



To: Mayor and City Council
From: Mercy G. Cabral, Deputy City Clerk
Subject: Supporting the Protection of Public Health, Safety and the Environment of its Residents
Date: May 26, 2016

Recommendation

Contra Costa Building Trades Council requests Council's consideration on a resolution supporting Section 25536.7 of the Health and Safety Code, which was adopted by Senate Bill 54 protecting public health, safety and the environment of its residents adjacent to volatile industrial facilities.

Background

SB 54 was overwhelming passed by both houses of the Legislature and signed by the Governor on October 14, 2013. This bill required outside contractors working at refineries to have its workers properly trained through State-approved apprenticeship programs, thereby ensuring the quality of construction and significantly reducing threats to the public health, safety and environment in these volatile 24-hours-a-day industrial facilities.

To protect public safety and the environment, the California Legislature adopted Section 25536.7 of the Health and Safety Code to require that a refinery owner or operator entering into contracts after January 1, 2014, "for construction, alteration, demolition, installation, repair, or maintenance work" at its facility must "require that its contractors and any subcontractors use a skilled and trained workforce to perform all onsite work" (Health and Safety Code Section 25536.7(a)).

Fiscal Impact

No impact to the General Fund.

Attachments

1. Resolution
2. Background to SB 54
3. Articles on Refineries

APPROVED BY:



Acting City Manager

RESOLUTION NO. -16

SUPPORTING SENATE BILL 54 PROTECTING PUBLIC HEALTH, SAFETY AND THE ENVIRONMENT OF ITS RESIDENTS ADJACENT TO VOLATILE INDUSTRIAL FACILITIES

WHEREAS, as the host city for a safety-sensitive petroleum refining facility, the City of Martinez and its residents would be immediately impacted by an accident at the facility that threatened public health and safety and the environment; and

WHEREAS, the Shell Oil Martinez Refinery has sent notices to Martinez residents about plans for significant maintenance work to be performed by temporary workers at the Martinez Refinery beginning in May and lasting through mid-June; and

WHEREAS, the California Legislature found and declared that "the use of unskilled and untrained workers at chemical manufacturing and processing facilities that generate, store, treat, handle, refine, process, and transport hazardous materials is a risk to public health and safety, and the risk to public health and safety is particularly high when workers are employed by outside contractors because they generally will be less familiar with the operations of the facility and its emergency plans and the owner or operator of the facility will have less incentive to invest in their training" (Stats. 2013, Ch. 795, Sec. 1); and

WHEREAS, to protect public safety and the environment, the California Legislature adopted Section 25536.7 of the Health and Safety Code to require that a refinery owner or operator entering into contracts after January 1, 2014 "for construction, alteration, demolition, installation, repair, or maintenance work" at its facility must "require that its contractors and any subcontractors use a skilled and trained workforce to perform all onsite work" (Health & Safety Code Section 25536.7(a)); and

WHEREAS, the California Legislature has defined a "skilled and trained workforce" to mean that all the workers employed by outside contractors and subcontractors are "skilled journeypersons" or apprentices enrolled in state-approved apprenticeship programs and that, for work performed after January 1, 2016, at least 60 percent of the skilled journeypersons are graduates of an approved apprenticeship program (Health & Safety Code Section 25536.7); and

WHEREAS, the as the elected body representing the City, the City Council has a vital interest reassuring the residents of the City that they are not being exposed to unjustified risks to public safety and the environment when shutdown work is being performed at refinery facilities and in taking the necessary steps to ensure that the City is prepared to respond to accidents.

NOW, THEREFORE, BE IT RESOLVED AS FOLLOWS:

Section 1. The City Council requests that the Shell Oil Martinez Refinery provide the City Manager with: (a) a list of all the outside contractors and subcontractors that will be performing work at the refinery for the maintenance work that is scheduled in May and lasting through mid-June, (b) documentation that the Shell Oil Martinez Refinery has required each of these contractors and subcontractors to use a "skilled and trained workforce" within the

meaning of Health & Safety Code Section 25536.7; and (c) an assurance that the Shell Oil Martinez Refinery will monitor these outside contractors and subcontractors to ensure they actually employ a skilled and trained workforce.

If any of these contractors or subcontractors will not be using a skilled and trained workforce within the meaning of Health & Safety Code Section 25536.7, the City Council requests that the Shell Oil Martinez Refinery identify the contractor or subcontractor and provide an explanation of why a skilled and trained workforce will not be used; and

Section 2. The City Council requests the City Manager communicate this request to the Shell Oil Martinez Refinery and that the City Manager provide copies of the response from the Shell Oil Martinez Refinery to the members of the City Council.

* * * * *

I HEREBY CERTIFY the foregoing is a true and correct copy of a resolution duly adopted by the City Council of the City of Martinez at a Regular Meeting of said Council held on the 1st day of June, 2016, by the following vote:

AYES:

NOES:

ABSENT:

RICHARD G. HERNANDEZ, CITY CLERK
CITY OF MARTINEZ

Background to Senate Bill 54

Protecting Communities Adjacent to Volatile Industrial Facilities

Studies by UC Berkeley and Governor Brown's Interagency working group on Refinery safety both concluded in reports that training of most outside maintenance workers at refineries is inadequate, and that most contract construction workers are displaced migrant out-of-state workers with less training and experience than the qualified work force that has been trained through state-approved industrial apprenticeship programs.

Many states throughout this nation are reviewing the issue of industrial facilities that have minimal oversight and operate in close proximity to schools and working-class communities. Recently in the city of West, Texas (see attached article) a minimally regulated nitrate plant exploded, killing three workers inside and 12 fire fighters, and decimating the surrounding communities. The death toll would have been much higher but for the bravery of the fire fighters and volunteers who had evacuated a large section of the surrounding city and were in the process of performing a final check when the explosion occurred.

SB 54 is an effort by the state of California to address the risk posed to public health and safety resulting from unskilled and untrained construction workers without the necessary training, knowledge and skill to perform quality construction at these complicated, dangerous and hazardous facilities. This bill was strongly supported by fire fighters and other public agency first responders.

SB 54 was overwhelmingly passed by both houses of the Legislature and signed by the Governor on October 14, 2013, becoming law January 1, 2014.

This bill requires that outside contractors that work at refineries will have properly trained workers through state-approved apprenticeship programs, ensuring the quality of construction in these volatile 24-hour-a-day industrial facilities, and significantly reducing threats to the public health, safety and environment.

Permitting an overabundance of inadequately trained workers at refineries is foolish and dangerous, and has been a backdrop to the many incidents that have taken place at California industrial facilities. SB 54 offers the logical solution: making those workers better trained, and in turn, making those facilities more safe to the surrounding communities and the state of California.

From Wikipedia:

Chevron Richmond Refinery Fire 2012

City lawsuit cites "a continuation of years of neglect, lax oversight and corporate indifference to necessary safety inspection and repairs."

On August 6, 2012, a large fire erupted at the refinery at about 6:15 PM and reported to be contained at 10:40 PM.^{[16][17]} Flames were seen issuing from at least two of the refinery's towers. Contra Costa Health Services responded by notifying residents [shelter in place](#). BART shut down local service.^[18] The shelter-in-place order was lifted at 11:15 PM.^[17] Initial reports estimated that 11,000 people sought treatment at area hospitals,^[19] and later reports placed the number above 15,000 people.^[20]

A refinery spokeswoman stated that the fire erupted in the number 4 [crude distillation unit, or CDU](#). Just before 6:30 p.m., an inspection crew discovered that there was a diesel leak in a line in the CDU—and that the leak was growing. The crew evacuated the area just before the diesel ignited, said Nigel Hearne, manager of the refinery.^[18] Three refinery workers were given first aid at the refinery. On April 15, 2013, the US Chemical Safety Board released their preliminary report citing Chevron for a chronic failure to replace aging equipment and called for an overhaul of regulatory oversight of the industry to prevent such accidents from happening again.^{[21][22][23][24]} In January 2015, the CSB released their final investigation report.^[25]

Analysts predicted that the fire would cause an increase in gasoline prices in the western United States.^[26] A Chevron spokesperson later said that the fire was one factor among others, including the price of crude oil, that influenced prices.^[27] However, data collected by the California Energy Commission showed that increased production at other refineries more than made up for the Richmond loss, with 461,000 gallons of crude oil added to state refinery production during the week of August 3 through August 10, 2012.^[27]

In 2013, the company pleaded no contest to six charges in connection with the fire, and agreed to pay \$2 million in fines and restitution.^[28] On the first anniversary of the fire, 210 people were arrested while marching to protest safety issues at the refinery.^[20]

Around the same time the settlement was announced, the Richmond city council voted to file suit against Chevron. The reasons for the suit included "a continuation of years of neglect, lax oversight and corporate indifference to necessary safety inspection and repairs."^[20]

Coordinates: 29°22′29″N 94°56′01″W﻿ / ﻿

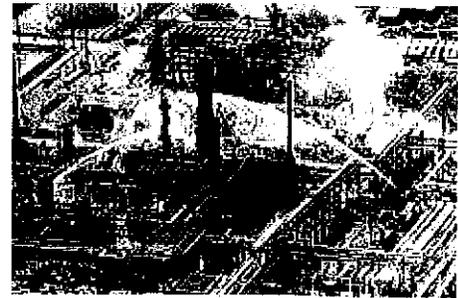
Texas City Refinery explosion

From Wikipedia, the free encyclopedia

The **Texas City Refinery explosion** occurred on March 23, 2005, when a hydrocarbon vapor cloud exploded at the ISOM isomerization process unit at BP's Texas City refinery in Texas City, Texas, killing 15 workers and injuring more than 170 others. The Texas City Refinery was the second-largest oil refinery in the state, and the third-largest in the United States with an input capacity of 437,000 barrels (69,500 m³) per day as of January 1, 2000.^[1] BP acquired the Texas City refinery as part of its merger with Amoco in 1999.^{[2][3]}

BP's own accident investigation report^[4] stated that the direct cause of the accident was "[...]heavier-than-air hydrocarbon vapors combusting after coming into contact with an ignition source, probably a running vehicle engine. The hydrocarbons originated from liquid overflow from the F-20 blowdown stack following the operation of the raffinate splitter overpressure protection system caused by overfilling and overheating of the tower contents." Both the BP and the U.S. Chemical Safety and Hazard Investigation Board reports^[5] identified numerous technical and organisational failings at the refinery and within corporate BP.

