLICABLE DOCUMENTS

The following documents of the date and issue shown form a part of this document to the extent specified herein. "(Current Issue)" is shown in place of a specific date and issue when the document is under Space Shuttle PRCB control. The current status of documents shown with "(Current Issue)" may be determined from NSTS 08102, Program Document Description and Status Report.

The environmental requirements are drawn from federal, state, and local statutes and regulations, Executive Orders (EOs), and national agreements, as well as from NASA's agency-specific environmental directives, which implement EOs and the major federal statutes and regulations. More details about the environmental regulations are provided in Appendix C.

NSTS 07700 Volume IV - Book 1 (Current Issue)	Configuration Management Requirements, Requirements
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Ref. Preface

NSTS 07700 Volume XIX (Current Issue)	Program Risk Management Plan
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Ref. Para. 4.1.2

NSTS 07700 Volume XX - Book 1 (Current Issue)	Space Shuttle Closeout Requirements, Transition and Retirement
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Ref. Preface, Para. 1.6.1, 1.6.2, 3.0

NSTS 07700 Volume XX - Book 2 Appendix 19 (Baseline Pending)	Space Shuttle Closeout Requirements, Closeout Requirements, Program Risk Management Plan Closeout Requirements
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Ref. 4.1.2

NSTS 60576 (Current Issue)	Space Shuttle Program Transition Management Plan Ref. Preface, Para. 1.2, 1.5, 1.6.1, 5.0, 8.0, 9.4, 10.1, 10.3.2
ASTM 1527-05	Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process Ref. Para. 10.1.1
EO 12114	Environmental Effects Abroad of Major Federal Actions Ref. Para. 9.1; Apx. C
EO 12898	Federal Actions to Address Environmental Justice In Minority Populations and Low-Income Populations Ref. Apx. C
EO 13212	Actions to Expedite Energy-Related Projects Ref. Apx. C
EO 13221	Energy Efficient Standby Power Devices Ref. Apx. C
EO 13287	Preserve America Ref. Apx. C
EO 13327	Federal Real Property Asset Management Ref. Apx. C

EO 13423	Strengthening Federal Environmental, Energy, and Transportation Requirements Ref. Apx. C
NAS4 2008	Space Shuttle Programmatic Environmental Assessment, Transition and Program Property Disposition Ref. Para. 10.2.1
NPD 8500.1	NASA Environmental Management Ref. Para. 9.4.2.1; Apx. C
NPR 1441.1	NASA Records Retention Schedules Ref. Apx. C
NPR 4300.1A	NASA Personal Property Disposal Procedural Requirements Ref. Para. 10.1, 10.3.1
NPR 8000.4	Risk Management Procedural Requirements Ref. Para. 4.1.2
NPR 8530.1	Affirmative Procurement Program and Plan for Environmentally Preferable Products Ref. Apx. C
NPR 8553.1	NASA Environmental Management System (EMS) Ref. Apx. C

NPR 8570.1	Energy Efficiency and Water Conservation Ref. Apx. C
NPR 8580.1	Implementing the National Environmental Policy Act and Executive Order 12114 Ref. Para. 9.1; Apx. C
NPR 8800.15A	Real Estate Management Program Implementation Manual Ref. Para. 10.1
14 CFR Chapter V	National Aeronautics and Space Administration Ref. Apx. C
14 CFR 1216.3	Procedures for Implementing the National Environmental Policy Act (NEPA) Ref. Para. 9.1
36 CFR 800	Protection of Historic Properties Ref. Para. 9.1
40 CFR	Council on Environmental Quality Ref. Para. 9.1
40 CFR 50-95	National Primary and Secondary Ambient Air Quality Standards Ref. Table 9.1

40 CFR 82	Protection of Stratospheric Ozone Ref. Apx. D
40 CFR 130	Water Quality Planning and Management Ref. Apx. C
40 CFR 260	Hazardous Waste Management System Ref. Para. 9.2.3
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan Ref. Table 9.1
40 CFR 700	Toxic Substances Control Act (TSCA) Ref. Apx. C
41 CFR	Federal Property Management Regulations Ref. Para. 10.1, 10.3.1
48 CFR	Federal Acquisition Regulations System Ref. Para. 10.1, 10.3.2

2.1 APPLICABLE REFERENCES

NSTS 37345	Program Management Plan for Shuttle Environmental Assurance Initiative
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3.0 SSP T&R ENVIRONMENTAL REQUIREMENTS GUIDANCE

Guidance for SSP T&R environmental activities is given below in Paragraphs 3.1 and 3.2. Related requirements are given in NSTS 07700, Volume XX - Book 1. Some requirements involve working with interfacing organizations. These interfaces are defined in later subparagraphs and in the environmental risk categories table (Paragraph 4.2). The requirements also feed into the environmental reporting metrics identified in Paragraph 7.0.

The environmental requirements and guidance apply to the SSP and/or to the SSP elements/projects. Each element/project has a prime contractor that will actually implement many of these identified requirements. Environmental requirements for the prime contractors, along with other T&R requirements, will flow down from the appropriate SSP contract and contracting officer.

3.1 PROGRAM GUIDANCE SUMMARY

- a. Establish an EST.
- b. Provide a T&R Environmental Plan and the SSP environmental requirements for T&R.
- c. Facilitate the identification of environmental T&R risks, risk management, and mitigation in coordination with the SSP and SSP elements/projects.
- d. Identify, manage, and mitigate element/project environmental T&R risks (for example, National Environmental Policy Act [NEPA] requirements, regulatory exemptions, and capabilities) in coordination with the SSP and the EST.
- e. Plan and conduct environmental risk mitigation in accordance with applicable federal, state, and local laws and regulations, as well as with relevant NASA requirements.
- f. Provide documentation and products for the environmental risk mitigation efforts conducted at the program level.
- g. Provide interface and coordination with the centers, NASA HQ, CxP, International Space Station Program (ISSP), and other stakeholders.
- h. Provide the Programmatic Environmental Assessment (EA) and/or other environmental review documentation as required by the NEPA for the proposed T&R actions.
- i. Provide the NEPA Programmatic EA administrative record and requirements for other environmental records in support of the SSP T&R.
- j. Provide a Transition Plan for the Shuttle Environmental Assurance (SEA) Initiative.

3.2 ELEMENTS/PROJECTS GUIDANCE SUMMARY

- a. Provide an EST representative; support and participate in the EST.
- b. Provide input, data, and reviews for the major environmental products, including the programmatic EA.
- c. Include an environmental section in element/project SSP T&R implementation plans.
- d. Provide interface and coordination with the centers (facilities, property, environmental, and historical), NASA HQ, CxP, ISSP, and other stakeholders.
- e. Identify, manage, and mitigate element/project environmental T&R risks (for example, risks associated with permits, leases, agreements, regulatory exemptions, pre-screening of personal and real property, decontamination and safing of assets) in coordination with the SSP, the EST and the responsible Center Environmental Management Office (EMO).
- f. Ensure that review board CRs, board review packages, Space Shuttle Management Resource Transition (SMRT) documents, property disposition documents, and other appropriate SSP T&R documentation address environmental risks, including compliance with environmental regulations, potential environmental impacts, and associated costs and schedule impacts.
- g. Coordinate draft PRCB CRs, SMRT documents, and other major briefings with the appropriate EMO EST representative and the SSP Environmental Management Transition Lead.
- h. Plan and conduct environmental risk mitigation in accordance with applicable federal, state, and local laws and regulations, as well as with relevant NASA requirements.
- i. Develop final documentation for the environmental risk mitigation efforts conducted.

4.0 SSP T&R ENVIRONMENTAL RISK MANAGEMENT

This plan groups the various environmental risk drivers into categories to facilitate identification and mitigation, and includes results of an initial effort to identify environmental risk categories and initiate mitigation planning.

4.1 ENVIRONMENTAL RISK MANAGEMENT

4.1.1 Environmental T&R Risks

Risk is the combination of: 1) the probability (qualitative or quantitative) that a program or project will experience an undesired event, such as cost overrun, schedule slippage, safety mishap, compromise of security, or failure to achieve a needed technological breakthrough; and 2) the consequences, impact, or severity of the undesired event were it to occur.

SSP T&R environmental risks include the potential liability associated with, for example, environmental contamination, potential for permit violations, potential for the SSP and NASA to be out of compliance with NEPA and other requirements, potential that environmental requirements associated with the disposition of real and personal property would not be met, and potential loss of access to materials that require regulatory exemptions.

The impacts associated with these risks primarily are impacts on cost and schedule. There also are potential human health and environmental impacts associated with the disposition of the SSP capabilities. The laws and regulations and the associated processes that govern the disposition of SSP capabilities should ensure that meeting these requirements will minimize potential risks to human health and the environment. Such risks will be identified, where appropriate.

T&R environmental risks range from small, site- or process-specific issues, such as appropriately managing small amounts of hazardous waste or documenting the environmental data associated with the disposition of property, to large program- or agency-wide issues, such as the requirement to develop a NEPA programmatic EA.

4.1.2 SSP Risk Management Processes

Risk management is an organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risks to increase the likelihood of achieving program and project goals.

Risk management will be conducted throughout SSP T&R consistent with NPR 8000.4, Risk Management Procedural Requirements. Risk management will be conducted in accordance with NSTS 07700, Volume XIX, Program Risk Management Plan during

flight period, and NSTS 07700, Volume XX - Book 2, Appendix 19, Space Shuttle Closeout Requirements, Closeout Requirements, Program Risk Management Plan Closeout Requirements after the last flight.

The Shuttle Integration Risk Management Application (SIRMA) will be used as a risk management tool as appropriate to maintain consistency and to provide the SSP Managers with an integrated view of total program risk that includes the T&R environmental risks.

Environmental risks that require a major mitigation effort and budget will be identified by the elements/projects or by the Environmental Management Lead and submitted into a risk management tool by the risk owner. The general approach used to identify risks is to capture the most significant risks in each venue and to document these as program risks. Typical, small environmental concerns, such as those associated with personal property disposition, will be managed using the existing agency/center processes and requirements and associated procedures.

4.1.3 Environmental Risk Identification and Mitigation

The EST will support the program and elements/projects in identifying and mitigating environmental risks.

Much of the data needed to identify environmental risks associated with asset processing and disposition will be collected as part of the process SSP elements/projects will follow in dispositioning property. These data include usage history and any knowledge of hazardous materials or hazardous waste associated with the property. Paragraph 10.0 discusses these processes in more detail. Pre-screening and risk tools are described in Subparagraph 10.1.1.

When SSP elements/projects identify a T&R-related activity that requires action, such as an asset ready for disposition, the responsible element/project identifies the last-need dates and prepares a board review package, and in some cases an SMRT document, for the proposed action(s). Many review packages are presented to the TCB for decision, prioritization, and funding. To facilitate informed decision-making, all review packages will incorporate environmental needs including the cost, schedule, and technical risks related to the environmental requirements for the proposed action.

4.1.4 Documentation and Communication

The environmental aspects of assets and disposition decisions will be brought to the center EMOs for review, input, and advice. Projects will coordinate draft PRCB CRs, SMRT document summaries, and other major board review packages and briefings with the appropriate center EMO EST representative and the SSP T&R Environmental Management Lead.

Risk closure documentation will be prepared for each identified environmental risk. This documentation can be a stand alone document addressing environmental risks, or can be included in other documentation prepared by the elements/projects.

For more complex risk mitigation efforts, documentation should include documentation of the final condition when SSP transfers or disposes the asset. This documentation is here called a Final Site Condition Report and will be prepared by the element/projects with support from the EST and the responsible center EMO. Final Site Condition Reports describe a risk closure and/or asset disposition and will include:

- a. A brief summary of the environmental issue(s).
- b. Summary of final disposal and associated actions taken.
- c. Final resolution of environmental issues.
- d. Organization taking possession of asset.

Environmental risks and mitigation progress will be documented by the risk owner, captured in environmental metrics, and reported.

4.2 T&R ENVIRONMENTAL RISK CATEGORIES

Categories of environmentally driven risks to SSP that are managed at the program level are listed in Table 4.1. These include those related to overall program environmental planning, preparation of NEPA documents, and planning for transitioning the SEA Initiative.

Table 4.2 provides generic descriptions of risk categories that should be used by elements/projects to identify element/project-owned environmental risks. These risks include those related to permit changes and environmental compliance, environmental contamination, real and personal property disposal, and environmental records management. As the SSP nears retirement, additional program, project, and site-specific risks are likely to be identified.

Risks identified herein are for the SSP. Some of these risks and risk categories also are applicable to CxP, other programs, centers, and NASA HQ.

