

FACTS Database with hazardous materials used for industrial safety maintained by the Department of Industrial Safety of TNO Coded Accident Abstract	Accident Nr. 17196
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Identification

<u>Type</u>	<u>Value</u>	<u>Text</u>
Class	* * * * *	-
Abstr	Extended abstract english	-
Address	Usa	
Adate	1994	
Time		1845
Activ	Pipetransport	Distribution
Loctn	Building-site	Excavation site
Surr	Residential quarter	Eight-story retirement home
Surr	Nearby-objects/Places	Shopping center
Surr	Nearby-objects/Places	Parking lot

Cause

<u>Type</u>	<u>Value</u>	<u>Text</u>
Cause	Management-failure	-

Description

<u>Type</u>	<u>Value</u>	<u>Text</u>
Date		23 may.1994
Occur	Management-failure	Inadequate excavation programs
Occur	Management-failure	Failed to shore up excavation
Occur	Management-failure	Not competent person to
Occur	Management-failure	Inspect jobsite and equipments
Occur	Management-failure	Improperly protect pipeline
Occur	Management-failure	Did not learn from accidents
Occur	Management-failure	No emergency training
Occur	Management-failure	No adequate supervision
Occur	Remove	Removed asphalt paving above
Eqinv	Tank	Underground storage fuel tank
Qcont		30.3/m
Chem	Heating oil	-
State	Liquid	-
Occur	Groundwork	Excavated contaminated soil
Depth		3-3.5/m
Eqinv	Industrial-vehicle	Backhoe
Occur	Fall	Soil wall collapsed
Eqinv	Fragment	Piece of asphalt paving
Occur	Collision	Struck
Eqinv	Pipeline	Gas service (distribution) line
Eqcir	Bad-design	Absence of excess flow valve
Eqcir	Bad-design	Absence of gas detector
Coating		Plastic (x-tru-coat)
Eqmade		Steel
Dpipe		51/Mm
Length		40.5/m
Thwall		3.9/Mm
Press		379/Kpa
Chem	Natural gas (pressurized)	-
State	Gas	-
Occur	Get-loose/Lose	Separated at
Eqinv	Coupler	Compression coupling
Occur	No-action	Failure to notify gas company
Dtime		15/Days
Occur	Release	Escaping

Occur	Disperse/Spread	Passed through openings in
Eqinv	Building	Building's foundation
Eqdate		1965/1966
Occur	Penetrate/Puncture	Entered, through openings in
Eqinv	Building	Floor, mechanical room
Occur	Disperse/Spread	Migrated to other floors
Occur	Stench-emission	Strong odour of gas
Time		1845
Occur	Human-operations	Noticed the smell of gas
Occur	Safety-measures	Shut off backhoe
Time		1848
Occur	Safety-measures	Phoned gas company
Occur	Block-of-system	Shut off gas line valve
Occur	No-action	Failed to call emergency services
Occur	Wrong-action	Lacked tools to operate
Eqinv	Valve	Below-ground valve
Occur	Overfill/Overload	Gas accumulated into buildings
Time		1858
Occur	Ignition	By electrical arcs?
Occur	Explosion	1st explosion
Dtime		5/Min
Occur	Explosion	2nd explosion
Occur	Fire	-
Occur	Dust-emission	Cloud of dust
Occur	Evacuation	Building
Time		1859
Occur	Safety-measures	Alerted fire department
Occur	Fire fighting/Emergency response	Put out the fire
Time		1915
Occur	Block-of-system	Shut off/Closed gas line
Occur	Safety-measures	Also closed at 2 gas meters
Eqinv	Valve	Service-line valves
Occur	Remove	Removed for inspection
Eqinv	Line	15/M of service line
Fatals	Occupant	1
Injurs		65-66
Text	Citizen/Resident	56
Text	Fireman/Firefighter	5
Text	Passer-by/Spectator	4
Wdng	Burns	-
Treatm	Hospital	By helicopter
Cost	Loss-of-property	>5e+6 usa dollars
Cost	Fine (penalty)	54300 usa dollars
Lesson		See extended abstract
Drwng		2
Photo		3

