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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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Approval Date

FOREWORD

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NASA SAFETY CULTURE HANDBOOK

1. SCOPE

1.1 Purpose

The purpose of this Handbook is to define the NASA Safety Culture Program and to provide guidance in the development and implementation—sustainment, growth, and practice—of Safety Culture at the Center level. It defines 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 is approved for use by all NASA personnel (Civil Service and Contractor) at NASA Headquarters (HQ) and NASA Centers, including Component Facilities and Technical and 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 culture has been one of outstanding technical and scientific achievement. However, the Agency has also experienced failures and mishaps that created the need to make improvements by learning from the past. After the *Columbia* accident in 2003, NASA endeavored to transform its organizational and safety culture. A variety of efforts were undertaken to improve NASA's safety culture. In 2009, a coordinated Safety Culture Working Group (SCWG) representing each of the Centers was established via charter 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 accepted 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 is 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 of the NASA Safety Culture.

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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 8715.1	NASA Occupational Safety and Health Programs
NPR 8715.3	NASA General Safety Program Requirements
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

AFCAST	Air Force Culture Assessment Survey Tool
ARAP	Army Readiness Assessment Program
CSA	Command Safety Assessment
DASHO	Designated Agency Safety and Health Official

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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 has also been 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.

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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, 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.
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's objectives are to create a culture in which:

- Employees share a common goal of creating a safe and healthful workplace (Engaged Culture).
- Top management is involved with safety and provides leadership (Engaged Culture)
- Safety evolves from a priority to a value (Flexible Culture).
- Management not only expects hazard reporting but also values and rewards it (Reporting Culture/Just Culture).

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- Employees go beyond the call of duty in finding hazards and feel comfortable reporting them (Engaged Culture/Reporting Culture).
- Incident investigations are based on fact-finding instead of faultfinding (Reporting Culture/Just Culture).
- Everyone feels responsible and pursues safety and health every day (Engaged Culture).
- Employees intervene with and coach one another (Learning Culture).

5. NASA SAFETY CULTURE PROGRAM VISION

The NASA Safety Culture Program envisions an environment characterized by safe attitudes and behaviors modeled by leaders and embraced by all that fosters an atmosphere of open communication, mutual trust, shared safety values and lessons, and confidence that we will balance challenges and risks consistent with our core value of safety to successfully accomplish our mission.

The NASA Safety Culture Program supports and reinforces NASA's Core Values are outlined in the Governance and Strategic Management Handbook, NPD 1000.0. When the NASA's Core Values of Safety, Excellence, Teamwork, and Integrity 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 the Governance and Strategic Management Handbook, NPD 1000.0B. As stated there: "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, and Integrity (see Figure 1). When these core values are applied together in each employee's day-to-day activities, Mission Success is realized. Space Shuttle, Space Station, Opportunity, Spirit, and Curiosity are examples of programs that have embraced NASA's Core Values and achieved mission success.

NASA-HDBK-8709.24—November 23, 2015**Figure 1: NASA Core Values****6.2 Safety**

Safety is one of NASA's core values. You can think of the core values as part of our NASA DNA; they're the master molecules embedded in all of our 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 the safety of its people was paramount to accomplish the mission of advancing the world of aeronautics and the exploration of space. From these experiences, successes, and failures, NASA's Safety Program evolved to be one of the best in the world. It is from these experiences that the NASA Safety Culture was developed. As NASA embarks in a new direction and new challenges, it is important to look at the Safety Culture, how it evolved, where it is now, and how it needs to change to continue mission success.

7. NASA SAFETY CULTURE MODEL**7.1 Five Factor Model**

The NASA Safety Culture Model is composed of the five factors of Reporting Culture, Just Culture, Flexible Culture, Learning Culture, and Engaged Culture. The Model should be used to assess safety culture during mishap investigations and during organizational assessments. The Model could be beneficial to develop an action plan to address any safety culture issues discovered.