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TABLE 4.1

GENERIC SSP T&R ENVIRONMENTAL RISK CATEGORIES FOR SSP

Risk Category	SSP Potential Impacts	Other Stakeholders/ Interfaces
Overall Environmental Planning and Coordination		
<p>Environmental Planning for SSP T&R</p> <p>SSP T&R environmental issues and associated responsibilities are spread across NASA HQ, SSP, centers, and contractors, which creates a risk that some SSP environmental liabilities will not be appropriately identified and mitigated. If appropriate and timely environmental planning and coordination is not accomplished to identify and mitigate environmental risks and liabilities, then SSP, the responsible centers, and NASA could be noncompliant with environmental laws and regulations, and the overall transition cost and schedule could be affected.</p>	<ul style="list-style-type: none"> a. Debris is defined as broken and/or scattered. b. Noncompliance with federal and state laws and NASA requirements. c. HQ could stop disposition of assets. d. Citizen lawsuits. e. Impact to cost and schedule. f. Negative impact on public perception. g. Potential human health and environmental impacts. 	<ul style="list-style-type: none"> a. SSP Elements/ Projects b. SSP Contractors c. HQ d. CxP e. Other Programs f. Centers g. Public
NEPA		
<p>NEPA Requirement for SSP T&R</p> <p>If NEPA documentation for SSP T&R is not accomplished, SSP and NASA would not be in compliance with federal law and NASA requirements; such non-compliance could have the potential for impacts to cost and schedule, as well as to public perception. Other NEPA-related risks include the possibility that a more detailed Environmental Impact Statement (EIS) would be required; that external reviews and approvals could change NEPA requirements and review times; and that conflicts with the Constellation (Cx) NEPA documents could create public and HQ concerns.</p>	<ul style="list-style-type: none"> a. Noncompliance with federal and state laws and NASA requirements. b. HQ could stop disposition of assets. c. Citizen lawsuits. d. Impact to cost and schedule. e. Negative impact on public perception. f. Citizen lawsuits. 	<ul style="list-style-type: none"> a. SSP Elements/ Projects b. HQ c. CxP d. Centers e. Public

TABLE 4.1

**GENERIC SSP T&R ENVIRONMENTAL RISK CATEGORIES FOR SSP -
Concluded**

Risk Category	SSP Potential Impacts	Other Stakeholders/ Interfaces
SEA Initiative Capability		
<p>Potential Loss of SEA Initiative Capability</p> <p>If the SEA Initiative capability to identify and mitigate environmentally driven materials obsolescence is not maintained, there could be an impact on SSP and agency mission execution, cost, and schedule.</p>	<p>a. Potential technical impacts.</p> <p>b. Impact to mission execution as capabilities are lost.</p>	<p>a. SSP Elements/ Projects</p> <p>b. SSP Contractors</p> <p>c. HQ</p> <p>d. CxP</p> <p>e. Other Programs</p> <p>f. Centers</p>
Regulatory Exemptions		
<p>Potential for Impact to SSP and HQ Hydrochlorofluorocarbon (HCFC) 141b Essential Use Exemption</p> <p>The risk is the potential for CxP decisions and activities; including negotiations with the United States (US) Environmental Protection Agency (EPA) to affect the materials replacement and other requirements associated with the SSP essential use exemption for HCFC 141b.</p>	<p>a. Technical compliance impact.</p> <p>b. Mission execution impact: HCFC 141b could be unavailable to SSP.</p>	<p>a. SSP Elements: External Tank (ET), Reusable Solid Rocket Booster (RSRB) (motor and booster), Orbiter</p> <p>b. SSP Contractors</p> <p>c. HQ</p> <p>d. CxP</p>

TABLE 4.2
SSP T&R ENVIRONMENTAL RISK CATEGORIES FOR
ELEMENTS/PROJECTS

Risk Category	SSP Elements/ Projects Potential Impacts	Other Stakeholders/ Interfaces
NEPA		
<p>NEPA Requirement for Santa Susana Field Laboratory (SSFL)</p> <p>Disposition of the SSFL will require an Environmental Impact Statement.</p>	<p>a. Impacts to cost and schedule</p>	<p>a. SSP</p> <p>b. HQ</p> <p>c. Centers</p> <p>d. Public</p>
Agreements, Leases, and Memorandums of Understanding (MOUs)		
<p>Potential for Failure to Meet Environmental Obligations Associated with Outside Agency Agreements</p> <p>Failure to identify and meet environmental obligations associated with leases, MOUs, and other agreements upon Shuttle retirement could leave SSP and NASA liable for environmental contamination and other responsibilities at properties after Shuttle retires.</p>	<p>a. Potential liability for environmental contamination</p> <p>b. Impacts to cost and schedule</p>	<p>a. SSP</p> <p>b. HQ</p> <p>c. CxP</p> <p>d. Other Programs</p> <p>e. Centers</p>
Environmental Permits and Compliance		
<p>Potential Gap in Funding and Responsibility for Environmental Operations</p> <p>The risk is a potential for a gap or overlap between contractors and programs that could result in an impact to environmental operations, resulting in noncompliance with environmental requirements resulting in potential SSP liability, and cost and schedule impacts.</p>	<p>a. Noncompliance with federal and state laws and NASA environmental requirements</p> <p>b. Impacts to cost and schedule</p> <p>c. Liability</p> <p>d. Potential impacts to human health and the environment</p>	<p>a. SSP</p> <p>b. SSP Contractors</p> <p>c. HQ</p> <p>d. CxP</p> <p>e. Other Programs</p> <p>f. Centers</p>

TABLE 4.2

SSP T&R ENVIRONMENTAL RISK CATEGORIES FOR ELEMENTS/PROJECTS - Continued

Risk Category	SSP Elements/ Projects Potential Impacts	Other Stakeholders/ Interfaces
Environmental Permits and Compliance - Concluded		
<p>Need for Permit Modifications or Notifications</p> <p>If permits are not properly modified or notifications to regulatory agencies made as SSP operations are terminated, SSP, NASA, and contractors could be out of compliance with environmental laws. Operational changes in operations could be delayed, resulting in cost and schedule impacts to SSP and CxP, as well as to centers, ISSP, and other stakeholders.</p>	<ul style="list-style-type: none"> a. Noncompliance with federal and state laws and NASA environmental requirements b. Impacts to cost and schedule c. Liability d. Potential impacts to human health and the environment 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. CxP d. Other Programs e. Centers
<p>Potential Loss of Grandfathered Permits and Agreements</p> <p>If SSP closes an operation that relies on permits or agreements that have been grandfathered in and then needs to re-start the process, the environmental permitting required could present a significant time and cost and technical impact. The loss of these grandfathered permits also presents a risk to CxP and other programs.</p>	<ul style="list-style-type: none"> a. Impacts to cost and schedule b. Capability loss 	<ul style="list-style-type: none"> a. SSP b. HQ c. CxP d. Other Programs e. Centers
Regulatory Exemptions		
<p>Potential Liability for 1,1,1-trichloroethane (TCA) Stockpile Disposition</p> <p>SSP may have some liability in managing, transferring, or disposing of the TCA stockpiled at Alliant TechSystems (ATK) in Utah.</p>	<ul style="list-style-type: none"> a. Cost and schedule impact to CxP b. Liability c. Loss of critical material 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. HQ d. CxP

TABLE 4.2

SSP T&R ENVIRONMENTAL RISK CATEGORIES FOR ELEMENTS/PROJECTS - Continued

Risk Category	SSP Elements/ Projects Potential Impacts	Other Stakeholders/ Interfaces
Environmental Records		
<p>Potential Failure to Maintain Required Environmental Records</p> <p>If environmentally related records (historic surveys, remediation plans, agreements with regulators, disposition documents, mitigation plans, and documentation) are not maintained, the SSP and NASA could be in noncompliance with federal law and agency requirements, with a potential impact to cost and schedule.</p>	<ul style="list-style-type: none"> a. Noncompliance with federal and state laws and NASA environmental requirements b. Impacts to cost and schedule c. Negative impact on public perception d. No documentation of work accomplished 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. HQ d. CxP e. Other Programs f. Centers
Environmental Contamination		
<p>Documentation of Final Site Condition</p> <p>SSP facilities and personal property at NASA centers, other government facilities, and contractor sites that are being transferred to each center, CxP, International Space Station (ISS), or other stakeholders could have caused or be causing environmental contamination. If SSP does not document the condition of the facility, site, and/or equipment before and after the transfer, SSP could be held liable in the future for decontamination and remediation costs.</p>	<ul style="list-style-type: none"> a. Cost and schedule impacts b. Noncompliance with federal and state laws and NASA environmental requirements c. Future liability d. Potential human health and environmental impacts 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. HQ d. CxP e. Other Programs f. Centers

TABLE 4.2

SSP T&R ENVIRONMENTAL RISK CATEGORIES FOR ELEMENTS/PROJECTS - Continued

Risk Category	SSP Elements/ Projects Potential Impacts	Other Stakeholders/ Interfaces
Property Transfer and Disposal Requirements		
<p>Environmental Considerations for Real Property Disposition</p> <p>Decisions on real property disposition could be made without consideration of environmental requirements. If environmental requirements are not considered, the true cost and schedule for decisions will not be taken into account, resulting in cost and schedule impacts. Failure to properly address environmental considerations associated with real property disposition also could have human health and environmental impacts.</p>	<ul style="list-style-type: none"> a. Cost and schedule impacts b. Noncompliance with federal and state laws and NASA environmental requirements c. Future liability d. Potential human health and environmental impacts 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. HQ d. CxP e. Other Programs f. Centers
<p>Environmental Considerations for Personal Property Disposition</p> <p>Decisions on personal property disposition could be made without consideration of environmental requirements. If environmental requirements are not considered, the true cost and schedule for decisions will not be taken into account, resulting in cost and schedule impacts. Failure to properly address environmental considerations associated with personal property disposition also could have human health and environmental impacts.</p>	<ul style="list-style-type: none"> a. Cost and schedule impacts b. Noncompliance with federal and state law and NASA environmental requirements c. Future liability d. Potential human health and environmental impacts 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. HQ d. CxP e. Other Programs f. Centers

TABLE 4.2

SSP T&R ENVIRONMENTAL RISK CATEGORIES FOR ELEMENTS/PROJECTS - Concluded

Risk Category	SSP Elements/ Projects Potential Impacts	Other Stakeholders/ Interfaces
Property Transfer and Disposal Requirements - Concluded		
<p>Environmental Considerations for Artifacts</p> <p>In some circumstances, SSP may be responsible for the decontamination of SSP-related government property before it can be dispositioned. Artifacts may need to be treated in a special way to prepare them for transfer. This area represents a potential liability and cost and schedule impact. Failure to properly address environmental considerations associated with artifacts disposition also could have human health and environmental impacts.</p>	<ul style="list-style-type: none"> a. Cost and schedule impacts b. Future liability c. Potential human health and environmental impacts 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. HQ d. CxP e. Other Programs f. Centers
<p>Environmental Considerations for Material Stockpiles</p> <p>There may be government-owned stockpiles of material bought for use by SSP. If materials have associated environmental issues, the SSP may be responsible for the cost associated with their disposal. Failure to properly address environmental considerations associated with material stockpiles disposition also could have human health and environmental impacts.</p>	<ul style="list-style-type: none"> a. Future liability b. Cost impacts c. Potential human health and environmental impacts 	<ul style="list-style-type: none"> a. SSP b. SSP Contractors c. HQ d. CxP e. Other Programs f. Centers

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5.0 ENVIRONMENTAL T&R ROLES AND INTERFACES

SSP roles associated with SSP T&R environmental activities are described in the following subparagraphs. More details concerning the roles of these organizations in the SSP T&R are provided in NSTS 60576. This paragraph also describes the interfaces SSP will need to ensure that environmental requirements for T&R are met and that environmental risks are mitigated.

5.1 SSP ENVIRONMENTAL ROLES AND RESPONSIBILITIES

5.1.1 SSP Transition Environmental Management Lead

Cross-cutting functions have been identified in areas common across the SSP to facilitate coordination across the program, elements/projects, and centers. Each of these cross-cutting functions has defined Lead positions that work to ensure the activities are handled in a consistent and coordinated manner. The Environmental Management Lead facilitates the SSP T&R EST and coordinates T&R-related environmental issues with other cross-cutting functions, as well as with the elements/projects, centers, NASA HQ, CxP, and other T&R stakeholders. The Environmental Management Lead owns program level environmental risks; identifies, mitigates and documents final closure of program level risks, collects environmental metrics; and reports to the Transition Program Manager.

5.1.2 Center Transition Leads

Center Transition Leads integrate among the institution, the resident programs and elements/projects. These Center Transition Leads ensure that the center's and program's interests are represented in T&R decision-making.

5.1.3 SSP Elements/Projects

Each SSP element/project has a Transition Lead who is responsible for transition planning and implementation within that project. These Leads coordinate and integrate their projects' requirements with those of other SSP T&R stakeholders, develop board review packages and documentation, communicate and status updates to the appropriate boards, and identify, track and mitigate element/project environmental risks. The element/project Transition Leads incorporate environmental requirements in their T&R plans and for their prime contractors. These leads also coordinate with CxP and the center's EMO, property, historical, records, and procurement functions.

5.1.4 Prime Contractors

Prime contractors support the elements/projects in addressing the environmental requirements for SSP T&R. Requirements and requests for support in preparation of

board review packages and other transition documentation, as well as specific implementation of the environmental requirements, flow from the SSP contracts and contracting officers to the prime contractors.

5.1.5 Environmental Support Team

The SSP EST has been established to help identify and mitigate environmental T&R risks through the identification and implementation of environmental requirements. The EST is led by the SSP T&R Environmental Management Lead. The composition of the EST is provided in Table 5.1.

The EST provides the interfaces, technical support, and information resources needed to define and integrate the environmental requirements and guidance for the SSP T&R, using an approach that is consistent with other T&R processes. The EST will provide input to the T&R environmental plans and requirements and will support the implementation of the environmental requirements through the end of the SSP retirement. The EST will provide environmental planning, integration, regulatory coordination, and recommendations concerning environmental compliance and issues identification and risk mitigation, including those associated with the disposition of real and/or personal property, and environmental tasks.

