Corrective Action Plan (CAP) Team for Construction Project Incidents

May 1, 2018
Gail Fong
1. **April 7, 2017 – Water Intrusion at Building 950**: Approximately 5,000 gallons of rainwater leaked into building through three unsealed openings in the penthouse floor.

2. **April 26, 2017 – Unexpected Drop of Concrete Block at Building 950**: A rectangular concrete block weighing 515 pounds unexpectedly dropped 17 feet to the floor of the room below while being removed by subcontractor workers.

3. **July 15, 2017 – Girder Dropped During Lift by Mobile Crane at Cryoplant**: A 78-foot bridge crane girder weighing 15,750 pounds unexpectedly dropped 15-20 feet to the ground while being lifted by a mobile crane for installation.

4. **August 2, 2017 – Uncontrolled 110-volt Lighting Circuit Struck during Core Drilling at Building 40**: During core drilling through a 12-inch concrete wall to install new process cooling water lines at Building 40, subcontractor workers struck an uncontrolled 110-volt lighting circuit embedded within the wall.

5. **October 27, 2017 – Energized 277-volt Lighting Circuit Struck during Cleanroom Demolition at Building 31**: During demolition of the cleanroom in Building 31, a subcontractor worker struck an energized 277-volt lighting circuit while using a reciprocating saw to cut through a conduit located above the ceiling of the cleanroom.
• In December, 2017, as a result of these incidents, a Corrective Action Plan Team was assembled by SLAC’s Deputy Director of Operations and was charged to:

“… collaboratively develop a corrective action plan (CAP) that considers and addresses the common themes and lessons learned from these events with the goal of ensuring that SLAC can sustainably plan and execute all phases of the construction project lifecycle in a safe, effective, and efficient manner.”

• Members included SLAC staff from mission support groups related to supporting construction projects, science program groups, SSO as observer

  - Gail Fong, LCLS (Lead)
  - Dan DeMott, BTS-SCM
  - Greg Johnson, ESH/F&O
  - Sayed Rokni, ESH
  - John Seabury, AD

  - Jeff Sims, OPM
  - Analisa Tan, BTS-Finance
  - Marc Weibel, CACM
  - Shane Wells, F&O
  - Scott Wenholz, DOE-SSO Observer
Key Aspects to Consider and Address in the CAP

1. **Lines of authority and accountability** are clearly defined for all aspects of the construction project lifecycle.

2. **Qualified staff and resources** are provided to support various phases of the construction project lifecycle and perform effective subcontractor oversight.

3. **Procurement** processes in the areas of vendor outreach, selection criteria, and subcontract terms and conditions to select the best qualified subcontractors and ensure safe, effective, and efficient project work.

4. **Project management** practices and procedures that ensure the unique circumstances, safety hazards, and risks to SLAC’s mission associated with construction work on active facilities are sustainably considered and addressed.

5. **Work planning and control** for construction projects that ensures all quality and safety requirements and expectations are effectively flowed down to, and met by, all subcontract tiers.
Key Aspects to Consider and Address in the CAP (continued)

6. Oversight of all aspects of the construction project lifecycle to ensure:
   • Projects are completed as designed
   • Work is performed as planned
   • Key leading performance indicators are monitored and promptly acted upon as necessary
   • Subcontract terms and conditions for poor performance are enforced in a timely manner
   • Budget decisions and/or project changes are jointly considered by project management and associated customers and stakeholders to minimize adverse short-term and long-term safety, mission, or operational impact

7. Key leading indicators and metrics are developed and used for construction work activities to monitor and enable the sustainable achievement of safe, effective, efficient and high-quality work

8. Institutional and/or organizational policies and procedures with requisite training are in place to ensure sustainable and effective management of all aspects of the construction project lifecycle
CAP Development Process – January to April

1. Data Gathering
   • Review of current processes in Project Management, Construction Management, Work Planning and Control, Office of Project Management, Procurement, Finance
   • Established baseline of knowledge across the team