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The next few sections will provide a description of each of the five factors of NASA's Safety Culture Model, as well as examples that could be used 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 can be viewed as part of 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 is designed as 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 is dependent upon the others. If one component is missing, the entire system will fail. Everyone—from the newest technician to top NASA leadership—should take an active role in the Agency's safety.

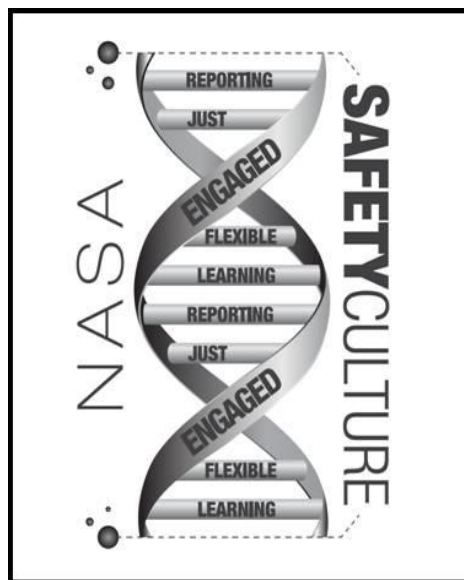


Figure 2: NASA Safety Culture Logo

7.2 Reporting Culture

In a Reporting Culture, employees are strongly encouraged to report hazards or safety concerns. The reporting system should be user-friendly, maintain anonymity, and be separate from disciplinary processes. Feedback based on reporting should be quickly accessible and insightful. In a healthy Reporting Culture, employees know important information will be voiced, heard, and acted on appropriately, which creates an atmosphere of trust between managers and workers.

There are many avenues, both formal and informal, to report safety concerns at NASA. All these processes are available to employees—Civil Servants, Contractors, visitors, students, faculty, etc. Each Center also has specific processes and procedures to report safety concerns.

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It is critical that employees understand that they will not be adversely affected in any way for reporting a safety concern. If the employee is harassed, punished, or discriminated in any way by the employee's peers, management, or organization, the employee should contact the Center's SMA organization immediately.

In pursuit of NASA's next generation of programs and projects, it is important that concerns are communicated. When recognizing hazards, potential risk, employee concerns or process issues, employees need to inform management and/or the safety organization.

7.2.1 Formal Reporting

At NASA, employees are encouraged to actively look for, analyze, and report safety concerns. It is important to report any unsafe issue, big or small, whether it presents an immediate danger or not. These reports allow management to assess trends, identify problems, and find solutions before mishaps occur.

Everyone at NASA is responsible for reporting suspected safety or health hazards to appropriate officials. There must be a commitment to protect the safety and health of the general public and all elements of the workforce as well as preventing damage or destruction of high-value assets.

7.2.1.1 Reporting to Supervisor – Employees should always report safety and health concerns to their supervisor. The supervisor is responsible to address any safety and health concerns related to his/her direct reports and/or the area(s) of responsibilities.

7.2.1.2 Center-Level Reporting – If the employee, after reporting to the supervisor does not feel satisfied with the action taken, he/she should elevate the concerns to the Center's Safety and Mission Assurance Organization. In addition, the concerns could be reported through the Center's Facility Management organization.

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.

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

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

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7.2.1.3 Agency-Level Reporting – If an employee does not feel the problem has been resolved at the Center level, he/she can report the problem to NASA HQ. There are two organizations that are responsible to address safety and health concerns – the Office of the Chief Health and Medical Officer (OCHMO) or OSMA. The OCHMO is the Designated Agency Safety and Health Official (DASHO) for NASA.

7.2.1.4 NSRS - If an employee still doesn't feel like the problem has been resolved neither at the Center level nor the Agency level, he/she can report a problem anonymously using the NASA Safety Reporting System (NSRS) (see Figure 3). NSRS is an anonymous, voluntary, and responsive reporting channel to notify NASA's upper management of an employee's concerns about hazards and safety issues. To use NSRS, employees download the reporting form, fill it out, and mail it to the address shown on the document. The document is received by an independent third party who removes all identifying information and forwards the report to the proper level of management at NASA. If the employee includes his or her contact information or email address in the report, the third party will send a reference code and a link to a website, which the employee can use to track the status of the report.

