NASA SAFETY CULTURE HANDBOOK

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FOREWORD

This Handbook is published by the National Aeronautics and Space Administration (NASA) as a guidance document on the NASA Safety Culture Program. In addition, this Handbook defines the development of the NASA Safety Culture Model, the implementation of the NASA Safety Culture Program, and related information on how to implement safety culture at the NASA Centers. It provides references and other types of guidance information that may help the Government or its Contractors in the implementation of safety culture at NASA.

This Handbook is approved for use by NASA Headquarters and NASA Centers, including Component Facilities and Technical and Service Support Centers.

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11/23/15
Approval Date

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1.   SCOPE

1.1   Purpose

This Handbook defines the main elements of the NASA Safety Culture Program. It contains guidance on the development, implementation, sustainment, growth, and practice of Safety Culture at the Center level. It also presents the NASA Safety Culture Model, describes the Safety Culture Survey (SCS) process, and outlines training and other related resources to support the practices of Safety Culture throughout NASA.

1.2   Applicability

This Handbook applies to all NASA stakeholders: personnel (Civil Service and Contractor), NASA Headquarters (HQ), NASA Centers, Component Facilities, and Technical & Service Support Centers. This Handbook also applies to the Jet Propulsion Laboratory and/or to other Contractors; grants recipients; or parties to agreements to the extent specified or referenced in their contracts, grants, or agreements.

1.3   Safety Culture Background and Overview

Throughout its history, NASA's has demonstrated a culture highlighted by outstanding technical and scientific achievement. However, at times the Agency also experienced failures and mishaps. These events created an awareness of the need to continually make cultural improvements and learn from the past. After the *Columbia* mishap in 2003, NASA decision-makers re-committed to transform its organizational Safety Culture. The Agency initiated a variety of efforts to return to flight in 2004. The NASA Aerospace Safety Advisory Panel (ASAP) made comments regarding the need for Safety Culture improvements in all annual reports. In 2009, the NASA Office of Safety and Mission Assurance (OSMA) established and chartered a Safety Culture Program. Program elements included Assessment, Education, Engagement, Guidance, and Resources (Media and Tools). The Safety Culture program manager created and leads the Agency Safety Culture Working Group (SCWG), for inclusions and representation of all Agency organizations to "Promote and sustain a strong Safety Culture at all levels of the Agency."

After reviewing various Safety Culture models, the SCWG selected the widely recognized Safety Culture Model based on Dr. James Reason's five factors of Safety Culture. The SCWG developed the NASA Safety Culture Model (detailed in Section 7) based on the five factors of Reporting Culture, Just Culture, Flexible Culture, Learning Culture, and Engaged Culture. The NASA Safety Culture Model forms the basis for Safety Culture training sessions, presentations, poster sessions, literature, and events at every Center. NASA leadership recognizes the importance of a strong Safety Culture and supports all efforts to promote the five factors approach.

Since its founding in 2009, the NASA Safety Culture Program evolved into an integral part of the Safety and Mission Assurance (SMA) Program throughout the Agency. From the beginning

of the SCS, Feedback received from the survey provided   information and understanding for needed improvements to the safety, health, and mission assurance efforts at the Programs and Institutional level. It is now a well-accepted, integrated, and anticipated tool across the Agency for leaders, managers, supervisors and employees.

2.   APPLICABLE DOCUMENTS

2.1   General

The documents listed in this section are applicable to the guidance in this Handbook. The latest issuances of cited documents apply unless specific versions are designated.

2.2   Government Documents

2.2.1   NASA Documents

NPD 1000.0   NASA Governance and Strategic Management Handbook

NPD 8700.1   NASA Policy for Safety and Mission Success

NPR 7120.5   NASA Space Flight Program and Project Management Requirements

NPR 8621.1   NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

NPR 8705.6   Safety and Mission Assurance (SMA) Audits, Reviews, and Assessments

NPR 8715.1   NASA Occupational Safety and Health Programs

NASA-STD 8709.22 Safety and Mission Assurance Acronyms, Abbreviations, and Definitions

2.2.2   Non-NASA Documents

29 CFR 1960   Basic Program Elements for Federal Employee Occupational Safety and Health

DOE G 450.4-1B   Integrated Safety Management System Guide (Volume 1) for use with Safety Management System Policies

JPDO Paper 08-10   Safety Culture Improvement Resource Guide

3.   ACRONYMS AND DEFINITIONS

3.1   Acronyms and Abbreviations

AFCMRS	Air Force Combined Mishap Reduction System
ARAP	Army Readiness Assessment Program
CSA	Command Safety Assessment
DASHO	Designated Agency Safety and Health Official
DNA	Deoxyribonucleic Acid
DoD	Department of Defense
HQ	Headquarters
IPA	Intergovernmental Personnel Acts
JPDO	Joint Planning and Development Office
JSC	Johnson Space Center
KSC	Kennedy Space Center
MCAS	Maintenance Climate Assessment Survey
NASA	National Aeronautics and Space Administration
NRC	Nuclear Regulatory Commission
NSC	NASA Safety Center
NMIS	NASA Mishap Information System
NSRS	NASA Safety Reporting System
OIG	Office of the Inspector General
OCHMO	Office of the Chief Health and Medical Officer
OSHA	Occupational Safety and Health Administration
OSMA	Office of Safety and Mission Assurance
POC	Point of Contact
SATERN	System for Administration, Training, and Education Resources for NASA
SCS	Safety Culture Survey
SCWG	Safety Culture Working Group
SMA	Safety and Mission Assurance
STEP	SMA Technical Excellency Program
VPP	Voluntary Protection Program

3.2   Definitions

Safety	Freedom from those conditions that can cause death, injury, occupational illness; damage to or loss of equipment or property; or damage to the environment. In a risk-informed context, safety is an overall mission and program condition that provides sufficient assurance that accidents will not result from the mission execution or program implementation or, if they occur, their consequences will be mitigated. This assurance is established by means of the satisfaction of a combination of deterministic criteria and risk criteria. The term "safety" broadly includes human safety (public and workforce), environmental safety, and asset safety.

Safety Culture: Safety Culture is the value placed on safety, as demonstrated by people's behavior. It is the way safety is perceived, valued, and prioritized in an organization. It reflects the commitment to safety at all levels in an organization. It's also described as "how an organization behaves when no one is watching." Safety Culture is expressed and observed via individual and group attitudes and behavior, as well as organizational processes.

Reporting Culture: We report our concerns. In a Reporting Culture, everyone is encouraged to report safety concerns. An atmosphere of trust exists between leadership and employees, with employees knowing that important information will be heard and acted upon appropriately. No one should ever be afraid to speak up; it could save a life.

Just Culture: We treat each other fairly. A Culture that is Just balances the need for discipline when warranted with rewards when earned. People clearly understand acceptable and unacceptable behaviors. There's a sense of fairness in how business is conducted for everyone. In a Just Culture, those in authority do not "shoot the messenger" for bringing up safety concerns.

Flexible Culture: We change to meet new demands. A Flexible Culture is one that builds in resilience from the beginning. It enables an organization to adapt to unforeseen developments and make changes based on incoming trend information. It also allows an organization to push past obstacles when something new or different happens. In a Flexible Culture, operations aren't disrupted by additional demands, but continues to operate in a steady state to successfully complete the mission.

Learning Culture: We learn from our successes and our mistakes. In a Learning Culture, employees collect, assess and share information, both formally and informally. That includes continuing education programs such as SATERN and the Safety and Mission Assurance Technical Excellence Program (STEP), as well as resources on the NASA Engineering Network and NASA Safety Center (NSC) Web sites. It is important for employees to learn from their experiences and apply that knowledge to their jobs.