2. Review of Data
   • Validation of processes – documents, quantitative measures, approvals, reports

3. Development of Corrective Actions
   • Included corrective actions developed, implemented and proposed

4. Review of Corrective Actions
   • Gap analysis
   • Evaluation of value, sustainability, achievability, measures
   • Joint ownership agreement and integration
   • Review by senior management in BTS and F&O

5. Draft Report reviewed by Operations Council, DOE Site Office, Senior Management Team

6. Final Report Issued
Deliverables: CAP Report and Corrective Actions

• Each “Key Aspect” was reviewed and addressed
  - Each group had already started to address the issues and actions, including on current construction projects
  - Opportunities for improvement were found, especially related to integration and communication

• Corrective Actions
  - Over 45 corrective actions with multiple steps were developed, many shared actions with leads assigned and due dates
  - Deliverables were defined and measurable
  - Effectiveness reviews for 6-12 months were defined to answer the question of “Did the action meet the objective?”
  - All will be tracked in the SLAC issues management system with regular status briefings to the Director’s Assurance Council

• Common Themes and Recommendations summarized
Processes, Procedures, Roles & Responsibilities Need Integration and Improved Training for All Roles

F&O, SCM, ESH Policies and Related Training of Construction Support Personnel: Updates to the construction project-related documents are needed and the construction project lifecycle needs to be documented in an integrated way across all areas. Training is needed for staff working directly on projects, staff supporting projects, and subcontractors on construction projects.

Project Management Process: The project management process described in the Project Implementation Manual (PIM) is sound, but is somewhat general and does not always provide enough implementation detail to ensure that the processes are consistently adhered to. More effective onboarding and ongoing training and coaching are needed. Regular forums to discuss best practices and a formal lessons learned process will facilitate continuous improvements.

Roles and Responsibilities: Lines of authority and accountability are not always clearly defined or understood by those in management and oversight of construction projects. Personnel may understand roles and responsibilities associated with their own job function, but often have a limited knowledge of others’ roles and responsibilities or understanding of the overall process. Defined roles, responsibilities, authorities and accountabilities should be included in the training.
WPC Processes Need to be Tailored to Fit Construction Projects and Help Contractors be Successful

**Construction Work Planning and Control (WPC):** SLAC’s work planning and control process for “red” work does not always address unique aspects of construction projects, where job scoping, identification of hazards and controls, and performance of work is done by subcontractors rather than SLAC personnel. WPC forms should be modified for construction projects.

**Flow Down of Requirements:** Flow down of requirements and standards from SLAC to all subcontractor tiers does not consistently occur, often because they are not communicated in a form that is easily understandable by subcontractor workers performing the work. Clear summary of processes and forms should be provided on a new contractor website.

**Enforcement of Requirements:** General contractors are responsible for ensuring that sub-tier contractors meet all SLAC requirements and standards. When general contractors fail to do so, SLAC has not always held general contractors accountable, particularly for small issues early in a project’s lifecycle. WPC forms should be modified to ensure general contractors have reviewed and approved plans from their subcontractors.
Risk Management requires Ownership and Collaboration Between the Program and F&O

Risks Associated with Active Buildings: Although risk assessment and planning is included in the early stages of the project management process, the potential risks to SLAC’s science mission due to work on or near active buildings are not always specifically identified as part of this process (e.g., unplanned interruption of ongoing experimental work, delays to upcoming experimental work, damage to scientific equipment or facilities, etc.).