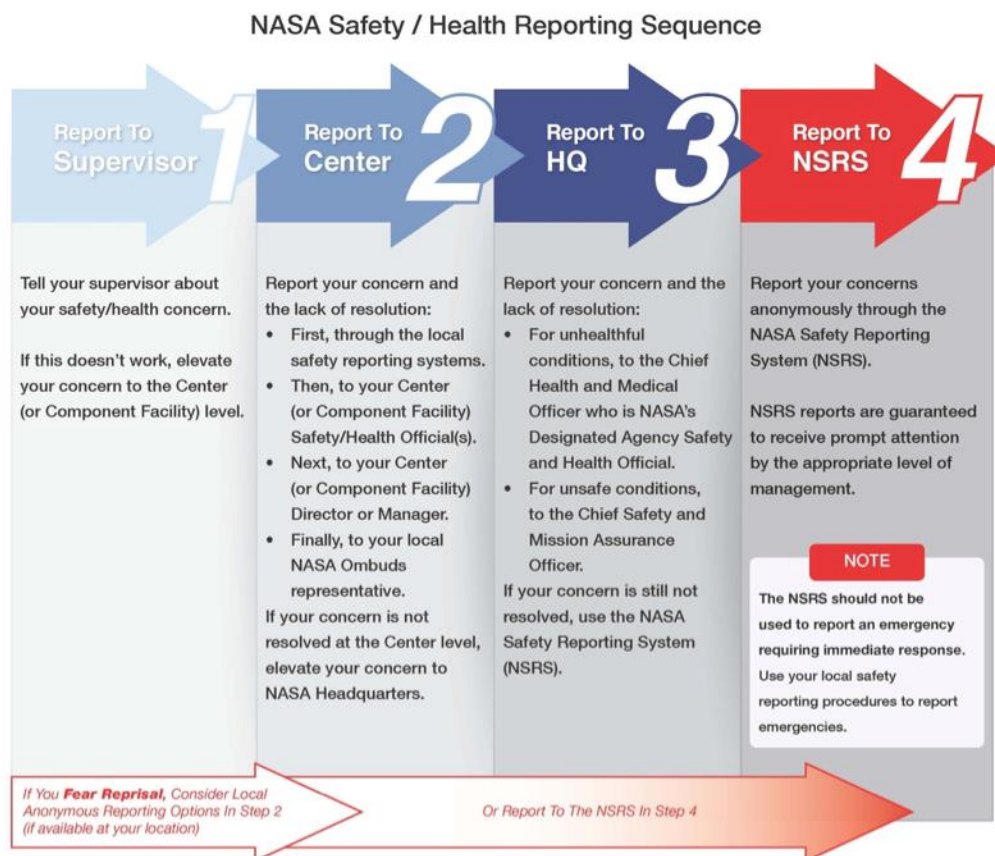


Figure 3: NASA Safety Reporting System Chart

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7.2.1.5 NASA Mishap Information System (NMIS) – All mishaps and close calls involving NASA personnel and/or their Contractors and NASA property are required to be reported using the NMIS. All mishaps and close calls will be investigated to ensure that the conditions of the mishap do not happen again.

7.2.1.6 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 these criteria, the employee can report his or her concerns to the Center's OIG office.

7.2.1.7 OSHA – The Occupational Safety and Health Administration (OSHA) establishes safety and health requirements at Federal facilities. 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 safety concern reported by the employee.

7.2.1.8 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 3.3.2.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).)

7.2.1.9 Dissenting Opinion – A dissenting opinion is a disagreement with a decision or action that an individual judges is of sufficient importance that it warrants a specific review and decision by higher-level management, and the individual specifically requests that the dissent be recorded and resolved by the dissenting opinion process (see NPR 7120.5).

