A REPORT ON TWO TRAIN WRECKS

Ammonia erroneously declared a culprit; tanks cars and storage tanks functioned to contain practically all of ammonia involved.

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At approximately 9:00 p.m. on New Year's Day, 1968, two railroad trains were meeting on a double track at the small town of Dunrith, Ind., approximately 40 miles east of Indianapolis. A track defect apparently caused the two trains to sideswipe, causing a wreck and involving a large number of cars with a considerable amount of double track torn up.

Fortunately, no one was seriously injured, but the property damage to the railroad and surrounding property was tremendous. There were five cars of flammable material involved, one of which contained acetone cyanohydrin, a lethal material under some conditions.

I did not hear of the accident until the following morning when news broadcasts told of its happening and the resulting fires and explosion in which ammonia was creating such a hazard. All townspeople were being evacuated and ammonia fumes were being reported as a poison gas. It was reported that the ammonia tanks located at the site were leveled and ammonia had drained into nearby streams. Cattle drinking from this stream were dying from ammonia poison. I drove to the scene which was approximately 250 miles away and on the way heard several news braodcasts making reference to the ammonia hazard.

Flammable liquid a hazard

Cars of flammable liquid broke open causing a canning factory to burn. Some of the flaming liquid flowed down a small depression between the rail bed and a gravel road which carried the fire under ammonia cars on a sidetrack and also under an ammonia storage tank and nurse tanks located there. An explosion which took place later threw freight trucks, being hauled piggyback, a distance of over 50 ft.

The car of acetone cyanohydrin was leaking at the east edge of the wreck area, with the leaking material running east into a small creek. When cattle drank of this creek they quickly died.

About 18 hours after the accident, cleanup operations were underway. Stacks of canned tomato juice in the burned cannery were still occasionally exploding. About this time, a car of ethylene oxide exploded with intense violence and heat, shattering many windows in the area and knocking several firemen off their truck. Due to the intense violence and heat, and uncertainty of the contents of the remaining cars, it was not considered safe to approach the fire to try to extinguish it.

The ammonia storage tank foundations were affected by the fire and the piping around the tank was scaling from heat. The storage tank itself was black from smoke, but since it was filled with cold liquid there was not sufficient heat to raise the temperature of the tank and material to cause the pressure to build to an unsafe level. Hence, the relief valves did not open and no ammonia escaped from the storage tank.

Ammonia cars did not vent

Burning flammable material from the wrecked area had a marked effect on the exterior of the ammonia cars on the sidetrack. The cars are made with a heavy inner shell to contain the pressure and the vessel is covered with a layer of insulating material, and finally finished off with a sheet metal cover. The amount and intensity of the heat was sufficient to warp the walkway grating of the cars. The insulation, however, gave sufficient protection to the ammonia to prevent pressure from building up to a level necessary to open the relief valves of the cars.

The 1,000 gal. nurse tanks also were affected by the flaming material. Tires, step board, and hose were burned off and the frame was hot enough to bend under the weight of the tank. The nylon valve seats were affected by the heat and didn't seal tightly, permitting vapor to escape. The buildup of pressure from the heat allowed relief valve seats to open and relieve the pressure and prevented rupturing of the tanks.

About three weeks later a train derailed at Royal, Ill., northeast of Champaign. There were no cars of flammable material involved but the box cars did hit an ammonia storage tank located alongside the track and five ammonia cars that were setting on the track. Despite the fact that the piping was torn off the tank, the valve was closed and no ammonia escaped. The tank cars took a severe beating, but again were unloaded eventually with no ammonia being lost.

In both accidents, the press and radio reported ammonia as being involved and causing damage, which was not the case. In the case of the first wreck, the small amount of vapor which escaped from the nurse tanks was drawn up in the updraft of the heat and smoke and was not a hazard.

Individuals interested in 16 slides of the two accidents may make arrangements with the author by writing him % Sinclair Oil Corp., P.O. Box 1, Congerville, Ill. 61729

Discussion

D. W. HINES, New Jersey Zinc Co.: I would like to comment on two items which we might be overlooking.

Item One: The failure of ammonia tank cars to have relief valve vent stacks on them.

