Investigator

Joe Kenny, ext. 2201, jkenny@slac.stanford.edu

Date/time of incident

14 April 2010 14:21:08

Witnesses

Horton, Nicholas W., x3755
Hau, Andrew, x8789
McCulloch, Matt, x3288
Osier, Shawn N., x4096
Pierson, E.S., x2686
Racine, Michael, x3543

Property damage

None

Incident description

At 14:21 on Wednesday, 14 April 2010, six SLAC-employee workers witnessed a sudden decoupling of a 75.5-lb. magnet lifter from the South Drift-chamber Removal Support Beam Stand (“Forward Stand”) in IR-2 during removal of Drift-chamber extraction gear in the hall. Tension from the 10-ton hoist, suddenly and unexpectedly, raised the lifter roughly 12 inches. No one was injured as a result of the event, and no damage was incurred to materiel.

In the early afternoon of 14 April, the IR-2 workers (listed above), as part of loading out gear used earlier in the day to extract the BaBar Drift Chamber, attempted to use a 2200-lb.-capacity magnetic lifter (a Simonds DL2200) rigged to the hall’s 10-ton hoist to remove the Forward Stand, a 300-lbs. steel fixture, from the BaBar Forward-end platform. As the hoist operator raised the lifter, which was fully engaged to the clean, painted, flat surface of the stand’s top plate, the lifter suddenly disengaged and jumped roughly 12 inches while swinging north. The lifter swung roughly two feet north, then two feet south before re-engaging the Forward Stand. The worker to the immediate south of Forward Stand discovered that no one had removed one of the four bolts (the southeast bolt) that had connected the stand to the platform. The workers stopped the activity, removed the bolt, assured functionality of the lifter, re-engaged the lifter on the stand and successfully removed the stand. The Chief Engineer removed the synthetic sling from service at the end of the shift.

The stored energy of a magnetic device drops to zero when the magnetic bond is broken. Therefore, this lifter was only
Incident description (Cont’d)

subjected to the tension in the sling which is extremely non-linear for the type of synthetic sling that was used in the lift. This sling tension resulted in a vertical force vector upward and a force vector to the north (away from the nearest worker). Calculations show that the vertical velocity of the lifter immediately after disengagement was 5.45 mph (8 ft/sec) upward and slowed to zero mph by the acceleration of gravity after approximately twelve inches of rise. The elapsed time of the vertical rise was .25 seconds. At the time of the disengagement, the vertical center of the hoist (10 Ton Auxiliary) was at its southern location limit - approximately 25 inches north of the vertical center of the Forward Stand. This northern offset of the hoist effected the pull to be 4.33 degrees off of vertical in the north-south direction. Hence, the horizontal velocity of the lifter immediately after engagement was .41 mph (.60 ft/sec) to the north (away from the nearest worker). No east or west offset was assumed.

The affected supervisor (BaBar D&D Chief Engineer) and Safety Manager agreed that the occurrence did not meet the BaBar D&D threshold for Incident Notification of SLAC Security (x5555).

Direct cause

Failure to fully disconnect the Forward Stand from the platform directly caused the unplanned disengagement of the magnet lifter from the stand.

Contributing causes

The decision to use the magnet lifter to move the Forward Stand was poor. Though the stand’s weight was well within the lifter’s capacity, the lifter manufacturer recommends its use only on unpainted surfaces. The workers should have rigged the stand with slings.

The workers had earlier that day completed the difficult task of removing the Drift Chamber from the BaBar Detector and as such were fatigued and more likely to err.

Root cause

Inattention to detail. The worker tasked with detaching the Forward Stand from the Forward-end platform left the southeast bolt unremoved.

How recurrence will be prevented

1. Verify disconnection before lifting objects that may be attached to other objects. (Disseminate at PPA work-release meetings)
How recurrence will be prevented (cont’d)

2. Use magnet lifters only as recommended by the manufacturer. (Disseminate at PPA work-release meetings)

3. Limit activity in times when workers may be suffering from fatigue. (Disseminate at PPA work-release meetings)

Signatures

Completed by Joseph Kenny, PPA ES&H Coordinator

Reviewed by Frank O’Neill, Chief PPA ES&H Coordinator

Reviewed by E. S. Pierson, BaBar D&D Safety Manager

Investigation approved by H. James Krebs, BaBar D&D Chief Engineer

Reviewed by David MacFarlane, Associate Lab Director for PPA