TABLE 5.1
SSP T&R ENVIRONMENTAL SUPPORT TEAM

Organization	Team Representation
SSP	<ul style="list-style-type: none"> a. Cost and schedule impacts b. SSP Environmental Management Lead c. SSP Business Management Office d. Center Transition Leads
SSP Project Elements	<ul style="list-style-type: none"> a. Element/Project Offices b. Prime Contractors <ul style="list-style-type: none"> --United Space Alliance (USA) --Boeing Space Exploration --ATK Launch Systems --Lockheed Martin --Pratt-Whitney Rocketdyne
CxP	Program Environmental
NASA HQ	<ul style="list-style-type: none"> a. SOMD b. ESMD c. Environmental d. Facilities and Property e. Historical Preservation
NASA centers that host or oversee SSP operations	<ul style="list-style-type: none"> a. ARC, DFRC, GRC, JSC, KSC, LaRC, MAF, MSFC, SSC b. Environmental c. Facilities d. Historical e. Property Disposition

5.2 INTERFACES

5.2.1 NASA Headquarters

NASA HQ organizations involved in the SSP T&R include SOMD, ESMD, Office of Infrastructure and Administration (Environmental Management Division [EMD], Property Disposition Office, Facilities), Office of General Counsel, and others.

The NASA HQ Office of Infrastructure and Administration supports the SSP T&R through several of its divisions. For environmental issues, the primary support function is the EMD. The EMD establishes NASA environmental policy and is responsible for environmental compliance at the agency level. EMD personnel participate in and provide guidance to the EST regarding SSP T&R-related environmental issues. The EMD

is responsible for the review of and concurrence with NEPA documentation for NASA agency-level proposed actions, such as the SSP Programmatic EA. EMD also is responsible for Environmental Compliance and Restoration (ECR) and Cultural and Historic Resources.

Additionally, the EMD sponsors Principal Centers to provide assistance and expertise agency-wide on environmental issues (reference Table 5.2).

5.2.2 NASA Centers

The SSP, ISSP, and CxP are executed at the NASA centers under direction from the appropriate HQ Mission Directorates. Each center maintains the institutional capabilities required for programs, projects, and missions, including environmental management, historical preservation, procurement, legal and property management. These center organizations have processes in place for their respective functions. The existing center processes will continue to be used for SSP T&R. For example, environmental compliance is managed throughout the agency according to a standard Environmental Management System (EMS) framework. As part of each center's EMS, environmental aspects and impacts have been identified for activities conducted onsite, including SSP-related activities. This SSP-related EMS information will assist the elements/projects and the centers' EMO in addressing evolving SSP T&R environmental issues.

The centers with SSP capabilities participate in the EST and assist the SSP and elements/projects in meeting the environmental requirements of the SSP T&R activities. Center EMOs work with regulatory and enforcement agencies to modify or close government-held or -owned permits and to make regulatory notifications regarding changes to operations.

Center Real Property Officers (RPOs) manage the termination of leases on property that will not be transferred to other NASA entities, and EMOs help ensure that all environmental-related issues are resolved. EMOs also work with the center Supply and Equipment Management Officer (SEMO), Industrial Property Officer (IPO) and Property Disposal Offices (PDOs) to ensure that personal property is dispositioned in accordance with the environmental requirements.

5.2.3 Constellation Program

CxP will be affected by SSP T&R activities related to capability availability, environmental risks, future liabilities, and other environmental considerations. The CxP Environmental Lead and the CxP Transition Manager are located at JSC. CxP is interfacing with SSP environmental planning and coordinating with the SSP Program, SSP elements/projects, center EMOs, and the EST, during appropriate life-cycle phases.

CxP has representatives on the EST and works directly with the SSP elements/projects and Center Transition Managers to assess the CxP need for specific SSP capabilities. CxP also has representation on the agency level boards and forums, where senior management decisions concerning Shuttle asset disposition are made.

CxP will coordinate with the responsible center EMOs to make the necessary environmental permit modifications and regulatory notifications related to transferred operations and associated permits. CxP also will determine the requirements for Ozone Depleting Substance (ODS) materials, such as HCFC 141b and TCA. If an ODS usage requirement is anticipated, CxP will coordinate the necessary exemption activities with the Principal Center for Regulatory Risk Assessment and Communication (RRAC) Lead and HQ EMD.

5.2.4 ISS and Other NASA Programs

Other programs also may be affected by SSP T&R activities related to capability availability, environmental risks, future liabilities, and other environmental considerations. These programs will continue representation on the agency level boards and forums at which high-level decisions concerning Shuttle asset disposition are made.

5.3 OFFICES AND ORGANIZATIONS PROVIDING ENVIRONMENTAL GUIDANCE

Several offices and organizations within NASA function as technical resources to provide environmental support and guidance related to environmental regulations and requirements. These offices and organizations are outlined in Table 5.2.

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TABLE 5.2**ORGANIZATIONS PROVIDING ENVIRONMENTAL GUIDANCE**

Organization/Contact	Function
SSP Transition Environmental Management Lead	Coordinate programmatic environmental requirements with SSP; provide technical support to program and elements/projects.
EST	Identify environmental requirements and facilitate communications among elements/projects and center functions; provide technical support.
Center EMO	Resolve element/project environmental requirements, such as permit modifications, potentially responsible party investigations, site restoration, hazardous waste disposal, and hazardous chemical handling.
Center Property Officer	Support the disposal of government-owned property. Identify requirements for each disposal alternative and coordinate those requirements with the responsible office.
Center Historical Officer	Maintain list of historical property and evaluate the historical eligibility of unlisted property. Provide requirements to facilities for disposal or modification of historical properties.
Center Chief Counsel's Office	Provide center legal guidance.
HQ Environmental Management Division	Provide agency-wide environmental guidance and policy.
Principal Center for RRAC (MSFC)	Review environmental regulations and laws to identify potential impacts to programs and centers. Negotiate exemptions and waivers with regulatory agencies.
Principal Center for Technology Evaluation for Environmental Risk Mitigation (TEERM) (KSC)	Identify Pollution Prevention (P2) needs and foster intra-agency and extra-agency efforts to validate environmental technology solutions for application to affected NASA systems.
Principal Center for Recycling and Affirmative Procurement (KSC)	Provide resources and support to help NASA execute the affirmative procurement program.
HQ Historical	Provide agency-wide historical guidance and policy.
HQ Office of General Counsel	Legal guidance.

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6.0 FUNDING AND BUDGET CONSIDERATIONS

SMRT documents, board review packages, and mitigation plans must address environmental considerations and associated funding needs. Environmental risk mitigation may include a budget to accomplish pre-screening and risk planning, decontaminate real and personal property, clean up minor environmental contamination, and dispose of wastes. In addition, funds may be required to maintain, modify, and/or close various environmental permits. Ongoing and newly identified environmental remediation needs will have to be addressed.

Currently, the funding and contract support for the environmental efforts is complex, involving numerous programs, projects, centers, HQ, and associated contract support. Environmental efforts are funded in several ways. The SSP funds environmental efforts by direct cost on contracts, indirect cost to contract overhead, and Center Management Operations (CMO) costs. The current center remediation costs are funded by NASA's ECR budget. NASA's ECR program funds major environmental soil and groundwater remediation projects at government-owned sites.

Special emphasis must be placed on ensuring that current and new environmental responsibilities are addressed during and in some cases after T&R activities are complete. Careful consideration must be given to address these needs because of the risk of potential compliance violations and other cost and schedule impacts.

For routine decontamination and disposal of real and personal property located at NASA centers, the responsible center covers the associated costs. For large and/or complex dispositions, the costs to decontaminate and safe real and personal property may be negotiated between the SSP and the responsible center. For government-owned property at contractor sites, the SSP contract funds the work.

As part of the SSP budget planning process, the SSP issues environmental guidelines during the Program Planning Budget and Execution (PPBE) process to ensure a focus on the environmental budget needs for T&R.

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7.0 ENVIRONMENTAL METRICS

Metrics will be provided to SSP Management for insight into the progress of the T&R environmental efforts. Program and/or element/project environmental risk owners will measure the performance of environmental efforts made to support the overall transition objectives. There are a variety of efforts associated with environmental risk mitigation, according to the risk categories established in this plan. Note that it is important to address each environmental risk because of the potential liabilities, even for small quantities, tasks, etc. Risk owners may choose to group the various disposition efforts or products when reporting. Items entered into a risk management tool will be tracked individually. To simplify the information to be collected and reported, Table 7.1 summarizes three key indicators and the associated measurements needed to form the environmental metrics. Environmental metrics will be combined with the various other metrics being reported to the program.

TABLE 7.1

KEY ENVIRONMENTAL PROGRESS INDICATORS AND ASSOCIATED MEASUREMENTS

Indicator Metric	Measurement
Risk Identification	Environmental risks and concerns identified and addressed in each disposition document produced
Risk Mitigation	Mitigation progress percent complete
Documentation	Environmental documentation of mitigation completion

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8.0 ENVIRONMENTAL DATA AND RECORDS MANAGEMENT

NSTS 60576 addresses the management of SSP T&R data and records.

Two types of environmental information must be considered for retention as part of the SSP T&R include: 1) information that must be retained according to regulatory and statutory requirements; and 2) information that should be retained for environmental management activities, such as to ensure a complete administrative record or to assist the CxP and other NASA entities in the future by providing the historical perspective regarding an issue.

Information required for environmental regulatory or statutory reasons typically is collected and archived on a retention schedule by the EMOs. Details are identified in the respective regulation.

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9.0 SSP T&R ENVIRONMENTAL GUIDANCE AND CONSIDERATIONS

This paragraph provides general guidance and information to aid in planning for and implementing the environmental T&R requirements. Guidance for addressing the environmental requirements associated with the disposition of real and personal property is provided in Paragraph 10.0.

9.1 NATIONAL ENVIRONMENTAL POLICY ACT

NEPA requires all federal agencies to consider environmental, technical, and economic factors when planning actions and activities that may have a significant impact on the quality of the human environment before an action is taken. NEPA is also an environmental disclosure statute. It requires that available information be adequately addressed and made available to NASA decision-makers in a timely manner so they can consider the environmental consequences of the proposed action or activity. Environmental information also must be made available to the public, as well as to other federal, state, and local agencies. The Council on Environmental Quality (CEQ) regulations for implementing the provisions of NEPA (40 CFR, Council on Environmental Quality, Parts 1500 through 1508); EO 12114, Environmental Effects Abroad of Major Federal Actions; NASA's policies and procedures at 14 CFR 1216.3, Procedures for Implementing the National Environmental Policy Act (NEPA); and NPR 8580.1, Implementing the National Environmental Policy Act and Executive Order 12114, set the requirements for the preparation of NEPA documentation.

To support and facilitate this process, the SSP Environmental Management Lead, with environmental engineering support from the MSFC EMO prepared a Programmatic EA document in accordance with NEPA requirements. Preparation of the EA required the collection of data from individual SSP element/project offices, as well as each center's EMO. A thorough review and concurrence was also required from the SSP, SSP element/project offices, HQ, and centers. Some real property disposal or other follow-on actions may require additional NEPA documentation.

The CxP prepared an EIS and EAs to comply with NEPA. The SSP worked with the CxP Environmental Lead and with the HQ EMD to coordinate the two NEPA documents.

Federal agencies must coordinate NEPA compliance with the responsibilities of 36 CFR 800, Protection of Historic Properties (National Historic Preservation Act [NHPA]) to ensure that historic and cultural properties are given proper consideration in the preparation of the EA. The Environmental Management Lead coordinated with the Historical Preservation Working Group (HPWG) to ensure that the EA integrated NHPA considerations, along with other environmental impact analyses and studies (40 CFR Part 1502.25).

SSP assets will be evaluated for historic significance in accordance with the NHPA. The EA addressed potential impacts to historically significant SSP assets documented in each center's eligibility survey. Each center will be responsible for coordinating with its State Historic Preservation Office (SHPO) before dispositioning historically significant assets according to the provisions in this plan, the EA, and NPR 8580.1. The EA and historical disposition documentation developed for the SSP T&R will be made available to other NASA programs and projects, including CxP. This detailed information forms a body of reference data to provide an environmental and historical perspective regarding SSP operations, facilities, and assets in the future.

9.2 AGREEMENTS, LEASES, AND OTHER INSTRUMENTS OF OBLIGATION

9.2.1 Environmental Risks Associated with Agreements and Leases

Elements/Projects and the SSP carry some liability associated with agreements and leases, although the primary responsibility for their management generally lies with HQ or the responsible center.

SSP agreements, leases, MOUs, and other such instruments will be identified. The responsible element/project, with support from the EST, will review relevant agreements to determine environmental content, liabilities, assets, and risks. Where appropriate, an environmental risk mitigation plan will be developed to address the environmental issues and to support planning activities.

The planning activities will be initiated by the affected element/project and coordinated with the CxP and appropriate offices at the responsible centers, including EMOs, facilities, property disposition, and historical preservation. Planning activities will consider SSP obligations and determine the appropriate disposition of the instrument in question (agreement, lease, etc.), according to the schedule for disposition developed by the SSP. Specific environmental mitigation steps will be identified and included to address obligations, constraints, risks, and other considerations. These activities should include the identification of the lead NASA organization, potential risks, mitigation schedule, and resources needed to fulfill SSP obligations and to properly transfer the mitigation responsibilities to the appropriate organizations.

9.2.2 Transoceanic Abort Landing (TAL) Sites

NASA has three TAL sites that are used in the case of an emergency during the Space Shuttle's ascent into orbit. The TAL sites are located at Moron Air Base (AB), Spain; Zaragoza AB, Spain; and Istres AB, France.