The science program must be ultimately responsible for safety and work planning and control in active facilities with assurance from F&O that appropriate controls in the project are in place. The science program has the lead in ensuring the identification and mitigation of risks with F&O. It is F&O’s responsibility to provide regular updates and proposed mitigations as conditions change.
Resource Management Process is Needed Across SLAC with Management Escalation for Schedule Recovery

Resource Management (FCM/PM/ESH/SCM/FIN): Hiring of critical management positions (DCS manager) and project-related positions (FCM, PM, Field Safety, SCM, and Finance) were not timely and resulted in staffing shortage for construction projects. Resource planning needs to be an ongoing process throughout the year (ALP, Lab Agenda, Strategic Capital Planning meetings, regular customer meetings). The resource planning actions and staff augmentation contracting strategies need to be timely to allow for enough time for the hiring/contracting process and adequate onboarding.

Schedule Pressure: Maintaining project completion dates was seen as a priority to project team members and SLAC leadership. Decisions were made to recover schedule by working longer hours, including weekends. Extended work hours added stress and fatigue that may have led to reduced focus on oversight and work planning and control. In consultation with F&O management and science mission management, these decisions should be escalated to the Laboratory Director’s Office to determine if the Lab should significantly modify work schedules, weighing the risk to a project against risk to the Lab.
Additional Management Oversight and Monitoring Leading Indicators can Facilitate More Timely Course Corrections

Senior Management Oversight: Senior management needs to be informed of potential issues with regular updates and with management walk-arounds. Quarterly reports to the Operations Council and an annual summary with lessons learned and improvements to the Senior Management Team should be developed. The Laboratory Director’s Office, specifically the Deputy Laboratory Director and the Deputy Director of Operations should be involved in the decision to authorize significant “overtime” work in attempts to recover schedule.

Leading Indicators: Cost and schedule are typical measures that are tracked in projects. In addition, leading indicators should be tracked and monitored. Examples of leading indicators include performance issues with subcontractors, quality of work, safety trends, communication, housekeeping, adequacy of FCM support, quality of tailgates, risk and risk mitigation management, coaching/PM performance guidance, procurement methods (errors/omissions, incentives, liquidated damages, change orders), and staffing levels. Leading indicators need to be analyzed and course corrections need to be timely.
Procurement Strategies: Improvement is needed to increase vendor pool of bidders. Procurement acquisition strategies need to be assessed based on the project risk (design/build, design/bid/build, etc.). Active recruitment of vendors is needed and an external website for contractors is in the process of being developed for outreach and as a resource to vendors.

Once subcontractors are performing work, SLAC needs to partner with subcontractors to provide incentives, tools and information to help them be successful. Guidance needs to be documented for vendor corrective actions. A procurement operating manual is in development and data is now being tracked for FY18 and will be analyzed quarterly for trends and improvements to processes, including the field change order process. Improvements to training on procurement processes is needed for staff related to construction projects, including initial onboarding, ongoing training, lessons learned and tracking of training.
Improved Partnering with Project Resources and Regular Reporting Can Enhance Project Success

**Finance and SCM Support:** Financial reconciliation and forecasting of projects was hampered due to a lack of communication and not having access to all the information available and less than adequate communication between the Project Management, Procurement and Finance teams. In addition, there was turnover in these positions, resource shortages and unclear assignment of responsibility. A project management dashboard/report should be developed to show resource assignments and key performance indicators, including cost changes, schedule changes, RFIs, change orders, etc. that allow the Design and Construction Manager to review during regular status updates.

**Monthly reporting and meetings** between DCS, SCM and Finance to discuss status, trends and issues, is recommended. To facilitate better communication, touchdown spaces for Finance and SCM in the Project Management office building will give project staff more readily available access to these resources.
Summary

- CAP process facilitated shared understanding of the processes between F&O, Field Safety, OPM, SCM, Finance to support construction projects.
- The action items have been thoroughly reviewed to ensure that they add value to the construction project lifecycle in a sustainable manner. Actions tracked to completion in the SLAC system with due dates ranging from now until December.
- The CAP team members were committed to improve the construction project planning and delivery to ensure projects are execute in a safe, effective and efficient manner.

Success of construction projects is a shared responsibility that requires management and staff to engage and all project members (SLAC & contractors) to work as an integrated team.