ERCB Energy Resources Conservation Board

ST57-2012

Field Surveillance and Operations Branch – Field Operations Provincial Summary 2011

ACKNOWLEDGEMENTS

Thank you to the following Energy Resources Conservation Board staff who contributed to this report. This list is in no means exhaustive, as it does not include everyone who helped "behind the scenes":

The Business, Analysis, and System Support Section; Maria Skog, Carla Giesbrecht, and Karen Leussink; and Editing, Design, and Web Services.

Report Coordinator: Kari Hass

ENERGY RESOURCES CONSERVATION BOARD
ST57-2012: Field Surveillance and Operations Branch – Field Operations Provincial Summary 2011

February 2013

Published by
Energy Resources Conservation Board
Suite 1000, 250 – 5 Street SW
Calgary, Alberta
T2P 0R4

Telephone: 403-297-8311
Toll free: 1-855-297-8311
E-mail: inquiries@ercb.ca
Website: www.ercb.ca

Contents

1. Overview

1.1 Purpose

This report provides 2011 Field Surveillance and Operations Branch (FSOB) field operations statistics based on data received by December 31, 2011.

1.2 Field Inspection Summary

FSOB field staff inspect construction, operation, and abandonment activities relating to upstream oil and gas energy development. They also respond to emergencies and public complaints on a 24-hour basis.

Energy Resources Conservation Board (ERCB) field surveillance staff conducted more than 13 500 inspections in 2011 to ensure industry compliance with ERCB regulations. The ERCB conducts both random and prioritized inspections, the latter focusing on high risk operations or operations that have had recent complaints or incidents.

The requirements for reporting incidents in Alberta are prescriptive and comprehensive. Industry incident numbers increased in four operational areas in 2011—well sites, oil facilities, gas facilities, and pipelines. In most cases, volumes were small or on lease, or no product was released. The pipeline failure rate was 1.5 failures per 1000 kilometres.

In responding to and analyzing the causes of incidents, the Field Operations Group used the results of its analysis to develop its 2012 operational plan. The group will continue to conduct inspections in higher priority areas to monitor industry compliance and to minimize incidents throughout the province.

Inspection results for each field inspection category in 2011 are summarized in Table 1.

Table 1. Field inspection summary

Field inspection category	Inspections	High risk noncompliant
Drilling operations	362	41
Well sites*	6 095	101
Well servicing	204	4
Oil facilities*	3 200	63
Gas facilities*	2 309	51
Pipelines	1 457	156
Drilling waste	145	16
Waste facilities	55	5
	13 827	**437**

*Includes air monitoring inspections.

Table 2 shows the number of air monitoring inspections from 2007 to 2011.

Table 2. Air monitoring inspections

	2007	2008	2009	2010	2011
Well site	3	16	48	33	97
Oil facility	427	374	535	557	383
Gas facility	260	161	439	316	263

Air monitoring is a type of inspection and is included in each field inspection category. In 2011, there were 743 air monitoring inspections: 4 were high risk noncompliant—all involved off-lease hydrogen sulphide (H_2S) odours.

The ERCB has two mobile ambient air monitoring units that read and record H_2S and sulphur dioxide (SO_2) emissions in parts per billion. Monitoring is also conducted with a forward-looking infrared (FLIR) camera, which can detect hydrocarbon leaks.

Table 3 shows operational suspensions in 2011 by field inspection category.

Table 3. Operational suspensions

Field inspection category	Number of suspensions
Drilling operations	10
Well sites	7
Well servicing	3
Oil facilities	12
Gas facilities	3
Pipelines	23
Drilling waste	1
Total	**59**