NASA has an Memorandum of Agreement (MOA) with each TAL site base for NASA's use of the sites. At Zaragoza AB and Moron AB, the US government, through NASA,

has an agreement with the government of Spain, and through the US Department of Defense (DoD), with the Spanish Ministry of Defense to lease hangars and use runways to support SSP emergency landing operations. NASA uses the hangars for operations and storage. Maintenance of the NASA-leased facilities and equipment at Zaragoza and Moron ABs is done by on-site contractors administered through the DoD Manned Space Flight Support (DDMS) office. DDMS offices at Patrick Air Force Base (AFB) are responsible for the day-to-day operations and support. DDMS also maintains a Landing Support Office at JSC. NASA owns no facilities at either Spanish ABs.

At Istres AB, through an agreement between the US and the French governments, NASA leases a building from the French aircraft manufacturer Dassault. The facilities are maintained by Dassault. NASA owns no facilities at Istres AB.

9.2.3 Permits

Each NASA center's EMO has ultimate responsibility for the development and management of environmental permits for compliance with federal, state, and local regulations, as well as for conducting any negotiations necessary for the acquisition or modification of these permits. Examples of types of permits held by facilities are provided in Table 9.1.

NASA is responsible for permits at NASA facilities. A contractor or contractors at a government-owned facility, who are responsible or partially responsible for the operation, management, or oversight of environmental activities at the facility, may sign the permit as the operator(s); however, any modifications to or development of new permits must be coordinated with the center EMO.

40 CFR 260, Hazard Waste Management System (Resource Conservation and Recovery Act [RCRA]) permit requirements may be of special concern as the SSP plans for retirement. If the SSP determines that it no longer requires permitted hazardous waste facilities, the facilities must be closed according to a RCRA closure plan. The plan must be initiated within 90 days of the date the facility will be taken out of service; and completed within 180 days unless an extension is obtained. Material removed from a permitted hazardous waste facility taken out of service is a waste and is subject to the 90-day storage limit.

If the facility is left in operation, all environmental requirements for that facility must be continued. If a permitted hazardous waste facility needs to stay in operation and another program taking possession of the facility wishes to retain the current permit, the permit conditions, such as inspections, maintenance reporting etc., must be continued in the interim, operator changes appropriately modified, and regulatory agencies notified.

At contractor-owned sites, the contractors are responsible for obtaining and complying with any necessary permits.

NASA centers are responsible for processing any new permits, working with local environmental agencies to close or modify existing permits as required, adjusting data reporting to environmental agencies to reflect any environmental program changes, and coordinating with the State Historical Preservation Officers (SHPOs).

As changes are made due to the SSP T&R, SSP elements/projects should include any related requirements for permit modifications or other changes with PRCB review packages and/or SMRT documents. The center EMO will evaluate the process changes for alterations in permitted discharges, such as a decrease or increase in flow or change in chemicals used; and evaluate what, if any, permitting changes need to be made. Process changes also may result in changes to chemical inventories, waste management, and reporting requirements. The EMO will determine the action required to modify or terminate the permit or other action; to develop a mitigation plan; and to coordinate the plan with the appropriate affected party (SSP, CxP, HQ Environmental Office, regulatory agencies, and any other affected party).

The environmental sections of element/project Transition Implementation Plans should include a process to address the coordination and management of SSP-related permits and agreements, including closure, transfer, and modifications.

In the event that both the SSP and another program, such as CxP, plan to conduct processes operating under an existing permit, coordination will be required among the two programs, as well as among the responsible center and the regulatory agency that issued the permit, so that the proper modifications and notifications are made and to ensure NASA's compliance with permit requirements.

9.3 RESERVED

9.4 ENVIRONMENTAL CONTAMINATION AND REMEDIATION

Environmental contamination includes the introduction of chemicals, toxic substances, wastes or wastewater into water, air, or soil at levels that make the medium unfit for its intended use. Contamination can also refer to building surfaces, including asbestos and lead based paint.

Contamination in buildings (such as asbestos or lead paint) and contamination associated with personal property (such as lead or chromium contamination or hazardous waste) are addressed through the property dispositioning process. Further details regarding SSP T&R property management are provided in NSTS 60576 and are discussed in Paragraph 10.0 of this report.

The SSP is responsible only for contamination of government-owned property used in support of the SSP. The location and the use of government-owned property, as well as the site condition upon property removal, should be documented in the final site condition report.

TABLE 9.1
TYPES OF PERMITS

Media	Type of Permit	Description
Water	State Indirect Discharge (SID)	Regulates wastewater discharges into treatment facilities, such as Industrial Wastewater Treatment Facility (IWTF) or city sewers.
	Aquatic Resources Alteration Permit	Regulates the planned alterations of streams, rivers, lakes, and wetlands.
	National Pollutant Discharge Elimination System (NPDES)	Regulates wastewater or storm water discharges from point sources (pipes, ditches etc.) to bodies of water (such as streams, ponds, rivers, or lakes).
	NPDES Storm Water Program (Phases I and II)	Regulates water run-off from construction sites.
Air	40 CFR 50-95, National Primary and Secondary Ambient Air Quality Standards (Clean Air Act [CAA]), Title V, and CAA Synthetic Minor Source Permit, Interim Title V Construction Permits	Regulates air discharges from industrial and operational usages (boilers, operating equipment, and manufacturing processes) and from construction activities.
Hazardous Waste	RCRA; 40 CFR 300, National Oil and Hazardous Substances Pollution Contingency Plan (Comprehensive Environmental Response, Compensation and Liability Act [CERCLA]), and Hazardous and Solid Waste Amendments (HSWAs)	Part B permits regulate hazardous waste treatment, storage, and disposal. Corrective action under HSWA regulates the cleanup of contaminated sites (only for Solid Waste Management Units [SWMUs]).
Other	Sewer Connection Permits	Agreement between NASA and a local government allowing the discharge of waste to a community treatment facility.
	Underground Storage Tanks (USTs) and Aboveground Storage Tanks (ASTs)	Registration of regulated USTs and ASTs and/or notification of applicable USTs and ASTs with the state agencies when tanks are taken out of service.
	Coastal Zone Management	Regulates usage and protects beaches and other land areas along water bodies.
	Wetlands Construction Permit	Regulates construction activities in wetlands.
	Nuclear Regulatory Commission (NRC)	Use of nuclear materials may require a license from the NRC.

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9.4.1 Minor Environmental Contamination

Minor contamination of environmental media associated with SSP government-owned personal property at both NASA centers and contractor sites may be the responsibility of the SSP and elements/projects if contamination is the result of normal equipment operations. When the SSP leaves a government-owned facility, or removes government-owned personal property from a contractor facility, an assessment of the environmental condition of the facility associated with the removal, decontamination, and dispositioning of government-owned equipment will be done.

Final conditions will be documented in a Final Site Condition Report that describes the asset, environmental risks, actions taken and final environmental condition. This documentation will serve to reduce SSP future liabilities, as well as to document environmental data associated with T&R activities. This documentation can be a stand alone document addressing environmental risks, or can be included in other documentation prepared by the elements/projects.

9.4.2 Major Environmental Contamination

9.4.2.1 NASA Centers and Government-Owned/Contractor-Operated (GO/CO) Sites

Soil and groundwater contamination at NASA centers and sites and at GO/CO sites is documented and managed by the responsible center's EMO. NASA's HQ ECR funds remediation and restoration work for contamination at NASA centers and sites. SSP operations use several sites where environmental remediation is covered by ECR funds.

It is possible that unknown releases of contaminants may be discovered during the disposition of SSP assets. If a chemical release to the environment occurs or appears to have occurred, as indicated by soil staining, stressed vegetation, unusual odors, leaking sumps or pipelines, or any other indication of a release, the center's EMO should be promptly contacted to evaluate the discovery. EMO personnel will investigate the area per the requirements of NPD 8500.1, NASA Environmental Management, and the RCRA or CERCLA.

9.4.2.2 Contractor and Vendor Sites

In general, SSP contracts do not directly provide for cleanup of soil or water contamination. Environmental support and cleanup projects may be indirectly funded through contract overhead cost.

If issues arise concerning soil and groundwater contamination at contractor sites, the elements/projects should work with the procurement, environmental, and legal organizations at the responsible center.

9.4.2.3 Leased Facilities

Responsibility for the remediation of soil and water contamination at sites leased for SSP use will be negotiated with the site lessor before SSP leaves the leased facility. This negotiation is the responsibility of the responsible center PDO and EMO in consultation with the center Chief Counsel's Office. The responsible SSP element/project should participate in these negotiations. SSP elements/projects leaving a leased facility also should request that the responsible center document the final site condition at the facility.

9.5 REGULATORY EXEMPTIONS

There are two major environmental exemptions related to SSP operational requirements, as discussed below. It is possible that there may be other site-specific or other environmental exemptions or waivers related to SSP operations. SSP elements/projects should include any such information in board review packages and SMRT documents, as appropriate. Resources for further information include the EST, RRAC, the responsible center EMOs, and the HQ EMD.

9.5.1 Essential Use Exemption for Solid Rocket Motor (SRM) Applications of TCA

TCA, or "methyl chloroform", is a Class I ODS that was phased out in the US in 1995 under the CAA because of concerns related to the depletion of the stratospheric ozone layer. TCA is a mission-critical material used on the Orbiter and in the solid motor portion of the RSRB manufacturing operations. It is expected that CxP's Ares I and Ares V First Stage rocket motors also will require use of TCA in critical manufacturing processes.

Because TCA is a Class I ODS that has been banned for emissive applications in all developed countries under the Montreal Protocol, in addition to being phased out under the CAA, SSP access to freshly manufactured TCA required a two-phased exemption process. First, NASA obtained the assistance and advocacy of the US EPA to approach the international Parties of the Montreal Protocol with a petition for an Essential Use Exemption. After obtaining approval for such an exemption from the Parties of the Protocol, NASA and the SSP were able to obtain approval from EPA to acquire and use TCA in SRM critical applications.

In 1998, the Parties of the Protocol approved the use of up to 176.4 metric tons of TCA in SRM manufacturing from 1999 "until such time as safe alternatives are implemented for remaining essential uses." Under the CAA, however, all uses of TCA other than medical dose inhalers were prohibited.

Thus, NASA currently may not purchase freshly manufactured TCA for use in SRM manufacturing, although the Essential Use Exemption is still considered valid internationally. This international Essential Use Exemption should be considered an environmental asset by NASA, even though it may not be used to procure TCA at this time.

Because NASA may not currently procure fresh TCA for emissive uses, such as SRM manufacturing, a stockpile of TCA was established for this application. EPA has agreed to allow CxP to use this TCA stockpile for SRM processing.

9.5.2 Exemption Allowance for SSP Applications of HCFC 141b

HCFC 141b is a Class II ODS that was banned from production in the US in 2003 under the CAA. It is a component of foams used on the ET, Orbiter, and RSRB (motor and booster).

EPA has granted NASA an Exemption Allowance for production and use of SSP applications of HCFC 141b. This exemption may only be used for the specific SSP applications listed in NASA's petitions.

The SSP must report HCFC 141b usage to EPA semiannually, on 31 January and 31 July each year. These usage reports are submitted as consolidated, SSP-wide usage, and are integrated at the program level by the SEA Team.

The SSP anticipates needing HCFC 141b foams throughout the life of the program. After the final SSP purchase of HCFC 141b-containing materials, the Lead for SEA should notify HQ EMD and the RRAC Lead. HQ EMD personnel will notify EPA that the SSP Exemption Allowances will no longer be needed.

The current NASA and SSP exemption requires that ongoing replacement efforts be made. The SSP conducted replacement work in Calendar Year (CY) 2007. Beginning in CY 2008 no replacement work was planned because of program retirement and the constraints on material qualification. NASA HQ, SSP, and CxP are coordinating to continue the NASA HCFC 141b replacement work under the CxP or other follow-on programs.

9.6 SHUTTLE ENVIRONMENTAL ASSURANCE INITIATIVE

The SEA is an intangible asset in the scheme of SSP capabilities. SEA is a multi-project and multi-program cross-functional team whose primary role is to support SSP mission execution through the life of the Shuttle by identifying materials that may become obsolete as a result of environmental, health, and safety regulations and to work as a team to mitigate these risks. SEA members work together to exchange information about pollution prevention and data regarding replacements for such materials as ODSs, Hazardous Air Pollutants (HAPs), and Volatile Organic Compounds (VOCs).

SEA represents critical skills and interfaces that should be transitioned as the SSP nears retirement to provide continuity and to act as a resource to other programs. This SSP asset comprises expertise, experience, and knowledge related to identifying and mitigating environmentally driven materials' obsolescence issues, and the relationships and interfaces SEA has developed both inside and outside of NASA. SSP developed a transition plan to transition this capability to support other programs without affecting its capacity to support the SSP in mission execution.

10.0 ENVIRONMENTAL CONSIDERATIONS RELATED TO PROPERTY DISPOSITION

10.1 SSP T&R PROPERTY DISPOSITION PROCESSES

This paragraph describes the general environmental considerations related to property disposal. Specific requirements are called out in various contracts, procurement regulations (48 CFR, Federal Acquisition Regulations System, Parts 45 and 52), NPR 4300.1A, NASA Personal Property Disposal Procedural Requirements; NPR 8800.15A, Real Estate Management Program Implementation Manual; and in General Services Administration (GSA) 41 CFR, Federal Property Management Regulations, Part 101. NSTS 60576 provides flowcharts to aid in the communication and implementation of these processes.

SSP tangible assets are defined as the hardware, software, land, and documentation under the management of the SSP. SSP tangible assets will be categorized into real property items and personal property items. Real property includes land, buildings, and other structures and their associated built-in systems. Personal property is comprised of hard assets not classified as real property, and includes parts, materials, agency-peculiar property, tooling, and other equipment.