A dissenting opinion expresses that a decision or action, in the dissenter's opinion, should be changed for the good of NASA and requests a review by higher-level management. In this context "for the good of NASA" should be read broadly to cover mission success, safety, project, program, etc.

7.2.2 Informal Reporting

7.2.2.1 Open Door Policy – Many organizations have an "Open Door Policy" where it is permissible for an employee to discuss issues and concerns with management informally at any time. This is an open and transparent communication with management.

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7.2.2.2 Email – Email could be used for written communication to management to convey issues and concerns. The employee could use this media to document his or her concerns and provide additional information (photos, references, etc.) that could be used as additional documentation to validate 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. Upon investigation, the material was identified as beryllium (which can have serious health effects). The machinist that observed and halted the operation was recognized with an Ames Safety Award for speaking up. This is a great example of Reporting culture.

7.3 Just Culture

A Just Culture balances the need for discipline when warranted with rewards when earned. In a Just Culture, there is a clear understanding of acceptable and unacceptable behaviors. There is also a sense of fairness in how business is conducted; employees are not afraid of reporting safety concern.

Employees are less willing to inform an organization about their errors and other safety problems or hazards if afraid of being punished or held accountable. A lack of trust from employees prevents the management from being properly informed of risks. Managers are then unable to make informed decisions in order to improve safety. However, a totally “no-blame” culture is neither feasible nor desirable. Some level of accountability is desirable when a mishap occurs.

Supervisors should strive to praise in public and to reprimand in private. This fosters an environment where supervisors and employees can address their concerns in a professional manner, without the scrutiny or the judgment of others not involved in the resolution of the concern.

7.3.1 Fear of Reprisal – How an organization responds to a reported incident, accident, or concern determines if employees will feel comfortable to report again. In a Just Culture, all employees will 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 concealment, avoidance, 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 mistakes or concerns. At NASA, this is done through formal or informal awards processes that vary by Center. 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, Safety Awards Program, pins

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such as the “Safe, Not Sorry” pin, ice cream socials, certificates, and coins.

7.3.3 Discipline— In a Just Culture, employees will not be disciplined if their behavior was not intentional or negligent. For example, NASA’s Mishap Program focuses on finding the root cause of the mishap instead of placing blame. Employees are given the opportunity to learn from their mistakes to prevent recurrence. However, when employees demonstrate unacceptable behaviors, such as knowing violations of NASA Safety Policies and Requirements, they must be held accountable for their actions. It is important to note that supervisors need to correlate the disciplinary action to the individual who demonstrated the unacceptable behavior and not to the one who reported the incident, accident, or concern.

7.3.4 Process for Reprimand and Counsel – For those civil service personnel who demonstrate an unacceptable behavior, NASA has SREF-3000-0020, NASA Desk Guide for Table of Disciplinary Offenses and Penalties. Contractors should 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. Autonomous flight research and development was performed by JSC, 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 KSC employee who had observed the operation was recognized by the JSC Center Director. This is a great 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.

In a Flexible Culture, change is made both proactively and reactively. A Flexible Culture strives to continuously improve rules, procedures, and systems in order to safely accomplish the mission.

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The Agency will benefit if a Flexible **Culture is part of its cultural core**. To create a culture of flexibility, leaders, managers, and employees must define solutions for problems or challenges. Employees at all levels will have to be open to change to address the evolving needs of the Agency. They should determine how people at all levels will have to do their jobs differently and effectively to address the changing needs of the Agency.

7.4.1 Disruptions – Disruptions may occur that require employees to rethink existing decisions, rules, or processes. Disruptions could be either external or internal. A hurricane, changes to NASA's budget, or even scheduling pressures could be considered external disruptions. Internal system disruptions, such as a human or computer failure, could cause loss of function. The only way the Agency can effectively respond to these kinds of disruptions is if it maintains flexibility in its planning and responses and continually improves its processes.

