May 27, 2011

Alan Anacheka-Nasemann Project Manager Army Corps of Engineers New England District Regulatory Division 696 Virginia Road Concord, MA 01742-2751

Re: CENAE-R, Draft Environmental Impact Statement, FILE NO. NAE-2007-00698

Dear Mr. Anacheka-Nasemann:

I have examined the above captioned report. In my professional opinion, the DEIR/DEIS is inadequate because it does not evaluate the project in light of all specific factors required by 33 CFR 320.4(a)(1), which states:

"All factors which may be relevant to the proposal must be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, **general** <u>environmental concerns</u>, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, <u>safety</u>, food and fiber production, mineral needs, <u>considerations of property ownership</u> and, in general, the needs and <u>welfare of the people</u>." (Emphasis Added.)

I also find it disturbing that the DEIR/DEIS, without any explanation or justification, limits its scope to the construction stage of the project and ignores the serious environmental and public safety hazards which will emerge during the operations of the passenger and particularly freight trains.

Proper consequence analyses as well as past accident experience reveal that operational risks or consequences can be so high, they may alter or even dominate the ranking of the alternatives considered in this project. Yet, the current version of the DEIR/DEIS implicitly and categorically ignores these known hazards and known potential consequences.

For example, accidents such as the puncture of a tank wagon by collision or derailment, and failure and mal-operation of the tank wagon equipment can lead to a catastrophic loss of containment of toxic, radioactive, polluting, flammable or combustible material such as chlorine, LPG, and even diesel fuel. Resulting spills can get into ground water, poison or burn the public, pollute the atmosphere, or create flammable clouds capable of posing flash fire, Vapor Cloud Explosion, BLEVE, blast and jet fire hazards to public and property. Transport of condensed materials such as fertilizer presents special explosion hazards similar to that of TNT or C4, especially when these materials are mixed with diesel fuel.

Before it can reasonably be deemed adequate, the report, at the least, must evaluate the consequences of the above-mentioned scenarios. It must also consider potential impacts all other scenarios and all different material releases experienced during previous incidents. For your consideration, I have attached summaries of selected accidents in the annex.

Please do not hesitate to contact me if you have any questions.

Sincerely Yours, (Van

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Annex A Compilation of Selected Accidents

1) Crescent City, IL. On June 21, 1970, 15 railroad cars including 9 cars carrying LPG derailed. The force of the derailment propelled one of the rail cars over the derailed cars in front of it. Its coupler then struck another rail car and punctured it. LPG was released and ignited. The resulting fireball reached a height of several hundred feet and extended into the part of the town surrounding the trains. The fire caused other rail cars to be ruptured. Portions of the ruptured rail cars rocketed away, travelling by as far as 1600 feet. The fire lasted 56 hours. At the end, 16 businesses were destroyed and 7 others were damaged. Twenty-five homes were destroyed and many others were damaged. Owing to prompt evacuation, no one died but 66 people were injured.

2) Kingman, AZ. On July 5, 1973, BLEVE of a single railroad tank car containing LPG occurred. One-half of the railroad tank car rocketed away by 1200 feet. At the time of the explosion, there were 13 fire fighters and 2 employees within 150 ft at the time explosion occurred. Thirteen of them died of extensive burns. Most of the 95 injured people were spectators located along the highway some 1000 ft away from the tank. The flaming debris and heat radiated from the fireball ignited structures located by as far as 900 ft.

3) Viareggio, Italy. On June 29th, 2009 the derailment of a freight train carrying 14 LPG (Liquefied Petroleum Gas) tank-cars near, caused a massive LPG release from a single rail car. The flashing LPG spill caused the formation of a gas cloud and a boiling pool. No loss of containment occurred from the other 13 tank wagons. A gas cloud formed and ignited triggering a flashfire that resulted in 31 fatalities and in extended damages to residential buildings around the railway line. (see Figure below)



Figure. a) Continuous wall on the West side of the station; b) hedge in front of houses damaged by the fire on the East side of the station; c) example of severe damages to vehicles;

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d) example of damages due to thermal stresses caused by the fire exposure; e) example of damages due to internal overpressure (Landucci et al., 2010).

4) On Saturday, May 27, 2000, about 11:48 a.m., central daylight time, 33 of the 113 cars making up eastbound Union Pacific Railroad train QFPLI-26 derailed near Eunice, Louisiana. Of the derailed cars, 15 contained hazardous materials and 2 contained hazardous materials residue. The derailment resulted in a release of hazardous materials with explosions and fire. About 3,500 people were evacuated from the surrounding area, which included some of the business area of Eunice. No one was injured during the derailment of the train or the subsequent release of hazardous materials. Total damages exceeded \$35 million.

5) On Wednesday, October 10, 2007, about 12:02 p.m., eastbound CSX Transportation (CSX) freight train Q380-09 derailed 31 cars in Painesville, Ohio, while being operated on main track 1. The train was traveling 48 mph at the time of the derailment. The crew's last train operation had been made about 1 1/2 miles before the derailment. The train consisted of 2 locomotives and 112 cars (106 loaded and 6 empty). The 31st through 61st cars in the train derailed. The derailed cars included seven tank cars carrying ethanol, one tank car carrying liquefied petroleum gas, and one tank car carrying phthalic anhydride. Also among the 31 cars that derailed were covered hoppers carrying corn, wheat, feed, plastic, and lumber. The ethanol tank cars and many of the other freight cars caught on fire. Twenty-six of the derailed cars were destroyed. (See figure 1.)

As a precaution, about 1,400 area residents were evacuated from an area of approximately 3 square miles. There were no reported injuries. The temperature at the time of derailment was 51° F, and it was daylight. Estimated damages and environmental cleanup costs were \$8.48 million. At 10:00 a.m., about 2 hours before the accident, the engineer and conductor had gone on duty at CSX's Collinwood Yard in Cleveland, Ohio, to relieve the inbound crew of the train. The crew received new train documentation and the current dispatcher bulletin. The engineer performed the required air brake test, contacted the train dispatcher for permission to depart, and departed at 11:28 a.m.

6) About 10:41 p.m. eastern daylight time on Friday, October 20, 2006, Norfolk Southern Railway Company train 68QB119, en route from the Chicago, Illinois, area to Sewaren, New Jersey, derailed while crossing the Beaver River railroad bridge in New Brighton, Pennsylvania. The train consisted of a three-unit locomotive pulling 3 empty freight cars followed by 83 tank cars loaded with denatured ethanol, a flammable liquid. Twenty-three of the tank cars derailed near the east end of the bridge, with several of the cars falling into the Beaver River. Of the 23 derailed tank cars, about 20 released ethanol, which subsequently ignited and burned for about 48 hours. Some of the unburned ethanol liquid was released into the river and the surrounding soil. Homes and businesses within a seven-block area of New Brighton and in an area adjacent to the accident were evacuated for 2 days. No injuries or fatalities resulted from the accident. The Norfolk Southern Railway Company estimated total damages to be \$5.8 million.