In 2011 BP announced that it was selling the refinery as part of its ongoing divestment plan to pay for ongoing compensation claims and remedial activities following the Deepwater Horizon disaster in 2010. The sale of the refinery was completed at the start of 2013 to Marathon Petroleum Corporation for US\$2.5 billion.^[6]



Fire-extinguishing operations after the Texas City refinery explosion

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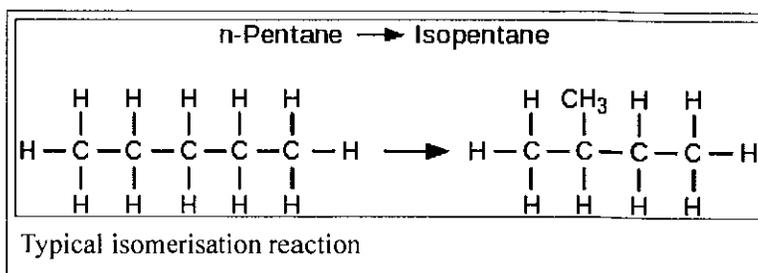
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Background

The refinery was built in 1934, but had not been well maintained for several years.^[7] Consulting firm Telos had examined conditions at the plant and released a report in January 2005 which found numerous safety issues, including "broken alarms, thinned pipe, chunks of concrete falling, bolts dropping 60 ft and staff being overcome with fumes." The report's co-author stated, "We have never seen a site where the notion 'I could die today' was so real."^{[8][9]} The refinery had also had five managers in the six years since BP inherited it in its 1999 merger with Amoco.^[10]

The ISOM plant isomerization at the site was designed for the conversion of low octane hydrocarbons, through various chemical processes, into higher octane rating hydrocarbons that could then be blended into unleaded petrol. One component of this ISOM site was a unit called the raffinate splitter. When operational, this 170-foot tall tower was used to separate out lighter hydrocarbon components from the top of the tower (mainly pentane and hexane), which condensed and were then pumped to the light raffinate storage tank, while the heavier components were recovered lower down in the splitter, then pumped to a heavy raffinate storage tank. It had an operational capacity of 45,000 barrels (7,200 m³) per day.



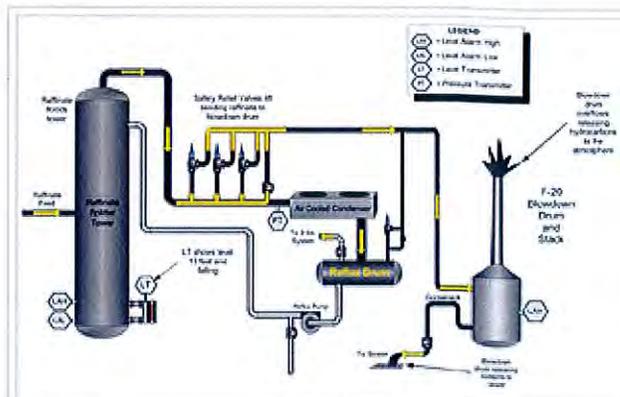
Remedial work had been started on the raffinate splitter from February 21, 2005. Two other turnaround^[11] activities were also taking place at the adjacent Ultracracker Unit (UCU) and at the Aromatics Recovery Unit (ARU) at the same time.

In 1995 and again in 2002, site-wide temporary siting analysis reports had been created at the facility that established the agreed layout of trailers and other temporary structures. The next siting analysis was due to take place in 2007 and, therefore, any siting changes before then would be under the management of change (MOC) process. Plans were made late in 2004 to accommodate contractors due to work on the UCU in 2005 in nine single trailers and a single double-wide trailer adjacent to the ISOM process unit. Although the team carrying out this assessment had identified that the double-wide trailer would be less than 350 feet (110 m) from the ISOM plant (and therefore had the potential to be susceptible to severe damage in the event of an explosion), they did not have the expertise to complete the Amoco workboat siting analysis, which was based upon the American Petroleum Institute standard "API 752".^[12] A number of action items were created from this assessment, and according to the procedure, these had to be closed before the MOC could be approved and prior to the double-wide trailer being used. These two actions were still pending in March, 2005 but nevertheless, the double-wide trailer had already been in use by contractors from November, 2004. The remaining nine UCU contractor trailers arrived on site at the start of 2005, but these had not been included in the 2004 MOC, so the additional exposure risk of

these new trailers being occupied in close proximity to the ISOM plant was never assessed.

Circumstances of the accident

After works had been completed on the raffinate splitter, consideration was given to the impending start-up of the plant. One of the primary safety critical steps in the prestart-up process was the use of the BP Pre-Startup Safety Review (PSSR) procedure. The purpose of the review was to ensure that complete and thorough technical checks were carried out and that all non-essential personnel were clear during the start-up operation. Once completed, the PSSR would be signed off by refinery operations and safety managers, authorising the start-up work but this essential safety procedure was not completed.^[13] In addition, there were a number of serious issues with items of safety critical equipment which had not been resolved prior to the start-up commencing including an inoperative pressure control valve (PV-5002), a defective high level alarm in the splitter tower (LSH-5102), a defective sight glass used to indicate fluid levels at the base of the splitter tower and the vital splitter tower level transmitter had not been calibrated.



The diagram shows the effects of the raffinate splitter tower overflowing, with subsequent release of flammable hydrocarbons into the environment through the blowback stack.

Start-up early morning

Nevertheless, the start-up process commenced with the Night Lead Operator on the March 22 with the initial filling of the splitter tower. The level transmitter was designed to indicate the raffinate level within a 5-foot (1.5 m) span from the bottom of the splitter tower to a 9-foot (2.7 m) level, i.e., 72% level indication would be 7.6 feet (2.3 m) from the bottom, but it was common practice to fill up to an indicated level of 99%, even though the procedural requirement was stated as 50%. The Day Supervisor arrived late for work and did not have a hand-over with the night shift. During the morning meeting on March 23, it was discussed that the heavy raffinate storage tanks were nearly full and, therefore, the second Day Supervisor was told that the start-up procedure should not continue, but this information was not passed on. The start-up procedure resumed just before 9:30 a.m. under instructions from the other Day Supervisor. Before recommencing the tower refill and circulation process, heavy raffinate was drained from the bottom of the tower via the level control valve into the heavy storage tank and was then shut off in "manual" mode and not the required "automatic" mode, with a 50% flow rate. The circulation process was restarted just before 10 a.m. and raffinate was once again fed into the tower, even though the level was already too high. Since the level control valve was shut and, therefore, there was no circulation out of the tower, i.e. no heavy raffinate being transferred to the storage tank, the splitter tower inevitably began to fill up. The defective level transmitter continued to show the level at less than 100%, and since the external sight glass was opaque, a visual check to verify the level in the splitter tower was not possible.

Late morning

Burners in the furnace were turned on to pre-heat raffinate going into the tower and to heat the raffinate in

the tower bottom, two more were lit at 11:16am. The required temperature for the tower reboiler return flow was 135 °C (275 °F) at 10 °C (18 °F) per hour but the procedure was not followed. During this start-up, this return flow temperature reached 153 °C (307 °F) with a rate increase of 23 °C (41 °F) per hour.^[14] The erroneous 93% reading from the defective level transmitter still indicated an ongoing safe level condition in the tower but there was still no flow of heavy raffinate from the splitter tower to the storage tank as the level control valve remained closed; instead of the hydrocarbon liquid level being at 8.65 feet (2.64 m), i.e. 93% level, as indicated, it had actually reached 67 feet (20 m). Just before midday, with heat increasing in the tower, the actual fluid level had risen to 98 feet (30 m). Pressure started to build up in the system as the remaining nitrogen in the tower and associated pipework became compressed with the increasing volume of raffinate. The operations crew thought that the pressure rise was a result of overheating in the tower bottoms as this was a known start-up issue, so the pressure was released.

At noon

By 12:42 p.m., the furnaces had been turned down and the level control valve was finally opened, draining heavy raffinate from the splitter tower. The operators believed the level transmitter reading which was now down to 78% (7.9 feet [2.4 m]) but the fluid level in the 170-foot (52 m) tall splitter tower had now reached 158 feet (48 m). Although the raffinate flow into and out of the tower were now matching (as the heated raffinate was now leaving the bottom of the tower), heat from this outflow was being transferred via a heat exchanger back into the liquid flowing into the tower from the feed pipe, raising the average temperature inside the column close to the liquid's boiling point. The liquid, already close to the top of the tower but continuing to expand due to the heat, finally entered the overhead vapor line and flowed into the relief valve system.

Pressure built up in the system as fluid filled the pipework running to the safety relief valves and the condenser. At 1:13 p.m., the three pressure relief valves were activated as the hydrostatic head pressure of the raffinate built to over 60 psi (410 kPa) above atmospheric pressure. With the relief valves fully open, over 196,000 litres (52,000 US gal) of heated raffinate passed directly into the collection header over a 6 minute period before closing, as pressure in the system dropped to their closing or blowdown pressure of 37.3 psi (257 kPa) above atmospheric pressure.