Scene

<u>Type</u>	<u>Value</u>	<u>Text</u>
Scene		Due to management failures, a
Scene		Gas service line escaped gas
Scene		Causing ignition, explosion,
Scene		Fire & at least 66 casualties

EXTENDED ABSTRACT ENGLISH

About 1845 hours, a 51/mm steel gas service line that had been exposed during excavation separated at a compression coupling about 1.5/m north of the north wall of

an eight-story retirement home. The separated service line released natural gas at 379/kPa. The escaping gas flowed underground to the retirement home, where it passed through openings in the building's foundation and filled the space beneath the mechanical room, which served as a combustion air intake reservoir for boilers. Gas then entered the mechanical room through openings in the floor. The gas then migrated to the building's other floors through an adjacent tower that housed the boiler exhaust stacks, through a trash chute, and through floor openings for electrical and other building services. At the same time, a backhoe operator was removing fuel-contaminated soil from the excavation site and detected the odour of gas coming from the building. He heard a woman in a third-floor apartment shout to him about a heavy gas odour. The loader, another employee, opened a side door to the building that led to the boiler room and encountered a very heavy gas odour that took his breath away. He told his foreman for his observation, and the foreman told the backhoe operator to shut off the machine. The foreman said that he then went to his pickup truck and, using his cellular phone, called the gas company and the housing authority, telling them that he was excavating near the gas line and smelled gas. He stated that he next made three attempts to phone "911".

He said that each time he called, there was no answer. He said he then moved his truck to another spot in the parking lot in case the phone signal to his cellular phone was being blocked. He said that at the new location he again tried unsuccessfully to call "911". The foreman's call was answered at 1848 hours by the pipeline company. The foreman said that there was a gas leak at the retirement home and that the gas line had been hit during digging. At 1852 hours, the pipeline company received a second call, which was apparently from the foreman. The pipeline company procedures did not require Gas Control to notify the fire department or any other emergency-response agency of either report about the release of gas because the caller did not indicate there was an imminent threat; consequently the fire department was not called. The foreman called the housing authority at 1855 hours and was connected to the after-hours answering device. At 1906 hours, the foreman's message was relayed to one of the housing authority's maintenance employees, who promptly went to the building. While the foreman was making the calls, he instructed the operator and the loader to trace the gas line back until they found the shutoff valve. They found the valve near the north edge of the parking lot, but were unable to close it. They lacked the necessary tools to operate the below-ground valve. (Later, when the fire department representatives arrived, the workmen did not tell them they had been unable to close the valve.) About 1850 hours, the pipeline company telephoned its on-call serviceman, who was at his residence about seven blocks from the building. At 1855 hours, he left for the building.

The foreman's call to Gas Control was relayed electronically. When the office received the report, an alarm sounded to tell the office employees that the message was urgent. One of the employees radioed a construction and maintenance crew that was working about 11-13/km north of the building.

He directed the crew to respond to the emergency. About 1858 hours, the natural gas within the building was ignited by one of several possible sources common in apartment buildings, such as the electrical arcs that are created when an electrical appliance or a piece of equipment is turned on or off. The employees stated that after the initial explosion, a second one occurred about 5/minutes later. After the second explosion, they observed fire within the building. The loader thought the explosion and fire originated in the area of the boiler room. At the time of the explosion, many of the residents were out of the building, walking around the adjacent shopping center, or sitting on the front lawn at the entrance of the building, which was on the south side. A pipeline employee, about 2.5 blocks from the building, was in his truck completing work reports when he heard an explosion and saw a cloud of dust rising into the air. Although he was not on call to respond to emergencies, he began driving in the direction of the dust cloud and radioed his dispatcher to find out whether he had

received a report on the explosion. The dispatcher replied that a gas release had been reported and that a serviceman was en route. The employee arrived at the building at 1903 hours. About a minute later, the on-duty serviceman arrived. The two men met with the fire department's emergency on-scene coordinator and received his approval to shut off the gas line. The pipeline employees made their way through the debris to the rear of the building, where a natural gas-fed fire burned from the back of the mechanical room. They located the shutoff valve and, about 1915, closed it.