Engaged Culture: Everyone does their part. An Engaged Culture ties together the other four cultures. Regardless of status or occupation, all NASA employees actively participate in safely accomplishing the agency's mission. The key is having engaged leaders and employees who demonstrate they value safety and get involved.

4.   NASA SAFETY CULTURE PROGRAM OBJECTIVES

The NASA Safety Culture Program includes multiple objectives to create a culture where:
- Leadership regularly engages and communicates safety as a core value.
- Management and employees share common goals of creating a safe and healthful workplace. Employees know how to report concerns and do so when warranted
- Supervisors listen and respond appropriately to employees' concerns.
- Management and supervisors' value and recognize hazard and incident reporting.
- All employees work toward and environment of open communication where retaliation for raising a safety concern is not condoned or tolerated.
- Changes are well managed with data-driven inputs, thoughtful execution and communication of rationale to those effected by the changes.
- Lessons from the past are known, collected, shared, discussed and incorporated into ongoing and new work. Employees regularly mentor and coach one another.
- All employees share a sense of responsibility and accountability to safety and health practices.
- All employees "Walk the talk" regarding safety remaining mindful of themselves, their colleagues, and their professional pursuits.

5.   NASA SAFETY CULTURE PROGRAM VISION

The NASA Safety Culture Program envisions a work environment characterized by safe attitudes and behaviors. Leaders model these attributes while employees see, understand and embraced them. All employees foster an atmosphere of open communication, mutual trust, and shared safety values and lessons. The NASA Mission Directorates, along with the support organizations and Technical Authorities, strive to balance challenges and risks consistently mindful of NASA core values, including safety, to successfully accomplish the mission.

The NASA Safety Culture Program supports and reinforces NASA's Core Values. These five Core Values are outlined in NPD 1000.0, NASA Governance and Strategic Management Handbook. When NASA's Core Values of Safety, Excellence, Teamwork, Integrity, and Inclusion are applied together in each employee's day-to-day activities, they ensure mission success.

6.   NASA SAFETY CULTURE AS RELATES TO NASA CORE VALUES

6.1   NASA's Core Values

NASA's Core Values are outlined in NPD 1000.0, NASA Governance and Strategic Management Handbook. It states: "NASA engages in a spectrum of programs, projects, and activities of extraordinary risk, complexity, and national priority. Mission-driven, with mission success at the cornerstone of its culture, the Agency rigorously manages requirements, schedule, facilities, human resources, and budget."

6.1.1   Description of NASA Core Values

NASA's Core Values are Safety, Excellence, Teamwork, Integrity and Inclusion (see Figure 1). These core values applied together in each employee's day-to-day activities create the conditions for safe mission accomplishment. Apollo, the Space Shuttle Program, the International Space Station, the Commercial Crew Program, Opportunity, Spirit, and Curiosity are examples of programs that embraced NASA's Core Values and achieved mission success.

Figure 1: NASA Core Values

6.2   Safety

Safety represents one of NASA's five Core Values. Employees can think of the Core Values as part of the NASA DNA; they're the master molecules embedded in all of the Agency's endeavors, present at each project milestone and critical for mission success. As stated in NPD 1000.0 "constant attention to safety is the cornerstone upon which we [NASA] build mission success." NASA is "committed, individually and as a team, to protecting the safety and health of the public, our team members, and those assets that the Nation entrusts to the Agency." It is NASA policy to "Encourage, support and monitor programs, activities and events that strengthen and sustain a healthy Safety Culture at NASA," per NPD 8700.1.

6.2.1   Evolution of the Safety Culture Program

Since the early days of the Apollo Program, NASA realized that employee safety was paramount to accomplish the mission of advancing the world of aeronautics and the exploration of space. From these experiences, incorporating the lessons from both its successes, and failures, NASA's Safety and Mission Success effort evolved into world-class Programs. NASA's Safety Culture developed from these experiences as well. As NASA embarks in new directions and faces new challenges, Safety Culture will continue to play a fundamental role. Maintaining a strong Safety Culture depends on employees knowing our history, involving themselves in our current and ongoing efforts, laying the foundation for future mission success.

7. NASA SAFETY CULTURE MODEL

7.1 Five Factor Model

Five Factors compose the NASA Safety Culture Model: Reporting Culture, Just Culture, Flexible Culture, Learning Culture, and Engaged Culture. The Agency uses the Model to assess Safety Culture during regular Agency-wide assessments, as well as during mishap investigations and organizational assessments. The 5-Factor Model also helps develop an action plan to address any Safety Culture issues discovered.

The next few sections provide a description of each of the five factors of NASA's Safety Culture Model, as well as examples to address Safety Culture concerns at any organizational level. The information contained in the following sections does not identify every possible scenario or activity but does provide some of the tools that are available for each factor.

7.1.1 The DNA Analogy

NASA's Safety Culture comprises NASA's DNA (see Figure 2). Just as DNA contains the genetic instructions that guide the development and function of every living organism, Safety Culture guides and defines safety within NASA. The NASA Safety Culture logo illustrates a DNA strand consisting of the five factors to remind everyone of the importance of safety as a component of NASA work life.

Each factor in the DNA model depends upon the others. One missing component makes the entire system vulnerable. Everyone from the newest employee to senior NASA leadership must take an active role in the Agency's safety.
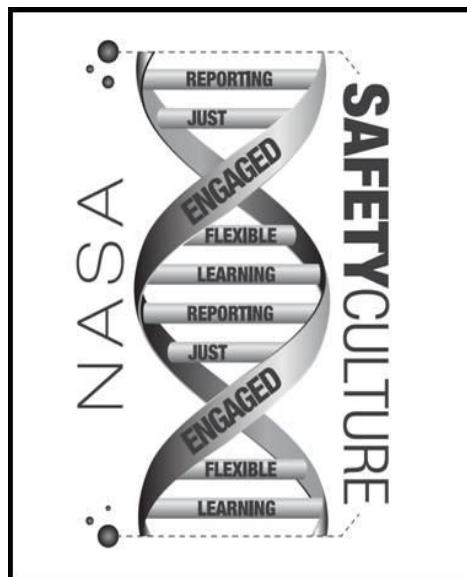

Figure 2: NASA Safety Culture Logo

7.2 Reporting Culture

In a strong Reporting Culture, employees report hazards or safety concerns, while supervisors listen and respond appropriately. The reporting system offers user-friendly tools, anonymous options and remains separate from disciplinary processes. Reporting results in quick, accessible, and insightful feedback. In a healthy Reporting Culture, employees know important information must be voiced, heard, and acted on with consideration of the context of events and the environment. This creates an atmosphere of trust between managers and workers.

Many avenues, both formal and informal, exist for employees to report safety concerns at NASA. Reporting processes are available to all employees including Civil Servants, Contractors, visitors, interns, students, faculty, and partners. Additionally, each Center develops and maintains specific processes and procedures to report safety concerns.

All employees must understand the critical role they fill in reporting safety concerns. Those that speak up receive no adverse actions for reporting a safety concern. Supervisors listen and act when appropriate. Leaders support employee processes and training. If an employee perceives harassment, punishment, or discrimination by peers, management, or the organization for reporting safety concerns, the employee should follow the guidance below.

The importance of employee communication cannot be overstated. As NASA continues its unique existing missions and while developing new challenging ones, feedback remains essential. When employees recognize hazards, potential risks, employee concerns, or process issues, they need to inform management and/or the safety organization.

7.2.1 Formal Reporting

NASA encourages all employees to actively look for, analyze, and report safety concerns. Reports of an unsafe issue, event, or condition make up an important part of NASA's safety mitigation processes. These reports allow management to assess trends, identify problems, and find solutions before mishaps occur.

Everyone at NASA bears responsibility for reporting suspected safety or health hazards to appropriate officials. All elements within the Agency workforce must commit to protecting the safety and health of the themselves, their colleagues, the general public and preventing damage or destruction of high-value assets.