Explosion

Investigating this pressure spike, the Day Board Operator fully opened the level control valve to the heavy raffinate storage tank and shut off of the gas fueling the furnace, but the raffinate feed into the splitter tower was not shut off. Hot raffinate flowed into the blowdown drum and stack and as it filled, some of the fluid started to flow into the ISOM unit sewer system via a 6-inch (15 cm) pipeline at the base of the blowdown drum. As the blowdown drum and stack filled up, liquid overflowed out of the top of the stack forming a 20-foot (6 m) "geyser" ^[15] as hot hydrocarbon liquid vented directly into the air. It then ran down the side of the blow-down drum and stack and pooled at the base of the unit. A radio call was received in the control room that hydrocarbons were overflowing from the stack. A pick-up truck, with its engine running, had been parked within 30 feet (9 m) of the blowdown stack; the vapor cloud reached the vehicle, causing the engine to race. The cloud continued to spread across the ISOM plant, across the pipe-rack to the West and into the trailer area. No emergency alarm sounded, and at approximately 1:20 p.m., there was a catastrophic vapor cloud explosion, probably ignited by the overheating truck engine.^[16] The blast pressure wave struck the contractor trailers. The force of the explosion sent debris

flying, causing fatal blunt force trauma to 15 people in and around the trailers. 180 others were injured. The pressure wave was so powerful it shattered windows off site up to a distance of three-quarters of a mile (1.2 km) away. An area estimated at 200,000 square feet (19,000 m²) was burned.^[17]

Investigation reports

Both BP-house experts as well as various authorities and committees investigated the explosion in relation to technical, organizational, and safety culture aspects. The results of the technical investigation of a team of BP-experts were summarized in the so-called Mogford report, the findings with regard to the organizational aspects and the responsibility of management in the so-called Bonse report. The U.S. Chemical Safety and Hazard Investigation Board examined both the technical aspects and the responsibility of the supervisory authorities. The Occupational Safety and Health Administration (OSHA) reviewed in the aftermath the compliance in relation to the various legal requirements.

Organisational failings included corporate cost-cutting, a failure to invest in the plant infrastructure, a lack of corporate oversight on both safety culture and major accident prevention programs, a focus on occupational safety and not process safety, a defective management of change process (which allowed the siting of contractor trailers too close to the ISOM process unit), the inadequate training of operators, a lack of competent supervision for start-up operations, poor communications between individuals and departments and the use of outdated and ineffective work procedures which were often not followed. Technical failings included a blowdown drum that was of insufficient size, a lack of preventative maintenance on safety critical systems, inoperative alarms and level sensors in the ISOM process unit and the continued use of outdated blowdown drum and stack technology when replacement with the safer flare option had been a feasible alternative for many years.^[18]

Mogford Report

A team of experts led by John Mogford, the Senior Group Vice President, Safety and Operations, examined the technical aspects of the explosion and suggested corrective actions. On December 9, 2005, BP published this accident investigation report.^[19] The report identified as main causes four critical factors. Without those factors, the event would not have happened or would have had a considerably lower impact. The factors included the unintentional release of substance, the operating instructions as well as their compliance with the commissioning of the rectification column, the work control policies, and the structure of the trailers and the design of the blow out vessel.

Bonse report

Another internal report (known as the Bonse report, led by the chairman of BP Germany, Wilhelm Bonse-Geuking) that was issued identified numerous management failures. On May 3 2007, a court ordered the release of the report, that was intended to be used only for internal purposes.^[20] The report investigated the compliance of management to internal management instructions (BP management framework, BPMF) and the BP Code of Conduct. The Refinery division of BP had issued these instructions in accordance with the Group-wide regulations. The so-called Blue Book was published in 2005. In addition to personal failings, the report noted unclear responsibilities within the Group at all management levels. As another contributing factor, the report noticed the poor state of the plants and to low spending on maintenance.

CSB report

Given the extent of the disaster the U.S. Chemical Safety and Hazard Investigation Board examined both the safety management in the Texas City refinery and the role of the BP Group as well as the role of the Occupational Safety and Health Administration (OSHA) as a regulatory body. The results of the investigation of the agency were published in a three hundred page long report on 20 March 2007.^[21]



The CSB found that organizational and safety deficiencies at all organizational levels of BP contributed to the refinery explosion, such as cost cuts and spending cuts in the safety area, although a large part of the refinery infrastructure and process equipment were in poor condition. In addition, the committee said that BP had cut the budget for training and reduced staff. Furthermore, the CSB found that OSHA had as supervising authority failed to carry out planned inspections of the refinery and did not enforce safety rules, although there were many warning signs. After the explosion, OSHA found 301 violations of requirements and imposed a fine of US\$21 million. The CSB found that only a limited number of OSHA inspectors received the specialized training and experience necessary for complex investigations in refineries.

The CSB issued a recommendation to develop a guideline for understanding, recognizing and dealing with fatigue during shift work. The directive API Recommended Practice 755 provided guidance for refineries, petrochemical and chemical plants and other facilities on how to deal with fatigue syndromes (Fatigue Risk Management System, FRMS). These guidelines include recommendations for work on rotating shifts, such as for the maximum number of overtime hours and the number of days to be worked on without interruption.

Aftermath

The CSB report found that BP had failed to heed or implement safety recommendations made before the blast. Among them were:

- In 1991, the Amoco refining planning department proposed eliminating blowdown systems that vented to the atmosphere, but funding for this plan was not included in the budget.
- In 1992, OSHA issued a citation to Amoco for unsafe design of similar pressure-relief systems at the plant. However, Amoco successfully persuaded OSHA to drop this citation by relying on the less-stringent requirements in API Recommended Practice 521.
- In 1993, the Amoco Regulatory Cluster project proposed eliminating atmospheric blowdown systems, but again, funding was not approved.
- In 1995, a refinery belonging to Pennzoil suffered a disaster when two storage tanks exploded, engulfing a trailer and killing five workers. The conclusion was that trailers should not be located near hazardous materials. However, BP ignored the warnings, and they believed that because the trailer where most of the deaths happened was empty most of the year, the risk was low.
- Despite Amoco's process safety standard No. 6, which prohibited new atmospheric blowdown systems and called for the phasing out of existing ones, in 1997, Amoco replaced the 1950s-era blowdown drum/vent stack that served the raffinate splitter tower with an identical system, instead

of upgrading to recommended alternatives that were safer.

- In 2002, engineers at the plant proposed replacing the blowdown drum/vent system as part of an environmental improvement initiative, but this line-item was cut from the budget, due to cost pressures.
- Also in 2002, an opportunity to tie the ISOM relief system into the new NDU flare system was not taken, due to a US\$150,000 incremental cost.
- During 2002, BP's Clean Streams project proposed converting the blowdown drum to a flare knock-out tank, and routing discharges to a flare. When it was found that a needed relief study of the ISOM system had not been completed due to budget constraints, the Clean Streams project proposed adding a wet/dry system to the ISOM instead.
- Between 1994 and 2004, at least eight similar cases occurred in which flammable vapors were emitted by a blowdown drum/vent stack. Effective corrective action was not taken at the BP plant.

As a result of the accident, BP said that it would eliminate all blowdown drums/vent stack systems in flammable service. The CSB, meanwhile, recommended to the American Petroleum Institute that guidelines on the location of trailers be made.

OSHA ultimately found over 300 safety violations and fined BP US\$21 million — the largest fine in OSHA history at the time.^[10]

Legal action

BP was charged with criminal violations of federal environmental laws, and has been named in lawsuits from the victims' families. The Occupational Safety and Health Administration gave BP a record fine for hundreds of safety violations,^[22] and in 2009 imposed an even larger fine after claiming that BP had failed to implement safety improvements following the disaster.^[23]

On February 4, 2008, U.S. District Judge Lee Rosenthal heard arguments regarding BP's offer to plead guilty to a federal environmental crime with a US\$50 million fine. At the hearing, blast victims and their relatives objected to the plea, calling the proposed fine "trivial". So far, BP has said it has paid more than US\$1.6 billion to compensate victims.^[24] The judge gave no timetable on when she would make a final ruling.^[25]

The case of Eva Rowe, a young woman who lost her parents in the explosion, attracted nationwide attention. She let it be known that she would not accept a settlement and would drag the group to justice. Ed Bradley, a well-known American journalist who made history in the television magazine 60 Minutes, published her case.

On 9 November 2006 BP settled the case with Rowe as the last applicant after her lawyers had tried to invite John Browne as witnesses. The amount of compensation for Eva Rowe remained unknown. BP also paid US\$32 million to universities and hospitals nominated by Rowe including the Mary Kay O'Connor Process Safety Center at Texas A & M University, the Medical Faculty of the University of Texas in Galveston, the Truman G. Blocker Adult Burn Unit and the College of the Mainland in Texas City. Furthermore, BP published about seven million pages of internal documents, including the Telos and Bonse report.^[26]

On October 30, 2009, OSHA imposed an US\$87 million fine on the company for failing to correct safety

hazards revealed in the 2005 explosion. In its report, OSHA also cited over 700 safety violations. The fine was the largest in OSHA's history, and BP announced that it would challenge the fine.^[27]

On August 12, 2010, BP announced that it had agreed to pay US\$50.6 million of the October 30 fine, while continuing to contest the remaining US\$30.7 million; the fine had been reduced by US\$6.1 million between when it was levied and when BP paid the first part.^[28]

Subsequent incidents

After the March explosion, other safety incidents occurred at the plant:

- On July 28, 2005, a hydrogen gas heat exchanger pipe on the resid hydrotreater unit ruptured, causing a release of hydrogen that erupted into a large fireball. One person received minor injuries. The Chemical Safety Board found that a contractor had accidentally switched a low-alloy steel elbow with carbon steel pipe elbow during maintenance, causing a failure mode known as "high temperature hydrogen attack" (HTHA).

The CSB found that BP had not informed the maintenance contractor that the elbows were different, and the maintenance contractor had not used any procedure (such as tagging) to ensure that the elbows were re-installed into their original locations.

- On August 10, 2005, there was an incident in a gas-oil hydrotreater that resulted in a community order to shelter. This incident occurred when a hole developed in the bottom of a valve that handles high-pressure gas and oil.
- On January 14, 2008, William Joseph Gracia, 56, a veteran BP operations supervisor, died following head injuries sustained as workers prepared to place in service a water filtration vessel at the refinery's ultracracker unit.^[29]
- On September 21, 2010, an incident in the Pipestill 3B unit left two workers with serious steam burns.^[30]

Baker Panel report

Following the 2005 incidents, on August 17, 2005, the CSB recommended that BP commission an independent panel to investigate the safety culture and management systems at BP North America.^[31] The panel was led by former U.S. Secretary of State James Baker III. The Baker panel report was released on January 16, 2007.^{[32][33]}

The Baker report cited a weak safety culture, and reported that BP did not adequately follow the



Ed Bradley, 1978



View of the ultracracker unit – location of January 14, 2008, accident.