As a precaution, they also closed the service-line valves at two gas meters just north of the building and then helped the emergency-response personnel. The fire in the mechanical room, which had spread through building utility chutes up to the fourth floor, died out from lack of fuel.

About 56 residents, 5 responders and 4 bystanders were injured in the blast and taken to hospitals. A 73-year-old occupant died from the cerebral injuries he received when he was struck by a door propelled by the force of the explosion.

OSHA fined the company 54300 USA dollars for 3 violations:

1.

Employees had been exposed on May 23, to a fall hazard when they were riding on a backhoe bucket to enter an excavation that was 3-3.5/m deep.

2.

The company had not a competent person inspect the jobsite, materials, and equipment, frequently and regularly; the company's designated competent person did not take prompt corrective measures on May 23 to eliminate or control hazardous practices.

3.

On May 23, the company did not properly protect and support the natural gas pipeline, thus exposing employees to injury and contributing to the building accident.

Conclusions

1.

Fatigue was not a causal or contributing factor.

2.

Whether drugs or alcohol was a factor cannot be established because the workmen were not tested after the accident; the excavator's management did not observe cause for tests, and Federal regulations did not require tests.

3.

By reducing the soil's capacity to restrain the movement of the pipe and by exerting forces on the service line that resulted in excessive longitudinal stress, the excavator caused the line to separate at a compression coupling.

4.

The housing authority and the city emergency response was well coordinated and effective.

5.

The excavator could have prevented the accident by shoring up the excavation, by providing effective supervisory oversight, by ensuring that the excavation was properly shored, by telling its employees to notify owners when buried facilities were damaged, or by training its employees in the requirements of its own health and safety program and in the excavation, trenching, and shoring requirements of OSHA.

6.

The gas company lost the opportunity to preserve the integrity of the service line because its procedures did not require a review of any unusual excavation near a gas service line that might damage the line and threaten public safety.

7.

The likely reason the fire inspectors did not notify the gas company that its service line was damaged was because the inspectors did not understand the importance of notifying operators so the effects on a facility could be assessed by the operators and

necessary action taken.

8.

Had the service line had an excess flow valve, the consequences of the accident could have been substantially reduced; the likely result would have been no injuries or deaths.

9.

State's excavation-damage program could be more effective if it (1) required each excavator and buried-facility operator to participate in the program, (2) required the excavator to mark the area he proposes to excavate, and (3) had an effective means of overseeing and enforcing the program's provisions.

10.

The consequences of this accident could have been significantly reduced had the excavator's foreman promptly called "911" and had his helpers promptly told the occupants of the building to evacuate.

11.

Before the explosion, the excavation crew members did not evacuate the residents and the foreman did not call the fire department because they had not trained in handling an emergency.

12.

The consequences of this accident might have been substantially reduced had a gas detector capable of alerting people throughout the building and at the nearest fire station been installed in the room where the service line entered the building.

13.

In the past 20/years, the Research and Special Programs Administration (RSPA) has failed to effectively assess the benefits of excess flow valves and has failed to promote their use.

Probable cause

The NTSB determines that the probable cause of the natural gas explosion and fire at the building was the failure of the management of the company, to ensure compliance with OSHA's and its own excavation requirements through project oversight.

Contributing to the accident was the failure of the workmen from the company, to notify the pipeline company, that the line had been damaged and was unsupported.

Contributing to the severity of the accident was the absence of an excess flow valve or a similar device, which could have rapidly stopped the flow of gas once the service line was ruptured. Also contributing to the severity of the accident was the absence of a gas detector, which could have alerted the fire department and residents promptly when escaping gas entered the building.

