

Ed Collins
280
2/5/02

3.2.2 The Grounded Jet

At the time that the work on PIPERS was taking place, HSL Buxton was carrying out computational fluid dynamics (CFD) calculations on gas jets emerging from slots at the side of a pipeline and striking the edge of a crater. They were referred to as grounded jets because the calculations indicated that they would stay close to the ground. In PIPERS, the thermal radiation from them was modelled by four point emitters placed horizontally at right angles to the pipeline with similar proportions and power to those used for the vertical jet-fire model. The user could set the height above ground of the emitters.

3.2.3 The Crater Jet

The crater jet was also a response to CFD simulations which suggested that a hole at the bottom of a pipeline would result in a jet emerging from the whole of the cross section of the crater. This implied a jet with reduced velocity that was affected to a larger extent by the wind. As for the vertical jet, the length of the flame is obtained using the Chamberlain correlation and by partitioning the heat amongst four emitters (see section 3.1.2).

3.2.4 The Pool Fire

The two pool fire simulations added to PIPERS are only used for liquid releases and do not therefore apply to natural gas.

4.0 Detailed results from nine incidents

The pipeline incidents that formed the greater part of this study were:-

- Bealeton - a 30 inch pipeline carrying natural gas at 51.5 bar.
- Beaumont - a 30 inch pipeline carrying natural gas at 70.7 bar.
- Cartwright - a 20 inch pipeline carrying natural gas at 55 bar.
- Edison - a 36 inch pipeline carrying natural gas at 69.2 bar.
- Erlangen - a 500mm pipeline carrying natural gas at 67.5 bar.
- Lancaster - a 30 inch pipeline carrying natural gas at 70.4 bar.
- Latchford - a 914mm pipeline carrying natural gas at 69 bar.
- Natchitoches - a 24 inch pipeline carrying natural gas at 54.6 bar.
- Rapid City - a 1067mm pipeline carrying natural gas at 60.7 bar.

Reports were found for several other failures of high-pressure natural gas pipelines (Burstall, Cideville, Houston La Salle and Pine Bluff). Unfortunately these contained no data on the shape of the burn area so that a sensible comparison could not be made with MISHAP98 calculations. Since conclusions on the performance of MISHAP98 were already clear, it was decided not to attempt to obtain additional information on them.

that state. The resulting audit of pipeline company records from 1981 through 1990 uncovered 317 spills involving estimated property damage of \$50,000 or more in each case. During that same period, OPS received only 31 reports of major pipeline spills in California.

Many of the unreported spills may have been from intrastate pipelines, which in California and a few other states are not included in requirements to report leaks and spills to the OPS. A review of state and federal records shows that many spills that meet the OPS reporting criteria never find their way into its database.

Sunniland Pipeline, a now-idle crude oil pipeline that ran from Collier County on Florida's southern Gulf Coast to Miami's Port Everglades, notified the OPS in 1986 that a spill in its line had dumped 5,000 gallons of crude oil onto a sawgrass prairie in the Broward County portion of the Big Cypress National Preserve.

But files of the Florida Department of Environmental Protection describe nine other Sunniland spills in the Big Cypress preserve, none of which appears in the OPS database -- even though each accounted for 2,100 gallons or more, the minimum amount for which pipeline operators are required to report. The company is now defunct, and former officials could not be reached for comment.

No regulation at sources across rural America

WILL THERE BE REGULATIONS
IN RURAL IRELAND

Thousands of miles of pipelines are unregulated in America. These are the small gathering lines that carry crude oil and natural gas from wellheads in rural areas to collection points.

The amount of oil that drips into creeks, streams and underground water reservoirs from these lines may never be known because companies are not required to report such leaks to the OPS. But there's ample anecdotal evidence to suggest many of these lines are in bad shape.

The General Accounting Office, Congress' investigative arm, warned of increasing problems from rural gathering lines in a report 23 years ago. Although the report urged regulation, no action was taken.

In 1991, a corroded, 5-year-old Marathon Oil Co. natural gas gathering line near Carlsbad, N.M., leaked more than 2.3 million gallons of salt water and natural gas condensate liquids, enough to fill two Olympic-size swimming pools.

In reports filed with the New Mexico Oil Conservation Division and the federal Bureau of Land Management, which owns the land under which the pipeline broke, the company estimated that the line had been leaking five months when the leak was discovered.