7) On Sunday, July 10, 2005, about 4:15 a.m., central daylight time, two CN freight trains collided head on in Anding, Mississippi. The collision occurred on the CN Yazoo Subdivision, where the trains were being operated under a centralized traffic control signal system on single track. Signal data indicated that the northbound train, IC 1013 North, continued past a stop (red)

signal at North Anding and collided with the southbound train, IC 1023 South, about 1/4 mile beyond the signal. The collision resulted in the derailment of 6 locomotives and 17 cars. About 15,000 gallons of diesel fuel were released from the locomotives and resulted in a fire that burned for about 15 hours. Two crewmembers were on each train; all four were killed. As a precaution, about 100 Anding residents were evacuated; they did not report any injuries. Property damages exceeded \$9.5 million; clearing and environmental cleanup costs totaled about \$616,800.

8) At 4:56 a.m., central daylight time, on October 15, 2005, westbound Union Pacific Railroad (UP) train ZYCLD 13 2 collided with the rear of standing UP train MPBHG 15 in the UP rail yard in Texarkana, Arkansas. The collision resulted in the puncture of a railroad tank car containing propylene, a compressed flammable gas. The propylene was heavier than air and flowed near the ground into a nearby neighborhood. The flowing gas reached a house where an unknown ignition source ignited the gas, and the house exploded. The single occupant was killed. The fire moved quickly along the flowing gas back to the punctured tank car. A second, unoccupied, home was destroyed in the fire, and a wooden railroad trestle burned completely. Approximately 3,000 residents within a 1-mile radius of the punctured tank car were advised to evacuate the area. The two crews and the employees working at the Texarkana yard were not injured, and they evacuated the area safely. Between 5:00 a.m. and 7:00 a.m., the wind was calm, the visibility was 10 miles, and the temperature was approximately 59° F. Total damage was \$2.4 million, including \$325,975 in equipment damage and \$2,053,198 in track damage.

9) About 5:03 a.m., central daylight time, on Monday, June 28, 2004, a westbound Union Pacific Railroad (UP) freight train traveling on the same main line track as an eastbound BNSF Railway Company (BNSF) freight train struck the midpoint of the 123-car BNSF train as the eastbound train was leaving the main line to enter a parallel siding. The accident occurred at the west end of the rail siding at Macdona, Texas, on the UP's San Antonio Service Unit. The collision derailed the 4 locomotive units and the first 19 cars of the UP train as well as 17 cars of the BNSF train. As a result of the derailment and pileup of railcars, the 16th car of the UP train, a pressure tank car loaded with liquefied chlorine, was punctured. Chlorine escaping from the punctured car immediately vaporized into a cloud of chlorine gas that engulfed the accident area to a radius of at least 700 feet before drifting away from the site. Three persons, including the conductor of the UP train and two local residents, died as a result of chlorine gas inhalation. The UP train engineer, 23 civilians, and 6 emergency responders were treated for respiratory distress or other injuries related to the collision and derailment. Damages to rolling stock, track, and signal equipment were estimated at \$5.7 million, with environmental cleanup costs estimated at \$150,000.

10) About 2:39 a.m. eastern standard time on January 6, 2005, northbound Norfolk Southern Railway Company (NS) freight train 192, while traveling about 47 mph through Graniteville, South Carolina, encountered an improperly lined switch that diverted the train from the main line onto an industry track, where it struck an unoccupied, parked train (NS train P22). The collision derailed both locomotives and 16 of the 42 freight cars of train 192, as well as the locomotive and 1 of the 2 cars of train P22. Among the derailed cars from train 192 were three tank cars containing chlorine, one of which was breached, releasing chlorine gas. The train engineer and eight other people died as a result of chlorine gas inhalation. About 554 people complaining of

respiratory difficulties were taken to local hospitals. Of these, 75 were admitted for treatment. Because of the chlorine release, about 5,400 people within a 1-mile radius of the derailment site were evacuated for several days. Total damages exceeded \$6.9 million.

11) On September 21, 2004, about 3:25 a.m., central daylight time, the Alton and Southern Railway Company 2 remote control train YAS313 derailed during switching operations at the east end of the Gateway Hump Yard in East St. Louis, Illinois. The remote control operator was unable to control the speed of the train as it crested the hump. 3 As the train entered track 066, it collided at 9.6 mph with a tank car containing vinyl acetate. During the collision and subsequent derailment, vinyl acetate began to leak from two tank cars and the cargo from both cars caught on fire.

About 140 people from the surrounding neighborhood were evacuated, and work at the hump yard was suspended. The evacuation order was lifted about 6:00 a.m. No injuries were reported. The weather was clear, about 67° Fahrenheit, with light winds from the south-southeast. It was dark at the time of the accident, but the area was well lit with stadium type lighting.

12) About 9:04 a.m. central standard time on February 9, 2003, northbound Canadian National freight train M33371, traveling about 40 mph, derailed 22 of its 108 cars in Tamaroa, Illinois. Four of the derailed cars released methanol, and the methanol from two of these four cars fueled a fire. Other derailed cars contained phosphoric acid, hydrochloric acid, formaldehyde, and vinyl chloride. Two cars containing hydrochloric acid, one car containing formaldehyde, and one car containing vinyl chloride released product but were not involved in the fire. About 850 residents were evacuated from the area within a 3-mile radius of the derailment, which included the entire village of Tamaroa. No one was injured during the derailment, although one contract employee was injured during cleanup activities. Damages to track, signals, and equipment, and clearing costs associated with the accident totaled about \$1.9 million.

13) About 9:30 a.m. central daylight time on September 13, 2002, a 24,000-gallon-capacity railroad tank car, DBCX 9804, containing about 6,500 gallons of hazardous waste, catastrophically ruptured at a transfer station at the BASF Corporation chemical facility in Freeport, Texas. The tank car had been steam-heated to permit the transfer of the waste to a highway cargo tank for subsequent disposal. The waste was a combination of cyclohexanone oxime, water, and cyclohexanone. As a result of the accident, 28 people received minor injuries, and residents living within 1 mile of the accident site had to shelter in place for 5 1/2 hours. The tank car, highway cargo tank, and transfer station were destroyed. The force of the explosion propelled a 300-pound tank car dome housing about 1/3 mile away from the tank car. Two storage tanks near the transfer station were damaged; they released about 660 gallons of the hazardous material oleum (fuming sulfuric acid and sulfur trioxide).

