

RED FLAG ALERT: Ignition of Residual Hydrocarbon Vapors in Underground Storage Tank Lead to Explosion

ALERT DATE: JANUARY 29, 2010

Medical treatment injuries and property damage occur, but fortunately no serious injuries occurred.

SUMMARY: During underground storage tank (UST) removal activities at an inactive service station, sparks from a demolition saw being used by a subcontractor employee to cut a metal bollard ignited residual hydrocarbon vapors in a nearby underground storage tank. No serious injuries occurred; however, one Kleinfelder employee and one subcontractor employee received medical treatment. Property damage from the explosion occurred at the service station and at near-by businesses and residences.

INCIDENT DETAILS: As part of divestment activities at an inactive service station in New Jersey, the USTs were cleaned on November 12, 2009 and scheduled for removal on November 23, 2009. The top of the 12,000-gallon UST was exposed via vacuum excavation to allow for the removal of appurtenances and piping.



At the time of the incident, a steel bollard, approximately 15 feet from the tank, was being removed in order to establish a clear pathway for the excavator to access the UST and to stage the tank upon removal. To remove the bollard, a demolition saw was being used by a subcontractor employee to cut the bollard from the concrete pad. Although the tanks were cleaned days prior to the work, the atmosphere inside the UST was not tested per Hot Work Procedures prior to work being performed that day and the vapor concentrations inside the tank were unknown. A combustible-gas indicator was being used in the immediate vicinity of the bollard removal activity. At the time of the incident, the sparks generated from the saw cutting activity were directed towards the tank field and open UST ports, which ignited the residual gasoline vapors inside the UST.

LOSSES/INJURIES: The resulting injuries were relatively minor, resulting in primarily scrapes and bruises, however, there was a significant potential for serious injuries or fatalities. In addition, property damage in the form of broken windows and blown debris had occurred at the service station building on-site and at near-by businesses and residences.

INVESTIGATION FINDINGS: Two main causal factors were identified during the investigation of this incident.

CF#1: Prior to the start of work, the atmosphere inside the UST was not tested. There were five findings related to this causal factor:

- The potential risk that there was flammable gas in the UST or that it could be affected by work away from the UST was not recognized. Involved personnel believed that monitoring of the immediate work zone as had been done in the past was adequate to provide protection against explosions.
- The client-specific tank removal procedures were not used as an on-site reference for the work being done, rather personnel relied only on their individual experience rather than verifying the procedures against the standard. Most personnel on the site had significant tank removal experience and in the past relied on their knowledge without verifying proper procedures. In addition, it was identified that there were opportunities for improvement in the field auditing and verification of actual work processes to better evaluate compliance with

the client and consultant tank removal procedures.

- The field crew reviewed the subcontractor's JLA for UST removal, but not the consultant JLA for UST removal and the consultant JLA contained information not included in the subcontractor JLA.
- The subcontractor stated that they thought the verification of a safe work zone was the responsibility of the consultant. The subcontractor had worked on sites with the consultant before and relied on the consultant as being responsible for safety. In addition, the consultant did not communicate effectively to the subcontractor that they are responsible for developing, managing and verifying a safe work environment and the consultant's role is to verify the same.
- The subcontractor JLA for Tank Closure Activities does not specify atmospheric testing inside the tank or the lines until tank or line cutting was to be conducted. The JLA also states that atmospheric testing is required in the "area of work" for all other tasks. Personnel believed that the atmosphere in the tank was essentially independent of other activities and would not be affected by the other activities occurring nearby. In addition, during the investigation, the subcontractor foreman indicated that he knew readings from inside the tank should have been taken prior to ANY work near the tank.

CF#2: Hot work was conducted without adequately assessing the hot work hazard and hazard mitigation. Two findings were related to this causal factor:

- The Hot Work Permit was prepared and approved by the consultant and not the party conducting the work, resulting in the risk analysis being done by the consultant without input from the subcontractor.
- The Hot Work Permit was treated as a prerequisite for this type of work and covered all of the tasks performed on the tank removal project for the day. The Permit was not viewed as an integral part of the "task specific" work with discussions, and consideration given to the specific task being performed, tools being used, changes in procedures or work site conditions, the hazards, mitigation techniques or responsibilities of personnel involved. In addition, the consultant did not communicate that the subcontractor should take the lead role in preparing the permit.

FOLLOWUP ACTIONS REQUIRED/SOLUTIONS TO PREVENT REOCCURRENCE:

- A revised Hot Work Procedure has been distributed to all consultant personnel. Revisions include specific improvements to address communication, roles and responsibilities, and hazard mitigation techniques for both consultant and subcontractor.
- When planning any task, a consideration of the hazards regarding hot work and an evaluation of the site specific conditions is required. Every site should be first approached as if there is a potential for fires and/or explosions, then through the use of observations and calibrated monitoring equipment, determine what hazards exist and the appropriate mitigation techniques.
- Follow the procedures that are in place for the planned activity and don't rely on experiences alone to prevent incidents from occurring.
- Only perform activities that you are qualified to perform and contact your supervisor or safety professional should you have questions or concerns.
- Communicate the potential hazards associated with the work to all personnel on-site. Be sure to pay particular attention when multiple activities are being performed on the site.

DO YOUR LPSA: IF IN DOUBT, ASK!

BEING UNSURE AND PROCEEDING ANYWAY IS UNACCEPTABLE!

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