Chris Shuey, environmental health specialist with the Southwest Research and Information Center, an environmental group, said the leak was discovered by accident.

"They didn't even know they were losing this stuff until the ground collapsed and they found it was saturated," he said.

List of pipeline accidents

From Wikipedia, the free encyclopedia



It has been suggested that *Nigeria oil blast* be merged into this article or section. (Discuss)

This is a list of pipeline accidents.

Outside the United States

- 1989 Sparks from two passing trains detonated gas leaking from an LPG pipeline near Ufa, Russia. Up to 645 people were reported killed on June 4, 1989.
- 1998 At Jesse, Nigeria in the Niger Delta in Nigeria, a petroleum pipeline exploded killing about 1200 villagers, some of whom were scavenging gasoline on October 17, 1998. The worst of several similar incidents in this country.
- 2004 A major natural gas pipeline exploded in Ghislenghien, Belgium near Ath (thirty kilometres southwest of Brussels), killing at least 23 people and leaving 122 wounded, some critically on July 30, 2004
- May 12, 2006 - an oil pipeline ruptured outside Lagos, Nigeria. Up to 200 people may have been killed. See Nigeria oil blast.

In the United States

- 1969 Low Pressure Natural Gas Distribution System, Gary, Indiana. June 3, 1969.
- 1969 High Pressure Natural Gas Pipeline, near Houston, Texas, September 9, 1969.
- 1970 Colonial Pipeline Company, Petroleum Products Pipeline, Jacksonville, Maryland, September 3, 1970.
- 1994 Texas Eastern Transmission Corporation Natural Gas Pipeline Explosion and Fire Edison, New Jersey March 23, 1994.
- 1997 Pipeline Rupture and Fire, Indianapolis, Indiana, July 21, 1997
- 1998 Natural Gas Explosion and Fire, South Riding, Virginia, July 7, 1998
- 1998 Natural Gas Pipeline Rupture and Subsequent Explosion, St. Cloud, Minnesota, December 11, 1998
- 1999 Natural Gas Service Line and Rupture and Subsequent Explosion and Fire, Bridgeport, Alabama, January 22, 1999
- 1999 A pipeline in a Bellingham, Washington park leaked gasoline, vapor from leak exploded and killed 2 children and a 18 year old young man on June 10, 1999
- 2000 Hazardous Liquid Pipe Failure and Leak, Explorer Pipeline Company, Greenville, Texas, March 9, 2000
- 2000 Natural Gas Pipeline Rupture and Fire Near Carlsbad, New Mexico This Explosion Killed 12 Members Of The Same Family. August 19, 2000
- 2000 Rupture of Piney Point Oil Pipeline and Release of Fuel Oil Near Chalk Point, Maryland, April 7, 2000
- 2002 Rupture of Enbridge Pipeline and Release of Crude Oil near Cohasset, Minnesota July 4, 2002.
- 2003 Excavation Damage to Natural Gas Distribution Line Resulting in Explosion and Fire, Wilmington, Delaware, July 2, 2003.

Retrieved from "http://en.wikipedia.org/wiki/List_of_pipeline_accidents"

Categories: Articles to be merged | Articles lacking sources | Dynamic lists | Commercial item transport and distribution | Pipelines | Transportation accident lists

http://en.wikipedia.org/w/index.php?title=List_of_pipeline_accidents&printable=yes

7/15/2006

Attachment "A"

EXAMPLES OF MAJOR PIPELINE ACCIDENTS (1980 - 1999)

Accidents

- (1) Fredericksburg VA 1980 (and again in 1989)

330,000 gallons of aviation fuel entered the city water supply, and the Rappahannock River, shut down the water treatment plant, a state of emergency was declared, and businesses and residents hauled water for a week

Causes: pipe damage upon installation, subsequent undetected corrosion, operator error, insufficient valve placement.

- (2) Moundsvew MN 7/8/86

An 8-inch gasoline pipeline burst, gasoline flowed along neighborhood streets until it was ignited, killing 2 people who burned to death and injuring 7.

Causes: failure to correct known defects, inadequate pipe specifications, inadequate operator training including delay in responding.

- (3) Flathead Indian Reservation MT 1986-1993

Seventy-one leaks and three major spills of gasoline, aircraft fuel, and diesel (including 163,000 gallons into a creek) over this period resulted in the Flatheads refusing to renew Yellowstone's franchise and move the line off of the reservation.