1.3 Summary of Concerns, Releases, and Blowouts

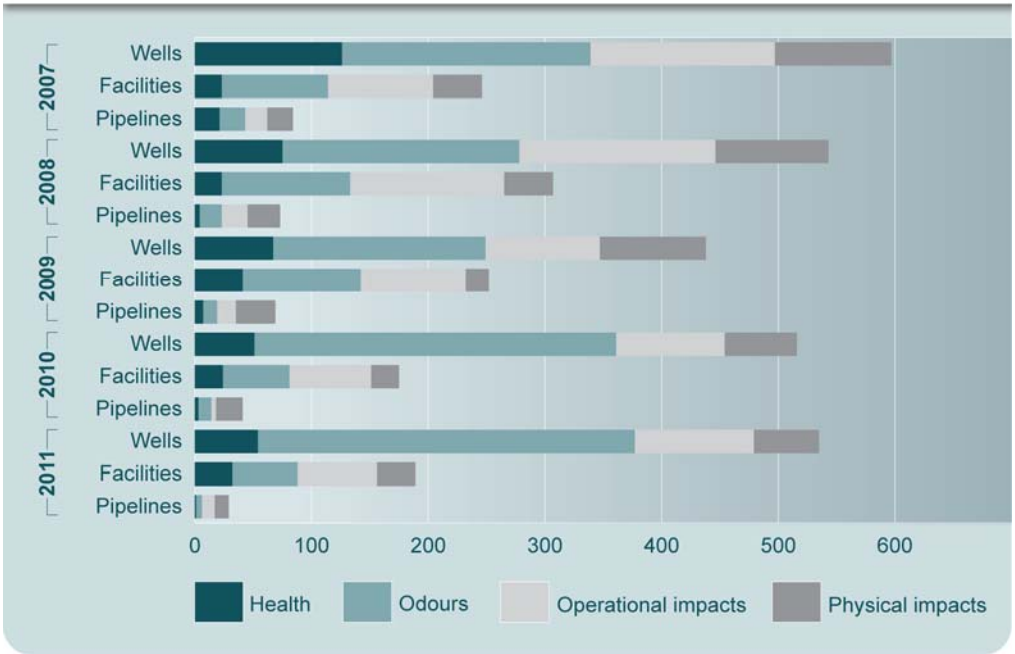
The ERCB receives public complaints about industry activity. These complaints, which may include one or more concerns, are logged and investigated by field operations staff.

Figure 1 illustrates the total number of concerns from 2007 to 2011. There were 753 concerns in 2011.

The four types of concerns are

- health[1]—concerns about possible impacts on human or animal health by upstream oil and gas activities;
- odours—all odour-type concerns (e.g., H_2S, SO_2, etc.);
- operational impacts—concerns about installation operations (e.g., explosion, fire, flare, smoke, spill, uncontrolled flow, nuisance, noise, etc.); and
- physical impacts—concerns about possible impacts on public safety, land, water wells, or other (e.g., lease management, public hazard, property damage, water wells, etc.).

Figure 1. Annual concerns



[1] Health concerns fall under the jurisdiction of the Government of Alberta and are not a part of the ERCB mandate. These concerns were acknowledged and redirected, or the complainant was advised to contact the appropriate health authority.

Figure 2 shows annual liquid hydrocarbon and water release volumes from 2007 to 2011. The increase in well release volumes in 2011 was largely due to one incident where water was released in the form of steam. Almost half of the total pipeline release volume in 2011 was a result of two incidents.

