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Launch Services Division Safety

Launch Services Safety Overview

Chuck Loftin
System Safety Engineer
NASA/KSC Launch Services Division
4 March 2008



Safety Roles & Responsibilities

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NASA/KSC Launch Services Division Safety (SA-D) services include...

- **Assessing the safety of the launch vehicle**
- **Assessing the safety of NASA ELV spacecraft (S/C) / launch vehicle (LV) interfaces**
- **Assessing the safety of spacecraft processing to ensure resource protection of:**
 - **KSC facilities**
 - **KSC VAFB facilities**
 - **KSC controlled property**
 - **Other NASA assets**
- **NASA personnel safety**
- **Interfacing with payload organizations to review spacecraft for adequate safety implementation and compliance for integrated activities**
- **Assisting in the integration of safety activities between the payload, launch vehicle, and processing facilities**

All organizations are responsible for the safety of their personnel in all facilities



KSC Safety Activities

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Safety Activities are defined by:

- *NASA-STD-8709.2 – NASA Safety and Mission Assurance Roles and Responsibilities for Expendable Launch Vehicles*
- *NPD 8610.23 – Launch Vehicle Technical Oversight Policy*
- *NASA-STD-8719.8 – ELV Payload Safety Review Process Standard*
 - *NPR 8715.XX - ELV Payload Safety Program to replace 8719.8*
- *NPD 8700.3 – SMA Policy for NASA Spacecraft, Instruments, and Launch Services*
- *AFSPCMAN 91-710 – Eastern and Western Range Safety Requirements*



KSC Safety Activities

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Activities can include:

- Safety data package review/approval for flight hardware, GSE, & processing activities
- Approval of hazardous procedures and audit of non-hazardous procedures
- Validation of customer implementation of procedural and operational controls
- Verification of facility walk-downs and training
- Support of Payload Safety Working Groups (PSWG), Design Reviews, Working Groups, Technical Interchange Meetings, etc.
- Support real-time resolution of safety issues during processing
- Review/Approval of safety variances



Payload Processing at Commercial Facility

LS Division Safety roles:

- SOW Requirements
 - NASA FAR Safety Requirements
 - Safety and Health Plan
 - Mishap Reporting

- Facility/Operational Safety Requirement Tailoring
 - Incorporate applicable Range Requirements, NASA Standards, User Requirements

- Certification of Facility Readiness (CoFR)
 - Document review, Audits, Facility Walkdown
 - Facility GSE and Safety Systems

- Ground Operations Review (GOR)

- Performance Evaluation
 - User Feedback
 - Surveillance



Safety Responsibilities at the PPF and Launch Site

S/C Processing Facility



Launch Complex

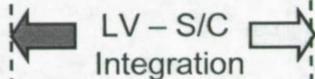
USAF Range Safety
Public Safety/Base Safety/Launch Site Safety

NASA S/C Center & Contractor Safety & Mission Assurance

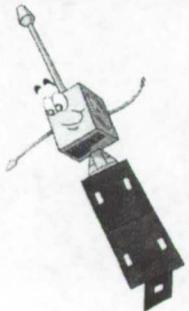


Payload Processing Facility
Facility Resource Protection/Safety Control Authority

NASA KSC Safety & Mission Assurance
KSC Resource Protection; LV - S/C Integration SMA; LV SMA



Launch Vehicle Contractor
LV SMA; LV - S/C Integration SMA





Compliance Documents

Mission, Range, and Processing Location determine applicable requirements

- NASA FAR supplement defines requirements for safety & health plan and mishap reporting
- OSHA defines personnel safety, Process Safety Management, etc.
- NASA-STD-8719.8 defines the safety review process for NASA ELV payloads; being replaced by NPR 8715.XX for ELV Payload Safety
- NASA and KSC requirements and standards (i.e. NPR 8715.3) define system design and operational requirements for NASA facilities and NASA designed hardware
- KNPR 8715.3 defines operational safety requirements for processing/operations on KSC facilities (VAFB SLC-2, KSC PHSF, etc..)
- AFSPCMAN 91-710 defines safety requirements for Eastern & Western range users
- MIL and industrial standards (e.g. ANSI, ASME, IEEE, ACGIH) may be contractually required