Causes: inattention and failure to correct defects.

- (4) North Blenheim NY 3/13/90

A liquid natural gas pipeline burst sending 100,000 gallons of product flowing down into the town -- enough to engulf the entire town. Residents noticed a "heavy fog" on their windshields, until one called and notified a company employee. Two people were killed and seven injured.

Causes: negligent maintenance procedures resulting in cracks in the pipe which were undetected; operator error; insufficient remotely operated valves and check valves.

- (5) Reston (Herndon) VA 3/28/93

Pipe burst sending a geyser of diesel fuel (407,000 gallons) into the storm sewer and eventually into a tributary of the Potomac River. (Could have been gasoline or jet fuel.) Significant environmental damage (\$1 million clean-up).

Causes: Third-party damage causing corrosion which went undetected

for a long period.

(6) Edison NJ 3/23/94

Natural gas transmission line burst and exploded. 1500 residents evacuated and \$25 million damage. Injuries included minor burns and cuts from broken glass.

Causes: Line hadn't been "pigged" since 1986, but it had deteriorated; no remote automatic valves; pipe manufacturing standards lax; no extra measures for highly populated areas.

(7) Allentown PA 6/9/94

Natural gas pipe burst and product flowed underground into the basement of an 8-story retirement home, where it migrated through vents into other floors and was eventual ignited. One death and 55 injuries.

Causes: company employee (backhoe operator) error; no excess flow valves which had been recommended by NTSB since 1972; insufficient public awareness.

(8) Reedy River SC 6/26/96

Fuel oil pipeline crossing the river burst resulting in a \$20 million clean-up effort.

Causes: Pipeline corrosion not responded to soon enough; computer malfunction; employee error; inadequate leak detection.

(9) Lively TX 8/8/96

Liquid natural gas pipeline burst, killing two men who accidentally ignited it.

Causes: Inadequate corrosion protection.

(10) Murphreesboro TN 11/5/96

84,000 gallons of diesel fuel (could have been gasoline) and \$5.7 million damage.

Causes: Corrosion; operator error -- 3 1/2 hours before detection.

(11) San Juan PR 11/21/96

Thirty-three people killed when a liquid natural gas line exploded.

Causes: Employee negligence in responding to a leak which had been ongoing for a week.

(12) Bellingham WA 6/10/99

Attachment "A" - Page

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Attachment "A" - Page

Notes

<http://64.233.183.104/search?q=cache:amPUDHQkF0J:commerce.senate.gov/hearings/03...> 6/21/2006

Notes

None of these accidents were the result of "third party damage" with the exception of the Reston incident.

All of them could have been prevented -- if safety recommendations had been acted upon.

The common causes of pipeline accidents are:

- ~ anomalies in the pipe not detected or not acted upon
- ~ operator inattention or error
- ~ computer system malfunction
- ~ shut-off capability insufficient or improperly deployed
- ~ leak detection insufficient

On average 6 million gallons spilled each year; 8 million last year.

Since 1996, 54 accidents investigated by NTSB, resulting in 209 recommendations

Since 1986, 39 deaths/189 injuries (natural gas), 35 deaths/247 injuries (liquid products)

Pipeline companies involved: Colonial, Yellowstone, Koch, Olympic, Williams, Texas Eastern, and others

Koch just fined \$30 million for 300 separate spills of 3 million gallons in six states between 1990 and 1997; leak detection system: wait until it breaks. (See attached article.)

Further resource: Battelle Labs' "Causes of Pipeline Incidents, Effect of the Aging Infrastructure on Incidents and Areas of Technology Development," Robert J. Eiber (1994), delivered at an OPS summit on pipeline safety.