Once the SSP T&R process results in a decision on disposition related to SSP real and personal property, the associated property will enter the processes for real and personal property disposition.

Tangible assets no longer required by the SSP will be disposed or transferred to CxP, the responsible center, or other NASA programs. If the asset is not needed by another NASA program, it will be transferred to the responsible center for maintenance or to be dispositioned using existing agency or federal excess property disposal processes. In either case, applicable environmental laws and regulations may apply, and their requirements should be included as part of all relevant board review packages and implementation plans and property documentation.

10.1.1 Pre-Screening and Risk Tools

The EMO at each center can help identify environmental risks associated with real and personal property. Center EMO offices and the EST can provide checklists and other guidance on pre-screening real property. Some of these checklists are contained in the regulations and requirements listed above.

Some large and complex assets, particularly real property and real property with associated assets that may be hazardous, may require a more detailed level of assessment to identify environmental risks to the SSP, the responsible center, CxP, and other programs.

This more detailed assessment may vary in the level of detail, from a more detailed checklist to an assessment here called an Environmental Baseline Liability Survey (EBLS). One approach to an EBLS is the American Society for Testing and Materials (ASTM), ASTM 1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

The detailed checklist or EBLS, if needed, will be developed as a coordinated effort between the elements/projects, the EST Management Lead, and the center EMO. The organization that will fund the detailed checklist or EBLS, when required, will be negotiated between the SSP, responsible center, CxP and other stakeholders.

SSP and the EST are in the process of developing tools to assist the program and the elements/projects in pre-screening property prior to disposition, and in identifying environmental risks and hazards associated with property. Appendix D provides information and guidance on special toxic and hazardous wastes including electronic waste, heavy metals, asbestos, hypergolics, and Chlorofluorocarbons (CFCs).

10.1.2 Decontamination and Safing

Decontamination and safing of property will often involve environmental concerns and activities. Center EMOs should be aware of and involved with decontamination processes. For routine decontamination and disposal of real and personal property located at NASA centers, the responsible center covers the associated costs. The actual decontamination and safing of the assets may be implemented by the responsible center, by center environmental or waste management contractors, or by the prime contractor. For large and complex dispositions, the costs to decontaminate and safe real and personal property may be negotiated between the SSP and the responsible center. For government-owned property at contractor sites, the SSP will negotiate responsibility per the environmental requirements in the contract. Historical artifacts with unusual or particularly hazardous components may require additional SSP funding and expertise to decontaminate, depending on the proposed end use of the artifact.

10.2 REAL PROPERTY

10.2.1 Government Real Property on NASA Centers

When the SSP is ready to dispose of real property, the property is reported to the responsible center's Real Property Accountable Officer (RPAO). The RPAO will determine if the property can be used by another NASA program, or may mothball, demolish, or release the property. If NASA wishes to convey the property to another federal, state, local, or private individual, the agency turns the property over to the US GSA. The GSA will convey the property according to federal laws and regulations.

SSP will provide information describing the property, including the date the property will be vacated and the operational history of the property, to assist in identifying potential environmental risks including, but not limited to, operations using or generating hazardous substances, equipment containing Polychlorinated Biphenyls (PCBs), asbestos-containing materials, lead paint, and UST systems, etc.

NEPA requirements apply to real property actions. The SSP NEPA documentation (NAS4 2008, Space Shuttle Programmatic Environmental Assessment, Transition and Program Property Disposition) addressed these requirements for the standard disposition processes. For major real property transfers related to SSP operations (for example, the SSFL), additional NEPA requirements will need to be addressed by the SSP risk owner or responsible center. The SSP elements/projects should contact the centers' EMOs to evaluate the need and level of NEPA documentation required. This can often be done with a minimum of required documentation. The SSP Programmatic EA covers the NEPA needs for most of the T&R actions that will be implemented, with the exception of those previously described.

NASA real property is evaluated for historical significance per the NHPA to determine eligibility for listing on the National Register of Historic Places (NRHP). If the evaluation recommends that the property meets the criteria for historical significance under the NHPA, it is submitted to the SHPO for comment and concurrence of historical significance. For those properties evaluated and accepted as eligible for listing on the NRHP, all actions involving the expenditure of federal funds including demolition or disposal are submitted for review and comment to the SHPO according to the procedures in the NHPA.

10.2.2 Government Real Property on Contractor Facilities

If the SSP wishes to dispose of government real property on contractor sites, it should contact the responsible center's RPO for disposal requirements. The RPO will coordinate any environmental requirements with the center EMO. The site owner and/or the responsible center's EMO should complete a property survey or checklist that reviews the operational history of the property to identify potential environmental issues including, but not limited to, operations using or generating hazardous substances, equipment containing PCBs, asbestos-containing materials, lead paint, and UST systems. The disposal process requirements are applicable to the contractors according to their contract provisions.

10.3 PERSONAL PROPERTY

10.3.1 Government Personal Property on NASA Centers

Once the SSP determines that it no longer requires an asset, the SSP elements/projects will screen the property for environmental risks such as hazardous materials and wastes and will provide that information to the center's PDO.

The SSP will supply usage history and any knowledge of any hazardous materials or waste associated with the property to the center's PDO as described above. This information will allow the center's PDO to prepare an information package addressing how to dispose of the property. It is important to include information about any hazardous materials associated with the property because this will affect disposal and transportation of the item. It also is important to note the presence of precious metals because it may be economically and/or environmentally beneficial for NASA to recover the precious metals.

The EMO at each center can help identify environmental risks associated with personal property. Center EMO offices and the EST can provide checklists and other guidance on pre-screening personal property.

NPR 4300.1A states that the PDO is responsible for interfacing with the center's Environmental and/or Health and Safety Offices in disposing of all identified hazardous materials and hazardous wastes, in accordance with existing EPA regulations and local laws.

The management of excess hazardous chemicals should be given special consideration. In particular, the federal regulations for the sale, abandonment, or destruction of excess hazardous materials, 41 CFR, Parts 101-42.403 through 101-42.406, should be considered. If excess hazardous chemicals are not properly managed, NASA may incur future "arranger" liability under CERCLA Section 107(A)(3). If it is determined that the excess chemicals can no longer be used for their intended purpose, and that their residual value is solely a function of the fact that they can be reprocessed to recover a valuable commodity, NASA could be considered liable for arranging for the disposal or treatment of hazardous waste. Under 41 CFR, Part 101-45.901, EMOs may dispose of excess hazardous chemicals as hazardous waste if they provide the PDO a written determination that the chemicals have no commercial value, or that the cost of managing the excess hazardous chemicals would exceed the estimated proceeds from their sale.

10.3.2 Government Personal Property on Contractor Facilities

The overall disposal process follows the one outlined in NSTS 60576. The disposal process can take various routes, depending on who is delegated the disposal responsibility. The disposal of government-owned property at contractor facilities should follow

the disposal and environmental requirements in the contracts, NASA regulations, and 48 CFR, Parts 45 and 52.

For most SSP contracts, disposal of government property on contractor facilities is delegated to the Defense Contract Management Agency (DCMA) Plant Clearance Officer (PCO). SSP personnel are responsible for supplying the PCO with information on hazardous materials or wastes, or other environmental issues associated with the property. SSP personnel also approve the recommendation to excess the property and make the property available to other NASA programs. If no NASA programs require the property, it enters the property disposal process.

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APPENDIX A

ACRONYMS AND ABBREVIATIONS

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APPENDIX A

ACRONYMS AND ABBREVIATIONS

AB	Air Base
AC	Alternating Current
ACM	Asbestos Containing Material
AFB	Air Force Base
ARC	Ames Research Center
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
ATK	Alliant TechSystems
CAA	Clean Air Act
CATEX	Categorical Exclusion
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESQG	Conditionally Exempt Small Quantity Generators
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CMO	Center Management Operations
CR	Change Request
CRT	Cathode Ray Tube
CWA	Clean Water Act
Cx	Constellation
CxP	Constellation Program
CY	Calendar Year
D/X	Direct Expansion
DCMA	Defense Contracts Management Agency
DDMS	Department of Defense Manned Space Flight Support
DFRC	Dryden Flight Research Center
DoD	Department of Defense
DOE	Department of Energy
DTSC	Department of Toxic Substances Control
EA	Environmental Assessment
EBLS	Environmental Baseline Liability Survey
ECR	Environmental Compliance and Restoration
EIS	Environmental Impact Statement

EMD	Environmental Management Division
EMO	Environmental Management Office
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
EPACT	Energy Policy Act
EPCRA	Emergency Planning and Community Right to Know
EPEAT	Electronic Product Environmental Assessment Tool
ESMD	Exploration Systems Missions Directorate
EST	Environmental Support Team
ET	External Tank
EVA	Extravehicular Activity
FY	Fiscal Year
GRC	Glenn Research Center
GSA	General Services Administration
GO/CO	Government-Owned/Contractor Operated
HAP	Hazardous Air Pollutant
HCFC	Hydrochlorofluorocarbon
HPWG	Historical Preservation Working Group
HQ	Headquarters
HSWA	Hazardous and Solid Waste Amendments
HVAC	Heating, Ventilating, and Air Conditioning
in	inch(es)
IPO	Industrial Property Officer
ISS	International Space Station
ISSP	International Space Station Program
IWTF	Industrial Wastewater Treatment Facility
kg	Kilogram
LaRC	Langley Research Center
LH2	Liquid Hydrogen
LQG	Large Quantity Generator
MAF	Michoud Assembly Facility
mg/kg	milligrams per kilograms

mg/L	milligrams per Liter
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
NECPA	National Energy Conservation Policy Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPR	NASA Procedural Requirements
NPD	NASA Policy Directive
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSTS	National Space Transportation System
NRC	Nuclear Regulatory Commission
ODS	Ozone Depleting Substance
OMS	Orbital Maneuvering System
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PCB	Polychlorinated Biphenyl
PCO	Plant Clearance Officer
PDO	Property Disposal Office
PIH	Plug-in Hybrid
PPBE	Program Planning Budget and Execution
ppm	parts per million
PRCB	Program Requirements Control Board
PRCBD	Program Requirements Control Board Directive
RCRA	Resource Conservation and Recovery Act
RCS	Reaction Control System
RPAO	Real Property Accountable Officer
RPO	Real Property Officer
RRAC	Regulatory Risk Assessment and Communication
RSRB	Reusable Solid Rocket Booster
SEA	Shuttle Environmental Assurance
SEMO	Supply and Equipment Management Officer
SHPO	State Historical Preservation Office
	State Historical Preservation Officer
SID	State Indirect Discharge

SIRMA	Shuttle Integrated Risk Management Application
SMRT	Shuttle Management Resource Transition
SOMD	Space Operations Mission Directorate
SQG	Small Quantity Generator
SRB	Solid Rocket Booster
SRM	Solid Rocket Motor
SSC	Stennis Space Center
SSFL	Santa Susana Field Laboratory
SSME	Space Shuttle Main Engine
SSP	Space Shuttle Program
SWMU	Solid Waste Management Unit
T&R	Transition and Retirement
TAL	Transoceanic Abort Landing
TCA	1,1,1-trichloroethane (methyl chloroform)
TCB	Transition Control Board
TCLP	Toxicity Characteristics Leaching Procedure
TEERM	Technology Evaluation and Environmental Risk Mitigation
TIWG	Transition Integration Working Group
TMP	Transition Management Plan
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
US	United States
USA	United Space Alliance
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WSTF	White Sands Test Facility

APPENDIX B
GLOSSARY OF DEFINITIONS

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APPENDIX B

GLOSSARY OF DEFINITIONS

Asset - Property (real or personal) and human capital with positive value.

Capability - In the context of SSP Transition, a capability is the combination of human capital, tangible assets, and intangible assets that, when combined, provide the potential to produce information, goods or services.

Center - NASA field installation that holds responsibility for SSP property or personnel during their disposition.

Contamination - The introduction of microorganisms, chemicals, toxic substances, wastes, or wastewater into water, air, and/or soil in a concentration that makes the medium hazardous, or constrains its future use.

Contractor-Owned/Contractor-Operated Facility - Facility that provides goods and/or services to a federal agency under contract, that is owned by the contractor.

Decommissioning - The process of removing from service; disassembling or deconstructing a vehicle or associated equipment.

Decontamination - Removal of radioactive, toxic, or hazardous contamination by a chemical, mechanical process, or biological process.

Demil - Removal of explosives/reactive materials/waste to render in a safe condition.

Environmental Assessment - An NEPA evaluation of the potential environmental impacts due to a federal action resulting in a Finding of No Significant Impact or an EIS.

Environmental Baseline Liability Survey - A survey of a real property asset to document site environmental conditions and risks.

Environmental Remediation - Clean up or mitigation of contamination in water, soil, ground water, sediment, etc.

Environmental Summary - Documentation of existing environmental conditions; including permits, remediation, and agreements, etc.; at NASA centers and facilities.

GO/CO Facility - Facility owned by a federal agency, but operated in whole or in part by private contractor(s).

Government-owned/Government-operated Facility - Facility at which the government owns and operates all regulated activity.

Liability - A legal obligation or requirement.

Permit - A legal and binding agreement issued by an environmental authority (usually a State Environmental Enforcement Department) needed for activities that will or may cause environmental pollution or degradation.

Personal Property - Personal property is comprised of hard assets not classified as real property; this includes parts, materials, agency-peculiar property, tooling, and other equipment.

Property Disposal - Orderly elimination of assets according to the established government excess property process.