Safety Requirements and Standards

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NASA Safety Documents

- NASA-STD-8719.8, *Expendable Launch Vehicle Payload Safety Review Process Standard*
- NPR 8715.3, *NASA General Safety Program Requirements*
- NPR 8715.XX, *Expendable Launch Vehicle Payload Safety Program*
- NASA-STD-8719.9, *Standard for Lifting Devices and Equipment*
- NASA-STD-8719.13, *Software Safety Standard*
- NPR 8621.1, *NASA Procedures and Guidelines for Mishap Reporting, Investigating, and Recordkeeping*
- NSS 1740.12, *Safety Standard For Explosives, Propellants, And Pyrotechnics* (Will soon be known as NASA-STD-8719.12)
- NPR 8715.6, *NASA Procedural Requirements for Limiting Orbital Debris*



Safety Requirements and Standards

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KSC Safety Documents

- KNPR 8715.3, *KSC Safety Practices – Procedural Requirements*
- KTI 5212, *Material Selection List for Plastic Films, Foams, and Adhesive Tapes*
- KNPR 1860.1, *KSC Ionizing Radiation Protection Program*
- KNPR 1860.2, *KSC Non-ionizing Radiation Protection Program*

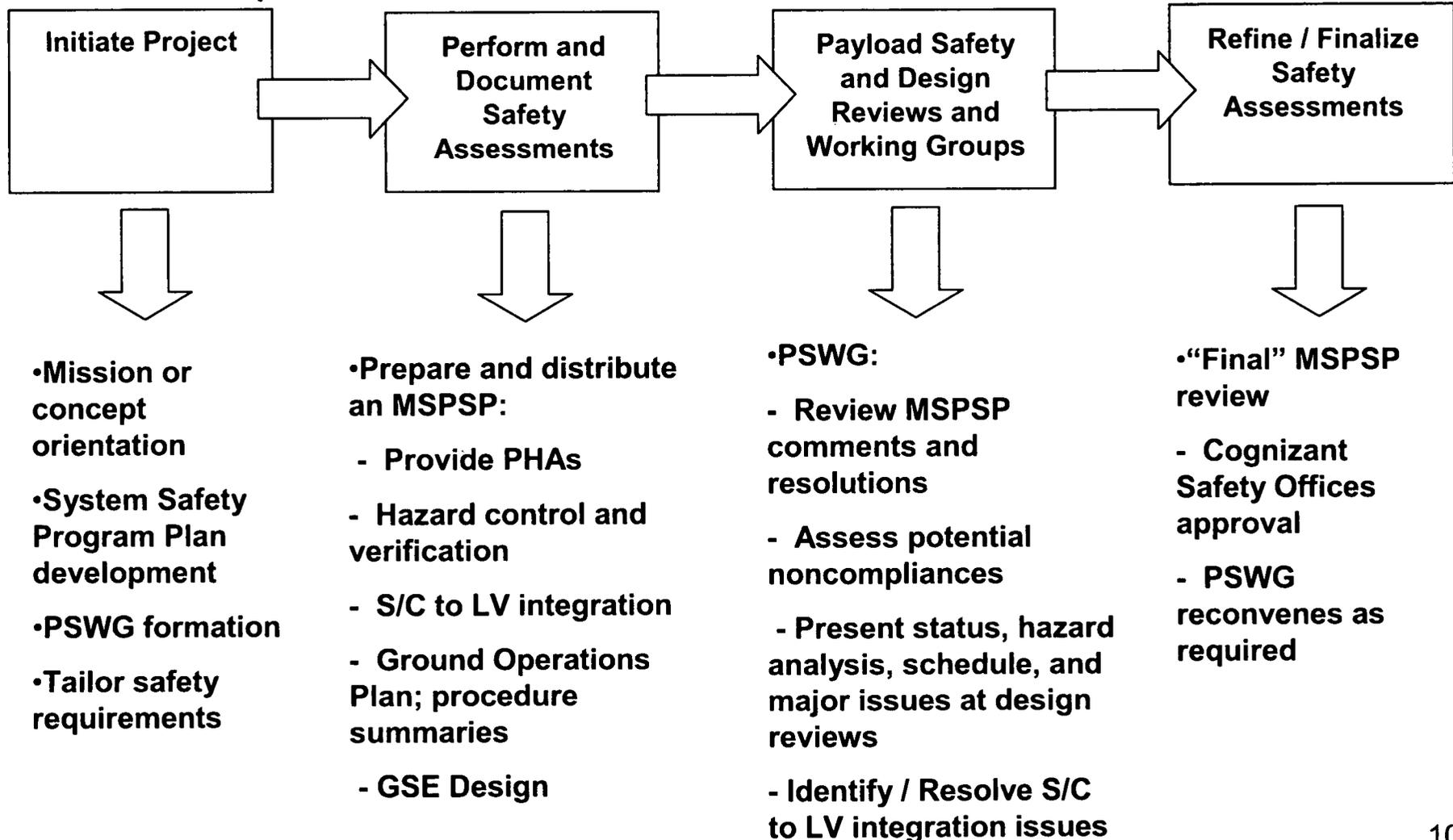
Government

- Title 29 CFR 1910, *Occupational Safety and Health Administration*
- Title 49 CFR, Parts 171 to 178, *Transportation, Department of Transportation*
- National Fire Codes (NFPA)



NASA-STD-8719.8 Process Elements

Spacecraft / Launch Vehicle Interface Safety Review Process





Safety Data Submittals

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Missile Systems Prelaunch Safety Package (MSPSP) – Comprehensive description of hazardous & safety critical flight hardware, systems, software, materials, hazard analysis and mitigations. Provides the means of verifying compliance to prelaunch safety requirements.