Explosions & Fires: 1992-2002

Sampling of Incidents at Shell Group Companies & Joint Ventures

21 Jun 92	<i>Choon Hong III</i> oil tanker explodes and burns while unloading xylene at the Port Klang, Malaysia oil depot, run by Tiram Kimia, a Shell joint venture. The fire spread onshore and engulfed three nearby storage tanks. Thirteen workers and crewmen were killed, and more than 200 families living in the port vicinity were evacuated. The ship later sank, spilling its cargo into the bay. A lawsuit was filed by the families of the 13 dead workers in October 1994 charging negligence and seeking \$13 million in damages from Shell. (the final outcome of that case was unavailable at publication). Shell reported that recommendations from an unidentified investigation were adopted at the terminal, with subsequent activities restricted to non-flammable products and blending. Shell also reported that the depot ceased operations in 1997. ¹
29 Sep 92	fire at Shell's Deer Park, Texas refinery shuts down the plant's 160,000-barrels-a-day crude distillation unit. ²
March 93	fire at Shell's Pernis, Netherlands refinery shuts down polypropylene plant until June. ³
1 Apr 93	explosion of a sludge collection storage tank at Shell's Martinez, California refinery sends 8-by-10-foot tank lid into a power line, cutting the area's electricity supply, causing a blackout. ⁴
26 Aug 93	fire at Shell's Martinez, California refinery damages a furnace that heats heavy crude oil. ³
8 Oct 93	explosion and fire at a sulfuric acid storage tank at Shell's Martinez, California refinery sends a giant, red cloud of smoke into the area. No injuries or evacuations reported. ⁵
20 Jan 94	fire at Shell's Pernis, Netherlands oil refinery. ⁷
27 May 94	a fire at Shell Chemical's Belpre, Ohio plant spreads to a nearby chemical storage tank area, touching off an explosion and ferocious chemical fire, causing four of the big tanks to burn and lose millions of gallons of chemicals. Four workers are killed in the incident and 1,700 people evacuated. The fire burns for about nine hours, and chemical leakage from the site pollutes the Ohio River with a 22-mile plume of ethylene dibromide, killing fish and forcing downstream municipalities to seek alternative water supplies. Shell later agrees to pay OSHA a \$3 million dollar fine for federal safety violations and also settles wrongful death lawsuits with the families of the dead workers, making payments in the range of \$2.1 to \$2.4 million per family. ⁶
18 Aug 94	fire and explosion at Shell chemical plant at Norco, Louisiana. In February 1995, the US OSHA issues a \$201,600 penalty to Shell in connection with the incident. ⁹
13 Jan 95	fire at Shell's Geelong refinery in Australia forces closure of catalytic cracker. The fire broke out in a heat exchange unit. ¹⁰
10 Jun 95	oil well blow-out & fire occur in the El Isba oil field at Shell Syria venture near the desert town of Deiral-Zur, Syria. Five workers are killed in the incident, with the fire continuing to burn for at least ten days. According to reports, the blow-out and fire resulted when oil and gas that had been seeping from fissures around the well since May 3 rd — more than a month prior to the blow-out — ignited. A wrongful death suit has been filed by at least one of the families of the dead workers. ¹¹
1 Dec 95	explosion and fire at Shell Oil tank farm at McCamey, Texas kills two workers and injures three others. Two of the workers were airlifted to the burn unit of the University Medical

***Note:** This 1992-2002 listing breaks out separately "explosions & fires" from those covered under all incidents in Appendix A of *Riding the Dragon*, and also includes *additional incidents* not included in the book or its appendix..