7.2.1.1 Reporting to Supervisor: NASA expects employees to report safety and health concerns to their supervisor. Supervisory responsibilities include addressing safety and health concerns related to his/her direct reports. Once reported, supervisors should communicate the outcomes of reported safety concerns to encourage future awareness for all.

7.2.1.2 Center-Level Reporting: If the employee, after reporting to the supervisor, does not feel satisfied with the resulting response, he/she should elevate the concerns to the Center's SMA

organization. In addition, the concerns could be reported through the Center's Facility Management organization.

Many Centers use their internal Web sites to communicate with management about concerns. Employees should refer to their Center's safety organization to obtain information on these specific tools.

To report an emergency, life-threatening safety concern, or hazardous condition, use local Center reporting procedures. These are outlined within the Centers' SMA Web sites and/or published guidance.

7.2.1.3 Agency-Level Reporting: If an employee does not feel the problem was resolved at the Center level, he/she can report to the problem to NASA HQ. There are two organizations responsible for addressing safety and health concerns: The Office of the Chief Health and Medical Officer (OCHMO) or the Office of Safety and Mission Assurance (OSMA). OCHMO is the Designated Agency Safety and Health Office at NASA Headquarters, while OSMA is the Agency Safety and Mission Assurance Office at Headquarters. Both of these Offices share responsibility for attending to reported health or safety concerns.

7.2.1.4 NASA Safety Reporting System (NSRS): If an employee determines that a reported problem was not resolved at the supervisory, Center, or Agency level, they can report a problem anonymously using the NSRS (see Figure 3). NSRS can also be used when employee's safety concerns involve supervisors their reporting pathway. The NSRS processes allow anonymous reporting of Safety concerns. OSMA administers and tracks NSRS cases to. To use the NSRS, employees download the reporting form, fill it out, and mail it to the NSRS independent contractor. The contractor receives and reviews the NSRS submission. After removing identifying information, the contractor forwards, the report to OSMA. OSMA determines the proper distribution and level of management for investigation at NASA. If the employee wants to know subsequent actions taken, they can include their contact information or email address in the report. The NSRS contractor will send the submitter a Website link and reference code to track the status of the report.
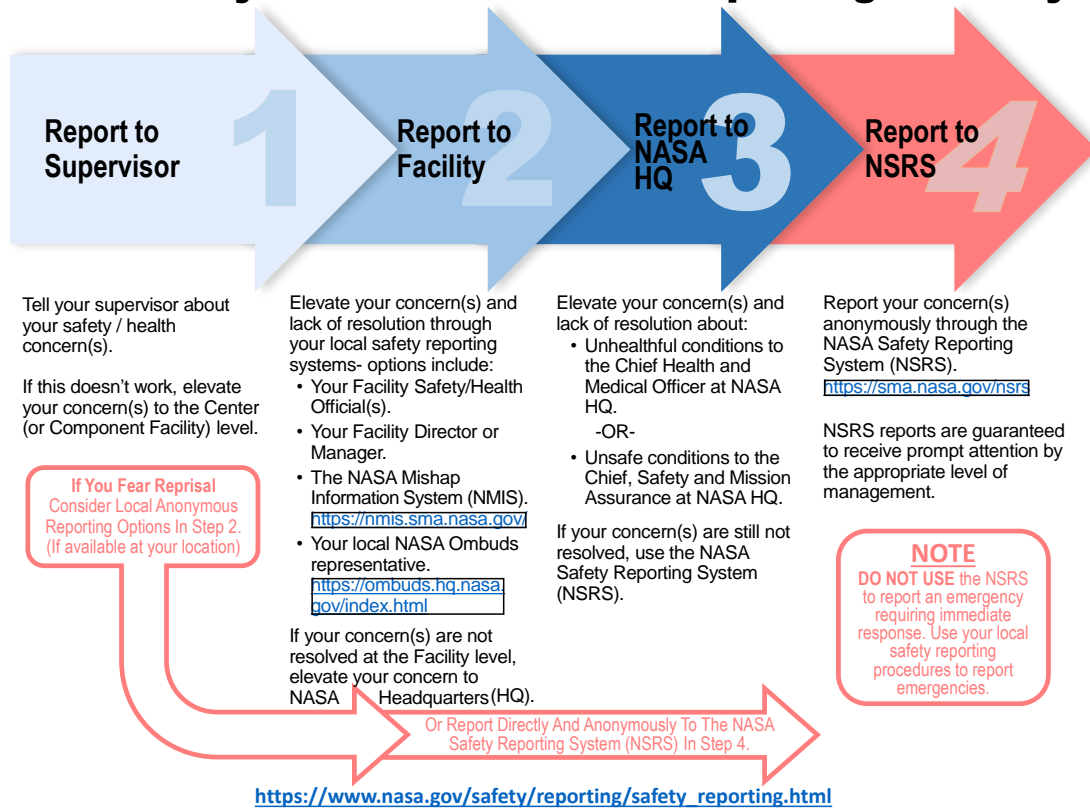
NASA Safety and Health Hazard Reporting Pathways

1 Report to Supervisor
2 Report to Facility
3 Report to NASA HQ
4 Report to NSRS

Tell your supervisor about your safety / health concern(s).

If this doesn't work, elevate your concern(s) to the Center (or Component Facility) level.

If You Fear Reprisal Consider Local Anonymous Reporting Options In Step 2. (If available at your location)

Elevate your concern(s) and lack of resolution through your local safety reporting systems- options include:
• Your Facility Safety/Health Official(s).
• Your Facility Director or Manager.
• The NASA Mishap Information System (NMIS). https://nmis.sma.nasa.gov/
• Your local NASA Ombuds representative. https://ombuds.hq.nasa.gov/index.html

If your concern(s) are not resolved at the Facility level, elevate your concern to NASA Headquarters (HQ).

Elevate your concern(s) and lack of resolution about:
• Unhealthful conditions to the Chief Health and Medical Officer at NASA HQ.
   -OR-
• Unsafe conditions to the Chief, Safety and Mission Assurance at NASA HQ.

If your concern(s) are still not resolved, use the NASA Safety Reporting System (NSRS).

Report your concern(s) anonymously through the NASA Safety Reporting System (NSRS). https://sma.nasa.gov/nsrs

NSRS reports are guaranteed to receive prompt attention by the appropriate level of management.

NOTE **DO NOT USE** the NSRS to report an emergency requiring immediate response. Use your local safety reporting procedures to report emergencies.

Or Report Directly And Anonymously To The NASA Safety Reporting System (NSRS) In Step 4.

https://www.nasa.gov/safety/reporting/safety_reporting.html

Figure 3: NASA Safety Reporting System Chart

7.2.1.5 NASA Mishap Information System (NMIS): NASA investigates all mishaps and close calls to ensure the conditions of the mishap do not happened again. All mishaps and close calls information and data involving NASA personnel and/or their Contractors and NASA property are required to be reported using NMIS. Mishap investigators enter data into NMIS, including Human Factors investigation using NASA Human Factors Analysis and Classification System (NASAHFACS). HFACS allows the identification of Safety Culture for mitigation and trending.

7.2.1.6 NASA Safety Culture Survey (SCS): OSMA Safety Culture programs oversees regular assessments of NASA's Safety Culture using the Agency Safety Culture Survey. The SCS is an expected, reliable avenue for employees to report concerns. More on the SCS can be found in NR 8705.6, Section 8 and the Appendices in this Handbook.

7.2.1.7 Ombudsman: Another alternative, is to report the concern to the Center's Ombudsman. The duty of the Ombudsman is to provide a safe and confidential forum for individual, group, and systemic problems by:
• Listening to and clarifying concerns.
• Identifying underlying issues and interests.

- Exploring possible options through formal or informal channels.
- Collecting general data on emerging trends and patterns in the organization.
- Recommending systemic changes.

