



Safety Alert

From the International Association of Drilling Contractors

ALERT 14 – 24

THREE INSTANCES OF UNCONTROLLED DESCENT OF THE TRAVELING BLOCK ASSEMBLY

WHAT HAPPENED:

First Event:

During troubleshooting of a Drawworks brake alarm there was an uncontrolled descent of the travelling block assembly to the rig floor resulting in equipment damage:

- The maintenance team was troubleshooting the Drawworks system for a brake status alarm that was preventing the top drive from breaking the upper connection. The initial understanding within the maintenance team was that the Drawworks brakes were set.
- Throughout the troubleshooting the maintenance team did not seek a clear understanding as to the condition of the brakes. This was further compounded by a Public Address announcement, which occurred during a critical phone call that resulted in the ongoing still believing that the brakes were set. As a direct consequence of those events, both drives were reset under the faulty assumption that the parking brakes were set.
- With no drives holding the load, and none of the brake calipers set, the travelling assembly descended to the floor.

Second Event:

During troubleshooting of a Drawworks brake alarm a few days after recovering from the first event, there was an uncontrolled descent resulting in the travelling block assembly lowering 7 feet (2.1 meters) until it was freely supported by the drill string. This resulted in no damage to equipment:

- After receiving a brake status alarm the emergency hydraulic dump was triggered on the Drawworks in order to ensure that the brakes were set. The Drawworks was then switched 'OFF' as part of troubleshooting.
- The hydraulic dump was reset and the Drawworks was switched 'ON' as part of ongoing troubleshooting. At this time the auxiliaries came online and almost immediately all brake calipers opened.
- Since the drives had not been commanded by the system to take the load from the brakes, and all brake calipers were open, the travelling block assembly descended. The emergency dump was triggered by the Driller from the doghouse. However, but by that time the travelling block assembly had already descended 7 feet (2.1 meters) and was freely supported by the drill string.

[Following the second event it was discovered that all brake calipers were held open due to sticking of all hydraulic solenoid valves that provide pilot pressure to the brake calipers; this same situation is what triggered the brake alarm during the first event. It was also learned that the solenoids only stick in the open position after an extended period of being energized in the open position; hence the reason this condition was not replicated during extensive commissioning following the first event]

Third Event:

During troubleshooting of excessive heat buildup in the Drawworks braking system there was an uncontrolled descent resulting in the travelling block assembly lowering 20 feet (6 meters). This resulted in no damage to equipment:

- After identifying excessive heat buildup in the Drawworks braking system a Permit to Work was made out to place the brake hydraulic pumps into manual mode in order to perform some non-intrusive troubleshooting. Operations on the Drawworks were not suspended at this time. However the brakes were set thru the Drillers chair and the load was fully supported on the brakes.
- Non-intrusive troubleshooting was allowed to escalate into intrusive troubleshooting without the knowledge of the Drill Crew.
- As part of intrusive troubleshooting plugs were installed on a section of vent pipework. This vent was connected through a manifold to all brake control solenoids. Due to natural internal fluid bypass of the spool within each of the solenoid valves, pressure was allowed to build up behind the plugs and all brake calipers opened.
- Since the drives had not been commanded by the system to take the load from the brakes when the brakes opened, the travelling assembly descended. The emergency hydraulic dump was triggered but by that time the travelling assembly had already descended 20 feet (6 meters) with a hanging load of 470 kips.

[Following the third event it was discovered that the overheating was primarily due to a hydraulic pump that was initially installed, and then run for a short time, with the supply/discharge ports reversed. The pump was changed out following the second event. This plumbing error was identified and corrected after approximately 5 minutes of run time. However the pump had already sustained damage that directly led to it heating up the fluid in the brake system hydraulic circuit]

WHAT CAUSED IT:

- Drawworks brakes were not set when troubleshooting of Drawworks drives was initiated
- Miscommunication of the Drawworks brakes status between the Drawworks operator and maintenance team prior to the reset of both Master Drawworks drives
- All solenoid operated hydraulic valves that control the position of the Drawworks brake calipers were stuck in the 'brake release' position
- Variations in levels of understanding around Drawworks operation / troubleshooting

- Failure to follow the conditions of the Permit to Work in place
- Less than adequate leadership and supervision
- Lessons learned not effectively shared
- Critical Safety Process value not understood by crew

CORRECTIVE ACTIONS: To address this incident, this company did the following:

- Use of control of work practices and procedures to ensure suspended loads are secured during troubleshooting of drives and PLCs will prevent similar reoccurrence.
- Instructed personnel that software systems should not be reset without verification that the equipment is mechanically secured.
- Replaced all OEM supplied solenoid valves and other components with new valves (of a different design), and flushed the system with a lighter viscosity oil.
- Trained crews and verified competency for operation, maintenance, alarm management and response for rig-specific equipment.
- Instructed rig and maintenance supervisors to ensure Critical Alarm Management Process is fully implemented, thereby ensuring that adequate controls are in place when responding to alarms.
- Established a Barrier Management approach during troubleshooting of critical systems.
- Trained crews on importance and use of the Critical Safety Processes such as: Permit to Work, Energy Isolations, Stop Work Authority, Management of Change and Behavior based safety tools.

The Corrective Actions stated in this alert are one company's attempts to address the incident, and do not necessarily reflect the position of IADC or the IADC HSE Committee.

This material is presented for information purposes only. Managers & Supervisors should evaluate this information to determine if it can be applied to their own situations and practices