Department of Energy's published safety recommendations.^[34] The report suggested that cost-cutting and production pressure from BP executives may have resulted in a lack of needed safety measures across the board.^[35] Carolyn W. Merritt, Chairman and Chief Executive Officer of the CSB stated, "The combination of cost-cutting, production pressures, and failure to invest caused a progressive deterioration of safety at the refinery. Beginning in 2002, BP commissioned a series of audits and studies that revealed serious safety problems at the Texas City refinery, including a lack of necessary preventive maintenance and training. These audits and studies were shared with BP executives in London, and were provided to at least one member of the executive board. BP's response was too little and too late. Some additional investments were made, but they did not address the core problems in Texas City. In 2004, BP executives challenged their refineries to cut yet another 25% from their budgets for the following year."^[32] In addition, safety improvements between 2002 and 2005 were "largely focused on personal safety — such as slips, trips, falls, and vehicle accidents, rather than on improving safety performance," according to Supervisory Investigator Don Holstrom.^[32]



James A. Baker III

Additionally, the panel created and administered, to all five of BP's North American refineries, an employee survey focusing on various aspects of "process safety". From the survey results, they concluded that the Toledo and Texas City, Texas plants had the worst process safety culture, while the Cherry Point Refinery, located in Birch Bay, Washington, had the best process safety culture. The survey results also showed that managers and white-collar workers generally had a more positive view of the process safety culture at their plants when compared with the viewpoint of blue-collar operators and maintenance technicians. The director of the Cherry Point refinery was promoted to oversee better implementation of process safety at BP.

In popular culture

- The explosion was featured on History Channel's series *Modern Marvels*, on Season 12, episode 47 "Engineering Disasters 20."^[36]
- The explosion was also featured on National Geographic's television series *Seconds From Disaster*, on the episode "Texas Oil Explosion".

See also

- National Geographic *Seconds From Disaster* episodes
- Deepwater Horizon oil spill

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Texas City Refinery explosion

From Wikipedia, the free encyclopedia

The **Texas City Refinery explosion** occurred on March 23, 2005, when a hydrocarbon vapor cloud exploded at the ISOM isomerization process unit at BP's Texas City refinery in Texas City, Texas, killing 15 workers and injuring more than 170 others. The Texas City Refinery was the second-largest oil refinery in the state, and the third-largest in the United States with an input capacity of 437,000 barrels (69,500 m³) per day as of January 1, 2000.^[1] BP acquired the Texas City refinery as part of its merger with Amoco in 1999.^{[2][3]}

BP's own accident investigation report^[4] stated that the direct cause of the accident was "[...]heavier-than-air hydrocarbon vapors combusting after coming into contact with an ignition source, probably a running vehicle engine. The hydrocarbons originated from liquid overflow from the F-20 blowdown stack following the operation of the raffinate splitter overpressure protection system caused by overfilling and overheating of the tower contents." Both the BP and the U.S. Chemical Safety and Hazard Investigation Board reports^[5] identified numerous technical and organisational failings at the refinery and within corporate BP.

In 2011 BP announced that it was selling the refinery as part of its ongoing divestment plan to pay for ongoing compensation claims and remedial activities following the Deepwater Horizon disaster in 2010. The sale of the refinery was completed at the start of 2013 to Marathon Petroleum Corporation for US\$2.5 billion.^[6]



Fire-extinguishing operations after the Texas City refinery explosion

Contents

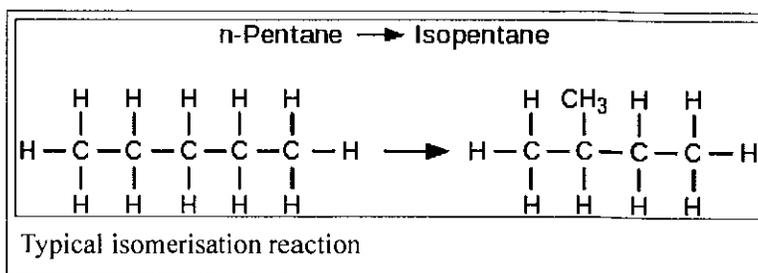
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Background

The refinery was built in 1934, but had not been well maintained for several years.^[7] Consulting firm Telos had examined conditions at the plant and released a report in January 2005 which found numerous safety issues, including "broken alarms, thinned pipe, chunks of concrete falling, bolts dropping 60 ft and staff being overcome with fumes." The report's co-author stated, "We have never seen a site where the notion 'I could die today' was so real."^{[8][9]} The refinery had also had five managers in the six years since BP inherited it in its 1999 merger with Amoco.^[10]

The ISOM plant isomerization at the site was designed for the conversion of low octane hydrocarbons, through various chemical processes, into higher octane rating hydrocarbons that could then be blended into unleaded petrol. One component of this ISOM site was a unit called the raffinate splitter. When operational, this 170-foot tall tower was used to separate out lighter hydrocarbon components from the top of the tower (mainly pentane and hexane), which condensed and were then pumped to the light raffinate storage tank, while the heavier components were recovered lower down in the splitter, then pumped to a heavy raffinate storage tank. It had an operational capacity of 45,000 barrels (7,200 m³) per day.



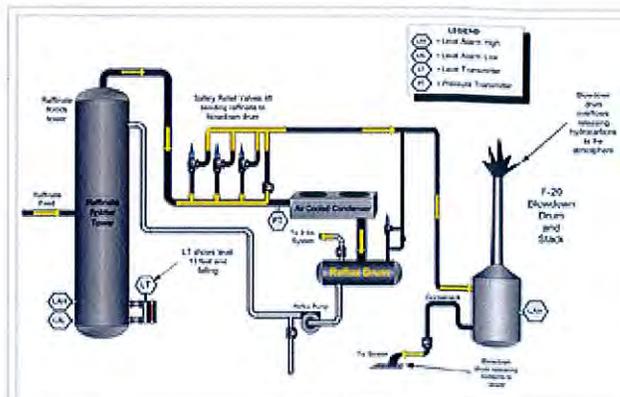
Remedial work had been started on the raffinate splitter from February 21, 2005. Two other turnaround^[11] activities were also taking place at the adjacent Ultracracker Unit (UCU) and at the Aromatics Recovery Unit (ARU) at the same time.

In 1995 and again in 2002, site-wide temporary siting analysis reports had been created at the facility that established the agreed layout of trailers and other temporary structures. The next siting analysis was due to take place in 2007 and, therefore, any siting changes before then would be under the management of change (MOC) process. Plans were made late in 2004 to accommodate contractors due to work on the UCU in 2005 in nine single trailers and a single double-wide trailer adjacent to the ISOM process unit. Although the team carrying out this assessment had identified that the double-wide trailer would be less than 350 feet (110 m) from the ISOM plant (and therefore had the potential to be susceptible to severe damage in the event of an explosion), they did not have the expertise to complete the Amoco workboat siting analysis, which was based upon the American Petroleum Institute standard "API 752".^[12] A number of action items were created from this assessment, and according to the procedure, these had to be closed before the MOC could be approved and prior to the double-wide trailer being used. These two actions were still pending in March, 2005 but nevertheless, the double-wide trailer had already been in use by contractors from November, 2004. The remaining nine UCU contractor trailers arrived on site at the start of 2005, but these had not been included in the 2004 MOC, so the additional exposure risk of

these new trailers being occupied in close proximity to the ISOM plant was never assessed.

Circumstances of the accident

After works had been completed on the raffinate splitter, consideration was given to the impending start-up of the plant. One of the primary safety critical steps in the prestart-up process was the use of the BP Pre-Startup Safety Review (PSSR) procedure. The purpose of the review was to ensure that complete and thorough technical checks were carried out and that all non-essential personnel were clear during the start-up operation. Once completed, the PSSR would be signed off by refinery operations and safety managers, authorising the start-up work but this essential safety procedure was not completed.^[13] In addition, there were a number of serious issues with items of safety critical equipment which had not been resolved prior to the start-up commencing including an inoperative pressure control valve (PV-5002), a defective high level alarm in the splitter tower (LSH-5102), a defective sight glass used to indicate fluid levels at the base of the splitter tower and the vital splitter tower level transmitter had not been calibrated.



The diagram shows the effects of the raffinate splitter tower overflowing, with subsequent release of flammable hydrocarbons into the environment through the blowback stack.

Start-up early morning

Nevertheless, the start-up process commenced with the Night Lead Operator on the March 22 with the initial filling of the splitter tower. The level transmitter was designed to indicate the raffinate level within a 5-foot (1.5 m) span from the bottom of the splitter tower to a 9-foot (2.7 m) level, i.e., 72% level indication would be 7.6 feet (2.3 m) from the bottom, but it was common practice to fill up to an indicated level of 99%, even though the procedural requirement was stated as 50%. The Day Supervisor arrived late for work and did not have a hand-over with the night shift. During the morning meeting on March 23, it was discussed that the heavy raffinate storage tanks were nearly full and, therefore, the second Day Supervisor was told that the start-up procedure should not continue, but this information was not passed on. The start-up procedure resumed just before 9:30 a.m. under instructions from the other Day Supervisor. Before recommencing the tower refill and circulation process, heavy raffinate was drained from the bottom of the tower via the level control valve into the heavy storage tank and was then shut off in "manual" mode and not the required "automatic" mode, with a 50% flow rate. The circulation process was restarted just before 10 a.m. and raffinate was once again fed into the tower, even though the level was already too high. Since the level control valve was shut and, therefore, there was no circulation out of the tower, i.e. no heavy raffinate being transferred to the storage tank, the splitter tower inevitably began to fill up. The defective level transmitter continued to show the level at less than 100%, and since the external sight glass was opaque, a visual check to verify the level in the splitter tower was not possible.