7.2.1.8 Office of the Inspector General (OIG): Federal law prohibits NASA managers from retaliating against employees who provide information the employee reasonably believes evidences any of the following:
- A violation of any law, rule, or regulation.
- Gross mismanagement.
- A gross waste of funds.
- An abuse of authority.
- A substantial and specific danger to public health and safety.

If an employee feels that a NASA manager meets one or more of these criteria, the employee can report his/her concerns to the Center's OIG office.

7.2.1.9 Occupational Safety and Health Administration (OSHA): OSHA establishes safety and health requirements at Federal facilities. OSHA's 29 CFR 1960.28(b) states that Federal Agencies will establish "… channels of communication [which] are intended to assure prompt analysis and response to reports of unsafe or unhealthful working conditions in accordance with the requirements of Executive Order 12196." Employees can report their safety concerns directly to OSHA. OSHA personnel will work with NASA personnel to address and resolve the employee's safety concern.

7.2.1.10 Stop-Work: NASA Safety Guidelines specifically state that an employee can "Stop any work or activity which may put an employee or member of the public in imminent danger" (Reference NPR 8715.1A, Section 3.3.3.e). In addition, "Employees have the right to report unsafe and unhealthful working conditions to appropriate officials without fear of reprisal" (reference NPR 8715.1, Paragraph 1.4, and 29CFR1960.46(a)).

7.2.1.11 Formal Dissent (FD): A FD describes a disagreement, usually technical. with a decision or action that an individual judge sufficiently important to warrants a specific review and decision by higher-level management. The individual with the FD formally requests the dissent be recorded and resolved by the FD process (see NPR 7120.5).

A dissenting opinion highlights a decision or action that in the dissenter's opinion should be changed for mission success. This DO generate a request for review by higher-level management.

7.2.2   Informal Reporting

7.2.2.1 Open Door Policy: Many organizations have an "Open Door Policy" where employees discuss issues and concerns with management informally at any time. This open and transparent communication often creates an environment of mutual trust.

7.2.2.2 Email: Emails containing written information help inform management of issues and concerns. Employee often use this tool to document concerns. It also allows the inclusion of additional information (photos, references, etc.) to further illustrate the employee's position.

7.2.3   Example of Reporting Culture

An experienced machine shop employee noticed a new machinist working a metal that looked suspect based on visible appearances. He asked the new machinist to stop work, and they talked to supervisor. The investigation found the material to be beryllium (which can have serious health effects). The machinist that observed and halted the operation received an Ames Safety Award for speaking up. This is real-life example of Reporting Culture.

7.3   Just Culture

A Just Culture ensures an environment of open communication while balancing the need for action when warranted along with recognition when earned. In a Just Culture, employees understand the difference between acceptable and unacceptable behaviors. Fair business conduct from all employees creates and sustains and environment for employees to report safety concerns.

Employees who fear unreasonable punishment or blame are less willing to inform an organization about their errors and other safety problems or hazards. A lack of trust on the part of employees reduces or eliminates the possibility of management being properly informed of risks by their employees. Uninformed managers," "do not know that they do not know". Supervisory decision-making relies on situational awareness. to prevent the same mishap from reoccurring when warranted.

Supervisors should strive to praise in public and to counsel in private. This fosters an environment where supervisors and employees address their concerns in a professional manner, without the scrutiny or judgment of others not involved in the resolution of the concern. It also models good supervisory practices for younger employees.

7.3.1 Fear of Reprisal: How an organization responds to a reported incident, accident, or concern influences employees reporting in the future. In a Just Culture, all employees feel empowered to report incidents, accidents, or concerns without fear of reprisal. Responses to incidents, accidents, or concerns that are seen as unjust can hinder safety investigations; promote fear in people who do safety-critical or mission-critical work; and cultivate a culture of denial, concealment, avoidance, rationalization, and self-protection. Without the ability to report failures and concerns openly and without reprisal, information sharing will not occur, and the Safety Culture will not thrive.

7.3.2 Recognition and Awards: Recognition and awards help develop positive reinforcement for employees who report hazards or concerns. Numerous formal and informal recognition programs exist within NASA. all NASA Centers create and award Center-specific forms of recognition as well. Formal recognition awards include the Silver Snoopy Award, Space Flight Awareness, group achievement awards, spotlight awards, and time-off awards. Informal

recognition includes public or private praise, the Safety Awards Program, pins such as the "Safe, Not Sorry" pin, ice cream socials, certificates, and coins.

7.3.3 Discipline: In a Just Culture, employee behavior is considered in the context of its occurrence. Punishment for mistakes is not part of a just culture. For example, NASA's Mishap investigation process focuses on finding the factors leading up to the mishap instead of placing blame. In a Just Culture employee learn from innocent mistakes and work towards preventing a reoccurrence. When employees demonstrate unacceptable behaviors, such as knowingly violating NASA safety policies and requirements, that intentional behavior must be addressed. It is important for supervisors to differentiate between the person who reports a concern and the reported concern itself. In a just culture disciplinary action is not taken against the e one who reported the incident, accident, or concern. Retaliation "chills" a reporting culture so all employee's adherence to these practices is an important part of the workplace environment.

7.3.4 Process for Reprimand and Counsel: When Civil Service personnel demonstrate unacceptable behavior, NASA uses SREF-3000-0020, NASA Desk Guide for Table of Disciplinary Offenses and Penalties. Contractors follow the established policies for their organization and/or company.

7.3.5   Example of Just Culture

The Morpheus Project was a joint Johnson Space Center (JSC) and Kennedy Space Center (KSC) activity. JSC performed autonomous flight research and development, and KSC performed the associated flight operations. The JSC tether tests were broadcast to KSC on closed-circuit TV. During preparations for tether testing at JSC involving a number of vehicle support service personnel, a KSC employee observed the JSC test crew on ladders, performing final adjustments to the vehicle prior to testing. Some personnel were not following prescribed ladder safety practices. The KSC employee sent an email to KSC safety personnel with screenshots of the observations, which were then shared with JSC safety. Project and JSC personnel conducted a Close Call review of the incident. The team found that required adjustments to the vehicle created schedule pressure for the test crew, and that recent change to the vehicle preparation required more complex handling. These circumstances unintentionally contributed to unsafe ladder practices.

As a result, Morpheus Project team and support personnel attended refresher ladder safety training. The JSC Center Director recognized the KSC employee who observed the operation. This is a real-life example of Just Culture.

7.4   Flexible Culture

In a Flexible Culture, the organization effectively balances and adapts to changing demands while managing complex technologies and maintaining productivity. A healthy Flexible Culture uses safety data to make meaningful changes when there's a concerning trend or issue.

A Flexible Culture makes changes both proactively and reactively. A Flexible Culture strives to continuously improve rules, procedures, and systems in order to safely accomplish the mission.

All missions within the Agency benefit from a Flexible Culture that learns and adapts. To create a culture of flexibility, leaders, managers, and employees maintain awareness, acknowledge concerns and consider options when conditions warrant. As part of a Flexible Culture employees at all levels work to consider change to address the evolving needs of the Agency. One aspect of a Flexible Culture is the management of change. When, why, how change is implemented underscores the potential success of a new approach. How the change is messaged, the involvement of stakeholders, and the rationale behind the changes – all of these influence the success of change.

Disruptions, either external or internal, occur that require employees to rethink existing decisions, rules, or processes. Weather, politics, budget, pandemic - These disruptions effect all within the Agency. Responding to these kinds of disruptions is critical to the Agency's mission.

