CSB NEWS RELEASE

CSB Issues Final Report on Barton Solvents Explosion, Calls on OSHA and Trade Associations to Improve Material Safety Data Sheets for Nonconductive Flammable Liquids; Safety Video with Animation Released

For more information, go to: Barton Solvents Investigation page

Wichita, Kansas, June 26, 2008 - The U.S. Chemical Safety Board (CSB) today released a **case study** and **safety video** on the July 2007 explosion and fire at the Barton Solvents distribution facility in Valley Center, Kansas. The CSB found the most likely cause of the explosion -- involving what is known as a nonconductive flammable liquid -- was a static spark resulting from a loosely-linked level-measuring float within the tank. The spark ignited the air-vapor mixture inside the tank as it was being filled.

Nonconductive flammable liquids can accumulate and maintain static electrical energy which discharges more slowly than from more conductive liquids. In addition, some of these liquids can form ignitable vapor-air mixtures inside storage tanks which can explode if a spark occurs.

The CSB released a ten-minute safety video which features a computer animation depicting the sequence of events that led to the explosion and fire. The video, entitled "Static Sparks Explosion in Kansas" is available for downloading free of charge through the agency's video website, www.safetyvideos.gov.

CSB Board Member William Wark said, "Our goal is to help companies understand the hazards associated with the kinds of flammable liquids that were stored and transferred at Barton Solvents. We believe our case study and the safety video will help accomplish that goal and prevent accidents."

The July 17, 2007 explosion and fire led to the evacuation of 6,000 residents. Eleven residents and one firefighter sought medical attention. Fire destroyed the facility. CSB investigators found that on the day of the accident a tanker-trailer arrived to transfer Varnish Maker's and Painter's Naphtha (VM&P Naphtha) into a storage tank. The CSB determined that the transfer equipment from the truck tanker to the storage tank likely was properly bonded and grounded to prevent the generation of static electricity. However, the CSB found, the float device inside the 15,000 gallon storage tank presented a hidden danger.

CSB Lead Investigator Randy McClure said, "When transferring liquids, it is standard industry practice to bond and ground storage vessels, tankers, and other equipment to prevent static discharges. But our investigation illustrates how normal bonding and grounding may not be enough to prevent ignition from static electric sparks."

Inside the tank was a device used for measuring the liquid level, a metal float linked to a metal tape measure. The CSB determined that a static electrical charge in the liquid was generated by the flow of the solvent pumped from the trailer into the storage tank, and by stop-and-start filling which introduced air into the liquid, resulting in bubbles and turbulence.

At the same time, the space above the liquid was being filled with an explosive mixture of vapor

and air. The CSB determined that the liquid flow and turbulence created by the filling of the tank likely resulted in the metal float accumulating a static electrical charge. As the float moved, a gap is believed to have formed within the linkage of the tape and the float. CSB investigators said a spark likely jumped between the metal parts and ignited the explosive mixture of vapor and air that had accumulated above the liquid.

The explosion blew the tank 130 feet into the air, and within moments two more tanks ruptured and released their contents. As the fire burned, the contents of nearby tanks were released and ignited, launching debris into the air where some of it struck a mobile home and a neighboring business.

Board Member Wark said, "Several common flammable liquids are particularly susceptible to ignition by static sparks. Some of these flammable liquids can produce the optimal amount of vapor to fuel an explosion at normal temperatures inside a storage tank."

Mr. Wark continued, "While we found the most likely cause of the Barton explosion was sparking across the float linkage, we emphasize that explosions can occur in tanks without faulty floats when there is a discharge from the build-up of static in the nonconductive flammable liquid itself."

Material Safety Data Sheets, or MSDSs, communicate hazard information on chemical products. The CSB determined the MSDS for the VM&P Naphtha did not adequately describe the explosive hazard or the precautions necessary to prevent ignition from static electricity. Most of the MSDSs for the flammable solvents supplied to Barton indicated that the solvent could accumulate a static charge, which could spark and ignite vapor. But the MSDSs did not warn that the solvent could form a highly explosive vapor-air mixture inside a storage tank.

The CSB reviewed 62 MSDSs for some of the most widely used nonconductive flammable liquids in industry, such as VM&P Naphtha, hexane and toluene. Most failed to recommend specific precautions beyond bonding and grounding.

"The accident at Barton Solvents emphasizes the need for accurate and detailed MSDSs," said Mr. Wark. "We found that while most MSDSs for this category of flammable liquids do warn about the dangers of accumulating static electricity because the liquids are poor conductors, the MSDSs do not warn specifically that they can be ignited in storage tanks. Companies should be aware that some of these flammable liquids can form an ignitable vapor-air mixture inside storage tanks."

The CSB issued recommendations to OSHA and others to improve required information contained in MSDSs to include addressing nonconductive flammable liquids which are routinely shipped to distributors such as Barton. The CSB also recommended that six major oil and chemical industry associations ask their member companies to improve the warnings on the MSDSs of flammable liquids because these materials can accumulate static electricity.

The Board recommended companies handling the liquids should take additional safety measures, such as:

- Obtain more detailed additional technical information on the liquids from manufacturers that may not be found on MSDSs.

- Purge storage tanks with an inert gas to remove oxygen.

- Add anti-static agents to the liquids.

- Pump liquids more slowly.

- Verify that storage tank level floats are effectively bonded.

The CSB is an independent federal agency charged with investigating industrial chemical accidents. The agency's board members are appointed by the president and confirmed by the Senate. CSB investigations look into all aspects of chemical accidents, including physical causes such as equipment failure as well as inadequacies in regulations, industry standards, and safety management practices.

The Board does not issue citations or fines but does make safety recommendations to plants, industry organizations, labor groups, and regulatory agencies such as OSHA and EPA. Visit our website, www.csb.gov. For more information, contact Sandy Gilmour at (202) 251-5496 (cell, in Wichita, Kansas for the news conference) or Public Affairs Specialist Hillary Cohen at (202) 261-3601 in Washington, DC.