- Center in Lubbock, Texas — Liberato Martinez, 23, with third-degree burns over his entire body, and Jimmie Jimenez, 23, with second- and third-degree burns over 70 percent of his body. Martinez died that night. Two other injured men, with less severe burns, were taken to McCamey Hospital. Robert Leroy Muncy, 40, was killed at the scene. The workers were performing maintenance work at the time of the accident.¹²
- 3 Feb 96 explosion at hydrogen unit operated by contractor Air Products at Shell's Martinez, California refinery; workers evacuated, 2 injured, community rattled.
- 1 April 96 explosion and fire at Shell's Martinez, California refinery, damages two hydro treating units, shakes up local community, and later invokes two violation notices from regional air pollution officials.¹³
- 3 April 96 fire in the desulfurization unit of Shell's Pernis, Netherlands refinery.¹⁴
- 24 Feb 97 fire at the Pilipinas Shell storage depot at Pandacan, near Manila, in the Philippines occurs after a loading hose disconnects from a truck at the LPG bulk filling station, resulting in property damage and lost work days.¹⁵
- 22 Jun 97 explosion and fire occur at Shell's Deer Park, Texas chemical plant after a flammable gas leak; blast felt 25 miles away, fire burns for 10 hours. More than 200 emergency responders involved; several workers injured with about 30 receiving medical treatment. A mile-long smoke plume prompts warning to residents from local health officials to stay indoors. Damaged unit inside the plant out of service for more than six months. Nearby residential property also damaged. Joint EPA/OSHA accident investigation report suggests accident was preventable. Shell is subsequently fined by OSHA and EPA for violations and infractions related to the incident.¹⁶
- 24 June 97 Shell Offshore, Inc., fined \$10,000 by the US Department of the Interior for operational and/or environmental violations. "The gas & fire detection systems were not tested within the required time frames." Fine paid, June 15, 1998.¹⁷
- 20 Jul 97 small fire erupts at Shell Oil's 150,000 barrel-a-day refinery in Martinez, California; fire occurs in the refinery's lubricant asphalt plant.¹⁸
- 13 Aug 97 fire in distillation unit shuts down Shell 28,000 barrels-per-day refinery at Odessa, Texas for about one week.¹⁹
- 31 Oct 97 flash fire occurs in one of the loading bays at the main fuels terminal of the Pilipinas Shell storage depot at Pandacan, near Manila, in the Philippines — caused by a faulty grounding system.²⁰
- 16 Dec 97 fire at Shell Chemical's Geismar, Louisiana plant disables one of plant's three alcohol units; Shell declares *force majeure* on all alcohols and derivatives; unit shut down for weeks.²¹
- 17 Dec 97 electrical fire in 625,000 mt/yr steam cracker unit at Shell Chemical plant at Moerdijk, Netherlands shuts down various petrochemical units at the complex for about a week.²²
- 19 May 98 explosion and fire at SAPREF oil refinery in Durban, South Africa due to a failure at the alkylation unit. The explosion is heard several kilometers away and the fire is fought for more than six hours. No injuries were reported at the time, but an estimated five tons of hydrogen fluoride (HF), a highly dangerous substance, were released.²³
- 2 Jun 98 storage tank explosion at Shell's Pernis, Netherlands refinery in Rotterdam kills one person, injures another.²⁴
- 15 July 98 Shell Petroleum Development Company pays \$258,000 to owners of farmland destroyed by fire caused by a leak in a gas pipeline in Rivers State, Nigeria.²⁵
- 10 Aug 98 hydrogen explosion in a compressor unit at Shell Chemical's Belpre, Ohio plant rattles buildings up to five miles away. A fire followed the blast, but was brought under control by the plant's firefighters within 30 minutes.²⁶

- 14 Aug 98 hydrocracking unit at Shell's Deer Park, Texas oil refinery, shut by a fire the week of August 3rd, is scheduled to be back on line.²⁷
- 27 Aug 98 Environmental Rights Action (ERA) of Nigeria reports pipeline explosion at Well #13 at Shell's Awoba flow station, at Bille, Rivers State, Nigeria. A subsequent fire "set the facility ablaze and the adjacent mangrove forest was inflamed. Several fishing traps and nets around the affected area were burnt." Several people harvesting produce in a nearby mangrove forest were injured in a stampede during the incident.²⁸
- 6 Oct 98 fire occurs at Shell's Berre-L'Etang, France refinery as it is being closed down for a turnaround. A gas oil line fails "due to accelerated naphthenic acid corrosion" and ignites. A kerosene air cooler also fails, adding additional fuel to the fire. A crude unit and a reformer are damaged. Losses are estimated at \$22 million.²⁹
- 25 Nov 98 six workers are killed at Equilon refinery near Seattle trying to remove residue from a coking unit; a flaming mass of hot liquid poured out of the unit setting off a huge explosion. State investigators later calculated it would have taken 236 days for the ambient air to cool the drum enough to allow the residue to be removed safely.³⁰
- 25 Dec 98 explosion and fire at Shell's gas-to-liquids plant at Bintulu, Malaysia.³¹
- 2 Jan 99 US Minerals Management Service reports "small fire" at Shell Offshore, Inc. platform A in block 128 of Garden Banks area in the Gulf of Mexico. Equipment failure is cited as cause; "minor damage" to pipeline pump noted. "...The seals failed, allowing excessive temperature to build up... this ignited the remaining lubricating oil..."³²
- 15 Jan 99 US Minerals Management Service reports "minor flash fire" at Shell Offshore, Inc. platform JC in block 176 of Eugene Island area in the Gulf of Mexico. Human error cited as cause. "...A welding operation to repair a hand railing on the top deck was in progress at the same time as a natural gas crane was in use. Slag sparks from the welding operation came into contact with the gas being exhausted from the crane. The crane was shut down and the fire was extinguished. No damage was reported."³³
- 6 Feb 99 eight oil workers suffered severe burns after a Shell Oil pipeline explodes in southern Nigeria, state health authorities reported.³⁴
- 7 Feb 99 US Minerals Management Service reports fire, platform damage, and worker injury at Shell Offshore, Inc. platform JA in block 40 of South Marsh Island area in the Gulf of Mexico. Equipment failure & human error cited as cause. Lone platform worker in living quarters is burned and injured after trying to stop liquid escaping from condensate pipe, which ignites, burning the worker and causing him to fall down a 15-foot stairway, sustaining