14) At approximately 1:37 a.m. on January 18, 2002, eastbound Canadian Pacific Railway freight train 292-16, traveling about 41 mph, derailed 31 of its 112 cars about 1/2 mile west of the city limits of Minot, North Dakota. Five tank cars carrying anhydrous ammonia, a liquefied compressed gas, catastrophically ruptured, and a vapor plume covered the derailment site and surrounding area. The conductor and engineer were taken to the hospital for observation after they complained of breathing difficulties. About 11,600 people occupied the area affected by the

vapor plume. One resident was fatally injured, and 60 to 65 residents of the neighborhood nearest the derailment site were rescued. As a result of the accident, 11 people sustained serious injuries, and 322 people, including the 2 train crewmembers, sustained minor injuries. Damages exceeded \$2 million, and more than \$8 million has been spent for environmental remediation.

15) About 3:45 a.m., eastern daylight time, on July 14, 2001, at the ATOFINA Chemicals, Inc., (ATOFINA) plant in Riverview, Michigan, a pipe attached to a fitting on the unloading line of a railroad tank car fractured and separated, causing the release of methyl mercaptan, a poisonous and flammable gas. About 4:09 a.m., shortly after the Riverview Fire Department chief arrived on scene, the methyl mercaptan ignited, engulfing the tank car in flames and sending a fireball about 200 feet into the air. Fire damage to cargo transfer hoses on an adjacent tank car resulted in the release of chlorine, a poisonous gas that is also an oxidizer. The fire was extinguished about 9:30 a.m. Three plant employees were killed in the accident. There were several other injuries; most of the injured were treated for respiratory symptoms and released. About 2,000 residents were evacuated from their homes for about 10 hours. Two tank cars, railroad track, and plant equipment (including hoses and fittings) were damaged in the fire.

16) On Saturday, May 27, 2000, about 11:48 a.m., central daylight time, 33 of the 113 cars making up eastbound Union Pacific Railroad train QFPLI-26 derailed near Eunice, Louisiana. Of the derailed cars, 15 contained hazardous materials and 2 contained hazardous materials residue. The derailment resulted in a release of hazardous materials with explosions and fire. About 3,500 people were evacuated from the surrounding area, which included some of the business area of Eunice. No one was injured during the derailment of the train or the subsequent release of hazardous materials. Total damages exceeded \$35 million.

17) About 12:05a.m. on February18, 1999, railroad tank car UTLX643593, which was on the west unloading rack at the Essroc Cement Corporation (Essroc) Logansport cement plant near Clymers, Indiana, sustained a sudden and catastrophic rupture that propelled the tank of the tank car an estimated 750 feet and over multistory storage tanks. The 20,000-gallon tank car initially contained about 161,700pounds (14,185gallons) of a toxic and flammable hazardous waste that was used as a fuel for the plant's kilns. There were no injuries or fatalities. Total damages, including property damage and costs from lost production, were estimated at nearly \$8.2million.

18) About 6:10 a.m., central daylight time, on September 2, 1998, the 17th through 19th cars and the first two platforms of the five-platform 20th car of westbound Burlington Northern and Santa Fe Railway Company intermodal freight train S-CHILAC1-31 derailed at Crisfield, Kansas. The accident occurred when the 18th car from the locomotive, DTTX 72318, an articulated, five-platform, 125-ton double-stack car, experienced a separation between the floor shear plate and bulkhead bottom angle at the leading end of the car's B platform. The separation allowed the car to sag below the rails, catch a part of a switch, and derail.

The train was traveling 68 mph through the east siding switch at Crisfield, milepost 291.7, on the Panhandle Subdivision of the railroad's Amarillo Division, when it began to derail. The train then went into emergency braking and stopped after traveling about 1/2 mile. The derailment resulted in a pileup involving four articulated multiplatform cars carrying intermodal shipping containers. Some of the containers were breached, resulting in the release of hazardous materials

and fires. About 200 people were evacuated within a 5-mile radius. No injuries resulted from either the derailment or the hazardous materials releases. Estimated damage was \$1.3 million.

19) About 12:37 p.m. eastern daylight time on Saturday, June 20, 1998, 30 of the 148 cars making up eastbound CSX Transportation, Inc., (CSX) train Q316 derailed at Cox Landing, West Virginia. Of the derailed cars, three were loaded with hazardous material, and eight others contained hazardous material residue. Two of the loaded cars were damaged in the pileup and leaked a combined volume of about 21,500 gallons of formaldehyde solution. No one was injured during the derailment of the train; however, 15 persons reported minor injuries as a result of the release of formaldehyde. Total damages in the accident exceeded \$2.6 million.

20) At **4:30** a.m., on April **2**, **1997**, tank car ACAX 80010 arrived at the Illinois Central Railroad yard in Memphis, Tennessee, on Illinois Central train No. GEME 01. At 12:05 p.m., a railroad inspector noticed leakage from the tank car during switching operations. The tank car was filled with anhydrous hydrogen fluoride, a corrosive and poisonous liquid. Vapor appeared to be leaking from a weld at a 2- by 3-foot patch in the tank wall. About 150 people (26 residences) were evacuated from a ¹/₂-mile radius around the yard for about 17 hours while the leak was controlled and the material was transferred to another tank car. No injuries were reported.

The tank car had been loaded at Allied-Signal, Inc., (the tank car owner and shipper) in Geismar, Louisiana, on March 17, 1997, and shipped on March 31, 1997, destined for Cameco in Port Hope, Ontario, Canada. The tank car had been removed from service for repairs in February 1997; the repairs included cutting out a 2- by 3-foot section of the tank wall and welding a patch into the wall. This shipment was the tank car's first after being returned to service.

21) On February 21, 1996 at about 5:55 a.m., mountain standard time, Southern Pacific Lines freight train 1ASRVM-18 derailed 39 cars and 2 locomotives while descending the Tennessee Pass, a 3.0 percent grade in the Rocky Mountains of Colorado. The train's three-member traincrew consisted of a locomotive engineer, a student locomotive engineer, and a conductor. According to the conductor, the train was being operated by the student engineer. As the train started the mountainous descent it began gaining speed and eventually ran away. The runaway train broke apart three different times, resulting in three separate derailments.

The derailment resulted in the death of both engineers. The conductor, who was in the second locomotive unit during the runaway, survived with serious injuries. As a result of the derailment 51,606 gallons of sulfuric acid and 19,733 gallons of triethylene glycol, both regulated hazardous materials, were released. Four family members living on a nearby farm were evacuated from the area. Monetary damage was estimated to be \$6.8 million.