Late morning

Burners in the furnace were turned on to pre-heat raffinate going into the tower and to heat the raffinate in

the tower bottom, two more were lit at 11:16am. The required temperature for the tower reboiler return flow was 135 °C (275 °F) at 10 °C (18 °F) per hour but the procedure was not followed. During this start-up, this return flow temperature reached 153 °C (307 °F) with a rate increase of 23 °C (41 °F) per hour.^[14] The erroneous 93% reading from the defective level transmitter still indicated an ongoing safe level condition in the tower but there was still no flow of heavy raffinate from the splitter tower to the storage tank as the level control valve remained closed; instead of the hydrocarbon liquid level being at 8.65 feet (2.64 m), i.e. 93% level, as indicated, it had actually reached 67 feet (20 m). Just before midday, with heat increasing in the tower, the actual fluid level had risen to 98 feet (30 m). Pressure started to build up in the system as the remaining nitrogen in the tower and associated pipework became compressed with the increasing volume of raffinate. The operations crew thought that the pressure rise was a result of overheating in the tower bottoms as this was a known start-up issue, so the pressure was released.

At noon

By 12:42 p.m., the furnaces had been turned down and the level control valve was finally opened, draining heavy raffinate from the splitter tower. The operators believed the level transmitter reading which was now down to 78% (7.9 feet [2.4 m]) but the fluid level in the 170-foot (52 m) tall splitter tower had now reached 158 feet (48 m). Although the raffinate flow into and out of the tower were now matching (as the heated raffinate was now leaving the bottom of the tower), heat from this outflow was being transferred via a heat exchanger back into the liquid flowing into the tower from the feed pipe, raising the average temperature inside the column close to the liquid's boiling point. The liquid, already close to the top of the tower but continuing to expand due to the heat, finally entered the overhead vapor line and flowed into the relief valve system.

Pressure built up in the system as fluid filled the pipework running to the safety relief valves and the condenser. At 1:13 p.m., the three pressure relief valves were activated as the hydrostatic head pressure of the raffinate built to over 60 psi (410 kPa) above atmospheric pressure. With the relief valves fully open, over 196,000 litres (52,000 US gal) of heated raffinate passed directly into the collection header over a 6 minute period before closing, as pressure in the system dropped to their closing or blowdown pressure of 37.3 psi (257 kPa) above atmospheric pressure.

Explosion

Investigating this pressure spike, the Day Board Operator fully opened the level control valve to the heavy raffinate storage tank and shut off of the gas fueling the furnace, but the raffinate feed into the splitter tower was not shut off. Hot raffinate flowed into the blowdown drum and stack and as it filled, some of the fluid started to flow into the ISOM unit sewer system via a 6-inch (15 cm) pipeline at the base of the blowdown drum. As the blowdown drum and stack filled up, liquid overflowed out of the top of the stack forming a 20-foot (6 m) "geyser" ^[15] as hot hydrocarbon liquid vented directly into the air. It then ran down the side of the blow-down drum and stack and pooled at the base of the unit. A radio call was received in the control room that hydrocarbons were overflowing from the stack. A pick-up truck, with its engine running, had been parked within 30 feet (9 m) of the blowdown stack; the vapor cloud reached the vehicle, causing the engine to race. The cloud continued to spread across the ISOM plant, across the pipe-rack to the West and into the trailer area. No emergency alarm sounded, and at approximately 1:20 p.m., there was a catastrophic vapor cloud explosion, probably ignited by the overheating truck engine.^[16] The blast pressure wave struck the contractor trailers. The force of the explosion sent debris

flying, causing fatal blunt force trauma to 15 people in and around the trailers. 180 others were injured. The pressure wave was so powerful it shattered windows off site up to a distance of three-quarters of a mile (1.2 km) away. An area estimated at 200,000 square feet (19,000 m²) was burned.^[17]

Investigation reports

Both BP-house experts as well as various authorities and committees investigated the explosion in relation to technical, organizational, and safety culture aspects. The results of the technical investigation of a team of BP-experts were summarized in the so-called Mogford report, the findings with regard to the organizational aspects and the responsibility of management in the so-called Bonse report. The U.S. Chemical Safety and Hazard Investigation Board examined both the technical aspects and the responsibility of the supervisory authorities. The Occupational Safety and Health Administration (OSHA) reviewed in the aftermath the compliance in relation to the various legal requirements.

Organisational failings included corporate cost-cutting, a failure to invest in the plant infrastructure, a lack of corporate oversight on both safety culture and major accident prevention programs, a focus on occupational safety and not process safety, a defective management of change process (which allowed the siting of contractor trailers too close to the ISOM process unit), the inadequate training of operators, a lack of competent supervision for start-up operations, poor communications between individuals and departments and the use of outdated and ineffective work procedures which were often not followed. Technical failings included a blowdown drum that was of insufficient size, a lack of preventative maintenance on safety critical systems, inoperative alarms and level sensors in the ISOM process unit and the continued use of outdated blowdown drum and stack technology when replacement with the safer flare option had been a feasible alternative for many years.^[18]

Mogford Report

A team of experts led by John Mogford, the Senior Group Vice President, Safety and Operations, examined the technical aspects of the explosion and suggested corrective actions. On December 9, 2005, BP published this accident investigation report.^[19] The report identified as main causes four critical factors. Without those factors, the event would not have happened or would have had a considerably lower impact. The factors included the unintentional release of substance, the operating instructions as well as their compliance with the commissioning of the rectification column, the work control policies, and the structure of the trailers and the design of the blow out vessel.

Bonse report

Another internal report (known as the Bonse report, led by the chairman of BP Germany, Wilhelm Bonse-Geuking) that was issued identified numerous management failures. On May 3 2007, a court ordered the release of the report, that was intended to be used only for internal purposes.^[20] The report investigated the compliance of management to internal management instructions (BP management framework, BPMF) and the BP Code of Conduct. The Refinery division of BP had issued these instructions in accordance with the Group-wide regulations. The so-called Blue Book was published in 2005. In addition to personal failings, the report noted unclear responsibilities within the Group at all management levels. As another contributing factor, the report noticed the poor state of the plants and to low spending on maintenance.

CSB report

Given the extent of the disaster the U.S. Chemical Safety and Hazard Investigation Board examined both the safety management in the Texas City refinery and the role of the BP Group as well as the role of the Occupational Safety and Health Administration (OSHA) as a regulatory body. The results of the investigation of the agency were published in a three hundred page long report on 20 March 2007.^[21]



The CSB found that organizational and safety deficiencies at all organizational levels of BP contributed to the refinery explosion, such as cost cuts and spending cuts in the safety area, although a large part of the refinery infrastructure and process equipment were in poor condition. In addition, the committee said that BP had cut the budget for training and reduced staff. Furthermore, the CSB found that OSHA had as supervising authority failed to carry out planned inspections of the refinery and did not enforce safety rules, although there were many warning signs. After the explosion, OSHA found 301 violations of requirements and imposed a fine of US\$21 million. The CSB found that only a limited number of OSHA inspectors received the specialized training and experience necessary for complex investigations in refineries.

The CSB issued a recommendation to develop a guideline for understanding, recognizing and dealing with fatigue during shift work. The directive API Recommended Practice 755 provided guidance for refineries, petrochemical and chemical plants and other facilities on how to deal with fatigue syndromes (Fatigue Risk Management System, FRMS). These guidelines include recommendations for work on rotating shifts, such as for the maximum number of overtime hours and the number of days to be worked on without interruption.

Aftermath

The CSB report found that BP had failed to heed or implement safety recommendations made before the blast. Among them were:

- In 1991, the Amoco refining planning department proposed eliminating blowdown systems that vented to the atmosphere, but funding for this plan was not included in the budget.
- In 1992, OSHA issued a citation to Amoco for unsafe design of similar pressure-relief systems at the plant. However, Amoco successfully persuaded OSHA to drop this citation by relying on the less-stringent requirements in API Recommended Practice 521.
- In 1993, the Amoco Regulatory Cluster project proposed eliminating atmospheric blowdown systems, but again, funding was not approved.
- In 1995, a refinery belonging to Pennzoil suffered a disaster when two storage tanks exploded, engulfing a trailer and killing five workers. The conclusion was that trailers should not be located near hazardous materials. However, BP ignored the warnings, and they believed that because the trailer where most of the deaths happened was empty most of the year, the risk was low.
- Despite Amoco's process safety standard No. 6, which prohibited new atmospheric blowdown systems and called for the phasing out of existing ones, in 1997, Amoco replaced the 1950s-era blowdown drum/vent stack that served the raffinate splitter tower with an identical system, instead

of upgrading to recommended alternatives that were safer.

- In 2002, engineers at the plant proposed replacing the blowdown drum/vent system as part of an environmental improvement initiative, but this line-item was cut from the budget, due to cost pressures.
- Also in 2002, an opportunity to tie the ISOM relief system into the new NDU flare system was not taken, due to a US\$150,000 incremental cost.
- During 2002, BP's Clean Streams project proposed converting the blowdown drum to a flare knock-out tank, and routing discharges to a flare. When it was found that a needed relief study of the ISOM system had not been completed due to budget constraints, the Clean Streams project proposed adding a wet/dry system to the ISOM instead.
- Between 1994 and 2004, at least eight similar cases occurred in which flammable vapors were emitted by a blowdown drum/vent stack. Effective corrective action was not taken at the BP plant.

As a result of the accident, BP said that it would eliminate all blowdown drums/vent stack systems in flammable service. The CSB, meanwhile, recommended to the American Petroleum Institute that guidelines on the location of trailers be made.

OSHA ultimately found over 300 safety violations and fined BP US\$21 million — the largest fine in OSHA history at the time.^[10]

Legal action

BP was charged with criminal violations of federal environmental laws, and has been named in lawsuits from the victims' families. The Occupational Safety and Health Administration gave BP a record fine for hundreds of safety violations,^[22] and in 2009 imposed an even larger fine after claiming that BP had failed to implement safety improvements following the disaster.^[23]

On February 4, 2008, U.S. District Judge Lee Rosenthal heard arguments regarding BP's offer to plead guilty to a federal environmental crime with a US\$50 million fine. At the hearing, blast victims and their relatives objected to the plea, calling the proposed fine "trivial". So far, BP has said it has paid more than US\$1.6 billion to compensate victims.^[24] The judge gave no timetable on when she would make a final ruling.^[25]

The case of Eva Rowe, a young woman who lost her parents in the explosion, attracted nationwide attention. She let it be known that she would not accept a settlement and would drag the group to justice. Ed Bradley, a well-known American journalist who made history in the television magazine 60 Minutes, published her case.