- the ground.” The polymerization unit was then down for maintenance, and no cause for the explosion was immediately apparent, although the state had begun an investigation.³⁷
- 10 Jun 99 massive fireball and explosion of the Olympic Pipeline near Bellingham, Washington following a gasoline leak of 277,000 gallons kills two ten-year-old boys and another young man. The pipeline, jointly operated by Equilon, ARCO and GATX, was found to have anomalies in the section that ruptured, requiring certain actions that did not occur. In May 2002, EPA and the US Department of Justice filed a civil suit against Shell and Olympic, alleging gross negligence and seeking civil fines of \$18.6 million against each company. The complaint charges that the pipeline rupture was caused by gross negligence in the operation and maintenance of the pipeline.³⁸
- 12 Aug 99 fire reported at Motiva's refinery in Convent, Louisiana.³⁹
- 24 Aug 99 small fire near the hydrogen unit at Equilon Enterprises' refinery in Bakersfield, California forces reduced runs to the hydrocracker.⁴⁰
- 17 Sep 99 leaking oil from the Ugehelli-Rapele pipeline at Ekakpamre, Urhobo in Delta State, Nigeria, owned by the Shell Petroleum Development Company of Nigeria (SPDC), catches fire. The fire burns for a reported three days over several kilometers of farmland and wetlands, burning up boats, fishing nets, and forests according to some accounts. Among the communities affected are Ekakpamre, Ighwrekreka, Ughewwughe, Ekrejegbe, and Otor-Edo. Local officials from four of the villages later call the incident “one of the worst environmental disasters to happen in Urhobo country in 40 years of oil exploration.” At an October 2, 1999 press conference these local officials reject claims that sabotage caused the spill and fire. They call for an independent inquiry and compensation to the affected communities.⁴¹ According to SPDC, an immediate investigation of the incident by a joint team, including representatives of the affected communities, concluded that the pipeline had been blown up with explosives placed beneath it. SPDC says it has tried to clean up the site, but is being denied access.⁴²
- 24 Mar 00 fire and two explosions at Shell's Godorf oil refinery in Cologne, Germany – the country's fourth-largest – causes more than \$5 million in losses, cutting production by half. The fire started at one of two crude oil distillation stations where a heated oil product leaked, ignited, and set off a small explosion, then a second, larger explosion fed by several tons of oil. About 120 firemen fought the blaze for about three hours. A bilious cloud of smoke rose 1,000 feet into air at the scene, and over a nearby autobahn, which was closed for several hours. No injuries were reported. A small “controlled” fire was allowed to continue burning at the site to consume remaining oil that escaped during the incident. Some people at a nearby shopping center and residents close to the plant complained of irritated eyes and breathing difficulties, although state experts said no dangerous pollution occurred. Water used to fight the blaze was being contained and would be treated before it was released to the nearby Rhine River, according to refinery officials. Shell reported that removal of damaged parts of the crude distiller had begun in mid-April 2000, with new equipment slated to arrive through June, with the unit expected to be shut down for many weeks ahead.⁴³
- 27 Apr 00 hundreds of residents living in a Brunei Shell company housing complex near the oilfield town of Seria, Brunei, are forced to abandon their homes following an explosion at one of the company's gas pipelines. The explosion destroys two homes and damages at least two others. “It was truly a miracle,” reported one resident. “The occupants of the two affected houses were out at work when the blast occurred. Luckily, there were also no children playing near the area or vehicles passing by when the incident occurred. . . .” The cause of the explosion was later found to be a corroded pipeline.⁴⁴