22) About 4:10 a.m., mountain daylight time, on April 11, 1996, 19 cars from Montana Rail Link (MRL) freight train 01-196-10 derailed near Alberton, Montana. Six of the derailed cars contained hazardous materials. One derailed tank car containing chlorine (a poison gas) ruptured, releasing 130,000 pounds of chlorine into the atmosphere; another tank car containing potassium hydroxide solution (potassium cresylate, a corrosive liquid) lost 17,000 gallons of product; and a covered hopper car containing sodium chlorate (an oxidizer) spilled 85 dry gallons onto the ground.

About 1,000 people from the surrounding area were evacuated. Approximately 350 people were treated for chlorine inhalation, 123 of whom sustained injury. Nine people, including both members of the train crew, were hospitalized. A transient riding the train died from acute chlorine toxicity.

U.S. Interstate Highway 90 (I-90) is roughly parallel and about 150 yards north of the MRL tracks at the accident site. The hazardous material cloud drifted across I-90 resulting in multiple highway traffic accidents. Several motorists were stranded in the cloud after these accidents. I-90 was closed following the accident requiring an 81-mile detour. Monetary damage was estimated to be \$3.9 million.

The Governor of Montana declared a state of emergency in Missoula and Mineral County. On April 14, 1996 the evacuation area was reduced to 15 square miles; the residents were temporarily escorted into the area to feed and water livestock animals, retrieve some personal possessions, and locate pets. Residents were allowed to return to their homes, and I-90 was reopened 17 days after the accident.

23) About 5:00 a.m. eastern standard time on February 7, 1996, in Sweetwater, Tennessee, Norfolk Southern eastbound train M34T5 stopped on the main track to allow a westbound train to pull onto a siding. About 5:30 a.m., as the engineer began to move his train forward, an uncommanded emergency brake application occurred. The train had moved about 33 feet and reached a speed of about two mph. When the train conductor walked back to determine the cause of the emergency brake application, he discovered that tank car GATX 92414 had separated almost completely into two halves near the middle of the tank and that about 8,000 gallons of carbon disulfide, a flammable and toxic material, had spilled. As a result of the spill, about 500 people were evacuated from the area, including residents of a nursing home. Five people were seen at a local hospital, but only one person was admitted.

About noon on February 9, 1996, emergency crews determined that the released carbon disulfide did not pose a problem outside the immediate area of the tank car, and the evacuation order was lifted. The Sweetwater Fire Department then relinquished control of the site to the Environmental Protection Agency on-scene coordinator (EPA OSC), and the focus of the activities at the site became environmental cleanup and product recovery.

About 4:45 p.m. on February 9, the EPA OSC decided to permit access to the tank car to examine the fracture surfaces before the tank was moved. Initially, polyethylene tarpaulins and plywood were placed over the spill area near the failed tank car. However, at 10:00 p.m., after discussions with the chemical shipper, Akzo Nobel Chemicals, Inc., the EPA OSC became concerned that the polyethylene tarpaulin and plywood could trap pockets of carbon disulfide vapors, which could possibly be ignited by people walking over the tarpaulin.

At 1:40 a.m. on February 10, as Norfolk Southern contractor personnel were attempting to remove the tarpaulin, a flash fire occurred. Four contractor personnel were caught in the flash fire, but because the fire was of short duration and the flames were low to the ground, no injuries resulted. Sweetwater emergency response agencies were not on scene at the time, but the Sweetwater fire chief resumed control of the site shortly after this fire and initiated a second area-wide evacuation. On February 12, following cleanup activities at the site, this evacuation was lifted.

24) At 3:55 p.m. on October 23, 1995, at the Gaylord Chemical Corporation plant in Bogalusa, Louisiana, yellow-brown vapors began leaking from the dome of the DOT class 105A railroad

tank car UTLX 82329 that contained a mixture of nitrogen tetroxide, which is a liquefied poisonous gas and oxidizer, and water. The vapors initially formed a plume between 10 and 15 feet in diameter. Plant personnel notified emergency response agencies and used two plant fire hoses to spray water into the plume to suppress the vapors. About 4:30 p.m. Bogalusa fire personnel arrived at the plant and set up fire hoses to help-suppress the vapors.

The head on the B-end of the tank car failed about 4:45 p.m., resulting in one end of the tank car jacket being torn away and thrown about 350 feet. The tank car was then propelled 35 feet down the track and derailed at a track bumping block. A large reddish-brown vapor cloud was released from the tank car. Vapors continued to be released from the opening in the tank car for another 36 hours until the chemical reaction that had occurred within the tank was brought under control through neutralization and dilution.

Some 3,000 people were evacuated from the area as a result of the vapor cloud. Of 4,710 people who were treated at local hospitals, 81 people were admitted.

25) Freight Train Derailment and Puncture of Hazardous Materials Tank Cars, Crestview, Florida, April 8,1979

About 8 AM on April 8, 1979, 26 placarded cars (of 29 car train) containing hazardous materials, of Louisville and Nashville Railroad Co freight train derailed while moving around a curve between Milligan and Crestview, Florida. Tow tank cars of anhydrous ammonia ruptured and rocketed. Twelve other cars containing acetone, methyl alcohol, chlorine, carbolic acid and anhydrous ammonia ruptured and burned. 14 persons injured, 4,500 persons evacuated. Released chlorine and anhydrous ammonia formed a cloud that threatened a 300-square mile area. The train consisted of 5 locomotives and 114 cars (107 loaded, 6 empty and a caboose), including 67 cars containing hazardous materials. Total trailing weight, 11,360 tons. Train separated between 36th and 37th cars and several cars had derailed. Tanks cars were lying in line along outside of curve. A fire had started in tank cars jacknifed along tracks. About 8:03 AM the 59th car exploded, releasing a gas cloud and propelling a part of the car eastward. One portion of the tank car rocketed east 650 feet; one portion west 250 feet. The 56th car containing anhydrous ammonia derailed, rolled over and dislodged its dome housing cover. Its relief valves were damaged and the tank car stopped upside down on top of its relief vent. One end pointing up and the lower end engulfed in a ground spill of acetone and methyl alcohol released from other ruptured cars. Train embankment where flammable materials pooled. About 8:23 AM the 56th car exploded. Derailed cars 48 through 55.were engulfed in a bright yellow-orange fire, which continued to bum for about 60 hours, consuming the acetone, methyl alcohol and carbon tetrachloride. All the breached cars contained residues which slowly vented in the wreck area for **5** days. Phosgene gas wafted from carbon tet car. 17 derailed cars had a capacity of 33,500 gallons. Extensive fire damage within 130-foot radius of derailed and burning cars. All trees and ground cover extending for 650 feet northwest of the derailment site were defoliated by the ammonia cloud.