- Spacecraft MSPSP – Addresses bus, instruments, payload and hazards
- Launch Vehicle MSPSP – Identifies launch vehicle design and hazards
- Launch Vehicle Mission Unique MSPSP – Addendum to baseline vehicle MSPSP, addressing mission unique items and spacecraft interface. Spacecraft inputs are required

Ground Operations Plan (GOP) – Detailed description of planned operations, associated GSE and the associated hazard analysis. Includes listing of all non-hazardous and hazardous procedures.

Procedures – All tasks performed on the range require written procedures. Hazardous procedures are to be submitted 55 days prior to use date with final procedures published 10 days prior to use.

Radiation Use Authorization/Request – Provides description of ionizing and non-ionizing sources, identifies Area Radiation Officer and Users, experience and training. Forms submitted to KSC LSIM.



Safety Data Requirements/Milestones

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“Typical”

Description	Action By	Review	Requirement	Submittal Requirements
Systems Safety Program Plan (SSPP)	S/C	PSWG	NASA-STD-8719.8; AFSPCMAN 91-710	Draft presented at Mission/Concept Briefing
Mission/Concept Briefing	S/C	PSWG, et.al.	NASA-STD-8719.8; AFSPCMAN 91-710	Mission Kickoff, 45 days after project start
Requirements Tailoring	S/C	PSWG	NASA-STD-8719.8; AFSPCMAN 91-710	Prior to PDR
S/C Draft/Initial MSPSP	S/C	PSWG	AFSPCMAN 91-710 ; NASA-STD-8719.8	PDR
Preliminary Design Review (PDR)	S/C	PSWG	NASA-STD-8719.8; AFSPCMAN 91-710	
Payload Safety Working Group (PSWG) meetings	S/C	PSWG	NASA-STD-8719.8	PDR, CDR, GOWGs, and as requested
S/C Preliminary MSPSP	S/C	PSWG	NASA-STD-8719.8	CDR
Critical Design Review (CDR)	S/C	PSWG	NASA-STD-8719.8; AFSPCMAN 91-710	



Safety Data Requirements/Milestones

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“Typical”