When operators are loading or unloading ammonia tank cars, they are constantly working with the tank car valves, lines slip tube, etc. When performing this work, they are exposed to the open area of the dome section of the car. Should the relief valve suddenly release pressure at this time, and this does happen because of broken valve springs,

etc., the operator could be seriously injured. However, if the relief valve is equipped with a vent stack, the vapor pressure will be directed to the atmosphere in a controlled pattern.

Many of the older tank cars were originally equipped with relief valve vent stacks, but for some reason these stacks are being removed and the relief valve left unguarded. The practice of removing these stacks should be discontinued.

Many of the newer "jumbo" cars are now being manufactured without relief valve vent stacks. The relief valve on these cars is positioned on the top of the pressure cover of the car. Should the relief valve discharge, the vapor pressure will exhaust into the entire dome section of the car. This will create a serious condition as it could blow into the operator's face and make it impossible to reach the tank car valves. I, therefore, strongly recommend that all ammonia tank cars be equipped with relief valve vent stacks.

Item Two: Ammonia tank truck liquid hose.

During the last two months, on two separate occasions, the liquid ammonia hoses on common carrier trucks have ruptured while the truck was being unloaded. Upon investigation, it has been found that truck hoses, in general, are not tested during their service life and that no record is kept on their time in service. Visual inspections are made periodically. These trucks are moved from one terminal to another, as conditions warrant, so the drivers themselves do not always know the history of the hose they are using. It would seem to me that more stringent safety measures, concerning these hoses, should be adopted by the trucking industry.

LEO SMITH, Wycon Chemical: I'd like to comment on the relief valve problem. We thought about this problem and took some steps to make it a little safer for our loaders. I think you can take a piece of light gauge aluminum pipe and make an extension for the vent stack around the relief valve. Even if that little vent stack is there, it's still in the dome, and a man working over it is considerably exposed. So just a light gauge pipe extension—that you can set on the existing stack to carry vapors above the man's head, will improve his safety.

And we felt it wasn't a bad idea to put a tie down chain on it so that if the valve did relieve it wouldn't blow the stack up in the air. This is sort of a secondary idea and I don't know how necessary it actually is.

I think one thing which is pretty important on ammonia spills is that they don't always act the way they did for the other fellow. I've seen some of the movies and heard comments about what a short distance the vapors actually travel—buy my experience has been that it is really a little more complicated than that.

We had a secondary letdown tank—an 18,000 gallon tank—the relief valve broke off on a cold day last January. It was on a Saturday afternoon. I'd been at the plant and had just gotten home. One of the operators called and he could hardly speak. He said there was ammonia all over the place, and something about a real catastrophe.

Needless to say, that was pretty bad news. Before I got out there, when I was about five miles from the plant, I could see a big grey cloud hanging over it. It was coming off right next to the 30,000 ton tank which was nearly full, and I had some pretty bad thoughts before I got there. We have a fairly elaborate emergency procedure, but about the only thing anybody remembered to do was call me. Of course, you might consider that a little bit. We've got a major railroad right alongside the plant, and also a secondary highway. It's not the main highway any more but it is traveled quite a bit, and I immediately told the guard to call the highway patrol and have them stop traffic. And about that time the tank leak was dissipated.

But the vapor cloud from this tank traveled several hundred yards, and smells were detected at least a mile away. Fortunately we had just a couple of rather minor injuries, and these really wouldn't have happened if the people had been more experiencd. We had a couple of laborers who were loading a dry products car about two hundred yards away. They saw this cloud of ammonia coming towards them, and since they'd only been working there a few weeks, they were about to the point where they were getting used to loud noises once in a while and seeing clouds steam all over, and they assumed this was steam until it enveloped them. They got off the car some way and got out of the area. We put them in for observation overnight. So there were no real injuries.

I think that our people could have greatly alleviated the problem had they sprayed water fog downward from the tank.

I would like to comment on this liquid spill, thing. I think you have to consider every case depending on how much liquid is coming out and where it's going. If it's running down through some natural channel because it will continue to pick up heat from the soil and continue to vaporize as long as it travels.

So I think it's pretty hard to list a hard and fast rule as to what to do with liquid spills.