Despite the use of self-contained breathing apparatus and short work shifts, 10 wreckclearing workers were overcome with fumes. Some were hospitalized. Sheriff and civil defense personnel evacuated several hundred people in the Town of Milligan and a 1-square mile area to the west of the derailment. When vapor cloud rose over 200 feet and began moving westward, evacuation area was extended 4.5 miles to the Town of Baker and involved over 1,500 residents. Information about the cloud observed by Air Force

AC 130 aircraft. By 11:30 AM, evacuation area extended to include the entire northwest quarter of Oakloosa County, over 300 square miles and more than 4,500 residents. By noon the cloud extended 28 miles northward to the FloridaIAlabama state line. During the next day the fire began to subside and the vapor cloud reduced to a height of 1,000 feet. The evacuation area was reduced from 13 miles to 4 miles downwind. Residents in the outward evacuation area were allowed to return home by 7 AM on April 10. By 4:15 AM on April 11, the tank car fires had burned out between April 12 and 16, all hazardous materials transferred. On April 13 all residents were allowed to return home.

26) Illinois Central Gulf Railroad Company Freight Train Derailment, Hazardous Material Release and Evacuation, Muldraugh, Kentucky, July 26,1980

About 758 AM on July 26, 1980, 4 locomotive units and 17 cars (38 trailing cars total), including 7 placarded tank cars containing hazardous materials were in Muldraugh, Kentucky Two tanks cars of vinyl chloride were punctured and their contents burned. About 6,500 persons were evacuated from Muldraugh and the US Army installation at Fort Knox. All the locomotive units derailed and overturned. The following 17 cars derailed. 7 tank cars contained hazardous materials. Six contained vinyl chloride and one contained chlorine. Gas escaped and ignited. Shortly after the derailment, crewmembers informed the Muldraugh police and Fort Knox military personnel. 6,500 persons were evacuated, including 4,000 military personnel. At about 8:25 AM, KY Division of Disaster and Emergency Services (DES) was called in by local authorities to implement an emergency response plan. A

temporary command post with DES in charge was established about 3/4 mile from the site and was later moved to a bldg at Fort Knox. Three highways and the air space (3 mile radius, 10,000 foot ceiling) was closed to air traffic. The evacuation area was reduced from 2 miles to 1 1/4 miles. The US Army provided assistance throughout the emergency.

27) Derailment of Southern Pacific Transportation Train Carrying Radioactive Material at Thermal, California, January 7, 1982.

About 9:50 PM on January 7, 1982, Southern Pacific Transportation Co freight train No. 01-BSMFF-05, derailed 14 cars at Thermal, California. Presence of radioactive material in the derailed Trailer-On-Flat-Car train discovered about 1 hour after the accident occurred. Accurate info regarding the precise nature of the radioactive material shipment not available at the accident site until 5 hours after the derailment. The radioactive placards were located about 5:00 AM. The truck trailer, on car 48, carrying americium was destroyed and their lading was badly damaged. The Ram consisted of 16 Ci of Am-241 and Be in mixture to be utilized in oil well exploration. The container consisted of a welded mild steel closed cylinder, about 20 inches long and 17 inches in diameter. An inner 2 inch diameter stainless steel tube contained a pressure vessel, The interior void was filled with polyethylene, a neutron absorber. Gross weight was 155 lb. The outer container had no damage. Four transients on the deck of the flat cars were injured, and one died.

28) Derailment of Illinois Central Gulf Railroad Freight Train and Release of Hazardous Materials at Livingston, Louisiana, September 28, 1982

About 5:12 AM on September 28, 1982, Illinois Central Gulf Railroad (ICG) freight

Re: CENAE-R, Draft Environmental Impact Statement, FILE NO. NAE-2007-00698 Dr. Erdem Ural to Mr. Alan Anacheka-Nasemann Page 11 of 19 train extra 9629 East derailed 43 cars (a total of 84 loaded cars and 16 empties plus a caboose) on the single line main track in Livingston, Louisiana. Of the derailed cars, 36 were tank

cars, 27 of these containing toxic or hazardous commodities and 5 contained flammable petroleum products. A total of 20 tank cars were punctured or breached in the derailment. Fires broke out in the wreckage. Thermally-induced explosions of two tank cars that had not been punctured caused them to rocket violently. About 3000 persons living within a 5-mile radius of the derailment site were evacuated for as long as two weeks. 19 residences and other buildings in Livingston were destroyed or severely damaged. More than 200,000 gallons of toxic chemical product were spilled, requiring extensive excavation of contaminated soil and its transportation to a distant dump site. This has resulted in long-term closure of the railroad line and an adjacent highway. Apparently the engineer was drunk and an unqualified person was at the controls.

The 16th through the 58th head cars had derailed along the main track for a distance of 750 ft at milepost 26.8 The 26th through 32nd car were tank cars with vinyl chloride, a flammable gas. Two were breached in the derailment, creating the fireball which extended 400 ft from the south margin of Hwy 190 across the derailment site to 250 ft north of the track, enveloping a brick house. The

Louisiana State Police undertook the coordination of the response and evacuated 2,700 persons within a 5-mile radius. 75 tank cars, 7 of which were empty. A total of 55 tank cars were placarded as follows:

Placard	Derailed	Not Derailed
Chlorine	0	1
Flammable Gas	8	6
Flammable Liquid	1	6
Flammable Solid	1	0
Poison	4	1
Corrosive	14	14

A fire ball ignited oil leaking from the 22nd and 23rd cars. Vinyl chloride gas venting from the 30th and 31st cars burned as well as styrene monomer and toluene diisocyanate leaking from the 52nd and 54th cars. The fires fed by vinyl chloride and plastic pellets pressurized the 27,28 and 32 cars which began to vent and bum. The fire became so intense that the 36th car, loaded with motor fuel anti-knock compound, exploded about 19 hours after the derailment, propelled into the pine grove north of the derailment. A second explosion occurred 82 hours following the derailment. The south tank head of the 29th car, loaded with vinyl chloride, was propelled 225 feet south. Most of the tank rocketed 425 feet north. Airborne fragments set fire to a 55-foot mobile home 500 feet south of the derailment site. Other parts traveled as far as 1,500 feet south. On October 4, concern over the stability of burning styrene monomer prompted emergency personnel to extinguish the fire and demolish the car with explosive charges the next day. On October 11, 6 vinyl chloride cars were detonated. In all, 36 cars were destroved. The car chemical products lost:

destroyed. The ear enemiear produces tost.	
Gallons	
163043	
23145	

Motor tiel anti-knock compound	5666
Toluene diisocyanate	2259
Phosphoric acid	148552
hydrofluosilicic acid	19780
Sodium hydroxide	15363
Perchloroethylene	14028
ethylene glycol	20840

Most of the chemicals not burned were captured from catch basins and diked drainage ditches. More than 100 truckloads of recovered and neutralized chemicals were transported to designated dump sites. More than 60,000 cubic yards of soil were toxically contaminated and trucked 150 miles to a dump site. Extensive scorching of trees, etc within a 1000 foot radius of the derailment.