7.4.2 New Challenges – Unanticipated challenges may require flexibility in order to achieve goals safely.

7.4.3 Resilience – Resilience may be necessary when facing a situation of any size. Here are just a few examples of when resilience is needed:

- Making a safety decision when the subject matter is in one's area of expertise.
- Reporting when new information or trends indicate that the current process is unsafe.
- Telling a supervisor when an employee does not understand how to follow a procedure or process.
- Adapting to negative feedback.
- Adjusting to roadblocks that cause delay to the project's timeline or budget.

7.4.4 Example of Flexible Culture

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

The GRC team had plenty of experience manufacturing test articles; however, this was their first time manufacturing flight hardware. The team came together very 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 had to augment skill shortages within their own civil service staff with union welders to meet schedule requirements. Leadership managed to integrate the all disciplines into an effective project team.

The GRC team also had to plan and execute the transportation of the segments from the Glenn Research Center to Kennedy Space Center (KSC) — over 1,000 miles away — for assembly and

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launch. The team was able to deliver the segments on schedule, and also supported the integration of the vehicle at KSC for launch. The Ares I-X test vehicle was launched successfully and on schedule. This is a true 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 its success and its mistakes. Collecting, assessing, and sharing from experience is a priority. Information should be available to everyone, from novice to expert.

NASA has had both unforgettable failures and spectacular successes, and the Agency has learned from both. As NASA continues to pursue the unknown, it is imperative that it embraces a Learning Culture. NASA is adept at determining what went wrong after a failure occurs; the challenge is assessing the supporting elements of its successes.

Within a Learning Culture, NASA should make continuous learning a part of day-to-day activities. Employees and supervisors should outline a development plan for each member of the team. Aside from training, there should be defined activities and experiences that will allow the employee to grow and learn new skills to be used as part of his or her duties.

In addition, within a Learning Culture, the Agency needs to look at failures honestly and understand what happened. NASA mishap investigations are not faultfinding investigations. The process reviews/assesses what happened and why so processes are changed/improved to reduce the risk 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 to 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, topics, or year. While a number of the lessons relate to the technical aspects of projects, there are a variety of lessons to be learned.

7.5.2 NASA Engineering Network – In the NASA Engineering Network, the employee can gain valuable insight into the human factors that resulted in mishaps and near misses. The Agency encourages all employees to visit the website, <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>. Studying these cases will allow the user to analyze safety failures and gain insight into why accidents happen, what factors were present, how culture can impact the propensity for an accident and the outcomes of accidents, and—most importantly—how an individual can step up 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 six

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disciplines: Aviation Safety, Operational Safety, Quality Engineering, Reliability and Maintainability, Software Assurance, and System Safety. There are additional curriculums for those with cross-discipline or leadership interests. STEP provides NASA with a means to measure and continuously advance the proficiency of the SMA workforce. The Knowledge Management Systems Office, an element of the NSC, manages the program.

7.5.5 Continuing Education – Continuing formal education is also an important factor in an employee's ability to work safely. 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.

7.5.6 Example of Learning Culture

The Nuclear Regulatory Commission (NRC) 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 had great success with NASA projects, and had the basic technical skills to address the nuclear hazards. In addition, the team contracted with companies that had the skills to perform the necessary tasks and had demonstrated the ability to accomplish this kind of work safely. Because every reactor decommissioning has its challenges, the team was always looking for ideas among other reactor decommissioning project teams to learn from their successes and failures. The team was always looking for innovated ideas and processes to make the project safer and more effective.

The project was completed within the projected budget and schedule, and without any major mishaps or release of nuclear material. Once the project was completed, the team presented their lessons learned to peers and to industry groups. It has been tradition at NASA to share our successes and failures. These lessons need to be shared with others to ensure a safe completion of programs and projects similar to ours. This is the true example of a Learning Culture.

7.6 Engaged Culture

In an Engaged Culture, all members of the organization are involved and actively participate in safely accomplishing the mission. To have a healthy Engaged Culture, leaders and employees demonstrate safety in actions as well as words. Getting involved and "walking the talk" shows an engaged workforce.

