



May 22, 2010

Vice Admiral Joseph W. Dyer, USN (Ret.)  
Chair  
Aerospace Safety Advisory Panel  
National Aeronautics and Space Administration  
Washington, DC 20546

Dear Admiral Dyer:

Enclosed are NASA's responses to recommendations 2009-03-01a, b, and 2009-03-02 from the 2009 Third Quarterly Meeting of the Aerospace Safety Advisory Panel (ASAP). Please do not hesitate to contact me if the Panel would like further background on the information provided in the enclosures.

I look forward to receiving continued advice from the ASAP that results from your important fact-finding and quarterly meetings.

Sincerely,

A handwritten signature in black ink, appearing to read "CBJ", written over a light blue horizontal line.

Charles F. Bolden, Jr.  
Administrator

2 Enclosures:

1. NASA Response to 2009-03-01 JPL Safety Performance
2. NASA Response to 2009-03-02 JPL Assessment Process

**Tracking Number 2009-03-01**  
**JPL Safety Performance**

**Recommendation**

**2009-03-01a:** “In order for JPL’s leadership to improve their current excellent safety record even further, we recommend that:”

1. The leadership express that challenge and their commitment to this to their workforce.

**NASA Response**

NASA and JPL agree, JPL has implemented a renewed emphasis on communicating the commitment to further improve the Lab’s safety record through the following actions:

- The JPL Director reaffirmed JPL’s commitment to safety at the Center All Hands Meetings.
- The new JPLSpace Home Web page has a prominent Safety link to the Occupational Safety Program Office with a clear message of management commitment to safety through expanded employee communication, expanded safety early reporting, improvement on employee wellness and health self-help programs, and particular focus of JPL-specific issues.
- The JPL Director has challenged JPL to reduce the Lab’s Total Case Rate for Injuries/Illnesses and do better than the NASA reduction goal.
- To effectively implement this challenge, the JPL Director and the Executive Council (EC) receive a report on safety statistics and actions on a quarterly basis and, when necessary, provide the appropriate feedback and redirection.
- The JPL Deputy Director reviews and signs the Annual Safety and Health Plan, participates in the Safety Coordinator’s Quarterly meetings to obtain first-hand information and feedback, and goes on ad-hoc safety “walk arounds.”

**Recommendation**

2. “Working with middle management and others--develop an action plan that implements improvements using an approach similar to the “continuous improvement process” used in manufacturing (often called the “lean” process or the (Six Sigma--“define, measure, analyze, improve, and control” (DMAIC)) process.

**NASA Response**

NASA and JPL agree and, reflecting the spirit of this recommendation, JPL has recently created and published a Mars Science Laboratory Human Factors Management Plan to proactively address and further reduce the number of issues arising during flight projects’ critical phases. This plan integrates the specific oversight and managerial responsibilities of line managers, project managers, occupational health, system safety, and mission assurance managers in a single, complete document. As a specific example, line managers are required to monitor and report weekly to the Safety Office on their employees’ work hours (in various categories) reflecting potential risk for the onset of fatigue.

Enclosure 1

The overall plan for using continuous improvement activities with the active involvement of middle management can be substantiated in five separate safety-related activities:

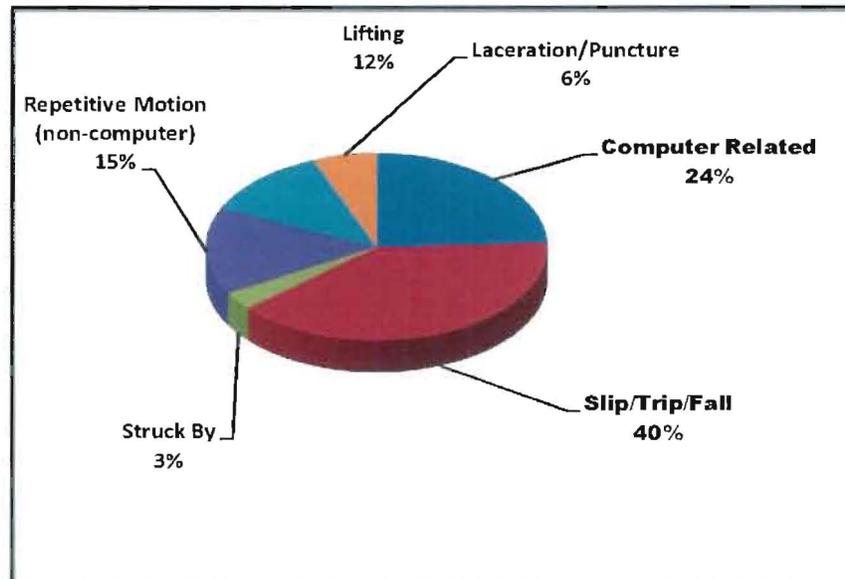
1. JPL has engaged middle management in an improvement of the inspection program through full participation in the adoption of real-time data capture to a programmable hand-held device (Pervidi Program) during safety audits.
2. JPL has engaged middle management in the process of inputting and reviewing mishap or close call data, briefing the laboratory safety committee, developing the details relative to lessons learned, and informing other critical players within the organization in order to initiate safeguards necessary to improve the safety of the workplace and continually improve the reporting process.
3. To fully implement the Pre-Operational Safety Review Program effectively, JPL involves the manager responsible for the operation in the review and sign-off, in addition to the review, input, and update of the various program elements.
4. In order to assess and continually ensure that all JPL projects have a full opportunity to provide additional input to the process of system safety risk review, the Laboratory is engaging middle managers in a customer input survey to ferret out any gaps that might be identified within the systems' safety engineering interface within the project life cycle.
5. JPL has recently piloted unique ergonomic improvement online programs that are automated to enhance the taking of breaks during work periods throughout the day. Many of the managers are part of a working team effort to enhance improvements by ensuring awareness is raised in this regard and that specific actions have been taken to reduce injury and promote wellness.

JPL recognizes that safety, by its very nature, requires continuous improvement. Continuous safety process improvement is part of the JPL culture and management operating mode. Using a practice analogous to the Six Sigma process, JPL has defined a set of measurable safety-related events, is keeping accurate statistics, and has analyzed the data to perform trend analysis to identify the top issues. JPL uses both leading and lagging indicator metrics to enable continuous improvement and examine our safety processes. Metrics are used to trend incidents to provide information regarding the likelihood of future, similar occurrences and enable prevention of more serious occurrences. Additionally, Third Party Safety Assessments are used to independently identify leading indicators to enable prevention of incidents. The Third Party Safety Assessments are conducted, based on a risk analysis, with the results prioritized for corrective actions.

As a result of the analysis, the JPL Environmental Health and Safety Program Office (EH&S) has enhanced measures to address the top two causes of injuries/illnesses: (1) slip/trip/fall and (2) computer-related incidents. Figure 1 below depicts the injuries/illnesses by category for Fiscal Year (FY) 2009. This data, in addition to prior year's data, were used for trend analysis. To improve the statistics related to slips/trips/falls, JPL has enhanced control by initiating the effort, described below in paragraph a, targeting the reduction of potential walking surface hazards. To reduce the instances of computer-related injuries, JPL has initiated the action described below in b, and to mitigate the severity of potential injuries, JPL has initiated the activity described in c. Activities described in b.

and c. require the proactive commitment of first line supervisors and managers for effective implementation.

Figure 1: JPL Trend Analysis Injuries/Illnesses by Category for FY 2009



- a. Due to JPL's hilly terrain and uneven walking surfaces, a Walking/Working Surface assessment of the entire Laboratory was performed to identify potentially hazardous conditions for employees. Findings were classified into three priority groups based on risk of potential injury: Priority 1 - highest hazard; Priority 2 - moderate hazard; and Priority 3 - minimal hazard. To date, actions have been completed for 95 percent of Priority 1 findings and 50 percent of Priority 2 findings. Close out actions will continue until findings actions are completed. All findings are reviewed at least monthly to determine if their priority (1, 2, or 3) needs to be elevated/lowered.
- b. JPL Occupational Safety Program Office (OSPO) rolled out a new online Ergonomics Assessment Tool (ErgoTool) to all JPL employees. This tool allows employees to perform ergonomic self-assessments of their individual workstations. This is expected to help reduce the second leading injury as shown in Figure 1. A snap shot of ErgoTool is shown in Figure 2.
- c. As the workforce age increases, the severity rate of injuries also tends to increase. JPL is acting to address this specific issue. With the average age of the JPL population being about 48 years old, JPL is diligently working to improve the overall fitness of employees to reduce severity of injuries and enable faster recovery. Current activities in place include: Wellness Classes, Fitness Facilities, Weight Watchers, and participation in the Mayo Clinic Wellness Program. One new activity being implemented is a walking program with various age-tailored "fitness circuits" throughout the Lab ranging in degrees of difficulty.