29) Vinyl Chloride Monomer Release from a Railroad Tank Car and Fire, Formosa Plastics Corporation Plant, Baton Rouge, Louisiana, July 30,1983

At 3:45 AM on July 30, 1983, vinyl chloride monomer under pressure escaped from a railroad tank car at the loading facility within the Formosa Plastics Corp manufacturing plant. The released VCM was ignited and a large billowing fire ensued.

VCM is a flammable compressed gas, easily ignitable, producing hazardous combustible gases composed of hydrogen chloride and carbon monoxide.

The tank car had a capacity of 24,859 gallons and a fully loaded weight of 90 tons. One fire burned for 120 hours.

30) Denver and Rio Grande Western Railroad Company Train Yard Accident Involving Punctured Tank Car, Nitric Acid and Vapor Cloud and Evacuation, Denver, Colorado, April 3,1983

About 4AM on April 3, 1983, a Denver and Rio Grande Western Railroad Company switch crew was switching 17 cars in the North Yard in Denver, Colorado when a coupler broke on the fourth car, leading to a 150 foot separation between the 3rd and 4th car. The engineer accelerated and plowed into a loaded car ahead at a speed of 10-12 mph. Upon impact, the end sill of the fourth car, an empty box car, over-rode the coupler of the loaded tank car and punctured the tank head. Nitric acid spilled from the car, formed a vapor cloud which dispersed over the area. As a result, 34 persons were injured and 9,000 persons were evacuated from the area. The fire department arrived at 4:12 AM. But at 4:23 AM, the Denver Hazardous Materials Coordinating Chief arrived on the scene and called off the firefighters. They withdrew to a safe distance -1200 feet. Seven cars of soda ash were located, 780 tons and arrived at 11 AM. A snow blower spread the soda ash, and it took about 1 1/2 hours.

The coupler between the loosened cars had failed completely.

31) Derailment of St Louis Southwestern Railway Company (Cotton Belt) Freight Train and Release of Hazardous Materials Near Pine Bluff, Arkansas, June 9.1985

About 1:33 PM on June 9, 1985, St Louis Southwestern Railway Company freight train extra 4835 north derailed while passing over a ballast deck pile trestle located about 3.3 mi southwest of Pine Bluff, Arkansas. 18 of the 42 derailed cam were loaded tank cars

and 14 of these contained regulated hazardous or toxic chemical commodities; 4 others contained non-regulated flammable petroleum. Fire broke out in the wreckage; two tank cars subjected to intense thermal exposure exploded. More than 2800 persons were evacuated from a l-mile radius.

Fire broke out immediately in the wreckage of 31 cars south of the bridge. Two tanks cars containing butyl acrylate, a combustible liquid, rupture and ignited. Burning liquid engulfed an insulated tank car loaded with liquid synthetic plastic and an insulated car containing ethylene oxide, a flammable liquid. Two derailed cars contained vinyl chloride and two tanks cars contained hydrogen fluoride anhydrous, a dangerous corrosive chemical.

The first fire crews were on the scene at 1:39 PM, 6 minutes after the accident. The conductor gave details of tank contents and instructions to the asst fire chief. For ethylene oxide, the recommended evacuation zone was 5000 foot radius. Rather than fight the fire, an estimated 2,840 persons were evacuated.

Initially the fire was caused by liquid butyl acrylate released from two punctured tank cars, but it spread rapidly to pelletized synthetic plastic that was spilled from four covered hopper cars, two of which were on top of the still intact ethylene oxide car. The car exploded at 6:40 AM on June 10, 17 hours after the accident occurred. A torch fire burned a large hole in one of the derailed tank cars containing liquid synthetic plastic (polyethylene polyphylisocyanate). This car burned and another filled with the same material exploded about 4:30 AM on June 11. After this, the fire diminished and unmanned fire hoses were set up by the fire department. The emergency was removed at 2:12 PM on June 15.

32) Collision and Derailment of Montana Rail Link Freight Train with Locomotive Units and Hazardous Materials Release, Helena, Montana, February 2,1989

About 4:30 AM on February 2, 1989, freight cars from, Montana Rail Link west bound train 1-121-28 rolled eastward down a mountain grade and struck a stopped helper locomotive. Train 121:3 helper units, 3 road units, 49 car train. 15 cars derailed including 3 tank cars containing hydrogen peroxide, isopropyl alcohol and acetone. Hazardous material released resulted in a fire and explosions. About 3,500 persons in Helena were evacuated. The locomotiveless cars and helper unit 1 collided. 21 cars involved and 15 derailed Engineer saw three tank cars, one was venting a whitish gray cloud. No flames sighted.

At 4:40 yard clerk saw orange glow. Clear liquid flowing in trackside ditch westward towards Benton Ave. Saw flames 2 feet high. First explosion occurred 3 to 4 seconds later. A second explosion occurred 1 to 2 seconds later. Flames 100 feet in the air. Second explosion was blue-white flash and loud noise. The crew of 121 was still traveling down the mountain and saw the explosion about 1 mile away.

On February 2, the mayor declared a local disaster and ordered an evacuation beginning 5:30. The initial evacuation was more than 1/2 mile radius, later reduced. By 10 on February 4, the evacuation was ended. About 3,500 people were involved. Extensive damage to a college dormitory. Damage to homes within 3 mile

radius of accident, including homes penetrated with fragments weighing several hundred pounds. Carroll College reported major damage to 10 buildings.

All the hydrogen peroxide (18,950 gallons) and all the isopropyl alcohol were released.

38% of the hydrogen peroxide (7,300 gallons) in another tank car released. A mixture of hydrogen peroxide and molten polyethylene could explode. Estimated force of second explosion equivalent to 10 tons of **TNT** (interaction between 9.1 tons of 70% hydrogen peroxide and 0.9 tons of polyethylene.