An Engaged Culture is a compilation of the other factors – Reporting Culture, Just Culture, Flexible Culture, and Learning Culture. In an Engaged Culture, employees not only do their jobs, but also ensure that mishaps are prevented, hazards are reported, and actions are taken before a mishap occurs. Accountability concerns are addressed within the organization to ensure that everyone contributes to the success of the mission. The organization is flexible enough to

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accommodate changes, and its employees and managers are always evaluating their actions to learn from their successes and failures.

The previous four factors are the building blocks of the Agency's culture connected by a safety-conscious, engaged workforce. Each component in the five-factor Model is dependent on the other. No one will report safety concerns in a culture that is not just. If no one reports safety concerns we cannot learn from our mistakes. If safety concerns go unreported the opportunity to change and adapt is lost. Our ability to change and adapt is shaped by the lessons learned from the past. The Agency is more prone to adapt to changes in a Just Culture. If one component is missing, the entire system fails.

NASA wants everyone, from the newest technician to top leadership, to be engaged and take an active role in NASA's safety. All employees have to do their part at each level of the organization to accomplish the Agency's mission. All employees need to be fully engaged and hold safety as a Core Value.

NASA managers, supervisors, and employees have all the necessary tools to be engaged in the culture. Every employee performance plan states how the employee's assignments and duties support NASA's Strategic Plan. Therefore, every employee should know that he or she is accountable, responsible, and permissible to do his or her part to accomplish the mission.

7.6.1 Committees – The following are examples of committees that enable management and employees to be engaged at their Centers:

7.6.1.1 Executive Safety Committee – Each Center has a committee comprised of senior members of the Center 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 members of the Center management team and non-supervisory employees that meet to address concerns related to working conditions. Among the 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 their 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

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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 or 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 who have accomplished VPP Star Certification are a true example of an Engaged Culture.

8. NASA SAFETY CULTURE PROGRAM

The tools and processes that NASA uses to implement the NASA Safety Culture Program are outlined in this section. It describes the Safety Culture Working Group and all of the tools they have developed to assess the safety culture at the Agency. It also defines the training courses and other outreach activities that have been used at the Centers to educate and inform employees of the NASA Safety Culture Program.

8.1 Safety Culture Working Group (SCWG)

Purpose – NASA strives to improve its Safety Culture Agency-wide. 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 POC 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, and
- The NASA Office of the Chief Health and Medical Officer.

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 Safety Culture Survey (SCS). The SCS is distributed triennially. The SCWG developed the SCS for personnel at all NASA Centers and NASA HQ to rate their safety culture at the organizational, Directorate, Center, and Agency levels. It is important for all employees to participate in the SCS; the results are used for benchmarking, trend analysis, and sharing results to build awareness and improve NASA's Safety Culture.

The SCS is conducted at the Center level. The SCWG point of contact (POC) coordinates with the SMA Director and the Center Director on the dates of the survey. Once the dates are established, the SCWG POC works with senior management to define the Center-specific questions that will be included for that Center's SCS only. The SCWG POC works with Center personnel to announce the dates of the SCS and encourage Center personnel (Civil Service and

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Contractor) participation. Before the SCS begins, the Center Director will send a note encouraging all Center personnel to take the survey. Once the SCS closes, the SCWG POC will verify that there are enough respondents to validate statistical significance.

The SCWG POC will analyze the results of the survey with the support of the NASA Safety Culture Manager. At the completion of the analysis, the SCWG POC will prepare a presentation to brief the results to the Center Director and the senior staff. The SCWG POC coordinates with the NASA Safety Culture Manager and the Center's SMA Director in the development of the presentation.

The SCWG POC will present the survey results to the Center Director. 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. If there are any areas the Center Director and his/ her staff would like to address, the SCWG POC may develop a plan to address these concerns.

The Chief of OSMA will also be briefed on the survey results and will send a letter of encouragement to the Center Director to address any concerns.