7.4.1 Resilience: Resilience within an organization provides capability when facing challenges and disruptions. Here are just a few examples of resilient organizations:
- Making modifications to the flight schedule after a significant weather event so that scientists gather their data as intended
- A supervisor making sure of all their employees' safety when driving between the center and home during winter months by providing emergency kits, information sources, and inspecting their cars for wiper fluid, proper tires, blankets, flares, and other winter emergency resources.
- Providing information to new employees regarding mission schedule, rationale, requirements, and options for how they should deal with an emergency situation.

7.4.2   Example of Flexible Culture

During the ARES 1 concept development, the ARES team addressed a requirement to build a test vehicle to validate the initial program requirements. NASA divided the development and manufacturing of the components for the ARES I-X test vehicle among several Centers. Glenn Research Center (GRC) manufactured the Upper Stage Simulator.

The GRC team possessed plenty of experience manufacturing test articles; however, this was their first time manufacturing flight hardware. The team coalesced   quickly due to the demanding launch schedule. They procured the equipment necessary to manufacture the 12 segments, each 10 feet high and 18 feet in diameter, for the Upper Stage Simulator. The project team developed their own manufacturing and lifting techniques and procedures to build and move the segments safely. The GRC team improved their own quality procedures to ensure the segments met all the project requirements.

The GRC project leadership augmented skill shortages within their own Civil Service staff with union welders to meet schedule requirements. Leadership integrated all of the input from different disciplines to create a safe and effective project team.

The GRC team also planned and executed the transportation of the segments from GRC to KSC, over 1,000 miles away, for assembly and launch. The team delivered the segments on schedule, and also supported the integration of the vehicle at KSC for launch. The Ares I-X test vehicle launched successfully and on schedule. This is a real-life example of adapting to changing demands to accomplish the mission, safely and successfully.

7.5   Learning Culture

In a Learning Culture, an organization learns from previous successes and failures. . This collecting and sharing of experiences to the next generates is a priority. Information should be available to everyone, from novice to expert.

NASA experience includes both unforgettable failures and spectacular successes. The Agency strives to learn from both. As NASA continues to pursue the unknown, it is imperative that it embraces a Learning Culture. NASA adeptly determines what went wrong after a failure occurs; to identify and mitigate hazards before a mishap is the larger challenge.

NASA's learning culture promotes continuous learning a part of day-to-day activities. Employees and supervisors can outline a development plan together. In addition to training, they should include activities and experiences that encourage employee growth and skills development.

 The Agency furthers it's Learning Culture when it identifies all facets of failures and seeks to understand what happened. For these reasons, NASA mishap investigations focus on identification of factors involved in the events. The MIB goals is increased understanding, improvement and prevention rather than fault-finding. The mishap investigation process identifies what happened and why, so processes changes/improvements can be implemented to reduce the likelihood of another incident.

7.5.1 Lessons Learned Information System: The Lessons Learned Information System is an online system that allows the NASA workforce to apply past knowledge for current and future mission success. This tool allows the user to search by a specific term or to narrow the search by Center, Mission Directorate, topic, or year. Many of the lessons relate to the technical aspects of projects and provide a variety of lessons to be learned.

7.5.2 NASA Engineering Network: The NEN allows employee interaction with discipline's Technical Fellows, subject-matter experts, and other practitioners through Communities of Practices. The NEN provides access to Lessons Learned, search capabilities in the NASA Repositories of interest, and updates of events, Webcasts, tools, and resources shared by the NASA engineering community. The Agency encourages all employees to visit the Web site, https://nen.nasa.gov (must be connected to a NASA VPN to access), to review any applicable lessons learned, or to learn about the relationship between human behavior and accidents.

7.5.3 System Failure Case Studies: System Failure Case Studies are available online on the NSC's Web site, https://nsc.nasa.gov/SFCS. Users study these cases to analyze safety failures, and gain insight into accident causation, learn what factors were present, understand how culture can impact the propensity for an accident and the outcomes of accidents, and most importantly, how employees can engage people and processes to prevent accidents at NASA.

7.5.4 STEP: The SMA Technical Excellence Program (STEP) is a career-oriented, professional development roadmap for SMA professionals. This voluntary training program is focused on eight curriculums: Aviation Safety Engineer, Aviation Safety Officer, Operational Safety, Quality Engineering, Reliability and Maintainability, SMA Technical Leadership, Software Assurance, and System Safety. STEP provides NASA with a means to measure and continuously advance the proficiency of the SMA workforce. The Technical Excellence Office, an element of the NSC, manages the Program (https://nsc.nasa.gov/home).

7.5.5 Continuing Education: Continuing formal education plays   an important role in an employee's professional development and safe work habits. NASA employees can find professional development opportunities in SATERN, a premier e-Training environment that supports employees' development. SATERN provides one-stop access to high-quality training products and processes to support learning and development (https://satern.nasa.gov/).

7.5.6 Example of Learning Culture

The Nuclear Regulatory Commission requested that NASA decommission a nuclear facility to eliminate the ongoing management of its license, as it was no longer in operation. The Agency and the Center responsible for this facility requested and received authorization from Congress to pursue this project.

The Agency and the Center appointed a project management team that demonstrated previous success with NASA projects and possessed the basic technical skills to address the nuclear hazards. Importantly, the team contracted with companies that required the necessary skill sets to perform the tasks safely while demonstrating the ability to accomplish this kind of work successfully. Because every reactor decommissioning brought its challenges, the team looked for ideas among other reactor decommissioning project teams to learn from their successes and failures. The teams search for innovative ideas helped make the project safer and more effective.

The Project team completed the tasks within the projected budget, on schedule, and without any major mishaps or release of nuclear material. The team presented their lessons learned to peers and to industry groups once finished. It's tradition at NASA to share successes and failures. Sharing lessons with others helps with safe completion of programs and projects similar to NASA's. Continuing this tradition internally and externally, is an example of NASA's Learning Culture.

7.6 Engaged Culture

Involvement and participation of all members of the organization in safe mission's accomplishment creates an Engaged Culture. Leaders and employees demonstrate safety in actions as well as words to create a healthy Engaged Culture. Supervisors involvement and "walking the talk" encourages an engaged workforce.

An Engaged Culture is the culmination of the other four factors: Reporting Culture, Just Culture, Flexible Culture, and Learning Culture. In an Engaged Culture, employees know that their jobs, include mishap prevention, hazard reporting, risk assessment and risk mitigation as part of everyday business. In an Engaged Culture, organizations listen, address raised concerns, and keep everyone moving towards mission success. Organizational flexibility accommodates changes while employees and managers evaluate potential benefits and consequences.

The Five factors represent the building blocks of the Agency's safety culture. Incorporation of these values creates a safety-conscious, engaged workforce. Each component in the five-factor Model depends on the others. We need an environment of trust, free of fear for speaking up, a Just Culture, for reliable Safety reporting. No one will report safety concerns in a culture that is not just. We need an environment of curiosity, a Learning culture to learn from the past and create a Just/Reporting Culture. If safety concerns to unreported the Agency cannot learn from its mistakes and the opportunity to change and adapt is lost. We need a system of collecting and sharing, a Learning Culture, to encourage a Flexible culture that changes to adapt to new needs NASA's interest in change is shaped by the lessons learned from the past. The Agency is more prone to adapt (Flexible) to changes in a Reporting/Just/Learning Culture. We need all components, working together, to achieve safe mission success. One missing component compromises the entire system.

NASA wants engagement from everyone, from the newest technician to top leadership. All employees play an active role in NASA's safety. Engagement from employees at each level of the organization to accomplish the Agency's mission illustrates NASAs Core Value of Safety.

NASA provides numerous tools, so all managers, supervisors, and employees engage in a healthy safety culture. Every employee is encouraged, accountable and responsible for safe mission accomplishment. From employee performance plans to Program Objectives, to NASA's Strategic Plan – every person's behavior makes a difference.