Figure 2. Annual (m^3) liquid release volumes

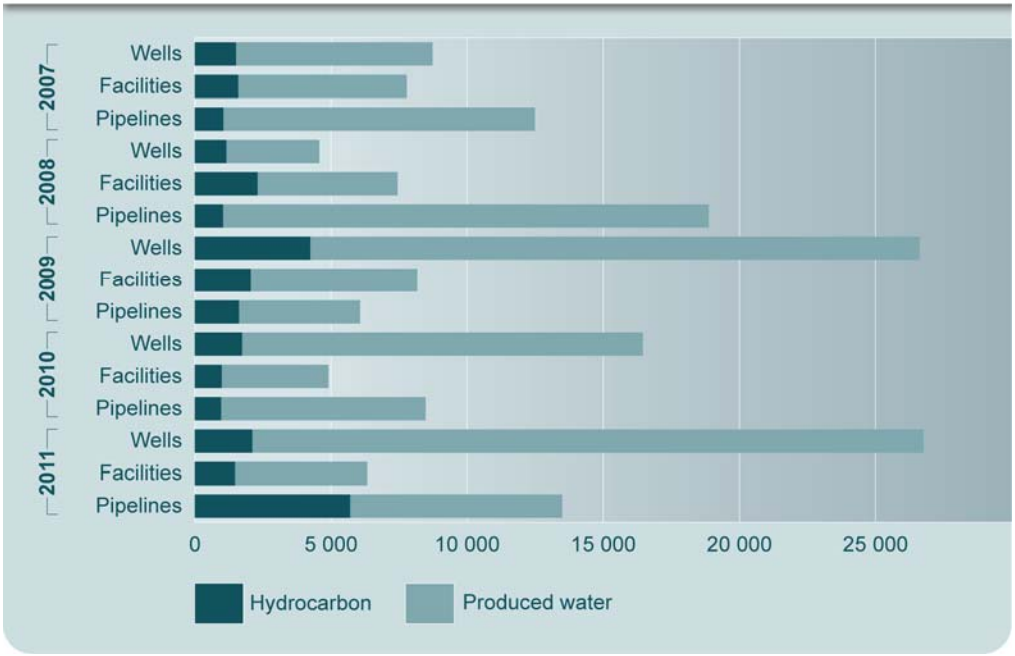
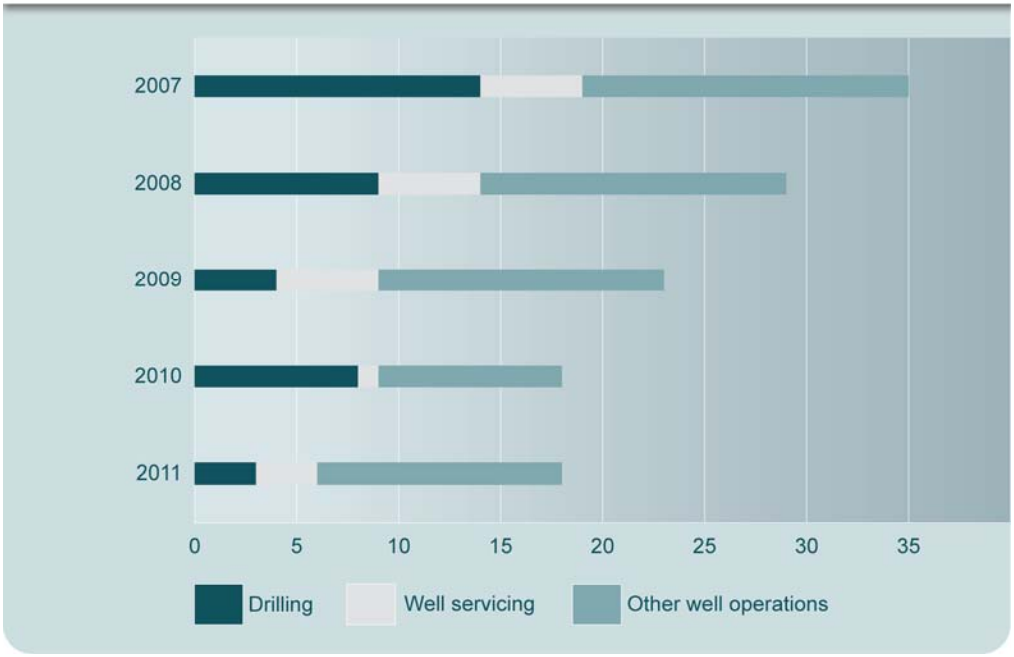


Figure 3 shows annual well blowouts from 2007 to 2011.

Figure 3. Annual well blowouts



2. Field Inspection Categories

This section outlines the categories, including oil and gas activities and infrastructure, that are regulated and inspected by ERCB field operations staff. It also outlines the most common high risk noncompliant events associated with each category.

Each field centre shares responsibility for conducting inspections in eight field operations inspection categories: drilling operations, well sites, well servicing, oil facilities, gas facilities, pipelines, drilling waste, and waste facilities.

The field inspection categories are broken down into inventory, inspections, and incidents, where applicable.

2.1 Drilling Operations

Inventory

Table 4 shows the number of drilling operations from 2007 to 2011.

Table 4. Drilling operations

	2007	2008	2009	2010	2011
Total	16 626	15 417	7232	9793	10 711

Inspections

Table 5 shows the number of drilling operations inspections from 2007 to 2011.

Table 5. Drilling operations inspections

	2007	2008	2009	2010	2011
Total	389	357	409	326	362

Of the 362 drilling operations inspections conducted in 2011, 41 were high risk noncompliant. The most common reasons for high risk noncompliance were problems associated with

- STICK diagrams,
- pressure testing, and
- flexible hoses.

2.2 Well Sites

Inventory

Table 6 shows the 2011 licensed well inventory. The 2010 inventory was 402 990.