Real Property - Land, rights for the land, ground improvements, utility distribution systems, buildings, and other structures. Real property does not include foundations and other work necessary for installing special tooling, special test equipment or plant equipment.

Regulation - A rule or order issued by an executive authority or regulatory agency of a government and having the force of law.

Remediation - Activity whose purpose is the restoration of a degraded environment to prior conditions or to negotiated levels.

Restoration - Measures taken to achieve the previous state of a natural environment.

Risk - The combination of 1) the probability (qualitative or quantitative) that a program or project will experience an undesired event such as cost overrun, schedule slippage, safety mishap, compromise of security, or failure to achieve a needed technological breakthrough; and 2) the consequences, impact, or severity of the undesired event were it to occur.

Risk Management - An organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risk to increase the likelihood of achieving program/project goals.

Safing - A process that is implemented in which the primary purpose is to prevent an unintended functioning of an explosive charge or release of a hazardous substance.

Tangible Asset - The hardware, software, land, and documentation under the management of the SSP.

APPENDIX C
REGULATIONS OVERVIEW

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APPENDIX C
REGULATIONS OVERVIEW

1.0 INTRODUCTION

T&R activities must comply with the applicable laws, regulations, policies, and guidelines. These requirements are summarized in the following subparagraphs. Throughout the agency, compliance is managed according to a standard EMS framework. As part of each center’s EMS, environmental aspects and impacts have been identified for activities conducted onsite, including SSP-related activities. This SSP-related EMS information will assist the centers’ EMO personnel in addressing evolving SSP T&R environmental activities.

Environmental regulations change, and the center EMOs and their support contractors review new and updated environmental regulations to ensure that all work on NASA facilities is done in accordance with current regulations.

2.0 NASA-SPECIFIC PROCEDURES AND REQUIREMENTS

Environmentally related agency guidelines and other requirements are summarized in Table C.1 and discussed further in the following subparagraphs.

TABLE C.1
NASA-SPECIFIC ENVIRONMENTAL GUIDELINES AND REQUIREMENTS

Designation	Title
NPD 8500.1	NASA Environmental Management
NPR 8530.1	Affirmative Procurement Program and Plan for Environmentally Preferable Products
NPR 8553.1	NASA Environmental Management System (EMS)
NPR 8570.1	Energy Efficiency and Water Conservation
NPR 8580.1	Implementing the National Environmental Policy Act and Executive Order 12114

2.1 NPD 8500.1

NPD 8500.1A outlines the following NASA policies regarding environmental management:

- a. Enabling the success of agency missions, services, and activities, as defined in the NASA Strategic Plan, by focusing on four areas: prevention, compliance, restoration, and conservation.
- b. Complying with all applicable requirements of federal law, regulations, and Executive Orders (EOs); NASA's self-established requirements and agreements with other agencies, industries, and/or organizations; and with state, local, or territorial environmental laws and regulations properly applicable to federal entities.
- c. Considering environmental factors throughout the life cycle of a program, including planning, development, execution, and disposition activities.
- d. Including in the life cycle analysis of costs the potential environmental impacts of programmatic activities and their supporting institutional processes.
- e. Fostering and actively supporting environmentally related technology transfer.
- f. Actively partnering with federal, state, and local regulatory agencies, as appropriate, to leverage available resources and comply with environmental requirements, to prevent pollution, to reduce waste generation, and to manage natural resources in the most efficient and effective manner possible.
- g. Promoting continual improvement in carrying out the agency's environmental management responsibilities.

This policy applies to NASA HQ and centers, including Component Facilities, and to the Jet Propulsion Laboratory to the extent specified in its contract.

2.2 NPR 8530.1

This NASA Procedural Requirement (NPR) establishes NASA standard procedures for procuring US EPA-designated and other environmentally preferable goods and services to the maximum extent practicable. To achieve this purpose, the NPR outlines the following requirements:

- a. Purchase environmentally preferable products and services to the maximum extent practicable.

- b. Publicize and promote NASA's use of environmentally preferable goods and services through convenient and cost-effective methods, such as internet web sites and other types of electronic distribution.
- c. Review and revise, as necessary, NASA specifications and standards to eliminate barriers to the preference for recovered materials.

This NPR applies to NASA HQ, NASA centers, and NASA Component Facilities, and to contractors to the extent specified in their contracts. Individual centers and Component Facilities are encouraged to develop additional requirements for environmentally preferable products and services, as appropriate, in support of their pollution prevention and conservation programs.

2.3 NPR 8553.1

Throughout the agency, compliance is managed according to a standard EMS framework. As part of each center's EMS, environmental aspects and impacts have been identified for activities conducted on-site, including SSP-related activities.

NPR 8553.1 serves as guidance for implementing the EMS at NASA centers and Component Facilities. The purpose of the agency EMS is to have a single overall agency approach to managing environmental activities that allows for efficient, prioritized program execution. This NPR provides overall direction for NASA EMS documentation, HQ-level documentation, and center-level documentation. Applicable NASA-wide documentation, NASA Policy Directives (NPDs), and NPRs comprise the minimum EMS performance criteria. Center EMS implementation activities may add content to reflect center-specific needs.

2.4 NPR 8570.1

NPR 8570.1 provides guidance to NASA HQ, centers, and Component Facilities, Strategic Enterprises, and Institutional Program Offices in implementing the requirements of federal law, EOs, and NASA policy related to evaluating and implementing cost-effective energy efficiency, renewable energy, and water conservation measures in NASA facilities and operations. This NPR addresses potential actions to ensure compliance with NASA's Strategic Plan, NASA's Strategy for Environmental Excellence in the Twenty-First Century, and NPD 8500.1A and consistent with the requirements of the National Energy Conservation Policy Act (NECPA), as amended by the Energy Policy Act of 1992 (EPACT).

2.5 NPR 8580.1

NPR 8580.1 establishes standard procedures for implementing the NEPA and NASA's overall environmental planning process, including responsibilities, procedures, and

guidelines for carrying out the requirements of NEPA, its implementing regulations, and EO 12114. The requirements of NEPA, its implementing regulations, and, if applicable, EO 12114, must be satisfied before an action can be taken that either would have an adverse environmental impact or would limit the choice of reasonable alternatives. This NPR is applicable to NASA HQ and centers, including Component Facilities.

3.0 EXECUTIVE ORDERS

Environmentally related EOs are summarized in Table C.2 and discussed further in the following subparagraphs.

**TABLE C.2
EXECUTIVE ORDERS**

EO Number	EO Title
13327	Federal Real Property Asset Management
13287	Preserve America
13221	Energy Efficient Standby Power Devices
13212	Actions to Expedite Energy-Related Projects
13423	Strengthening Federal Environmental, Energy, and Transportation Management
12898	Federal Actions to Address Environmental Justice In Minority Populations and Low-Income Populations
12114	Environmental Effects Abroad of Major Federal Actions

3.1 EO 13327

EO 13327 includes requirements to promote the efficient and economical use of America’s real property assets and to ensure management accountability for implementing federal real property management reforms. Under this EO, executive branch departments and agencies must designate a Senior RPO who will be responsible for developing and implementing an agency asset management planning process that meets the form, content, and other requirements outlined in EO 13327.

3.2 EO 13287

Federal agencies must seek partnerships with state and local governments, Indian tribes, and the private sector to promote local economic development through the use of historic properties, in a manner that contributes to the long-term preservation of those properties. Each agency also must examine its policies to ensure that its actions

encourage, support, and foster public-private initiatives and investment in the use, reuse, and rehabilitation of historic properties.

3.3 EO 13221

EO 13221 requires federal agencies to purchase energy-efficient products that use no more than 1 watt in standby power-consuming mode. The US DOE, US DoD, and the GSA issue a list of acceptable products that meet this requirement.

3.4 EO 13212

EO 13212 authorizes agencies to expedite projects that will increase the production, transmission, or conservation of energy. It also states that agencies must expedite the review of permits or take other actions necessary to accelerate the completion of energy-related projects.

3.5 EO 13423

The President issued this EO which supersedes five prior EOs (13101, 13123, 13134, 13148, and 13149) into a more cohesive approach to environmental and energy management. The EO requires federal agencies to implement sustainable practices by:

- a. Improving energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by:
 1. Three percent annually through the end of Fiscal Year (FY) 2015, or
 2. Thirty percent by the end of FY 2015, relative to the baseline of the agency's energy use in FY 2003
- b. Ensuring that at least half of the required renewable energy consumed by the agency in a FY comes from new renewable sources, and to the extent feasible, the agency implements renewable energy generation projects on agency property for their own use.
- c. Reducing water consumption beginning in FY 2008 by 2 percent annually through FY 2015 or 16 percent through FY 2015, relative to the baseline of the agency's water consumption in FY 2007, through life cycle cost-effective measures.
- d. Requiring agency acquisitions of goods and services to use sustainable environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products, and the use of paper that is at least 30 percent post-consumer fiber content.

- e. Reducing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the agency, increasing diversion of solid waste as appropriate, and maintaining cost-effective waste prevention and recycling programs in its facilities.
- f. Complying with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (2006) for new construction and major renovation of agency buildings, and 15 percent of the existing federal capital asset building inventory of the agency must incorporate the sustainable practices in the Guiding Principles by the end of FY 2015.
- g. Ensuring that, if the agency operates a fleet of at least 20 motor vehicles, the agency, relative to agency baselines for FY 2005:
 - 1. Reduces the fleet's total consumption of petroleum products by 2 percent annually through the end of FY 2015
 - 2. Increases the total fuel consumption that is non-petroleum-based by 10 percent annually
 - 3. Uses Plug-in Hybrid (PIH) vehicles when PIH vehicles are commercially available at a cost reasonably comparable, on the basis of life cycle cost, to non-PIH vehicles
- h. When acquiring an electronic product to meet its requirements, meeting at least 95 percent of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is no EPEAT standard for such product, enabling the Energy Star feature on agency computers and monitors, establishing and implementing policies to extend the useful life of agency electronic equipment, and using environmentally sound practices with respect to disposition of agency electronic equipment that has reached the end of its useful life.

3.6 EO 12898

EO 12898 requires federal agencies to document potential environmental impacts in environmental justice areas, including those with disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations and to target such impacts for reduction through P2.

3.7 EO 12114

EO 12114 requires federal agencies to consider the significant effects of their actions on the environment outside the US. The EO also specifically requires that the decision-

makers of the federal agencies be informed of pertinent environmental considerations and factor such considerations into their decisions. However, the decision-makers must still take into account considerations, such as foreign policy, national security, and other relevant special circumstances.

4.0 FEDERAL LAWS AND ASSOCIATED REGULATIONS

Numerous federal environmental laws and regulations apply to the SSP. These regulations and their applicability to the SSP T&R are summarized in Table C.3 and outlined in the following subparagraphs.

TABLE C.3
MAJOR ENVIRONMENTAL FEDERAL LAWS AND ASSOCIATED REGULATIONS

Law	SSP Applicability
14 CFR, Chapter V, National Aeronautics and Space Administration	NASA actions that effect environmental quality
NEPA	Consideration of environment for actions of the federal government
NHPA	Consideration of preservation of historical or cultural artifacts
CERCLA	Contamination of real property
RCRA	Contamination of real property Handling requirements for hazardous waste
CAA	Modification to permits due to elimination of source
40 CFR 130, Water Quality Planning and Management (Clean Water Act [CWA])	Modification to permits due to elimination of source
40 CFR 700, Toxic Substances Control Act (TSCA)	Handling requirements for hazardous materials

4.1 14 CFR, CHAPTER V

14 CFR, Chapter V, applies to NASA actions that affect environmental quality, floodplains and wetlands, and NEPA. These regulations can be more stringent than the related federal regulations or EOs, and their requirements should be considered in environmental planning.

4.2 NATIONAL ENVIRONMENTAL POLICY ACT

NEPA requires federal agencies to integrate environmental considerations into their decision-making processes. NEPA requires agencies to assess the environmental impacts of their proposed actions and reasonable alternatives to those actions. This assessment is accomplished by preparing NEPA documentation based on the anticipated level of impact to the environment. The three levels of NEPA documentation that often correspond with increasing impacts to the environment are Categorical Exclusions (CATEXs), EAs, and EISs.

4.3 NATIONAL HISTORIC PRESERVATION ACT

The NHPA requires all federal facilities to consider historical preservation in any action they undertake. Historical considerations will be incorporated into the SSP Programmatic EA. KSC personnel are developing historic survey criteria to evaluate NASA assets for historical significance related to SSP. After NASA review, the criteria will be coordinated with the Advisory Council on Historic Preservation, the National Parks Service, and the SHPOs of the states where SSP activities take place. The criteria will be used to perform historical surveys at NASA centers to evaluate SSP-related assets for listing eligibility.

4.4 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

The CERCLA, also known as Superfund, provides broad federal authority to respond to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites and provided for liability of those responsible for releases of hazardous waste at these sites. CERCLA also established a trust fund to finance the environmental remediation of sites for which no responsible party could be identified. NASA will coordinate remediation activities at each center with EPA and state regulatory agencies.

4.5 RESOURCE CONSERVATION AND RECOVER ACT

The RCRA gave EPA the authority to require facilities to control hazardous waste from “cradle to grave.” This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of nonhazardous wastes for Small Quantity Generators (SQGs) and Large Quantity Generators (LQGs). SQGs generate between 100 kilograms (kg) and 1,000 kg of hazardous waste per month. Conditionally Exempt Small Quantity Generators (CESQGs) generate less than 100 kg of hazardous waste per month. LQGs generate more than 1,000 kg of hazardous waste per month. RCRA also addresses the cleanup of the

release of hazardous substances at active sites. NASA must ensure that all hazardous waste disposal activities at NASA centers comply with RCRA. New hazardous waste streams must be characterized and approved by the state before disposal. NASA will coordinate cleanup activities at each center with EPA and state regulatory agencies, as appropriate.