Figure 2: ErgoTool Employee Assessment

**ergoTool** An ergonomic assessment of your work environment

**Humantech**

My Account Help Logout

**Survey**

**Workstation Layout**

Workstation layout can affect your motions and postures throughout the day. Work surfaces at comfortable heights and sufficient space are critical workstation layout issues.

**Workstation Space**

Do you have adequate storage at your workstation for files, office supplies, and personal items?  Yes  No

Is there sufficient space at your workstation to store your computer, phone, and other necessary equipment?  Yes  No

Do you have sufficient free desktop space to perform your required job tasks (writing, etc.)?  Yes  No

**Functional Space**

Are frequently accessed items (phone, files, keyboard, etc.) within an easy arm's reach?  Yes  No

Do you have adequate leg room at your workstation?  Yes  No

Are you able to position source documents for easy reference while using the computer?  Yes  No

Is your monitor positioned in front of you while typing?  Yes  No

**Work Surface**

Are your primary work surfaces free from hard and/or sharp edges?  Yes  No

Does your work surface provide enough depth to position your monitor in line with your keyboard?  Yes  No

While performing non-computer tasks, does the height of your work surface allow your arms to form a 90-degree angle?  Yes  No

**Definitions**

**Free desktop space**  
Work surface space that is available for reading, writing, editing documents, sorting materials, etc.

**Easy arm's reach**  
Reaching without moving the chair or having to bend or twist the back.

**Source document**  
Papers, manuals, or books that are referenced while entering information into the computer.

**Adequate leg room**  
Space to pull your chair close to the workstation without hitting your knees or thighs.

## Recommendation

3. “Track progress using explicit metrics that are periodically published to the workforce and implement further corrective actions as needed.”

## NASA Response

NASA and JPL agree, and OSPO currently tracks trend analysis metrics for all injury/illness including slip/trip/falls, and computer-related incidents. Metrics are presented at the Quarterly Laboratory Safety Committee Meeting attended by EH&S staff and Safety Coordinators, published on the OSPO Web site for all JPL employees, and posted on signs at two conspicuous locations onsite. Each Safety Coordinator disseminates the information within their organizations, identifying corrective actions and tracking them to closure in the JPL Mishap Reporting System (MRS).

Safety metrics and trends data are also presented to the Center Director and Executive Council on a quarterly basis.

**2009-03-01b:** “The new NASA Safety Center (NSC) at the Glenn Research Center is a resource that can be of great use to JPL and vice versa. The ASAP recommends JPL establish a closer working relationship with this organization and capitalize on its strengths and experience.”

### **NASA Response**

NASA and JPL agree. As a partner in the safe and successful achievement of NASA's strategic goals, JPL is working in concert with the NSC, focusing on improving the development of personnel, processes, and tools. As a part of this focus, JPL embraces the mission and vision of the NSC to achieve a world-class Safety and Mission Assurance (SMA) program which ensures that we are informed risk takers--managing the routine risks in the workplace effectively, preserving our resources for the execution of the NASA mission while establishing a learning environment, benchmarking from the best and bringing their best practices into our workplace, and learning from our mishaps. To this end, JPL is collaborating with the NSC SMA Technical Excellence Program (STEP) by the NSC organization categories, as follows:

- Technical excellence for the SMA community:
  - Making the SMA Technical Excellence Program available to JPL’s Office of Safety and Mission Success staff.
  - Providing JPL subject-matter experts to STEP and requesting NSC support, when needed.
  - Establishing NSC/JPL points of contact for STEP.
- Knowledge capture and dissemination:
  - Support interchange of data as required.
  - Supply best practices information for potential use at other Centers.
- Coordinated audits and assessments:
  - Provided JPL subject-matter experts to support NASA Institutional/Facility/Operational (IFO) safety audits, as requested.
  - Provided JPL subject-matter experts to support NASA Operation and Engineering Panels (OEPs), as requested.
  - NSC provided personnel to numerous JPL safety-related audits (e.g., IFO’s OEP’s, Quality Assurance Alerts).
  - Share audit results with NSC, where appropriate.
- Mishap investigation support:
  - Will provide JPL subject-matter experts to support Mishap Investigations Boards (MIB), as requested.
  - Will use NSC personnel to participate in MIBs.
  - Will share MIB results.

**Tracking Number 2009-03-02**  
**JPL Risk Assessment Process**

**Recommendation**

“JPL appears to have a well organized process for tracking potential safety risks and eventually making informed decisions about their acceptability based on wide coordination and reviews by various committees. A further improvement to that process would be the clarification of the individuals who in fact make the final formal decision. Recommend that the process be expanded to include a formal risk acceptance document signed by the authority designated with that responsibility in accordance with the risk level presented by the risk.”

**NASA Response**

JPL respectfully submits that it presently has well-defined levels of signature authority for dispositioning all project risks. The final formal risk acceptance for prelaunch is documented in the JPL Certificate of Flight Readiness (CoFR) resulting in a mission readiness letter from the JPL Center Director to the NASA Associate Administrator. For post-launch critical events, a Certificate of Critical Events Readiness (CoCER) is employed. These documents certify that a project has completed the products, tasks, and reviews required for flight or flight operations; that the residual risks to mission success are recognized, documented, and deemed acceptable; and that JPL is ready to execute the mission or mission-critical event. JPL respectfully submits that its current CoFR/CoCER process, signed forms, and the JPL Center Director’s letter meet the intent of the ASAP recommendation.

The signed CoFR/CoCER forms are required to be presented at the JPL Center Management Council (CMC), the most senior-level assessment body at JPL. As examples, copies of signed CoFR/CoCER forms for the Mars Phoenix Project and the Ocean Surface Topography Mission Project are enclosed. Also enclosed is a copy of the JPL Center Director’s letter for the Kepler Project.

Prior to launch, all residual risks are reviewed, and JPL acceptance is documented on the Engineering Technical Authority (ETA) JPL Certification of Flight Readiness form (CoFR). The CoFR is signed at a minimum by the ETA, the Safety and Mission Assurance Technical Authority (SMA TA), the Project Manager, the cognizant Programmatic Director for the JPL Chief Engineer, the JPL Office of Safety and Mission Success Director, and the JPL Associate Director for Flight Projects and Mission Success in the Office of the JPL Center Director. This is the final and highest level of risk acceptance for a project. The CoFR/CoCER process is a requirement levied by the JPL Flight Project Practices, and the process, including the required signatories, is owned and documented by the JPL Chief Engineer.

A similar process is employed post-launch, during flight operations, for mission-critical events. Prior to executing a mission-critical event, a senior-level review board is convened to conduct/assess risk, after which a CoCER form is signed, as similarly described for the CoFR above, with the Associate Director for Flight Projects and Mission Success being the final signatory. During development and flight operations, mission success risks are assessed by the Project Systems Engineer as the ETA and the Mission Assurance Manager as the SMA TA. Additionally, human safety risks are independently addressed/assessed by the project safety engineer (as part of the SMA TA) to ensure that safety risks have been mitigated and the residual risk is acceptable. TAs have independent reporting routes up to the JPL Center Director, if needed, should either TA feel a risk is not properly dispositioned or if they feel the project residual risk is not acceptable. It is noted that project risks are reported and discussed at major project gate reviews (e.g., Preliminary Design Reviews, Critical Design Reviews), monthly and quarterly reviews, JPL Center Management Committee reviews, the NASA Safety and Mission Success Review, and the Flight Readiness Review.