On 9 November 2006 BP settled the case with Rowe as the last applicant after her lawyers had tried to invite John Browne as witnesses. The amount of compensation for Eva Rowe remained unknown. BP also paid US\$32 million to universities and hospitals nominated by Rowe including the Mary Kay O'Connor Process Safety Center at Texas A & M University, the Medical Faculty of the University of Texas in Galveston, the Truman G. Blocker Adult Burn Unit and the College of the Mainland in Texas City. Furthermore, BP published about seven million pages of internal documents, including the Telos and Bonse report.^[26]

On October 30, 2009, OSHA imposed an US\$87 million fine on the company for failing to correct safety

hazards revealed in the 2005 explosion. In its report, OSHA also cited over 700 safety violations. The fine was the largest in OSHA's history, and BP announced that it would challenge the fine.^[27]

On August 12, 2010, BP announced that it had agreed to pay US\$50.6 million of the October 30 fine, while continuing to contest the remaining US\$30.7 million; the fine had been reduced by US\$6.1 million between when it was levied and when BP paid the first part.^[28]

Subsequent incidents

After the March explosion, other safety incidents occurred at the plant:

- On July 28, 2005, a hydrogen gas heat exchanger pipe on the resid hydrotreater unit ruptured, causing a release of hydrogen that erupted into a large fireball. One person received minor injuries. The Chemical Safety Board found that a contractor had accidentally switched a low-alloy steel elbow with carbon steel pipe elbow during maintenance, causing a failure mode known as "high temperature hydrogen attack" (HTHA).

The CSB found that BP had not informed the maintenance contractor that the elbows were different, and the maintenance contractor had not used any procedure (such as tagging) to ensure that the elbows were re-installed into their original locations.

- On August 10, 2005, there was an incident in a gas-oil hydrotreater that resulted in a community order to shelter. This incident occurred when a hole developed in the bottom of a valve that handles high-pressure gas and oil.
- On January 14, 2008, William Joseph Gracia, 56, a veteran BP operations supervisor, died following head injuries sustained as workers prepared to place in service a water filtration vessel at the refinery's ultracracker unit.^[29]
- On September 21, 2010, an incident in the Pipestill 3B unit left two workers with serious steam burns.^[30]

Baker Panel report

Following the 2005 incidents, on August 17, 2005, the CSB recommended that BP commission an independent panel to investigate the safety culture and management systems at BP North America.^[31] The panel was led by former U.S. Secretary of State James Baker III. The Baker panel report was released on January 16, 2007.^{[32][33]}

The Baker report cited a weak safety culture, and reported that BP did not adequately follow the



Ed Bradley, 1978



View of the ultracracker unit – location of January 14, 2008, accident.

Department of Energy's published safety recommendations.^[34] The report suggested that cost-cutting and production pressure from BP executives may have resulted in a lack of needed safety measures across the board.^[35] Carolyn W. Merritt, Chairman and Chief Executive Officer of the CSB stated, "The combination of cost-cutting, production pressures, and failure to invest caused a progressive deterioration of safety at the refinery. Beginning in 2002, BP commissioned a series of audits and studies that revealed serious safety problems at the Texas City refinery, including a lack of necessary preventive maintenance and training. These audits and studies were shared with BP executives in London, and were provided to at least one member of the executive board. BP's response was too little and too late. Some additional investments were made, but they did not address the core problems in Texas City. In 2004, BP executives challenged their refineries to cut yet another 25% from their budgets for the following year."^[32] In addition, safety improvements between 2002 and 2005 were "largely focused on personal safety — such as slips, trips, falls, and vehicle accidents, rather than on improving safety performance," according to Supervisory Investigator Don Holstrom.^[32]



James A. Baker III

Additionally, the panel created and administered, to all five of BP's North American refineries, an employee survey focusing on various aspects of "process safety". From the survey results, they concluded that the Toledo and Texas City, Texas plants had the worst process safety culture, while the Cherry Point Refinery, located in Birch Bay, Washington, had the best process safety culture. The survey results also showed that managers and white-collar workers generally had a more positive view of the process safety culture at their plants when compared with the viewpoint of blue-collar operators and maintenance technicians. The director of the Cherry Point refinery was promoted to oversee better implementation of process safety at BP.

In popular culture

- The explosion was featured on History Channel's series *Modern Marvels*, on Season 12, episode 47 "Engineering Disasters 20."^[36]
- The explosion was also featured on National Geographic's television series *Seconds From Disaster*, on the episode "Texas Oil Explosion".

See also

- National Geographic *Seconds From Disaster* episodes
- Deepwater Horizon oil spill

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Categories: BP | Disasters in Texas | Fires in Texas | Explosions in 2005 | 2005 in Texas | 2005 industrial disasters | 2005 disasters in the United States | Accidental explosion disasters in the United States | Industrial fires and explosions in the United States | Galveston County, Texas | Galveston Bay Area | Petroleum in Texas | Texas City, Texas

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Coordinates: 31.816°N 97.088°W﻿ / ﻿31.816°N 97.088°W﻿ / 31.816; -97.088

West Fertilizer Company explosion

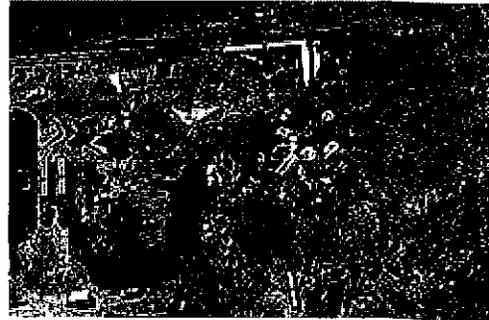
From Wikipedia, the free encyclopedia

On April 17, 2013, an ammonium nitrate explosion occurred at the West Fertilizer Company storage and distribution facility in West, Texas, eighteen miles (29 km) north of Waco, while emergency services personnel were responding to a fire at the facility.^[7] Fifteen people were killed, more than 160 were injured, and more than 150 buildings were damaged or destroyed. Investigators have confirmed that ammonium nitrate was the material that exploded.^[8] On May 11, 2016, the Bureau of Alcohol, Tobacco, Firearms and Explosives said that the fire had been deliberately set.^[1]

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West Fertilizer Company explosion



Aerial photo taken several days after the event.

Time	7:50:38 p.m. CDT (UTC−05:00)
Date	April 17, 2013
Location	West Fertilizer Co., 1471 Jerry Mashek Drive, West, Texas, United States
Coordinates	31.816°N 97.088°W﻿ / ﻿31.816°N 97.088°W﻿ / 31.816; -97.088
Cause	Arson ^[1]
Deaths	15 ^{[2][3]}
Non-fatal injuries	Approximately 160 ^[4] -200 ^[1]
Property damage	West Fertilizer Company building obliterated, ^[5] 60–80 homes destroyed, 50–75 homes damaged, 50-unit apartment building destroyed, ^[6] West Middle School damaged

Background

West Fertilizer Company has supplied chemicals to farmers since it was founded in 1962; as of 2013 it was owned by Adair Grain, Inc. and employed nine workers at the facility.^{[9][10]}

At the time of the accident, the plant had last been inspected by the Occupational Safety and Health Administration (OSHA) in 1985. According to records obtained by the Associated Press, OSHA cited the plant for improper storage of anhydrous ammonia and fined it \$30; OSHA could have imposed a fine of as much as \$1,000. OSHA also cited the plant for violations of respiratory protection standards, but did not issue a fine. OSHA officials said the facility was not on their "National Emphasis Plan" for inspections, because it was not a manufacturer, had no record of a major accident, and the Environmental

Protection Agency did not consider it a major risk.^{[11][12]}



Map of West, Texas

After a complaint in 2006 about an ammonia smell coming from the facility, the Texas Commission on Environmental Quality investigated and cited the operator for not having obtained a permit for its two storage tanks containing anhydrous ammonia. A permit was issued once the operators brought the facility into accord with agency regulations and recommendations. Also in 2006, the EPA fined the owners \$2,300 for problems that included a failure to file a risk management program plan on time.^{[13][14][15]} In June 2012, the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration further fined the facility \$5,250 for violations regarding its storage of anhydrous ammonia.^[12]

According to an open records request by Reuters, the plant had a long history of minor thefts, presumably by people wanting to use anhydrous ammonia to make methamphetamine. The facility lacked burglar alarms or even a fenced perimeter. It installed a surveillance system in 2009 after law enforcement had recommended it.^[16]

In an emergency planning report filed with the EPA in 2011, company officials stated the ammonia storage tanks did not represent a significant fire or explosion hazard. The tanks were still intact following the fire and explosion.^{[17][18]}

According to its last filing with the EPA in late 2012, the company stated that it stored 540,000 pounds (270 short tons; 240 t) of ammonium nitrate and 110,000 pounds (55 short tons; 50 t) of anhydrous ammonia on the site.^[19] A week after the explosion, Homeland Security Secretary Janet Napolitano told Senate investigators that the company did not appear to have disclosed its ammonium nitrate stock to her department. Federal law requires that the Department of Homeland Security (DHS) be notified whenever anyone has more than one ton of ammonium nitrate on hand, or 400 pounds (180 kg) if the ammonium nitrate is combined with combustible material.^{[15][16]}

Fire and explosion

The facility caught fire on Wednesday, April 17, 2013, then exploded with the force of 7.5-10 tons of TNT^[20] as firefighters were attempting to douse the flames.^[21] The cause of the initial fire remains unknown;^[22] authorities ruled out weather, natural causes, anhydrous ammonia, and ammonium nitrate in a rail car as possible causes of the fire.^[23] The BATF announced on May 11, 2016, that the fire was deliberately set.^[1] The explosion occurred about 7:50:38 p.m. CDT (00:50 UTC, April 18).^{[7][24]}

External video

 "Dangerously Close: Explosion in West, Texas" (<https://www.youtube.com/watch?v=pdDuHxwD5R4>). U.S. Chemical Safety and Hazard Investigation Board Safety Video about the fire and explosion at the West Fertilizer Company in West, Texas.