7.6.1 Committees: The following committee examples enable management and employee's engagement at their Centers:

7.6.1.1 Executive Safety Committee: Each Center has a committee comprised of Center senior members that provides oversight to the implementation of safety and health programs and provides direction to the implementation of policies at the Center.

7.6.1.2 Labor-Management Committee: The Centers have a committee, comprised of Center management team members and non-supervisory employees, that meets to address concerns

related to working conditions. Issues discussed by the committee include safety and health conditions at the work facilities.

7.6.1.3 Chartered Safety Committees: These committees, whose membership includes Civil Service and Contractor personnel, provide technical guidance to specific activities and/or processes at the Center. They support the regulatory implementation of programs such as Lifting Devices, Fall Protection, Electrical Applications, and Pressure Vessels.

7.6.2 Example of Engaged Culture

One of the main examples of a Center's Engaged Culture is the pursuit of programs like OSHA's Voluntary Protection Program (VPP). To achieve the coveted Star Certification, all elements of the Center—management and employees—need to come together and work together to demonstrate to OSHA that the Center's Safety and Health Program meets its stringent criteria. The Center's Safety and Health Program has to be compliant, and the loss rates must be below industry standard. The Center that chooses to become Star Certified has to demonstrate that management is involved in the implementation of the Safety and Health Program and that employees are fully involved in all aspect of safety and health implementation. Every member of the Center must do his/her part to achieve success. Once the Center achieves Star Certification, it needs to establish a philosophy of continual improvement to maintain the certification. Those Centers that have accomplished VPP Star Certification are a true example of an Engaged Culture.

8.   NASA SAFETY CULTURE PROGRAM

This section outlines the tools and processes that NASA uses to implement the NASA Safety Culture Program. It describes the Safety Culture Working Group (SCWG) and tools developed by the SCWG to assess the Safety Culture at the Agency. It also defines the training courses and other outreach activities that Centers use to educate and inform employees of the NASA Safety Culture Program.

8.1   Safety Culture Working Group

Purpose: NASA strives to improve its Safety Culture Agencywide. The SCWG develops, reviews, assesses, monitors, and tracks strategic Safety Culture activities at the Agency and Center levels to ensure long-term benefits for all NASA institutions, programs, and employees. For information about SCWG Points of Contact (POCs) please refer to https://sma.nasa.gov/sma-disciplines/safety-culture.

Membership: The SCWG membership consists of
- A Chair representative from Office of Safety and Mission Assurance (OSMA)
- A Co-Chair
- Representatives from each Center
- OCHMO
- OCE
- Other Agency Working Groups / Technical Groups (e.g. Risk Management, Mishap)

The SCWG works to include representatives from communities, programs, and projects without imposing additional administrative burdens.

8.2   Assessment

One of the tools NASA uses to assess Safety Culture is the Agency Safety Culture Survey (SCS). The SCS distribution occurs every two years (NPR 8705.6). The SCWG developed the SCS for personnel at all NASA organizations to assess the Safety Culture at the professional, Directorate, Center, and Agency levels. Employee participation in the SCS is vital; the results are used for benchmarking, trend analysis, and corrective actions, to improve NASA's Safety Culture.

OSMA conducts the NASA SCS throughout the Agency every two years. This is usually in the First quarter of the fiscal year, of the odd numbered year (e.g. Oct-November of 2021, 2023, etc) Each Center The Agency questions apply to all employees, both civil servant and contractors. The Center SCWG POC coordinates additional Center questions with the Center SMA director and Center Director. The SCWG POC works with Center personnel to manage the survey administrator including announcements, reminders and results.

The SCWG POC analyzes the results of the survey with the support of the NASA Safety Culture Manager. At the completion of the analysis, the SCWG POC prepares an outbrief of the survey results to the Center Director and the senior staff. The Centrer POC also sends a copy of the outbrief to OSMA at least one week prior to the Center outbrief for review.

IAW NPR 8705.6 the survey results shall be presented to the Center Director within 90 days from the completion of the survey. After the presentation, the SCWG POC may, at the direction of the Center Director, present the results to the other members of the Center's senior staff. The SCWG POC works with the Center Director and senior staff to develop an Action Plan for safety culture improvements. Center SCWG POCS send their Survey Action Plan to OSMA for tracking. The Center Action Plans are updated quarterly with indications of being open, in progress, or closed. Following the Center Director outbriefs, IAW NPR 8705.6 OSMA shall inform the NASA Administrator of Agency level SCS results 120 days after the closeout of the last survey in the survey cycle. In addition, OSMA may update survey progress, participation, results and action plans as requested.

8.2.1   Survey Questions

Initially, all Centers and their safety organizations contributed to the development of the survey questions. Over the first 10 years, the SCWG designed and updated the survey to be short, with approximately 25 questions in several categories. In the fourth cycle starting in 2018, employees supporting programs, who wished to provide feedback specific to their progra's safety culture, were offered 3 additional safety related questions. A copy of the questions can be found in Appendix B of this Handbook. These include questions regarding Center demographics, the five factors of the Safety Culture Model, and Center-specific questions, and the program questions. To find the SCS, visit https://www.nasascs.org/.

SCS access allows users to participate from any computer or device. Either from their office or home computer. The survey is anonymous in order to encourage honest reporting. Although it reduces the accuracy of the demographic data, SCS anonymity encourages more open communication, which is the priority.

8.2.2   Other Government Surveys

Federal Employee Viewpoint Survey: The Federal Employee Viewpoint Survey is a tool that measures Civil Servant employees' perceptions of whether, and to what extent, conditions characterizing successful organizations are present in their Agencies. Centers use survey results to benchmark employee viewpoints.

Throughout the year, NASA and/or other Agencies may request participation in other surveys to address specific concerns. In addition, Centers may use surveys to gather information on specific issues or concerns. Management will use the results of these surveys to make decisions in support of the employees and the mission of the Agency.

8.2.3   Other: Department of Defense (Army, Air Force, Navy)

The SCS uses the Department of Defense's (DoD) Culture Survey processes as a model. Each DoD program holds the common goal of assessing its branch's culture. The scope and the areas of concern vary among the different DoD branches, as does the NASA survey process.

Air Force Combined Mishap Reduction System: Air Force squadron commanders use the Air Force Combined Mishap Reduction System to help assess their unit's Safety Culture and its impact on operational readiness. The tool is a Web-based survey that provides commanders rapid access to their unit members' perceptions regarding operational and safety-related issues.

Navy/Marine Corps Safety Climate Assessment Surveys: The Navy and Marine Corps use two types of Safety Culture surveys: the Command Safety Assessment survey, which assess an organization's operational practices from a safety perspective, and the Maintenance Climate Assessment Survey, which assesses an organization's maintenance practices from a safety perspective.

Army Readiness Assessment Program: This Web-based tool provides battalion-level commanders with data on their formation's readiness posture through five areas: Process Auditing, Reward Systems, Quality Control, Risk Management, and Command and Control. The commander receives one-on-one feedback on key issues regarding command climate, Safety Culture, resource availability, workload, estimated success of certain safety intervention programs, and other factors relating to his/her unit's overall readiness.

**8.3	Education**

**8.3.1	Formal Training**

There are two formal training courses that provide NASA supervisors, employees, Contractors, interns, etc., with an overview of the NASA Safety Culture Model and how the Model applies to daily activities at the workplace. This training is consistent with NPR 8715.3, NASA General Safety Program Requirements, Chapter 7, Safety Training and Personnel Certification and with OSHA 29CFR1960.55 Basic Program Elements for Federal Employees. These courses are posted in SATERN. The SCWG recommends that everyone takes either the employee or supervisor course.