- 18 Aug 00 explosion at Motiva's Convent, Louisiana refinery injures nine workers; two treated at the scene with seven others taken to area hospitals, including one transported to the burn unit at Baton Rouge General Hospital. Some evacuation was also reported.⁴⁵
- 26 Oct 00 fire starts in storage tank being demolished at Shell's Deer Park, Texas refinery. The burning tank – which held naphtha, a gasoline component – produced heavy black smoke in the area, prompting the temporary closure of the Harris County Toll road.⁴⁶
- January 01 the Shell/BP joint venture South Africa Petroleum Refinery (SAPREF) in Durban, South Africa has two refinery fires in January – one in early January in the refinery's bitumen blending area, and another on January 23rd at the refinery's No. 2 crude distillation unit.⁴⁷
- 23 May 01 gas explosion at the partially Shell-owned (46%) Gorm oilfield in North Sea injures two workers. Rig is a Danish Underground Consortium facility operated by Danish oil and shipping group A.P. Moeller (39%), also partially owned by Texaco (15%). Oil and gas production at the 46,900 bpd operation was suspended following the accident, which occurred just prior to midnight. No oil pollution was reported.⁴⁸
- 6 Jun 01 a Shell pipeline, which passes through the community of Baraale in Rivers State, Nigeria, spills crude oil into the community, forests, and on farmland. According to an Environmental Rights Action field report, local officials reported the leak to Shell and local police, but they were told the community should suffer because the lines were cut by saboteurs. Several months later, in October, the leaking oil caught fire. Again, local officials reported the fire to Shell officials, and they were again told they should pay the consequences of their actions. The fire continued to burn at least through January 2002. Burnt-over farmland is ruined, soot has contaminated drinking water, and some local residents fell ill from thick pall of smoke that hung over the area.⁴⁹
- 17 July 01 a large aboveground storage tank holding spent sulfuric acid at Motiva's Delaware City, Delaware refinery explodes, killing one worker and injuring eight other workers. A fire followed. The tank, which had lifted off its foundation pad in the explosion, also collapsed, releasing more than 600,000 gallons of acid, some into a large bermed area which was later breached, with acid also reaching storm sewers polluting the nearby Delaware River, and killing thousands of fish and hundreds of crab. One week after the accident, Motiva admitted the collapsed tank had a history of leaks and corrosion and was overdue for an inspection. One plant worker had labeled the tank unsafe three weeks before the accident, and a company inspector had called for an immediate shutdown on June 26th. In January 2002, US OSHA recommended a \$259,000 fine, citing Motiva for three "willful" and seven "serious" violations. In July 2002, the US EPA and the Delaware Department of Natural Resources and Environmental Control (DNREC), sued Motiva, accusing the company of gross negligence, seeking penalties that could exceed \$50 million. In August 2002, the US Chemical Safety and Hazard Investigation Board (CSB) charged that the accident occurred because of neglected warnings, slipshod equipment changes, and chronic, unrepaired corrosion and leaks in the 415,000-gallon storage tank. "Had any one of these elements been handled more effectively," said CSB chairwoman, Carolyn W. Merritt, "this accident probably would not have occurred."⁵⁰
- 7 Aug 01 well blow-out and fire occur at the Zauliyah-16 well in Oman, 120 km northwest of Haima. Well is operated by Petroleum Development Oman, a 34%-owned Shell company. Fire continued to burn for at least 12 days, through August 16th.⁵¹
- 23 Sept 01 fire at Shell's Pernis, Netherlands refinery shuts down two hydro desulfurization units curtailing production of low-sulfur diesel and gasoil at the refinery for at least two weeks.⁵²

