



A little “nothing” can really be deflating!

### Here's what happened.....

When steam cleaning the interior of a railcar most of the air was displaced. When work was stopped at the end of the day all valves were closed. As the car cooled, the steam condensed, creating a vacuum, causing the railcar to collapse

During painting, a tank's vacuum relief valve was covered with plastic to prevent potential contamination of the contents. When liquid was pumped out the plastic covering prevented air/nitrogen from replacing the liquid volume. A vacuum developed leading to the partial collapse of the tank.

## VACUUM is a powerful force!

### COMMON causes of vacuum damage to tanks include:

- The vessel has insufficient strength to withstand a vacuum; a vessel with a 50 psig (or higher) ASME pressure rating is frequently capable of withstanding a full vacuum;
- vacuum is created when liquid is transferred from a vessel or when hot vapor condenses, neither of which is replaced by air/nitrogen or other non-condensable material, and
- a vacuum relief system is not present or is not functioning properly.

### Things to consider to prevent equipment damage from vacuum:

- install a system to provide vacuum relief. As one of the pictures graphically demonstrates, railcars and trucks MAY NOT have this equipment. These devices will allow air to enter the vessel and prevent vacuum formation.
- if installed, vacuum relief devices must be inspected and tested on a regular basis. They are just as critical as pressure relief devices.
- understand which vessels in your department are not rated for full vacuum. These are the vessels vulnerable to vacuum related incidents,
- demonstrate caution whenever liquids are transferred or vapors are condensed because of shutdown, maintenance, cleaning, etc..
- be sure that the addition of air, nitrogen, or other vacuum breaking materials are not impeded.

**WHENEVER vacuum relief systems are removed, covered, modified, etc., special precautions are needed to prevent an incident!**