Table 6. Licensed wells

Well type	
Oil well	54 614
Gas well	113 731
Coalbed methane gas well	16 957
Shale gas well	101
Coalbed methane and shale gas well	43
Service well	12 877
Suspended well	59 104
Drilling well	6
Abandoned well	156 367
Other well	1
Total	**413 801**

Inspections

Table 7 shows the number of well site inspections from 2007 to 2011.

Table 7. Well site inspections

	2007	2008	2009	2010	2011
Total	7002	9808	9983	6259	6095

Of the 6095 well site inspections conducted in 2011, 101 were high risk noncompliant. The most common reasons for high risk noncompliance were

- an inadequate 24-hour emergency number on the lease sign,
- inadequate well suspension procedures, and
- inadequate containment and clean up of a spill or release.

Incidents

Table 8 shows the number of well site incidents, including those reported for well servicing, from 2007 to 2011.

Table 8. Well site incidents

	2007	2008	2009	2010	2011
Total	617	600	520	526	567

Equipment failure, operator error, and third-party damage were the causes of these incidents.

2.3 Well Servicing

Inspections

Table 9 shows the number of well servicing inspections from 2007 to 2011.

Table 9. Well servicing inspections conducted

	2007	2008	2009	2010	2011
Total	256	288	350	236	204

Of the 204 well servicing inspections conducted in 2011, 4 were high risk noncompliant. The most common reasons for high risk noncompliance were

- no documented safe management practices at the well site, and
- inadequate crew training (or certification) and procedures.

2.4 Oil Facilities

Inventory

Table 10 shows the 2011 oil facilities inventory. The 2010 inventory was 24 700.

Table 10. Licensed oil facilities

Oil facilities	
Crude oil single battery	11 430
Crude oil group battery	2 998
Crude bitumen single battery	1 273
Crude bitumen group battery	2 122
Crude bitumen paper battery	2 448
Other injection/disposal	918
Custom treating facility	35
Oil/bitumen satellite	5 373
Total	**26 597**

Inspections

Table 11 shows the number of oil facilities inspections from 2007 to 2011.

Table 11. Oil facilities inspections

	2007	2008	2009	2010	2011
Total	3818	3786	4698	3354	3200

Of the 3200 oil facilities inspections conducted in 2011, 63 were high risk noncompliant. The most common reasons for high risk noncompliance were failure to

- provide an adequate 24-hour emergency number on the lease sign,
- report flared and vented gas volumes to PETRINEX (formerly the Petroleum Registry of Alberta), and
- test underground storage tanks every three years.

Incidents

Table 12 shows the number of incidents at oil facilities from 2007 to 2011.

Table 12. Oil facilities incidents

	2007	2008	2009	2010	2011
Total	348	404	356	321	363

Equipment failure and operator error were the causes of these incidents.

2.5 Gas Facilities

Inventory

Table 13 shows the 2011 gas facilities inventory. The 2010 inventory was 20 842.

Table 13. Licensed gas facilities

Gas facilities	
Gas single battery	10 139
Gas proration effluent battery	5 744
Gas test battery	3
Gas plant—sweet	524
Gas plant—acid gas flaring/Injection	199
Gas plant fraction—sour	3
Gas plant—sulphur recovery	43
Gas plant—straddle	9
Gas plant fraction—sweet	5
Compressor station	4 233
Total	**20 902**

Inspections

Table 14 shows the number of gas facilities inspections from 2007 to 2011.

Table 14. Gas facilities inspections

	2007	2008	2009	2010	2011
Total	2990	2005	3720	2325	2309

Out of the 2309 gas facilities inspections conducted in 2011, 51 were high risk noncompliant. The most common reasons for high risk noncompliance were failure to

- provide an adequate 24-hour emergency number on the lease sign,
- report flared and vented gas volumes to PETRINEX, and
- test underground storage tanks every three years.

Incidents

Table 15 shows the number of gas facility incidents from 2007 to 2011.

Table 15. Gas facilities incidents

	2007	2008	2009	2010	2011
Total	110	101	80	79	90

Equipment failure, operator error, and procedural or design were the causes of these incidents.

2.6 Pipelines

Inventory

Table 16 shows the 2011 pipeline inventory. The 2010 inventory was 398 253 kilometres (km).