- 22 Jan 02 "contained explosion" and fire in sulfur removal unit at Motiva's Delaware City, Delaware refinery sends thick plume of black smoke into area. One worker reported scrambling away from flames on hands and knees to activate firefighting systems. Gas reportedly ignited in the heater structure of the unit, followed by a fire that burned for an hour and half, shutting down one part of the refinery. A state fire marshal ruled the fire accidental, but the Department of Natural Resources and Environmental Control was conducting a review of the incident.⁵³
- 12 Feb 02 an explosion and flash fire at Shell Chemical Co.'s Geismar, Louisiana plant kills one worker and injures another during maintenance and cleaning. Gregory Gibson, 40, died of injuries at the Gonzales Hospital following the incident. He had worked at the plant for four years. At the time, Shell and the Louisiana State Police were investigating the incident.⁵⁴
- 3 April 02 fire at Shell's Deer Park, Texas plant burns for five hours after an out-of-service crude oil storage tank being cleaned caught fire; no injuries reported.
- 13 May 02 fire at Shell's Deer Park, Texas chemical plant, in olefins-3 unit sends large plumes of smoke into area, forcing nearby roads, including Texas Highway 225, to be shut temporarily; residents of Pasadena and Deer Park ordered to shelter-in-place.⁵⁵
- 24 July 02 fire at the hydrotreater unit of Motiva's Port Arthur, Texas refinery shuts unit down for a few days. In August, unit is taken down for early maintenance & repairs.⁵⁶
- 18 Aug 02 storage tank containing 30,000 bbls of residual fuel oil explodes at Houston Fuel Oil Terminal Co., a 50%-owned Shell joint venture specializing in oil handling and storage in Houston, Texas. The explosion and fire produced a dark, billowing cloud of soot and smoke that rose more than a mile into the air. It took five hours and 20 fire and foam trucks to extinguish the blaze. About a dozen workers were evacuated from the site during the fire. Although the tank did not collapse, the roof caved in. "We were very fortunate there were no injuries to our people and that we were able to quickly isolate the fire to one tank," said Willis Rossler, CEO of the company. There were about 80 other tanks in the area, located along the Houston Ship Channel, which was shut down for a few hours during the blaze. The cause of the explosion was believed to be a failed joint on a pipe supplying the tank. Property damage was estimated in the "millions of dollars."⁵⁷
- 1 Sept 02 explosion of storage tank – a sulfur pressure vessel – occurs at the Shell/BP South Africa Petroleum Refinery (SAPREF) in Durban, South Africa.⁵⁸

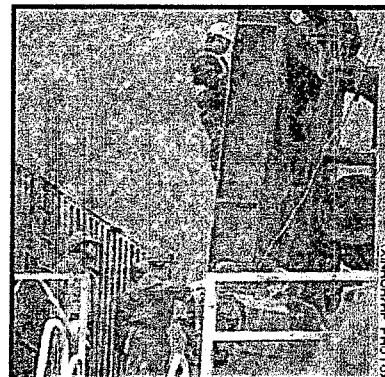
Compiled by Jack Doyle for the Environmental Health Fund, November 2002. The incidents listed above are taken from the available public record, government reports, court records, company documents, and third-party reports. It is not a complete and comprehensive listing of all such incidents at Shell companies and joint ventures for the indicated period, or their resolution in every instance. Sources cited are believed to be reliable and accurate.



Production and Consumption Branch

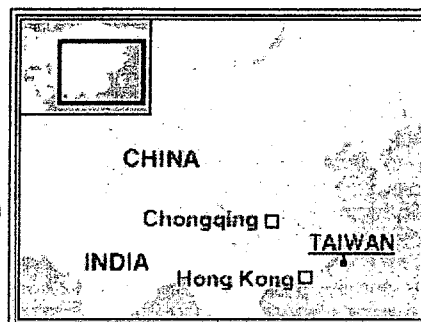
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Phenomena**Gas Well Blowout in Gao Qiao, Chongqing, China****23 December 2003****243 people died, 9,000 were injured, and 64,000 were evacuated**

- Brief Description
- Personal Quotations from the Community
- Possible Causes
- Historical Data
- What are the toxic fumes (Sour Gas)?
- How the impacts could have been reduced?
- International Guidance on Gas Drilling
- Links and Sources

**Brief Description**

Many of the confirmed dead are children or elderly people who were unable to flee after the explosion. Those who did not escape in time suffered burns to their eyes, skin and lungs from the gas.

A gas well blowout in an underground well happened at 10:00 pm on Tuesday, 23 December. The disaster took place at Chuandongbei gas field in Gao Qiao town in the north eastern part of Chongqing province and resulted in the release of natural gas and hydrogen sulphide, which is highly toxic when inhaled. The blowout - the worst of its kind in China's history - is thought to be caused by a puncture to the highly pressurised gas well caused by drilling.



According to press reports, the accident occurred as a drilling team was working on the 400 meter deep well. The accident sent toxic fumes (sour gas - a high

http://www.uneptie.org/pc/apell/disasters/china_well/china.htm

7/15/2006

WHY ARE PEOPLE WORKING AT 10 PM THE DAY BEFORE CHRISTMAS EVE THE STORY'S JUST DENYING WHAT REALLY HAPPENED CHILDREN ARE SUFFERING