Aftermath

for treatment. Patients were also admitted to Waco's Providence Healthcare Network, Fort Worth's John Peter Smith Health Network, Dallas's Parkland Memorial Hospital, and Temple's Scott and White Memorial Hospital.^[33]

It was announced on April 19 that twelve bodies had been recovered, sixty people were missing, and there had been at least 200 injured.^[34] The twelve dead included ten first responders as well as two civilians who had volunteered to fight the fire.^[35]

The final confirmed death toll was fifteen fatalities,^{[2][3]} while approximately 160^[4] to 200^[1] people sustained non-fatal injuries.

Reaction

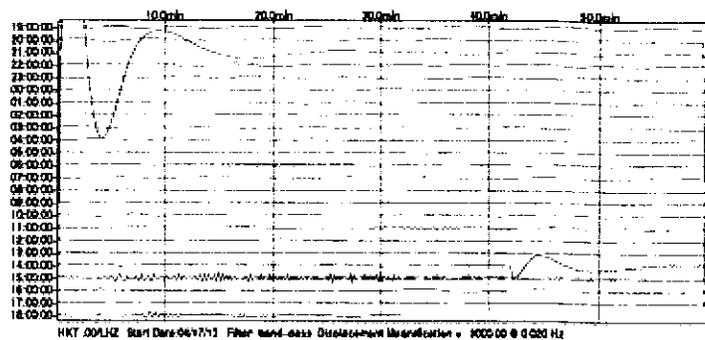
Those living in and around West report that the blast felt like an earthquake.^[36] The United States Geological Survey recorded the explosion as a 2.1-magnitude tremor.^{[37][38]} The blast was heard in nearby Hillsboro, Waxahachie, DeSoto, and as far north as Arlington. Windows were blown out in Abbott, 7 miles (11 km) NNE of West.^[39]

Texas Governor Rick Perry issued a statement on the evening of April 17:

“ *We are monitoring developments and gathering information as details continue to emerge about this incident. We have also mobilized state resources to help local authorities. Our thoughts and prayers are with the people of West, and the first responders on the scene.*^[40] ”

President Barack Obama issued his own statement on April 18:

“ *Today our prayers go out to the people of West, Texas in the aftermath of last night's deadly explosion at a fertilizer plant. A tight-knit community has been shaken, and good, hard-working people have lost their lives. I want to thank the first responders who worked tirelessly through the night to contain the situation and treat the wounded. My Administration, through FEMA and other agencies, is in close contact with our state and local partners on the ground to make sure there are no unmet needs as search and rescue* ”



Seismograph reading from Hockley, Texas, 142 miles (228 km) south-east of West, clearly displaying the temblor caused by the explosion

and response operations continue. West is a town that many Texans hold near and dear to their hearts, and as residents continue to respond to this tragedy, they will have the support of the American people.^{[41][42]}

Due to toxic fumes and a large number of displaced families, West Independent School District announced on its Twitter feed that all five of the district's schools would stay closed until further notice; they reopened on April 22.^[43] Nearby school districts Abbott Independent School District (ISD) and Penelope ISD also closed their schools for a day.

Waco Police indicated that the explosion site would be treated as a crime scene out of caution. The U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives announced on the morning of April 18 that it would be sending a national response team including fire investigators, explosive experts, chemists, and canine units to investigate the site.^[44] The U.S. Chemical Safety and Hazard Investigation Board, an independent federal agency that investigates accidents involving industrial chemicals, also dispatched a major investigation team to West to begin searching for the cause of the disaster.^[45]

Urban Search and Rescue Texas Task Force 1 and Texas Task Force 2 Urban Search and Rescue were deployed on the morning of April 18 to assist in search and rescue.^{[46][47]} An incident management team from the Texas A&M Forest Service was also deployed,^[48] as was the Veterinary Emergency Team from Texas A&M College of Veterinary Medicine & Biomedical Sciences.^[49]

Governor Perry declared McLennan County a disaster area, and on April 22, President Obama issued an Emergency Declaration, which afforded the state aid with 75% federal funding.^{[50][51]} On April 18, the Texas National Guard sent members of the 6th Civil Support Team to the area to test the air quality and assess chemical and biological hazards.^[52]

On June 13, 2013, the Federal Emergency Management Agency (FEMA) declined additional aid to the town, based in large part on the ability of the State of Texas to provide the necessary funds to rebuild.^[53] However, on August 2, 2013, FEMA reversed its original decision and approved a major disaster declaration for West.^[54]

Investigation

The state fire marshal department said that investigators interviewed "almost 300 people," and followed 160 leads in their initial investigation.

In May 2013, the Texas Department of Public Safety instructed the Texas Rangers and the McLennan Sheriff's Department to join the Texas Fire Marshall's Office and the U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives, in the criminal investigation into the explosion.^{[55][56]}

Investigators blamed stocks of ammonium nitrate fertilizer stored in a bin inside a seed and fertilizer building on the property for the explosion^[57] but failed to identify what started the actual fire that led to the explosion.

On April 22, 2014, the U.S. Chemical Safety and Hazard Investigation Board released preliminary results of its investigation into the explosion. It found that company officials failed to safely store the chemicals

in its stockpile, and that federal, state and local regulations about the handling of hazardous materials were inadequate.^[58] In a statement released alongside the report, the board's chair, Dr. Rafael Moure-Eraso, stated: "The fire and explosion at West Fertilizer was preventable. It should never have occurred. It resulted from the failure of a company to take the necessary steps to avert a preventable fire and explosion and from the inability of federal, state and local regulatory agencies to identify a serious hazard and correct it."^[59] The CSB's yearlong investigation found that 1,351 facilities across the country store ammonium nitrate, and that their many areas had no regulations to keep such facilities away from populated areas.^[59] Moure-Eraso urged new and revised regulations, stating "there is no substitute for an efficient regulatory system that ensures that all companies are operating to the same high standards. We cannot depend on voluntary compliance."^{[59][60]}

The ATF announced on May 11, 2016, that the fire that led to the explosion was intentionally set. However, they declined to comment about any possible suspects.^{[1][61]}

Regulatory changes

One year later, in 2014, the *Wall Street Journal* reported that fertilizer storage regulations in the U.S. were unchanged.^[62]

In April 2015, three bills regulating storage and inspection of ammonium nitrate and a fourth bill to create a statewide notification system alerting the public about any hazardous chemical leak at a manufacturing facility were introduced in the Texas Legislature.^[63]

Lawsuits

At least seven lawsuits were filed against Adair Grain Inc., which owned the West Fertilizer Company facility. On October 11, 2015, a day before jury selection was scheduled to begin, a partial settlement in one case was reached. Its terms have not been disclosed. The settlement includes the families of the three civilians killed in the fire and explosion.

A trial for a second group of plaintiffs is expected to begin in late 2016.^[64]

See also

- Ammonium nitrate disasters
- PEPCON disaster
- Texas City disaster, 1947
- AZF (factory) explosion, 2001

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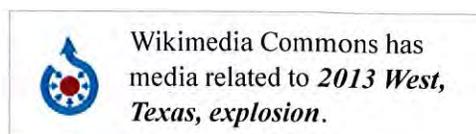
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State Fines Tosco \$400,000 for the Fatal Martinez Refinery Explosion

Environmentalists are outraged that CalOSHA cut fines to the oil giant in an incident in which four workers were killed

By *Kara Platoni*

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Two years ago, workers at the Avon petroleum refinery in Martinez were instructed to replace a leaky pipe through which flowed a highly pressurized petroleum mixture called naphtha. Several attempts were made to drain the pipe; finally, the workers were told to cut through it with a pneumatic saw. Unfortunately, the pipe was not completely drained, and naphtha erupted outwards. When it contacted the hot surfaces of nearby machinery, it ignited a massive fireball. The explosion killed four workers immediately and critically injured a fifth, who managed to save his life by jumping from a one-hundred-foot tower.

It was the worst refinery disaster in Contra Costa County history, one that heaped shame on the executive heads at Tosco Corporation, owners of the refinery at that time, and one that stoked the wrath of federal, state, and local agencies, all of whom firmly blamed the accident on poor managerial oversight and faulty safety procedures. Not that Tosco was a beloved name in the community; for years, it had been accused of endangering its neighbors with its constant discharge of noxious fumes and possibly toxic wastewater. Still, the explosion rattled everyone, and punishment was promised.

Now comes the aftershock. For two years, the state's Occupational Safety and Health Administration (CalOSHA) had been investigating the safety violations that caused the accident and had been expected to bring down the hammer on Tosco by handing out a whopping fine. Instead, CalOSHA announced two weeks ago that they were giving Tosco a break by cutting their fines in half, to \$400,000. (In a stroke of irony, just as the ink was drying on the settlement papers, another Tosco refinery in Carson, California, burst into flame.)

Tosco is currently the nation's largest independent refiner and petroleum marketer, owns the Circle K convenience store chain, and markets the Mobil, Exxon, and 76 brand gasolines. They have a lot of money, and they got even richer the year after the explosion, when they sold the Avon plant to Ultramar Diamond Shamrock for what will amount to \$800 million, the first \$150 million of which is due this September. (The new owners rechristened it the "Golden Eagle" refinery, perhaps a wise choice when so many in the community had taken to referring to the facility as the "death tower.") Moreover, Tosco will soon no longer be independent; it is currently in the process of

being acquired by Phillips Petroleum Company in a \$7 billion stock transaction. (Tosco spokespeople did not return calls for this story.)

All of this is making life tough for the folks at CalOSHA. Their main goal, after all, is enforcing worker safety regulations, and if Tosco leaves the state, as it appears to be doing, CalOSHA loses its regulatory power over them. That meant that they had to hurry up and come to some sort of conclusion before Tosco left for good. "The purpose for issuing penalties and citations is as a deterrent to the employer," says CalOSHA spokesperson Dean Fryer. "If there's no longer an employer in California, that whole issue is pretty much removed." Plus, he says, pursuing the Avon case through the appeals process had been a massive drain on the agency's time and money. "It's still the largest penalty ever issued to a single employer," Fryer points out.