Orientation to NASA Safety Culture (SATERN Course HQ-SMA-ONSC): "Orientation to Safety Culture" is a Web-based course intended for everyone in the NASA workforce. This includes Civil Service employees, Contractor employees, students and co-ops, military detailees, Intergovernmental Personnel Acts (IPA) assignees, and Presidential appointees. At the completion of this course, the learner will be able to define Safety Culture, recognize the influence of an organization's Safety Culture on individual and group decision-making, describe NASA's vision and goals with respect to Safety Culture, list the five factors defining NASA's Safety Culture, and describe the individual's responsibilities related to each of the five factors.

This course is mandatory to new civil service employees as part of the On-Boarding Process to NASA. It should be completed within 90 days of the service start date.

NASA Safety Culture for Supervisors (SATERN Course HQ-SMA-SCS): "Safety Culture for Supervisors" is a Web-based course intended for leads, supervisors, and managers in the NASA workforce. This includes Civil Service employees, Contractor employees, students and co-ops, military detailees, IPA assignees, and Presidential appointees. At the completion of this course, the learner will be able to define Safety Culture, recognize the influence of an organization's Safety Culture on individual and group decision-making, describe NASA's vision and goals with respect to Safety Culture, list the five factors defining NASA's Safety Culture, and describe supervisors' responsibilities related to each of the five factors.

**8.3.2	Informal Training**

Informal training is an opportunity to reinforce the factors of Safety Culture within day-to-day operations. This includes, but is not limited to:
- **Workshops**: Employees and supervisors can hold workshops to provide additional information, tools, and examples of culture-enhancing behavior and activities.
- **Staff Meetings, Presentations, and Other**: Employees can hold all-hands meetings, staff meetings, and teleconferences on Safety Culture on an as-needed basis. NASA and/or the Center's Web site, emails, and lessons-learned documents are also a means of disseminating additional informal training information.

8.4   Outreach

This section outlines the services, tools, and activities available to educate and reach out to NASA employees, Contractor employees, visitors, etc., on NASA Safety Culture.

Outreach tools and methods include, but are not limited to:

- **Posters, Brochures, and Checklists**: Each Center's SCWG POC can provide material to present the basics of the NASA Safety Culture Model.
- **Web Page**: The NASA Safety Culture Web page is located at http://sma.nasa.gov/sma-disciplines/safety-culture.
- **Newsletters**: Several Center SMA organizations publish safety newsletters that provide information to their Center on a variety of safety and health topics. These newsletters provide information about the NASA Safety Culture Program, the SCS, and other related information.
- **Safety Tips**: Several commercial and NASA services and organizations, such as the NSC, develop safety tips sheets that can be used as part of any safety and health outreach campaign. Some Center SMA organizations use safety tips sheets to address specific internal safety and health concerns. These are often part of safety awareness events and can be found on their Center's SMA Web site.
- **Safety Days and Open Houses**: Centers can use the results of their SCS to develop the theme for the Center's Safety Day or any activity where the importance of safety is conveyed, including refresher training activities.
- **Presenting at Senior Management Meetings**: A key component in the implementation of the NASA Safety Culture is to provide information to the senior management of each Center.
- **Emails**: Centers can use email to provide information about activities at the Center and/or the Agency. Emails can convey information about the SCS, training, and other activities associated with the Safety Culture Program.

APPENDIX A

References

The following are a series of references the SCWG used as part of the development of the NASA Safety Culture Model and the NASA Safety Culture Program:

"Safety Culture Improvement Resource Guide." JPDO Paper No. 08-010. (30 July 2008). Next Generation Air Transportation System, Joint Planning and Development Office. Washington, DC.

"Safety Culture: A Review." (May 2002). p.10. Wiegmann, D; Zhang, H; von Thaden, T; Sharma, G; & Mitchell, A. Aviation Research Lab of Institute of Aviation, University of Illinois at Urbana-Champaign, Savoy, IL.

Managing the Risks of Organizational Accidents. (1997). pp.194-196. Reason, J. Ashgate, Brookfield, USA.

Report of Apollo 204 Review Board, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Apollo 13 Review Board (Cortright Commission), NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Rodgers Commission - Report of the Presidential Commission on the Space Shuttle Challenger Accident, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Columbia Accident Investigation Board Report, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

NASA STEP Case Studies for Apollo I, Apollo 13, Challenger, and Columbia Mishaps Assessment and Plan for Organizational Culture Change at NASA, developed for NASA by Behavioral Science Technologies (BST), March 15, 2004.

Interim Assessment of the NASA Culture Change Efforts developed for NASA by Behavioral Science Technologies (BST), February 16, 2005.

APPENDIX B

Sample Survey Questions

Demographic Questions: Includes several questions to determine status (i.e., Civil Servant, Contractor, military, etc.), level in the organization, occupation, and number of years at the Center.

Safety Culture Model Questions: Includes approximately four questions that assess each of the five factors in the Safety Culture Model.

Center Questions: Centers developed several questions to address specific concerns at their Center. These questions were only used for that Center. This allowed each Center Director to gather information that is relevant and timely for his/her Center.

Quantitative and Qualitative Data: Most of the survey questions are multiple choice and use a Five-point Likert Scale. This allows analysis of quantitative data to gain a quick and broad overview of what people think about their Safety Culture. Most questions included a space for comments and there are also several open-ended questions. This provides more specific information to allow more in-depth analysis to understand what is influencing the numerical scores.

Frequency: Each Center takes the Survey every two years, per NPR 8705.6. The Centers each take the survey at different times. Centers typically announce the survey and leave it open for two to four weeks. The first set of surveys, called Round 1, started in 2009. It took approximately two years for all of the Centers to complete the first survey. Round 2started in 2012. In 2015, Round 3 began.

Philosophy: The results of the survey inform Centers about their Safety Culture and motivate organizations to make targeted improvements. Each Center uses the survey results to develop and track corrective actions. to improve their Safety Culture.

The following are the questions from NASA Safety Culture Survey Round 1:

1. Please rate your immediate work area with respect to its Reporting Culture.
2. Please rate your department with respect to its Reporting Culture.
3. Please rate your Center with respect to its Reporting Culture.
4. Please rate your immediate work area with respect to its Just Culture.
5. Please rate your department with respect to its Just Culture.
6. Please rate your Center with respect to its Just Culture.
7. Please rate your immediate work area with respect to its Flexible Culture.
8. Please rate your department with respect to its Flexible Culture.
9. Please rate your Center with respect to its Flexible Culture.
10. Please rate your immediate work area with respect to its Learning Culture.
11. Please rate your department with respect to its Learning Culture.
12. Please rate your Center with respect to its Learning Culture.

13. Please rate your immediate work area with respect to its Engaged Culture.
14. Please rate your department with respect to its Engaged Culture.
15. Please rate your Center with respect to its Engaged Culture.
16. Please specify the characteristic of Safety Culture that you feel is the most significant.

The following are the questions from NASA Safety Culture Survey Round 2:

1. Please rate your immediate work area with respect to its Reporting Culture.
2. I know how to report safety concerns.
3. People are encouraged to report safety concerns.
4. Reported safety concerns are addressed at my Center
5. Please rate your work area with respect to its Just Culture
6. I am comfortable discussing unsafe conditions with my manager if/when I see them although it may impact my work.
7. People are recognized for their contributions to safety.
8. Appropriate action is taken if safety rules are violated.
9. Please rate your immediate work area with respect to its Flexible Culture.
10. I have contributed to creative solutions to make things safer.
11. People in our organization manage change well.
12. Safety processes change to prevent future mishaps at my center.
13. Please rate your immediate work area with respect to its Learning Culture.
14. We learn from our successes and our failures.
15. People at my Center actively share safety information from past experiences.
16. My Center uses safety information from past experiences in future decision making.
17. Please rate your immediate work area in terms of its Engaged Culture.
18. I share responsibility for improving safety at my Center.
19. Leaders demonstrate they value safety by "walking the talk."
20. Employees get involved when concerned about safety.