4.6 CLEAN AIR ACT

The CAA requires that the US EPA set national health-based air quality standards to protect against common pollutants, including ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and particulate matter. Title V of the CAA requires major sources of criteria pollutants or HAPs to hold operating permits. These permits are legally enforceable documents that state permitting authorities issue to air pollution sources after the source has begun to operate. Even though state agencies issue Title V permits, the permits are federally enforceable. Any construction, demolition, or modifications of air emission sources must be coordinated through the state. Many states require the submittal of forms for these activities. NASA currently is regulated by Title V permits at Michoud Assembly Facility (MAF), MSFC, and KSC.

4.7 CLEAN WATER ACT

The CWA is a 1977 amendment to the Federal Water Pollution Control Act of 1972. The CWA provides a comprehensive framework of standards, technical tools and financial assistance to address the many causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. The CWA gave EPA the authority to set discharge standards on a technology-based or industry basis, in addition to setting water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit is obtained. The CWA's primary mechanism for imposing limitations on pollutant discharges is a national permit program established under Section 407 and referred to as the NPDES. NPDES permits are issued to regulate the discharge of pollutants to bodies of water and include limits and monitoring requirements for outfalls. Modifications to the discharge of wastewater as permitted in a Center's NPDES permit(s) must be coordinated with the state regulatory agencies.

4.8 TOXIC SUBSTANCE CONTROL ACT

Title I of the TSCA regulates the production and distribution of commercial and industrial chemicals in the US and ensures that the chemicals do not pose any adverse risks to human health or the environment. In addition, Subchapter I bans the production and distribution of PCBs and regulates the proper disposal and management of any

remaining PCBs. Title II of the law regulates asbestos to include requiring inspections for asbestos-containing materials, establishing an accrediting program for persons involved in asbestos identification and abatement, and implementing response actions for the cleanup and removal of asbestos. Title III of TSCA regulates radon and sets a national goal for radon levels in buildings so that air in the buildings should be as free of radon as the ambient air outside the buildings. Implementing radon programs, training, and public awareness also are included in the regulations. TSCA supplements other federal statutes, including the CAA and the Toxic Release Inventory (TRI) under Emergency Planning and Community Right to Know (EPCRA). PCBs and Asbestos Containing Materials (ACMs) are removed at centers either pro-actively or when required due to facility projects that disturb electrical devices and/or paint containing PCBs and/or ACMs.

5.0 STATE AND LOCAL LAWS AND REQUIREMENTS

Although federal requirements typically provide a baseline reference for environmental compliance, state and local laws and regulations can be more stringent than their federal counterparts. Additionally, in many cases, enforcement of federal requirements is delegated to the state or local environmental agencies. These agencies typically are responsible for permit modifications and participate in the environmental decision-making processes, including those related to restoration and remediation activities.

6.0 INTERNATIONAL LAWS AND REQUIREMENTS

Various international agreements apply to operations located in the US. These agreements, such as the Montreal Protocol on Substances that Deplete the Ozone Layer typically are implemented and enforced through existing federal lawmaking and rule-making processes.

7.0 ENVIRONMENTAL REGULATORY AND STATUTORY RECORDKEEPING REQUIREMENTS

Environmental documents and records currently are maintained at each NASA center in accordance with federal, state, and local regulations, and with NPR 1441.1, NASA Records Retention Schedules. It is important to verify these retention times for each NASA center with the appropriate state agency because the states may impose more stringent requirements. Each of the NASA centers also adheres to a document control procedure in conjunction with its EMS to effectively manage the center's environmental program and to comply with regulatory requirements.

APPENDIX D
SPECIAL WASTES

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APPENDIX D

SPECIAL WASTES

1.0 INTRODUCTION

This appendix addresses some special waste streams that are likely to be encountered during SSP T&R activities. The purpose of the appendix is to provide an awareness of the SSP T&R activities that will include the need to dispose of toxic or hazardous waste. The types of waste that will most likely be generated as part of the SSP T&R activities include:

- a. Electronic wastes
- b. Hypergolics
- c. Hexavalent Chromium
- d. Lead
- e. Asbestos
- f. Precious metals
- g. Explosives
- h. CFCs
- i. Compressed gasses
- j. Medical wastes
- k. PCBs
- l. Beryllium

The list is not all inclusive of the types of waste that may be encountered during SSP T&R activities. In all cases of asset disposition, property personnel, as well as the center's EMO should be contacted to assess the asset that requires disposal for potential wastes that may be present. In cases where waste disposal is required, the applicable federal, state, and local laws must be followed to avoid penalties.

A hazardous waste is a waste that meets any of the many criteria of a characteristic or listed hazardous waste. A characteristic hazardous waste is one that is flammable, explosive, corrosive, or toxic. There are specific regulatory definitions for these characteristics. In addition to characteristics, a waste can also be a listed hazardous waste.

There are many listed hazardous wastes in the regulations, and these are wastes that are generated from particular processes. The processes are described in the regulations. A hazardous waste has to be managed and disposed in accordance with the rules for all of the listings or characteristics that apply to that waste.

If these waste streams are encountered, care should be taken to ensure that they are properly characterized, documented, and disposed. The information provided in this appendix includes specifics about waste characterization and disposal; this information is provided on the basis of current federal regulations. Other aspects, such as safety and transportation, are not included and should be identified if the waste is encountered. State regulations should also be reviewed for applicability if the waste is encountered.

2.0 ELECTRONIC WASTE

Cathode Ray Tubes (CRTs) are most commonly found in computer monitors and televisions and the management of these discarded items is a growing concern. Fast-paced changes in technology and consumer interest in buying new electronic products will result in increased disposal of older items.

Electronic equipment (e.g., computers, televisions, communication equipment, test equipment) can contain a variety of toxic metals, such as lead, cadmium, and mercury, which can be harmful to the environment if not properly disposed. Research conducted on CRTs at the University of Florida shows the tendency of lead to leach when samples are subjected to the Toxicity Characteristic Leaching Procedure (TCLP). Electronic waste will be encountered at most, if not all, NASA centers. The major sources of electronic waste expected to be encountered are in flight simulators, control rooms, and laboratories. Examples of areas that will have electronic wastes are the simulators and control rooms at JSC and the launch control room at KSC.

Currently, in most states, electronic equipment (including CRTs) generated by business and/or industry is a solid waste and is subject to a hazardous waste determination. While it is up to each center's waste contractor to make this determination, it is likely that a CRT contains enough lead to cause a television or computer monitor to fail the TCLP, making it a hazardous waste when disposed. NASA should investigate alternative disposal options rather than land disposal.

One way to decrease the amount of electronic equipment making its way into the nation's landfills is to reduce the turnover of electronic equipment by choosing products that are more durable and keep those products as long as they remain useful and functional. Another option is reuse. Once you decide to discard your electronic equipment, keep in mind that many products (in whole or in part) can be reused by someone else. A third alternative, which some companies now offer, is recycling of various electronic products.

In California, hazardous E-waste can be managed under California's universal waste rules, which provide a less restrictive set of management standards for specified hazardous wastes that are more common and pose a lower risk to health and the environment than other hazardous wastes. Separate management standards have been established for California-generated CRT materials and for other E-wastes that do not include a CRT.

3.0 HYPERGOLICS

Hypergolics are used as propellants primarily on the Orbiter and the aft skirt of the Solid Rocket Boosters (SRBs). There are test complexes at various centers used for propulsion testing using hypergols along with routine maintenance of the Orbiter Orbital Maneuvering System/Reaction Control System pods and SRBs. For example, hypergol testing has been conducted at JSC, MSFC, and WSTF and possibly other centers. The primary use of hypergols associated with Orbiter and SRB operations is conducted at KSC.

Waste hydrazine and nitrogen tetroxide should be evaluated prior to disposal. Hydrazine as an unused commercial product is a hazardous waste and would carry the U133 waste code. Waste nitrogen tetroxide would not carry a U waste code. If the hypergolics are part of a mixture, there may be other codes that would also be applicable. Hazardous waste regulations for managing, transporting, and disposing of U133 waste must be complied with.

Center waste contractors may already have a profile for this waste stream; in this case, the waste contractor can provide direction on how to handle and manage the waste stream in accordance with local regulations and NASA policies. If a center waste contractor does not have a profile for this waste stream, samples of the waste would be needed to evaluate it prior to assigning waste codes to it.

4.0 HEXAVALENT CHROMIUM

Chromium is often used as a component of conversion coatings and primers applied to manufacturing equipment and Shuttle parts as a corrosion inhibitor. NASA strips off this coating before recycling or disposing of the metal. The coating is removed using a sand bead blasting. Prior to disposing of assets used in support of the SSP program, equipment coatings should be evaluated for the presence of coatings that contain chromium. Most, if not all, of the NASA centers will have equipment or space parts that have coatings containing hexavalent chromium. Hexavalent chromium is itself not a RCRA hazardous waste, but may be regulated as a hazardous waste in some states. However, the amount of chromium in the waste stream would need to be evaluated. Center waste contractors may already have a profile for this waste stream; in this case, the waste contractor can provide direction on how to handle and manage the waste stream in accordance with local regulations and NASA policies.

If a center's waste contractor does not have a profile for this waste stream, samples of the waste will be needed to evaluate the amount of leachable chromium in the waste. In addition, there may be lead in the waste stream if glass beads are used. If the sample shows that there are concentrations of leachable chromium (5 milligram per liter [mg/L]) or lead (5 mg/L), then the waste is a hazardous waste. Other beads that are not plastic or sand might also contribute toward the waste stream being a hazardous waste. Hazardous waste regulations for managing, transporting, and disposing of the waste must be complied with.

Some states also regulate chromium as hazardous waste at concentrations that differ from those regulated under RCRA. California, for example, regulates hexavalent chromium as hazardous waste if it occurs at a concentration equal to or exceeding 5.0 mg/L (soluble threshold limit concentration, measured using the California Waste Extraction Test) or 500 mg/kg (total threshold limit concentration). Total chromium is regulated as a hazardous waste if it occurs at a concentration equal to or exceeding 5.0 mg/L (soluble threshold limit concentration, measured using the California Waste Extraction Test) or 2,500 mg/kg (total threshold limit concentration). If the material is not a RCRA hazardous waste the soluble threshold limit concentration is raised to 560 mg/L. Elemental metals are only regulated as hazardous waste in California if they are in a friable, powdered, or finely divided state.

5.0 LEAD

Lead is a highly toxic metal that was used for many years in products found in and around our homes. Lead may cause a range of health effects, from behavioral problems and learning disabilities, to seizures and death. Children six years old and under are most at risk, because their bodies are growing quickly. Lead is found primarily in paints and solder. Prior to disposing of assets that have been painted or contain solder, such as buildings and manufacturing equipment etc., the paint coatings and solders should be evaluated to make sure they do not contain lead. Most, if not all, of the NASA centers will have buildings, equipment, or parts that contain lead. Lead-based paint can be a hazardous waste and can pose a health issue that should be referred to the Facilities and Occupational Health and Environmental Office for guidance.

Lead-based paint may be found in the former Shuttle buildings. Lead in leachable concentrations that exceed 5 mg/L is considered a hazardous waste and would carry the D008 waste code. It is likely that this waste would be hazardous. Hazardous waste regulations for managing, transporting, and disposing of D008 waste must be complied with.

Solder used in Shuttle processing may also contain high concentrations of lead and other metals. Lead in leachable concentrations that exceeds 5 mg/L is considered a hazardous waste and would carry the D008 waste code. It is likely that this waste

would be hazardous. Some states also regulate lead as hazardous waste at concentrations that differ from those regulated under RCRA. California, for example, regulates lead-containing material as hazardous waste if lead occurs at a concentration equal to or exceeding 5.0 mg/L (soluble threshold limit concentration, measured using the California Waste Extraction Test) or 1,000 mg/kg (total threshold limit concentration). Elemental metals are only regulated as hazardous waste in California if they are in a friable, powdered, or finely divided state.

Hazardous waste regulations for managing, transporting, and disposing of D008 waste must be complied with.

NASA's waste contractor may already have a profile for these waste streams; in this case, the waste contractor can provide direction on how to handle and manage these waste streams in accordance with local regulations and NASA policies. If a center's waste contractor does not have a profile for these waste streams, samples of the waste would be needed to evaluate it prior to assigning waste codes to it.

6.0 ASBESTOS

Asbestos is found in many building materials in older buildings. In addition, there may be asbestos present at the centers in manufacturing or laboratory settings that involve heat treating metals or other materials. Also, pipelines and Heating, Ventilation, and Air Conditioning (HVAC) ducts have been found to be constructed from asbestos beginning in the 1940's. Most, if not all, of the NASA centers will have buildings or manufacturing processes that contain asbestos in one form or another. The only way to know if materials contain asbestos is to sample them. The NASA facility may have on file an asbestos plan that should identify the asbestos-containing material at the center. Asbestos has been found in roof tiles, sheetrock, floor tiles, and insulation. Asbestos can pose a health issue that should be referred to the Facilities and Occupational Health and Environmental office for guidance.