8.2.1 Survey Questions

The survey questions were developed with the input from all of the Centers and their safety organizations. It was designed to be short, with approximately 25 questions in several categories. A copy of the questions used 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. The SCS can be found at <https://www.nasascs.org/>.

The SCS is hosted outside the NASA firewall to allow users to participate from their office or home computer. There is no way to track the survey to an individual in order to encourage honest reporting. Although it reduces the accuracy of the demographic data, the SCS's 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. Survey results are used by the Centers 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.

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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 their 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 AFCMRS (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 (CSA) survey, which assess an organization's operational practices from a safety perspective, and the Maintenance Climate Assessment Survey (MCAS), which assesses an organization's maintenance practices from a safety perspective.

Army Readiness Assessment Program (ARAP) – 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 their unit's overall readiness.

8.3 Education

8.3.1 Formal Training

There are two formal training courses to 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 the System for Administration, Training, and Education Resources for NASA (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.

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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** – Workshops can be held periodically with employees and supervisors to provide additional information, tools, and examples of culture-enhancing behavior and activities.
- **Staff Meetings, Presentations, and Other** – All-hands meetings, staff meetings, and teleconferences on Safety Culture can be held 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** – Material to present the basics of the NASA Safety Culture Model can be obtained from each Center’s SCWG point of contact.
- **Web Page** – The NASA Safety Culture Web page is located at <http://sma.nasa.gov/sma-disciplines/safety-culture>.
- **Newsletters** – Several Center’s Safety and Mission Assurance (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, such as the NASA Safety Center (NSC), develop safety tips sheets that can be used as part of any safety and health outreach campaign. Some Centers’ 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** – The results of a Center’s SCS can be used to develop the theme for the Center’s Safety Day or any activity where the importance of safety is conveyed, including refresher training activities.

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- **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** – Email can provide information about activities at the Center and/or the Agency. It can be used to convey information about the SCS, training, and other activities associated with the Safety Culture Program.

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APPENDIX A

References

The following are a series of references used by the SCWG 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.

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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: Each Center 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 their Center.

Quantitative and Qualitative Data: Most of the survey questions are multiple-choice and use a 5-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 were 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 3 years. The Centers each take their Surveys at different times. They typically announce the Survey and leave it open for 2 to 4 weeks. The first set of Surveys was called “Round 1” and was started in 2009. It took approximately 2 years for all of the Centers to complete their first Survey. Round 2 was started in 2012. In 2015, Round 3 began with the Centers.

Philosophy: The results of the Survey are intended to be used to inform Centers about their safety culture and to motivate organizations to make targeted improvements. Therefore, the results of each Center are not compared with other individual Centers, only to the average of all Centers. This encourages honest reporting. Each Center was encouraged to use the Survey results in a way that would be most useful to improve their safety culture rather than mandating particular changes for all Centers.

The following are the questions used for the 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.

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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 used for the 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 used for the 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.

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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.

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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 5 Safety Cultural elements were evident.

Reporting Culture: We report our concerns. *Identification of hazards or safety concerns is encouraged, including a system that is easy to use. The reporting system maintains anonymity and is separate from the disciplinary processes. Useful feedback based on reporting is quick and insightful. An atmosphere of trust exists between managers and workers, with employees knowing important information will be voiced, heard, and acted on appropriately.*

- 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. *Balances the need for discipline when warranted, with rewards when earned. People are held accountable for the deliberate violations of rules, as well as recognized for outstanding performance. There's clear understanding of acceptable and unacceptable behaviors. There's a sense of fairness about how business is conducted, where people aren't punished for reporting and aren't afraid of reprisal if they do.*

- 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.

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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. *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.*

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. *Collecting, assessing, and sharing from experience is a priority. Information is available to everyone from novice to expert. Values and commits to proactively "learn from our mistakes," both formally and informally.*

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?

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Engaged Culture: Everyone does their part. *All members regardless of status or occupation are involved and actively participate in safely accomplishing the mission. The key is to have leaders and employees who demonstrate that safety is valued by “walking the talk.”*

- 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?