Lessons learned (recommendations)

As a result of its investigation, the NTSB makes the following recommendations:

1. to the RSPA:

Require gas-distribution operators to notify all customers of the availability of excess flow valves; any customer to be served by a new or renewed service line with operating parameters that are compatible with any commercially available excess flow valve should be notified; an operator should not refuse to notify a customer because of the customer's classification or the diameter or operating pressure of the service line.

2. to the States:

Require gas distribution operators to install excess flow valves in all new or renewed gas services lines, when operating conditions are compatible with commercially available valve, including service lines supplying schools, churches, and other places of public assembly.

3. to the pipeline company:

Require that people handling emergency calls determine whether escaping gas is likely to enter a structure, and if so, require that the information be quickly conveyed to

"911".

Modify its excavation-damage prevention program to include the review and close monitoring of any proposed excavation near a gas service line, including any line with unanchored compression couplings, that is installed near a building and that, if damaged, might endanger public safety significantly.

Instruct members of local governments and contractor groups in its service area about the threat to public safety posed by a gas line that is unsupported or damaged, and emphasize the importance of reporting such information immediately to the facility owner.

4. to the excavation company:

Instruct its employees on actions to take when buried facilities, such as gas lines, are unsupported or damaged; such actions should include alerting local response agencies and residents of threatened buildings, initiating evacuations, and notifying facility owners.

5. to the Governor of the Commonwealth of Pennsylvania:

Require any person or entity that excavates to participate in the State's excavation-damage prevention program.

Designate a single State agency responsible for the State's excavation-damage prevention program; give the agency the power to levy administrative penalties.

Require each contractor to outline the area of the proposed excavation before asking the facility operators to mark the locations of their facilities.

6. to the city:

Instruct fire and other city inspectors to advise facility owners, such as gas companies, immediately about any suspected damage to their buried facilities or any lack of structural support.

Require as an excavation-permit condition that the excavator instruct his workmen in how to help members of the public in the immediate vicinity of an emergency, how to notify the local response agencies and the owner of a damaged facility, and how to evacuate anyone who might be in danger.

7. to the International Association of Fire Chiefs:

Urge its members to instruct their inspectors to report observed or suspected damage to a buried facility, including lack of support, to the owner immediately.

8. to the Department of Housing and Urban Development:

Require the installation of excess flow valves in new and renewed gas services to buildings that the Department has approved for Federal rent subsidies.

Evaluate the safety benefit of requiring the installation of excess flow valves in gas services to existing buildings and, where feasible, require their installation.

Evaluate the safety benefits of using gas detectors in buildings approved by the Department of Federal rent subsidies as a means of providing building occupants and local emergency-responders agencies with early notice of released natural gas within buildings; require that gas detectors be used in buildings in which the Department has determined that a gas detector would be cost effective and beneficial.

9. to the city Housing Authority:

Encourage the pipeline company, to install an excess flow valve in the gas service to any building the housing authority owns or manages.

Evaluate the safety benefits of using gas detectors in buildings that it owns or manages that are served with gas as a means of providing emergency-response agencies with early notice of released gas within buildings; install gas detectors in buildings in which it is determined that they would be cost effective and beneficial.

10. to the Associated General Contractors:

Inform its members about the accident and encourage them to train their excavation employees in: (a) notifying local emergency-response agencies of any emergency conditions immediately; (b) helping members of the public who are in the immediate vicinity of an emergency, including evacuating anyone who is in danger; (c) notifying the buried-facility owner of any changes in the work plan; (d) notifying the

buried-facility owner of any damage to or lack of support for his facility promptly and relying on the buried-facility operator to decide whether corrective action is needed.

11. to the National Utility Contractors Association:

Inform its members about the accident and encourage them to train their excavation employees in: (a) notifying local emergency-response agencies of any emergency conditions immediately; (b) helping members of the public who are in the immediate vicinity of an emergency, including evacuating anyone who is in danger; (c) notifying the buried-facility owner of any changes in the work plan; (d) notifying the buried-facility owner of any damage to or lack of support for his facility promptly and relying on the buried-facility operator to decide whether corrective action is needed.