Table 16. Length of Alberta pipelines[1]

Pipeline type	Length (km)
Alberta Utilities Commission (AUC) natural gas utility pipelines[2]	11 458
Crude oil pipeline	19 698
Multiphase pipeline	59 326
Natural gas pipeline	235 996
Other pipeline	34 605
Sour gas pipeline	22 098
Water pipeline	23 793
Total	**406 974**

[1] Excludes National Energy Board (NEB) pipelines.

[2] The ERCB, through a memorandum of understanding, conducts surveillance and inspections, incident response, and failure investigations on natural gas utility pipelines regulated by the AUC.

Inspections

Table 17 shows the number of pipeline inspections from 2007 to 2011.

Table 17. Pipeline inspections conducted

	2007	2008	2009	2010	2011
Total	1647	1611	1602	1627	1457

Of the 1457 pipeline inspections conducted in 2011, 156 were high risk noncompliant. The most common reasons for high risk noncompliance were inadequate

- internal corrosion programs,
- external corrosion programs, and
- operations and maintenance manuals.

Incidents

Table 18 shows the number of pipeline incidents[2] from 2007 to 2011.

Table 18. Pipeline incidents

	2007	2008	2009	2010	2011
Total	974	976	737	687	717

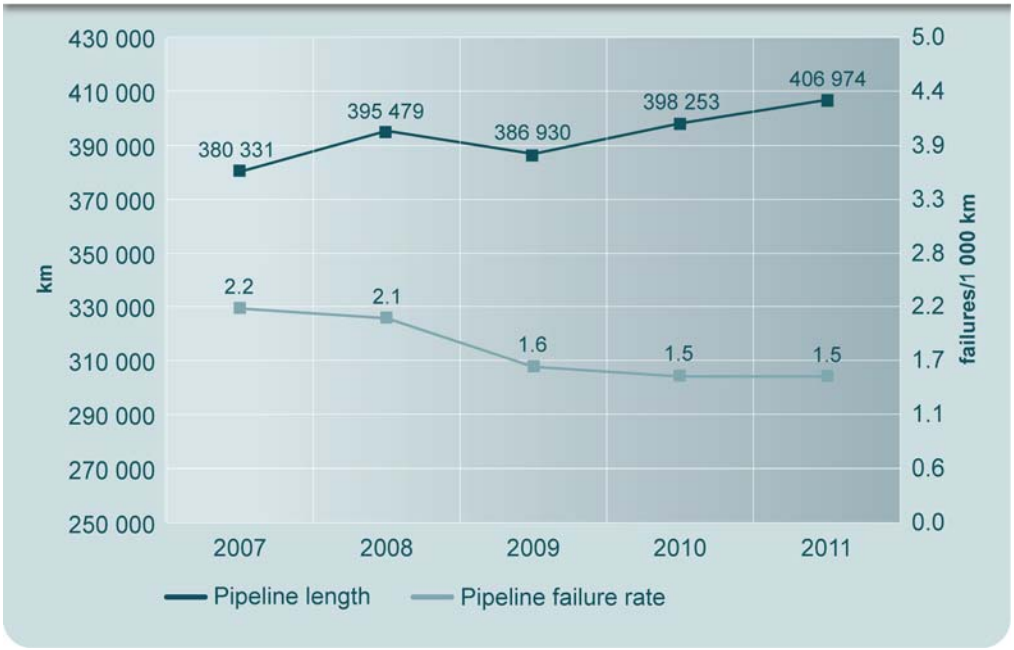
Of the 717 pipeline incidents in 2011, 102 were pipeline pressure test failures.[3] The remaining 615 pipeline incidents, consisting of 76 hits with no release, 523 leaks, and 16 ruptures, were mainly caused by equipment failure, third-party damage (i.e., damage by others), operator error, and procedural or design.

[2] Pipeline incidents include pipeline failures (leaks and ruptures) and pipeline hits.

[3] Pipeline pressure test failures do not occur under normal pipeline operating conditions and are not included in the pipeline failure rate calculation. If there is product loss, it is usually fresh water and not an environmental concern.

Figure 4 shows the pipeline failure rate and pipeline length from 2007 to 2011. The length of pipeline under ERCB jurisdiction decreased in 2009 because of various pipeline transfers to NEB jurisdiction.

Figure 4. Pipeline length and failure rate



2.7 Drilling Waste

Inspections

Table 19 shows the number of drilling waste inspections from 2007 to 2011.