33) Burlington Northern Inc Monomethylamine Nitrate Explosion, Wenatchee, Washington, August 6,1974

At 12:32 PM on August 6, 1974, a shipment of Monomethylamine Nitrate solution detonated during routine switching operations in the BN Apple Yard in Wenatchee, Washington. The explosion killed two persons, injured 113 and destroyed equipment and buildings. On July 29, about 10,000 gallons of PRM was shipped by DuPont, Biwabik, MN to DuPont, Wash. The tank car arrived, after several stops, in Wenatchee at 6:55 AM on August 6, 1974. The shipment was involved in switching operations when it began to spew smoke and fire then detonated.

Apple Yard lies on the west bank of the Columbia River, south of Wenatchee. The T was 82°F. At the time there were nine cars adjacent to the car. The area surrounding the yard was residential.

Parts of the tank car were found one mile from the accident. Many cars were ignited and hundreds of acres of grassland burned. Most of the structural damage was within a radius of one mile, but broken glass was reported 3.5 mi east and 2.5 mi north. 71 cars and 4 containers were demolished. The cargo was PRM crystals in a water solution, to be used in a explosive product called TOVEX.. About 4000 pieces weighing 3,760 lbs or 19% of the tank shell were recovered.

34) Southern Pacific Transportation Co. Freight Train 2nd BSM 22 Munitions Explosion, Benson, Arizona, May 24,1973

At 4:30 PM on May 24, 1973, Southern Pacific Co.'s freight train, 2nd BSM 22, left Lordsburg, New Mexico, a stop enroute from San Antonio to San Francisco. Cars 35 through 46 contained MK 82, 500-lb bombs. A series of explosions occurred between 6:50 PM and 1:15 AM that destroyed 12 munitions boxcars. The first

explosion occurred with car 38. The explosion did not interfere with the progress of the train and occurred without the knowledge of the train crew. The conductor in the caboose notices burning crossties and notified the engineer who began braking. The train was traveling at 30 mph at the time.

A second explosion occurred which blew 6 bombs and a portion of a 7th from car 38. When the conductor saw fire and black smoke, he placed the train brakes in emergency and jumped from the caboose. Reconstruction of the accident showed that a piece of flooring was exposed to a fire of 1500 'F for 25 minutes. The outside of the board burned about 5 minutes.

As car 98 passed the point of the original explosion, a low order explosion of one of the bombs that had been expelled from car 38 produced a small crater. The train separated between cars 35 and 34. Explosions of varying intensity continued until 1:15 AM on May 25 (7 hours later!).

The accident occurred in a sparsely populated region of Arizona; the nearest residence was 5 miles away.

The MK 82 bombs consisted of coated steel casing filled with tritonal, fuse wells and

charging tubes for arming the bombs.

The major explosions produced a 115 foot by 93 foot crater, 25 feet deep and scorched the desert 1/4 mile in all directions. The force of three of the main explosions were recorded by Seismological Observatory in Tucson, Arizona as 1.6, 1.4 and 1.2 on the Richter scale. Several cars exploded at about the same time. About 500 of the 2600 bombs were recovered unexploded. Bombs were blown as far as 1 mile from the main crater area. Windows were shattered in a home 5 miles from the accident. Spacer cars between explosive cars would have been helpful.

35) Derailment of Southern Pacific Transportation Company Freight Train on May 12, 1989 and Subsequent Rupture of Calnev Petroleum Pipeline on May 25, 1989, San Bernardino, California

About 7:36 AM on May 12, 1989, Southern Pacific Transportation Co freight train 1-MJLBP-111 consisting of a 4 unit locomotive on the head end of the train, 69 hopper cars loaded with trona and a 2 unit helper locomotive on the rear of the train derailed at milepost 486.8 in San Bernardino, California. The entire train was destroyed. Seven homes were totally destroyed and 4 were extensively damaged. 2 crew members died and 3 were injured. Two residents were killed and one injured. Homes in the surrounding area were evacuated because of concern the adjacent 14 inch Calnev pipeline carrying gasoline and under the wreckage would rupture. Residents returned to their homes 24 hours after the derailment.

About 8:05 AM on May 25, 1989, 13 days after the train derailment, the pipeline ruptured at the site of the derailment and ignited. 2 residents were killed, 3 received serious injuries and 16 reported minor injuries. Eleven homes were destroyed and 3 received smoke damage. 21 motor vehicles were destroyed. Residents within a four block area were evacuated.

Total injured: 6 serious, 23 minor. Total killed: 6

36) Derailment of CSX Transportation Inc Freight Train and Hazardous Materials Release Near Freeland, Michigan on July 22,1989

About 11:20 am July 22, 1989 CSX Transportation Inc freight train R-331-22 derailed near Freeland, Michigan. The train consisted of 2 locomotives, 17 loaded cars, 15 empty cars and an unoccupied caboose. Of the 14 derailed cars, 6 were tanks cars. About 1000 residents were evacuated for 7 days.

At about 11:20 AM the train crew felt a slight lurch followed

almost immediately by the train going into emergency. When they looked back, they saw cars derailing amid a large fireball and black smoke. About 1000 residents were evacuated within a 1/2 mile radius of the accident site. Hazardous materials burned for 6 days. The evacuation order was lifted at 8:56 PM on July 29.

Of the 15 cars that contained hazardous materials, 7 derailed. They included cars loaded with styrene monomer, acrylonitrile, acrylic acid, petroleum naptha and a mixture of chlorosilanes, including trimethylchlorosilane. Styrene and acrylic acid are flammable, corrosive and can polymerize, releasing heat in the process. Acrylonitrile and trimethylchlorosilane are flammable liquids, corrosive and difficult to extinguish. The latter forms hydrochloric acid in the presence of water.

On July 23, all parties decided to allow the burning to proceed. On July 25, with the

trimethylchlorosilane still burning, the fire chief tried sodium bicarbonate. A reaction occurred that created hydrogen gas that ignited. Tried increased air to accelerate burning. Still burning on July 28. Tank cars emptied and evacuation lifted at 8:56 pm on July 29.

37) Southern Railway Company Train 154 Derailment with Fire and Explosion, January 25,1969

Southern Railway Company train 154 was wrecked at Laurel, Mississippi, about 145 mi north of New Orleans, on January 25, 1969 at about 4:15 am when 15 tank cars of liquefied petroleum gas derailed. The train, with four locomotives, 139 cars and caboose was moving northward at 30 mph when the west wheel on the lead truck of the 62nd car broke. The car derailed about 256 feet north; the entire train behind the 62nd car derailed 2,146 feet further north.