Asbestos is a TSCA waste, and should only be removed and handled by personnel who have been trained and certified to conduct this work. The material has to be wetted and double bagged (at a minimum) prior to disposal in a sanitary landfill that is permitted to accept the waste. Notifications to state agencies must also be made prior to starting the removal. This waste must be transported in covered vehicles and have a manifest for its disposal.

Asbestos removal is also regulated by the CAA, Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health. An estimated 1.3 million employees in construction and general industry face significant asbestos exposure on the job. Heaviest exposures occur in the construction industry, particularly during the removal of asbestos during renovation or demolition. Asbestos is

well recognized as a health hazard and is highly regulated. OSHA and EPA asbestos rules are intertwined.

Some states also regulate asbestos as a hazardous waste. California, for example, regulates asbestos-containing material as hazardous waste if it contains friable asbestos at a concentration equal to or greater than one percent.

7.0 PRECIOUS METALS

In most states, precious metals can be recycled without being considered hazardous wastes. A few states, such as California, have additional regulatory requirements for recycling activities. This includes recyclable materials that are reclaimed to recover economically significant amounts of gold, silver, platinum, palladium, iridium, osmium, rhodium, ruthenium, or any combination of these. These types of metals are used in spacecraft and simulators for the ability to resist corrosion, ability to inhibit the passing radiation, or electrical properties. It is anticipated that these metals will be found in plating shop operations and long duration flight testing operations conducted for the test articles at MSFC. These metals are also present in Orbiters and simulators at KSC and JSC, respectively. However, if there is not a regulation that allows this recycling, then the metals might be considered hazardous waste (depending on the composition and leachable metals concentrations).

Center waste contractors may already have a profile for this waste stream; in this case, the waste contractor can provide direction on how to handle and manage the waste stream in accordance with local regulations and NASA policies. If NASA's waste contractor does not have a profile for this waste stream, the contractor should be contacted for information about how to collect, manage, and transport this waste stream.

8.0 EXPLOSIVES

The SSP has many uses for explosives on the Shuttle Stack. Approximately 100 explosive devices are used for each flight. There are 35 explosive devices that are used in the event of an emergency. The explosives associated with the Shuttle Stack are handled at KSC. In addition, pyrotechnic testing conducted at NASA centers includes age testing of the charges and space flight certification testing. Explosives are hazardous waste and carry the D003 waste code. Hazardous waste regulations for managing, transporting, and disposing of D003 waste must be complied with.

Explosive wastes must be managed so that the material does not explode, violently react, or release gases. The Material Safety Data Sheet (MSDS) for the material (or a similar material) should be used to identify the steps necessary to manage this waste stream. General management standards for explosives would be to eliminate ignition sources, use grounded equipment, and keep combustible materials away.

Explosive waste must be certified as safe to transport prior to offsite shipment. Certain munitions-type explosive wastes may be detonated at permitted Open Detonation/Open Burning facilities.

Center waste contractors may already have a profile for this waste stream; in this case, the waste contractor can provide direction on how to handle and manage the waste stream in accordance with local regulations and NASA policies. If a center's waste contractor does not have a profile for this waste stream, samples of the waste would be needed to evaluate it prior to assigning waste codes to it.

9.0 CHLOROFLUOROCARBONS

CFCs are primarily used as refrigerants. NASA also uses, for example, CFCs in pressure chambers at JSC and blowing agents for various manufacturing processes at the MAF. The CFCs are a group of aliphatic organic compounds containing the elements carbon and fluorine, and, in many cases, other halogens (especially chlorine) and hydrogen.

The use and recycling of CFC is regulated by the CAA. Persons working with Freon or working on equipment that contains CFCs must be trained and certified to do this work. CFCs cannot be vented to the atmosphere. It has a value and cannot be disposed of. Coordinate the recycling of Freon with the center's waste contractor. Other centers should accept this material for use. Centers may be required to remove refrigerants from chillers, Direct Expansion (D/X) HVAC units, and other refrigerant systems associated with buildings and process systems that will be mothballed or abandoned during SSP Transition.

NASA maintains a Halon Bank at KSC. Halon 1301, CFC 21, and CFC 113 currently are maintained at KSC for remaining agency-wide needs. NASA centers that have excess ODSs should coordinate with the KSC Halon Bank.

HCFC 141b is a Class II ODS that was banned from production in the US in 2003 under the CAA. It is a component of foams used on the ET, Orbiter, and RSRB (motor and booster). EPA has granted NASA an Exemption Allowance for production and use of SSP applications of HCFC 141b. This exemption may only be used for the specific SSP applications listed in NASA's petitions. HCFC 141b bought under this essential use exemption may not be recycled or sold, and excess material must be destroyed. Class II ODS materials must either be transformed in processing or destroyed by an approved destruction method (40 CFR 82, Protection of Stratospheric Ozone). Verification of destruction should be received by the purchaser to assure all materials have been expended.

10.0 COMPRESSED GASES

NASA uses compressed gases that may be inert, toxic, or hazardous. Compressed gases used at NASA centers include air, helium, nitrogen, oxygen, and hydrogen. If the compressed gas is still under pressure, then it is considered to be a reactive (D003) waste. In addition, the contents of the canister may also carry a U or P code or may be toxic (D codes). This is dependent on the material within the canister.

Center waste contractors may already have a profile for this waste stream; in this case, the waste contractor can provide direction on how to handle and manage the waste stream in accordance with local regulations and NASA policies.

11.0 RADIOACTIVE WASTE

NASA uses radioactive sources and devices, and potentially other radioactive materials in their facilities and operations. These devices are used on test articles to evaluate their ability to impede radiation, assess how radiation affects the functionality of Orbiter's systems, and the space suit material used for Extravehicular Activities (EVAs). These radioactive sources and devices are typically in sealed form (i.e., small amount of sealed radioactive material inside a heavy metal casing) and are used for such things as detecting, measuring, gauging, or controlling density, thickness, or chemical composition or for producing light or an ionized atmosphere; and in luminous aircraft safety devices and in calibration and reference sources. As long as these sources and devices remain intact and sealed and are handled and used properly, the devices do not present a health risk from the radioactive material inside. However, these sources and devices become radioactive waste and are required to be properly disposed in accordance with applicable EPA, NRC, and state regulations and NASA policies to ensure protection of the public and the environment when they are no longer in use or needed. Personal protective equipment, tools, rags, and other items that were generated during the use or handling of loose (i.e., unsealed) radioactive material is also radioactive waste that must be properly managed and disposed in accordance with the applicable EPA, NRC, and state regulations and NASA policies.

12.0 MEDICAL WASTES

There is an extensive astronaut medical monitoring program at JSC. This program entails monitoring the health of the current astronauts, as well as collecting long-term data to assess the impacts, if any, that space travel may have affected their health. Medical monitoring is also performed at KSC prior to and after a Space Shuttle mission to assess the immediate health of the astronauts. Medical waste is often described as any solid waste generated in the diagnosis, treatment, or immunization of human

beings or animals, in research pertaining thereto, or in the production or testing of biologicals. Examples of medical waste include, but are not limited to:

- a. Cultures and stocks of infectious agents and associated biological specimens from laboratories and discarded live or attenuated vaccines.
- b. Human blood and blood products - waste blood, serum, plasma, and blood products including containers used to hold blood and items saturated with blood.
- c. Pathological waste - tissues, human organs, body parts, blood, and body fluids removed during surgery, autopsy, and biopsy.
- d. Contaminated sharps - contaminated hypodermic needles, syringes, scalpel blades, Pasteur pipettes, and broken glass.
- e. Miscellaneous contaminated wastes - wastes from surgery and autopsy, laboratory wastes, dialysis unit wastes, and contaminated equipment.
- f. Wastes from patients isolated with highly communicable diseases.
- g. Unused sharp items - such as syringes, hypodermic needles, and scalpel blades which are potentially harmful.

Medical waste disposal is regulated at the state level. However, most states require infectious wastes to be incinerated or otherwise sterilized prior to disposal. Additionally, used and unused sharps (needles, scalpels, etc.) typically have to be collected in puncture resistant containers.

13.0 POLYCHLORINATED BIPHENYLS

During SSP T&R activities, PCB-containing items may be encountered while disposing an asset. PCBs are commonly found in light ballast, hydraulic fluids, transformers and capacitors, high voltage cables, and paints. PCBs are regulated at the federal level under the TSCA PCB regulations. States do not have the authority to regulate PCBs; however, some states have been delegated authority to perform TSCA inspections on behalf of EPA. PCB-containing items and wastes need to be stored in a TSCA-certified waste storage area, there is a time limit on length of storage, records of quantities stored must be kept, and there are unique and limited disposal options, etc.

Compliance with the TSCA PCB regulations requires knowledge of the concentration of the PCBs involved. There are three categories of PCBs: 1) less than 50 parts per million (ppm), which are minimally regulated; 2) greater than or equal to 50 ppm and less than 500 ppm, which are moderately regulated; and 3) greater than or equal to 500 ppm, which are stringently regulated. PCB concentrations can be determined from:

1) a permanent mark, label, or manufacturer documentation, 2) service records for the equipment, or 3) testing. A TSCA approval must be obtained from EPA prior to processing PCBs for treatment, disposal (except to store or transport PCBs for disposal or as otherwise allowed), or to meet a disposal concentration. PCBs may not be diluted to avoid any requirement of the TSCA regulations specifying a concentration unless otherwise provided.

PCB Transformers (that is, transformers containing greater than or equal to 500 ppm PCBs), including voltage regulators, and their location (or access), such as a door to a transformer vault, are required to be labeled with the large PCB (M_L) mark (i.e., 6 inches [in.] by 6 in. "Caution Contains PCBs" mark). If a transformer does not have a blue label that states "No PCBs", a transformer should be assumed to contain regulated levels of PCBs that are subject to TSCA requirements including, but not limited to, use, marking, storage, and disposal requirements, as well as prescription and time sensitive spill cleanup and reporting requirements for any leaks or releases of PCBs from the transformers.

Capacitors manufactured before July 20, 1979 or with an unknown manufacture date and unknown PCB concentration must be assumed to be a PCB capacitor (that is, greater than or equal to 500 ppm PCBs). PCB Capacitors and their location (that is, the access to a PCB Capacitor, such as a cabinet) are required to be marked with the PCB mark. Fluorescent light ballasts and small capacitors used in Alternating Current (AC) circuits that were manufactured prior to July 1, 1998, and are not labeled "No PCBs" by the manufacturer, should be assumed to contain elevated levels of PCBs (that is, greater than or equal to 500 ppm PCBs).

PCBs or PCB items, such as transformers, capacitors, hydraulic fluids, and light ballasts, that are designated or declared a waste, no longer fit for use, no longer may or can be serviced, not authorized for use, or materials on which PCBs are spilled are PCB wastes. The date removed from service for disposal (also known as the first date waste was placed in a PCB waste container for disposal or the date designated as a waste) must be placed on all PCB wastes. Federal TSCA regulations require PCB waste to be disposed within one year from the date that the item was removed from service for disposal or designated a waste. Once designated for disposal, PCBs are no longer in use and must be stored in a TSCA-certified storage area for disposal if stored for more than 30 days. Temporary storage of PCB waste (that is, less than 30 days) is only allowed under certain circumstances. PCB wastes in storage for disposal must be inspected at least every 30 days.

Disposal of PCB waste is regulated at the federal level. Disposal options for PCB-containing wastes are dependent on the type of PCB waste and its concentration. NASA's waste contractor may already have a profile for PCB waste streams; in this case, the waste contractor can provide direction on how to handle and manage these

waste streams in accordance with federal regulations and NASA policies. If a center's waste contractor does not have a profile for these waste streams, samples of the waste would be needed to evaluate it prior to assigning a PCB concentration to it and determining the appropriate disposition.

Some states also regulate PCBs as hazardous waste at concentrations that differ from those regulated under TSCA. California, for example, regulates PCB-containing material as hazardous waste if PCBs occur at a concentration equal to or exceeding 5.0 mg/L (soluble threshold limit concentration, measured using the California Waste Extraction Test) or 50 mg/kg (total threshold limit concentration).

14.0 BERYLLIUM

Beryllium is found in the following components of the Shuttle:

- a. Space Shuttle Main Engine (SSME) Liquid Hydrogen (LH2) high pressure turbo pump diffusers (T-50 Aluminum)
- b. SRB: Cover Assemblies (ET Top Side and ET Bottom Side), Card Guides, Connectors, Fuzz Button Springs, Heatsink (electrical)
- c. ET - Panels located where the Orbiter is attached
- d. Orbiter - Window frames, brakes, structural support
- e. Gyroscopes

Beryllium is not included as a toxicity contaminant in the federal hazardous waste regulations. However, in some states (such as California), beryllium can be considered a hazardous waste.

In California, beryllium is identified as an inorganic persistent and bioaccumulative toxic substance. If the material is in a friable, powdered or finely divided form and beryllium is found at a concentration equal to or exceeding 0.75 mg/L (soluble threshold limit concentration, measured using the California Waste Extraction Test) or 75 mg/kg (total threshold limit concentration), then the material would be considered a hazardous waste in California. Based on a 1993 letter from California Department of Toxic Substances Control (DTSC) to Hughes Aircraft that states that copper beryllium alloy scraps would be considered non-regulated scrap metal as long as the particle size was greater than 100 microns, NASA could handle their parts as scrap metal as long as that particle size limit was met. The wastes that NASA has are not friable and should not be considered hazardous waste. If the wastes are friable, then they should be evaluated for hazardous waste classification. An interpretation from DTSC should be obtained to ensure that the waste would be considered non-hazardous. Wastes with beryllium can also be recycled to recover the beryllium.

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