Description	Action By	Review	Requirement	Submittal Requirements
S/C Final MSPSP	S/C	PSWG	NASA-STD-8719.8 AFSPCMAN 91-710	45 days prior to S/C arrival at processing site.
S/C Final MSPSP Approval	PSWG	PSWG	NASA-STD-8719.8; AFSPCMAN 91-710	Prior to S/C arrival at the processing or Launch Site
S/C Hazardous Procedures	S/C	KSC, RS	KNPR 8715.3; AFSPCMAN 91-710	55 Days prior to use
S/C Waivers, Variances	S/C	PSWG	NPR & KNPR 8715.3; AFSPCMAN 91-710	
LV Material Use Authorization	LV	PSWG	KNPR 8072.1; KNPR 8715.3; AFSPCMAN 91-710	
LV Mission-Unique MSPSP	LV	KSC, RS, S/C	AFSPCMAN 91-710	NLT 45 days prior to Hardware Shipment to Range



Safety Data Requirements/Milestones

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“Typical”

Description	Action By	Review	Requirement	Submittal Requirements
Radiation Use Authorization Request	S/C; LV	RPO	KNPR 1860.1; AFSPCMAN 91-710	4 Months prior to SC arrival at processing site
LV Hazardous Procedures	LV	KSC, RS	EWR 127-1 or AFSPCMAN 91-710	55 Days prior to use
LV Waivers, Variances	LV	KSC, RS	EWR 127-1 or AFSPCMAN 91-710	
Ground Operations Review (GOR)	KSC	S/C, KSC		30 days prior to Hardware ship
Mishap Reports	S/C; LV; PPF		KNPR 8715.3; NPR 8621.1B	ASAP/within requirements
Safety & Mission Success Review (SMSR) (Formally SMARR)	KSC & S/C	HQ Code Q	OSMA-SMARR-05-01	L-30 days



Payload Safety Working Group

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The Payload Safety Working Group (as chartered by NASA-STD-8719.8), is the “Round Table” of ELV Payload Safety

- **Provides a common and uniform ELV payload safety process**
- **All members have an equal say**
- **KSC Safety will act as PSWG Chairperson; the chair does not have an overriding veto**
- **Not as regimented as many safety panels**
 - **Informal atmosphere**
 - **All welcome to speak at any time about any relevant safety topic**



Payload Safety Working Group

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- **PSWG involvement includes:**
 - **Requirements tailoring**
 - **Approvals**
 - **Safety Plan Development**
 - **MSPSP Development**
 - **MSPSP reviews**
 - **Specialized safety working groups**
 - **General safety topics discussion**
 - **Safety action items**

- **Functions as both a panel and as a working group**

- **Working groups can be held at anytime at the request of any PSWG member by face-to-face meetings or telecons**



KSC Safety

- **Things KSC Safety likes to see:**
 - **Plastic films, foams, and adhesive tapes (PFAs) to be used identified and submitted as soon as they are known**
 - **Hazard reports in MSPSP/ARAR**
 - **Timely submittal of verification tracking log (VTL) statuses**
 - **Safety analyses addressing KSC lessons learned**
 - **A Payload Organization safety representative at the launch site during S/C hazardous operations**
 - **Access to spacecraft propellant fill and drain valves through the payload fairing for contingency offloading**



KSC Safety

- **Things KSC Safety Does Not like to see:**
 - **Safety variances stating schedule and/or cost as the only driving factor(s)**
 - **GSE, PFAs, test plans, etc. that show up at the launch site that were not approved through the PSWG (MSPSP) process**
 - **Launch site processing being performed before approvals**
 - **Non-safety personnel performing safety assessments**
 - ***“...but XYZ payload didn’t have to...”***
 - **The use of older safety requirements because of convenience**



Contingency Planning

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- **NASA Launch Services Program (LSP) Mishap Preparedness and Contingency Plan (MPCP)**
 - Developed by Launch Services Division SMA for each mission.
 - Effective from Countdown Call-To-Stations through end of Launch vehicle mission.
 - Identifies specific immediate actions that NASA Launch Team personnel take in response to a launch mishap including:
 - Establishment of an Interim Response Team (IRT)
 - Mishap notification
 - Mishap Coordination with Launch Range
 - Coordination and release of public information
 - Mishap response teleconferences
 - Data impoundment at all locations where NASA and spacecraft personnel support launch operations
 - Witness statement collection





Points of Contact

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NASA/KSC Launch Services Division Safety Contacts

System Safety: Chuck Loftin
Phone: (321) 867-8797
Email: charles.e.loftin@nasa.gov