For about 40 minutes after the derailment there were continued explosions; pieces of tank cars ranging in size from 3/4 of a tank car to small parts were hurled up to 1,600 feet from the wreck, igniting dwellings and commercial buildings. At least 3 tanks rocket-propelled over long distances and started fires where they came to rest. Residents were evacuated from an area about 10 blocks square. A total of 54 residences were substantially destroyed and over 1350 residences suffered some damage. On January 26 residents retuped and slow speed service was restored at 5:30 PM.

The first 61 cars remained on track. The rear 63 cars remained on track, with the 76th car stopping about 20 feet from the derailed cars. Large mushrooms of flaming propane shot hundreds of feet into the air. 19 pieces of tanks were hurled off the right of way. One piece of tank car was hurled into a pump-house of a city well and cut an 8 inch water main, reducing the pressure. The fires in the residential area were under control by 11 am, 6 1/2 hours after the wreck occurred.

A 37 foot section was propelled 1000 feet in the air from the wreck, bouncing several - times and coming to rest 1600 feet from the wreck center. A 37 foot section was propelled 800 feet from the wreck, striking the peak of a roof, then bounced to about 1100 feet from the wreck.

The Police Chief issued instructions to seal off the area and evacuate residents at 4:20 AM. There was no telephone and electric power in parts of the city. No explosions after 5 AM. A damaged tank car was exploded. Residents returned at 10:30 AM January 26. Broken windows as far south as 3 mi from Laurel. 2 fatalities and 33 persons hospitalized.

38) Chicago, Burlington and Quincy Railroad Company Train Derailment and Collision with Tank Car Explosion, Crete, Nebraska, February 18, 1969

At about 6:30 AM on February 18, 1969, Chicago, Burlington and Quincy Railroad Company Train 64 derailed the 72nd to 90th cars at a turnout. The derailed cars struck standing cars on a siding south of the main track and the cars of train 824 standing on a track north of the main track. A tank car in 824 was completely fractured by the impact and released 29,200 gallons of anhydrous ammonia. A gas cloud was released and blanketed the area for quite some time due to weather conditions. 3 trespassers on train 64 were killed and 6 people were killed and 53 injured as a result of the ammonia cloud. The train had parted on the 71st car. The conductor and flagman saw a dense cloud forming, smelled ammonia and ran westward. The 72nd to 75th cars derailed southward and struck a boxcar and came to rest about 700 ft east of the initial derailment. The 76th and following cars were diverted northward and struck the standing cars of No. 824, including the 3 tank cars Ioaded with anhydrous ammonia. The 38th and 40th cars containing ammonia were turned on side, east and west of Unona Ave. The tank of the 39th car shattered after being struck by derailed cars, the tank divided into two sections. The top portion, about 16 ft in Iength, was propelled 200 ft over Highway 33 and landed in the front yard of a residence. The bottom portion of the head, with part of the center sill attached, was hurled northward about 140 feet where it landed along Unona Ave. Anhydrous ammonia is a liquid that boils at -28°F at atmospheric pressure. One part liquid volume becomes 877 parts gas volume. Because of the inversion and lack of wind, the gas cloud remained. 5 people were killed immediately and 28 people injured seriously. Another person died subsequently. Between 200 and 300 people were evacuated with difficulty. Extra mash were found at the local grain mill and National Guard armory. Evacuees returned home at 11 am February 20th.

39) Penn Central Transportation Co Freight Train Derailment, Passenger Train Collision with Hazardous Material Car, Sound View, Connecticut, October 8, 1970

8 cars of the westbound freight train Advance CB-1 derailed at Sound View, at 8:50 PM on October 8, 1970. This was immediately prior to the arrival of eastbound passenger train No. 174. This is a double track line. The entire passenger train was derailed and continued through flames. The derailment was due to the breakage of a truck side frame of a car on the freight train.

40) Derailment of Tank Cars with Subsequent Fire and Explosion on Chicago, Rock Island and Pacific Railroad Company Near Des Moines, Iowa, September 1, 1975 At *4PM* on September 1, 1975, 17 cars of a Chicago, Rock Island and Pacific Railroad Company train derailed on the main line near Des Moines, Iowa. Eleven of the derailed cars contained LPG.

About 4 PM, either the rear truck of car 26 or the lead of car 27 traversed the frog of a left-hand turnout and derailed towards the east. The coupler of car 28 penetrated the trailing end of car 29. The first of several explosions occurred about 9 minutes after the initial derailment. Parts of 3 tanks rocketed; 3 exploded and formed flat sheets and others burned.

Local firefighter responded immediately but before setting up a 2nd explosion occurred and they decided not to fight the fire. After retreating another car exploded and cast fragments into a nearby storage facility of LPG.

About 15 minutes after the train derailed, the Iowa State Fire Marshall observed the area from a helicopter and ordered that it be evacuated. The area was declared safe for reentry on September 5, 4 days after the accident. An estimated 300,000 gallons of LPG were consumed in the fire.

41) St Louis Southwestern Railway Company Freight Train Derailment and Rupture of Vinyl Chloride Tank Car, Lewisville, Arkansas, March 29,1978

About 12:10 AM on March 29, 1978,4 locomotive units and 43 cars of St Louis Southwestern Railway Company freight train SRASK derailed. The body of the 13th car struck and ruptured the tank head of the 12th car releasing vinyl chloride into the air which ignited. Bldgs within 1500 ft of the ruptured car were damaged and 1700 residents evacuated. The body of the 13th car struck and ruptured the tank head of the 12th car releasing vinyl chloride into the air which ignited. The fire engulfed the locomotive and the first 16 cars, a fireball that extended 1000 ft. The intensity of the fire decreased over 24 hours. Residents were allowed to return the next day.

42) Derailment of Louisville & Nashville Railroad Company's Train No. 584 and Subsequent Rupture of Tank Car Containing Liquefied Petroleum Gas, Waverly, Tennessee, February 22,1978

About 10:25 PM on February 22, 1978,23 cars of a Louisville & Nashville Railroad Company's Train No. 584 derailed at a facing point switch in Waverly, Term. At 2:53 PM on February 24, a derailed tank car containing LPG ruptured, igniting with explosive force. As a result 16 persons died and 43 were injured. 18 buildings and 26 motor vehicles were destroyed. The Waverly fire equipment was destroyed in the fire, but equipment from neighboring communities was brought in.

43) Head-On Collision of Two Penn Central Transportation Company Freight Trains Near Pettisville, Ohio, February 4,1976

About 11:52 PM on February 4, 1976, Penn Central Transpiration Company freight train NY-12 collided head-on with freight train BM-7 near Pettisville, Ohio. The 3 locomotives and 21 cars of NY-12 and the 4 locomotives and 4 cars of BM-7 were derailed. The head locomotive unit of each train was destroyed and the two crew members in each unit were killed.