Table 19. Drilling waste inspections

	2007	2008	2009	2010	2011
Total	191	138	187	134	145

Of the 145 drilling waste inspections conducted in 2011, 16 were high risk noncompliant. The most common reasons for high risk noncompliance were disposed drilling waste that

- pools, clumps, or erodes;
- is placed too close to surface water; and
- migrates off the disposal site.

2.8 Waste Facilities

Inventory

There were 106 active waste facilities in both 2010 and 2011. Waste facilities include

- waste storage and processing facilities,
- waste transfer stations,
- surface facilities associated with waste disposal wells,
- waste disposal wells (classes 1a and 1b),
- caverns,
- landfills,
- biodegradation facilities, and
- thermal treatment facilities.

Inspections

Table 20 shows the number of waste facility inspections from 2007 to 2011.

Table 20. Waste facility initial inspections

	2007	2008	2009	2010	2011
Total	84	89	97	68	55

Of the 55 waste facility inspections conducted in 2011, 5 were high risk noncompliant. The most common reasons for high risk noncompliance were

- failure to meet operational requirements,
- inaccurate accounting or reporting of hydrocarbon dispositions, and
- failure to accommodate surface water runoff.

Appendix 1 Glossary

Blowout—A well in which there is an unintended flow of wellbore fluids (oil, gas, water, or other substance) at surface that cannot be controlled by existing wellhead and/or blowout prevention equipment, or a well that is flowing from one formation to another formation (underground blowout) that cannot be controlled by increasing the fluid density. Control can only be regained by installing additional and/or replacing existing wellhead and/or blowout prevention equipment to allow shut-in or to permit the circulation of control fluids, or by drilling a relief well.

Blowout preventer—Equipment installed or that might be installed at the wellhead to control pressures and fluids during drilling, completion, and certain workover operations.

Facility—Any building, structure, installation, equipment, or appurtenance over which the ERCB has jurisdiction and that is connected to or associated with the recovery, development, production, handling, processing, treatment, or disposal of hydrocarbon-based resources or any associated substances or wastes. This does not include wells or pipelines.

High risk noncompliance—An event that represents an unacceptable level of risk not in accordance with an ERCB act, regulation, directive, or Board direction. In this instance, immediate mitigative measures must be taken. If the risk to health and safety, environmental impact, resources conservation, and stakeholder confidence in the regulatory process are more significant, the noncompliance is considered high risk. Examples of high risk noncompliance are off-lease H_2S odours at an oil battery and failure to conduct blowout preventer tests.

Hit—An incident where a buried pipeline is struck during a ground disturbance activity resulting in the pipeline or pipeline coating being damaged; a release of product does not necessarily result.

Hydrogen sulphide—A naturally occurring gas found in a variety of geological formations and also formed by the natural decomposition of organic matter in the absence of oxygen. H_2S is colourless, has a molecular weight that is heavier than air, and is extremely toxic. In small concentrations it has a rotten egg smell and causes eye and throat irritation.

Incident—An unexpected occurrence or event that requires action by emergency personnel to prevent or minimize the impacts on people, property, and the environment.

Inspection category—Describes an activity or operation (e.g., drilling operations, gas facilities, pipelines). Each inspection category contains a group of noncompliant events related to a specific activity or operation. The ERCB uses inspection categories to identify persistent

noncompliance related to that activity or operation. For the list of inspection categories, go to the ERCB website www.ercb.ca.

Leak—The escape of substance from a pipeline in a manner that does not immediately impair the operation of the pipeline.

PETRINEX—PETRINEX is a web-based system that provides management/exchange of volumetric, royalty, and commercial information associated with the upstream petroleum sector for the Provinces of Alberta and Saskatchewan.

Rupture—A pipeline failure where the pipeline is unable to continue operation.

STICK diagram—A well data information sheet specific to the drilling of a well.

Sulphur dioxide—A colourless, water-soluble, suffocating gas formed by burning sulphur in air; also used in the manufacture of sulphuric acid. SO_2 has a pungent smell similar to a burning match. SO_2 is extremely toxic at higher concentrations. The molecular weight of SO_2 is heavier than air; however, typical releases are related to combustion, which makes the gaseous mixture lighter than air (buoyant).

Third-party damage—Damage by others (third-party interference).