The following are the questions from NASA Safety Culture Survey Round 3:

1. Please rate your immediate work area with respect to its Reporting Culture.
2. I know how to report safety concerns.
3. People are encouraged to report safety concerns.
4. Reported safety concerns are addressed at my Center.
5. Please rate your immediate work area with respect to its Just Culture.
6. I am comfortable discussing unsafe conditions without fear of reprisal.
7. People are recognized for their contributions to safety.
8. Appropriate action is taken when safety rules are not followed.
9. Please rate your immediate work area with respect to its Flexible Culture.
10. My Center uses information from past experiences to improve safety.
11. People in our organization manage change well.
12. Processes change to improve safety at my Center.
13. Please rate your immediate work area with respect to its Learning Culture.
14. We learn from our successes and our failures.
15. People at my Center actively share safety information from past experiences.

16. Employees in my work area share knowledge with each other.
17. Please rate your immediate work area with respect to its Engaged Culture.
18. I share responsibility for improving safety at my Center.
19. Supervisors share responsibility for improving safety at my Center.
20. Leaders demonstrate they value safety by "walking the talk."
21. Employees are protected from health and safety hazards on the job.
22. I have sufficient resources (e.g., people materials, budget) to get my job done safely.

The following are the questions from NASA Safety Culture Survey Round 4:

1. Please rate your immediate work area with respect to its Reporting Culture.
2. I know how to report safety concerns.
3. People are encouraged to report safety concerns.
4. Reported safety concerns are addressed at my Center.
5. Please rate your immediate work area with respect to its Just Culture.
6. I am comfortable discussing unsafe conditions without fear of reprisal.
7. People are recognized for their contributions to safety.
8. Appropriate action is taken when safety rules are not followed.
9. Please rate your immediate work area with respect to its Flexible Culture.
10. My CENTER uses information from past experiences to improve safety (new)
11. People in our organization manage change well.
12. Processes change to improve safety at my Center.
13. Please rate your immediate work area with respect to its Learning Culture.
14. We learn from our successes and our failures.
15. People at my CENTER actively share safety information from past experiences.
16. Employees in my work area share knowledge with each other.
17. Please rate your immediate work area with respect to its Engaged Culture.
18. I share responsibility for improving safety at my center.
19. Supervisors share responsibility for improving safety at my Center. (new)
20. Leaders demonstrate they value safety by "walking the talk."
21. In the last 12 months, I've been asked or felt pressured to compromise safety to get my job done.
22. I have sufficient resources (e.g., people materials, budget) to get my job done safely.

The following are the questions from NASA Safety Culture Survey Round 5:

1. Please rate your immediate work area with respect to its Reporting Culture.
2. I know how to report safety concerns.
3. People are encouraged to report safety concerns.
4. Reported safety concerns are addressed at my Center.
5. Please rate your immediate work area with respect to its Just Culture.
6. I am comfortable discussing unsafe conditions without fear of reprisal.
7. People are recognized for their contributions to safety.
8. Appropriate action is taken when safety rules are not followed.
9. Please rate your immediate work area with respect to its Flexible Culture.
10. My CENTER uses information from past experiences to improve safety (new)

11. People in our organization manage change well.
12. Processes change to improve safety at my Center.
13. Please rate your immediate work area with respect to its Learning Culture.
14. We learn from our successes and our failures.
15. People at my CENTER actively share safety information from past experiences.
16. Employees in my work area share knowledge with each other.
17. Please rate your immediate work area with respect to its Engaged Culture.
18. I share responsibility for improving safety at my center.
19. Supervisors share responsibility for improving safety at my Center.
20. Leaders demonstrate they value safety by "walking the talk."
21. I have **not** been pressured to cut corners or compromise safety.
22. I have sufficient resources (e.g., people materials, budget) to get my job done safely.

APPENDIX C

Mishap Investigation Safety Culture Considerations

Upon completion of the investigation's determination of mishap causal factors, assess the extent to which each of NASA's five safety cultural elements were evident.

Reporting Culture: We report our concerns. *In a Reporting Culture, everyone is encouraged to report safety concerns. An atmosphere of trust exists between leadership and employees, with employees knowing that important information will be heard and acted upon appropriately. No one should ever be afraid to speak up; it could save a life.*

RED	**Multiple deficiencies in this element were significant issues in one or more causal factors.**
YELLOW	**One or more deficiencies in this element had some relevance to the mishap.**
GREEN	**It was not readily apparent that there were deficiencies in this element relevant to the mishap.**

Considerations for investigation and witness interviews:
- What are appropriate reporting processes? Do personnel involved in the mishap know them?
- Do personnel know of independent reporting avenues such as NSRS, Close Call or OSHA?
- Do personnel encourage each other to speak up about known issues, defects or hazards?

Just Culture: We have a sense of fairness. *A Culture that is Just balances the need for discipline when warranted, with rewards when earned. People clearly understand acceptable and unacceptable behaviors. There's a sense of fairness in how business is conducted for everyone. In a Just Culture, those in authority do not "shoot the messenger" for bringing up safety concerns.*

RED	Multiple deficiencies in this element were significant issues in one or more causal factors.
YELLOW	One or more deficiencies in this element had some relevance to the mishap.
GREEN	It was not readily apparent that there were deficiencies in this element relevant to the mishap.

Considerations for investigation and witness interviews:
- Are management expectations understood and respected?
- Do personnel, including leaders, involved in the mishap model convey behavioral norms?
- Do personnel treat each other with respect?
- Is a lack of fairness in relationships, rewards, discipline, assignments, or other aspects evident in the workplace?

Flexible Culture: We change to meet new demands. *A Flexible Culture is one that builds in resilience from the beginning. It enables an organization to adapt to unforeseen developments and make changes based on incoming trend information. It also allows an organization to push past obstacles when something new or different happens. In a Flexible Culture, operations aren't disrupted by additional demands, but continues to operate in a steady state to successfully complete the mission.*

RED   Multiple deficiencies in this element were significant issues in one or more causal factors.

YELLOW One or more deficiencies in this element had some relevance to the mishap.

GREEN   It was not readily apparent that there were deficiencies in this element relevant to the mishap.

Considerations for investigation and witness interviews:
- Are changes consistently communicated?
- Do personnel understand and accept change decisions?
- Do personnel cooperate to make change successful?

Learning Culture: We learn from our successes and mistakes. *In a Learning Culture, employees collect, assess and share information, both formally and informally. That includes continuing education programs such as SATERN and the Safety and Mission Assurance Technical Excellence Program, as well as resources on the NASA Engineering Network and NASA Safety Center websites. It is important for employees to learn from their experiences and apply that knowledge to their jobs.*

RED   Multiple deficiencies in this element were significant issues in one or more causal factors.

YELLOW One or more deficiencies in this element had some relevance to the mishap.

GREEN   It was not readily apparent that there were deficiencies in this element relevant to the mishap.

Considerations for investigation and witness interviews:
- Are there systems in place that are routinely used to share relevant lessons?

- Do personnel involved in the mishap routinely contribute relevant lessons to coworkers?
- Do personnel involved in the mishap routinely access lessons relevant to their work?

Engaged Culture: Everyone does their part. *An Engaged Culture ties together the other four cultures. Regardless of status or occupation, all NASA employees actively participate in safely accomplishing the agency's mission. The key is having engaged leaders and employees who demonstrate they value safety and get involved.*

RED	Multiple deficiencies in this element were significant issues in one or more causal factors.
YELLOW	One or more deficiencies in this element had some relevance to the mishap.
GREEN	It was not readily apparent that there were deficiencies in this element relevant to the mishap.

Considerations for investigation and witness interviews:
- Do personnel routinely discuss or act on potential safety or other process improvement ideas?
- Is it evident that each person contributes to and is recognized for their contributions to the workplace?
- Are leaders respected for providing relevant guidance?