Originally, CalOSHA had written up a total of 33 citations worth \$801,750 in response to the Avon fire. In the settlement, the agency knocked that down to eighteen violations worth half that. The settlement also resolved appeals stemming from five other incidents at both Tosco's Avon and Rodeo refineries. Collectively, the additional 37 citations had amounted to \$168,125 in fines; the settlement reduced that to 28 citations worth \$62,630. According to the settlement papers, CalOSHA agreed to reduce the fines connected to the Avon incident due to insufficient evidence and in consideration of a separate settlement reached between Tosco and the Contra Costa District Attorney's office, in which Tosco pleaded nolo contendere to five misdemeanor counts, paid \$945,000 in fines, and agreed to donate \$1 million to the county to help fund the Los Medanos Health Clinic. The settlement explicitly states that Tosco admits to no wrongdoing; that's a bit of legalese, Fryer says, because the heart of CalOSHA's case--five citations for "willful" violations--went uncontested. "It was a lot of give and take on both sides," says Fryer.

Still, it's hard for people like Denny Larson, spokesperson for Oakland-based Communities for a Better Environment (CBE), not to be ticked off. "I think it's outrageous that OSHA threw the towel in on probably the most clear-cut case to go for the maximum penalty that could possibly exist," he says. "It's tragic and sends a very bad message not only to Tosco but to other refiners that all they have to do is put up a battle and they can have their fines cut no matter how many people they kill."

Tosco has a terrible reputation among environmentalists, some of whom suspect them of running down their plants and then selling them off in order to get out of town. "[During] the quarter those men were killed, [the company made its] biggest quarterly profit on record at that time," says Larson. "Oil companies are raking it in, and here we're talking about \$400,000. Certainly Tosco can't be saying they don't have the money to pay the fine."

Environmental groups like CBE would like to contest CalOSHA's decision, but the fact that the facility has changed hands complicates matters, as does a recent change in California state law that makes it unclear as to whether individuals can file suit to force a company to disgorge profits made while violating the law.

For years, environmentalists have argued that the Avon refinery was endangering the surrounding community. Take, for example, the story of Terry DeCosta, who in 1994 moved with her husband and her son

Jonathan, now eight, to the tiny town of Clyde near the refinery. Her daughter Jenna, now five, was born there. DeCosta describes her home as a "dream house," although there were always reminders that they lived near a refinery--such as a near-constant odor she describes as "sweaty armpit cat urine with a metallic bite" and the fact that sometimes oil and sooty matter fell from the sky. In 1997, a refinery fire blew the seals off the DeCostas' windows. After they moved to Clyde, both parents noticed an increase in their respiratory problems. But the real problem was with the kids.

Both of DeCosta's children have severe developmental problems that affect them both physically and mentally. Both are mentally two years behind their peers; both have speech and motor problems including poor muscle tone that makes it difficult for them to move and play like regular children. Jonathan has seizures and severe emotional outbursts; Jenna has to wear special shoe inserts to help her stand up. The seriousness of their health problems means that the two have racked up expensive medical, testing, and therapy bills. Both children go to speech, anger management, and physical therapy; both have to take, among other medications, Risperdal, an antipsychotic drug that DeCosta estimates costs up to \$600 per month per kid. "I was told my son would never know his numbers or ABCs, but now he's adding and printing, so I'm finally seeing hope and progress with him." Jenna, she says, is still struggling to learn basic skills. "They'll be on medication for their whole lives; they'll be in Special Ed their whole lives."

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Martinez: Small fire extinguished at Shell refinery

By Natalie Neysa Alund Bay Area News Group

POSTED: 03/13/2015 10:28:14 AM PDT | UPDATED: ABOUT A YEAR AGO

MARTINEZ -- Shell employees extinguished a small fire Friday morning at the company's Martinez refinery, a spokesman for the company said.

The fire broke out about 9 a.m. along the side of the facility located off Marina Vista Avenue, said Shell spokesman Steve Leshner.

No one was injured and neither the community nor refinery operations were impacted, Leshner said.

Shell personnel responded quickly and the fire was extinguished within minutes of when it was reported, Leshner added.

The cause of the fire remained under investigation by the company.

An investigation will be conducted to determine the cause of the fire, he said.

Contact Natalie Neysa Alund at 510-293-2469. Follow her at [Twitter.com/nataliealund](https://twitter.com/nataliealund) (http://Twitter.com/nataliealund).

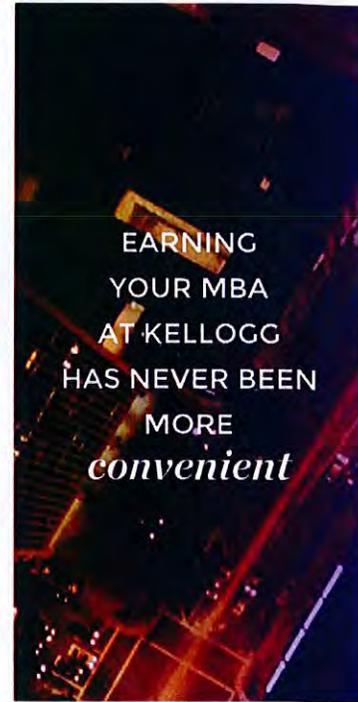
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Blast Ignites Fireball at Shell Refinery / No injuries in Martinez explosion

Erin Hallissy, Kevin Fagan, Chronicle East Bay Bureau

Published 4:00 am, Tuesday, April 2, 1996

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A spectacular roaring fire lit up the sky over Martinez last night after a neighborhood-rattling explosion at the Shell oil refinery.

Heavy clouds of pungent gray smoke filled the air, and Contra Costa County emergency workers warned residents to remain indoors and avoid breathing the polluted air. No evacuations were ordered, and no injuries were reported.

It took more than three hours to extinguish the blaze, which could be seen from as far away as Walnut Creek, 10 miles distant. Nearby residents likened the force of the blast to an earthquake.

It was Shell's third major nighttime explosion and fire since 1982 in a special processing unit called a catalytic feed hydro-treater. The unit removes impurities from oil in the production of gasoline.

The unit that was consumed last night had been rebuilt after it was destroyed by a series of thundering explosions and a major fire that injured two workers and burned for two days in 1989, said [Robert Jacoby](#), refinery environmental manager.

An enormous hydro-treater explosion in 1982 shattered windows not only in Martinez but also across the Carquinez Strait in Benicia.

Last night, flames shot hundreds of feet into the air from the inferno, which began with the 7 p.m. hydro-treater explosion inside the light-oil processing section near Pacheco Boulevard, Jacoby said.

The fire was declared out at 10:13 p.m., Jacoby said.

"It was a very unfortunate incident," he said. "We're very concerned about the community, the people who live around the plant. The main thing we're most pleased about was that nobody was hurt."

He said the cause of the blast had not been determined. About half of the refinery was shut down by the accident. The plant normally processes about 140,000 barrels of oil a day, Jacoby said.

The fire was a harrowing experience for many of those close by, particularly firefighters from the refinery and the Consolidated Fire District.

"All hell is loose in there," said a firefighter rushing from the scene to get more supplies just after the conflagration began. "They're putting water on it and trying to get a hold, but this is obviously not good."

The roar could be heard at least half a mile away.

Despite health warnings, hundreds of onlookers lined Pacheco Boulevard about two blocks from the fire. Even those standing next to each other had to shout to be heard.

"I heard a hell of a loud explosion," said [Bob Price](#), who lives about a quarter of a mile away. "It rattled the whole house."

[Christine Smith](#), who lives across Pacheco Boulevard, said she was watching television when she heard the blast.

"It scared me to death," she said. "The explosion almost knocked the door off. I've never seen it (the refinery) go up like this. I've never heard a roar like that. A half-hour later, I was still shaking."

A second large flame spewed from a smokestack as refinery workers scrambled to burn off pressure and shut down the unit, Jacoby said.

Jacoby said that the smoke from the fires, which rose in a corkscrew pattern and drifted over Interstate 680 toward Concord and Antioch, presented no immediate health danger and that no acutely hazardous materials were being released.

The county health department had activated its community alert network, a computer telephone calling system that dials homes near refinery accidents and warns residents to remain indoors.

[Jim Caroompas](#), a former newspaper reporter living in Benicia, said he watched four or five fireballs ascend into the sky above the refinery.

"I've covered three fires at the refinery, and none of them shook me up," he said. "This shook me up."

Reactions from residents at the scene ranged from panic to amusement.

[John Raush](#) screeched his sedan to a halt at a police line on Pacheco at 7:45 p.m., leaped from his car and asked a highway patrolman, "How do I get in there? My mother lives right next to that plant. She's 90 years old, and I'm very afraid for her."

The patrolman waved Raush through, and the man floored his car in the direction of the refinery.

Others sat on vehicles and stood on the sidewalk to watch the fiery show.

"Hey, this is our nightlife in Martinez," said [Matt Larson](#), 24, as he sat on a pickup truck with his friend, [Vince Hudson](#), and knocked back a beer. "This is the in thing to do -- park by the road, drink a little and watch the flames."

Larson said that he has lived in Martinez all his life and that "this is a pretty good fire, as these things go."

Hudson added, "There will be a lot of people rubbing oil out of their eyes tomorrow."

In addition to the major hydro- converter fires and explosions in 1989 and 1982, the refinery also was the site of a large explosion and fire in a sulfuric acid tank in 1993. That accident lofted a huge red cloud into the air that was visible from Oakland.

One of the worst accidents at Shell came in 1988 when a major oil spill devastated 150 acres of wetlands, coated 11 miles of Suisun Bay shoreline and killed hundreds of bird and mammals. Shell agreed to pay a record \$20 million settlement for the spill, which occurred when 432,000 gallons of oil leaked from a drain valve that had been left open.

Another major accident was a fire in 1981 that caused \$5 million in damage and covered Carquinez Strait communities from Martinez to Antioch 20 miles away with a huge, thick cloud of black smoke.

This February, a large explosion and a small fire accompanied the rupture of a hydrogen pipeline at the refinery.