

4.3.15 Environmental Hazard

The Lehigh Valley is home to over 900 identified facilities that utilize, ship, or house chemicals that are considered hazardous in nature. Of the 900 identified, 384 facilities have been identified under the Superfund Amendments and Reauthorization Act (SARA) as exceeding the quantity threshold for reporting.

Product release into the local environment can be generated from a fixed facility or along any location on a route of travel, and may be the result of carelessness, technical failure, external incidents, or an intentional act against the facility/container. The volatility of products being stored or transported, along with the potential impact on a local community, may increase the risk of intentional acts against a facility or transport vehicle. The release of certain products deemed to be hazardous materials can have an immediate adverse impact on the general population ranging from the inconvenience of evacuations to injury and even death. In addition to human impacts, any release can compromise the local environment through the contamination of soil, groundwater, or local flora and fauna.

For the purposes of this document, explosions are included under Environmental Hazard, as all reported and confirmed explosions have been the result of the loss of containment of a hazardous material, thus creating the explosion. According to the National Fire Protection Agency, the definition of explosion is “the sudden conversion of potential energy (chemical or mechanical) into kinetic energy with the production and release of gases under pressure, or the release of gas under pressure. These high-pressure gases then do mechanical work such as moving, changing, or shattering nearby materials.” This pairing of the two hazards is a natural process, as once the explosion occurs the product released is always considered a hazardous material.

4.3.15.1 Location and Extent

Hazardous materials are classified by the Department of Transportation (DOT) into nine classes based on the chemical characteristics producing the risk. The nine classifications are:

- Class 1: Explosives
- Class 2: Gases
- Class 3: Flammable Liquids
- Class 4: Flammable Solids
- Class 5: Oxidizers and organic pesticides
- Class 6: Poisons and etiologic materials
- Class 7: Radioactive materials
- Class 8: Corrosives
- Class 9: Miscellaneous

Within the Lehigh Valley, based on past occurrences, hazardous material releases are accidental and are not considered acts of terrorism or criminal in nature. While past occurrences have not been deemed intentional, the impact from the intentional release of any of these products in large quantity would pose a threat to the local population, economy, and environment resulting in lost revenue, injuries, and deaths.

The Lehigh Valley is home to just under 3,000 miles of local roadways including 57 miles of interstate highway, 33 miles of freeways, 191 miles of principal arterials, 223 miles of minor arterials, and over 400 miles of major collectors. With just under 3,000 miles of roadways linking more populated areas with rural communities, the grid work of roadways facilitates the free movement of hazardous materials throughout the region. While permitted, identified hazardous substance travel routes are not maintained

by the county or regional planning entities, the primary roadways being used, as identified within the Lehigh Valley Transportation Plan, are as follows:

- Interstate 78 (I-78)
- US Highway 22 (US22)
- PA-33
- PA-248
- Interstate -476 (I-476)
- PA-309
- PA-378 (LVPC, Date Unknown)

In addition to the major routes of transportation, each fixed facility identified within the Lehigh Valley poses a potential threat to the surrounding community.

Reported explosions within the Lehigh Valley are predominantly related to the release of a confined material evacuating from its containment. The most common reported explosion within the Lehigh Valley is the result of a failure within local infrastructure leading to the expansion and ignition of natural gas. The age of the infrastructure within the Lehigh Valley leaves the region prone to this type of occurrence and is currently being investigated by many federal agencies in an attempt to develop more comprehensive federal guidance.

4.3.15.2 Range of Magnitude

Environmental hazards incidents within the Lehigh Valley range from minor petroleum spills to large facility based incidents that lead to the loss of life, property, environment, and economy. Additionally, the range of explosion related incidents within the region varies from a small incident that has an impact on a residential or smaller type commercial building to a catastrophic failure leading to the loss of life, large amounts of property and economy.

The region has been home to significant hazardous materials releases over the previous decade with the largest environmental hazard incident happening in Lehigh County, Upper Macungie Township in August of 2011. The incident occurred on Interstate 78 near the Pennsylvania Route 100 Interchange. A tractor-trailer was involved in a vehicular collision resulting in the loss of over 7,000 gallons of motor oil, which spilled on the roadway and into the nearby earth and waterways. This incident lasted approximately 18 hours and the impacts from the accident caused PennDot to mill and resurface the roadway. In total, the initial response was able to collect just over 4,000 gallons of product, leaving almost 3,000 gallons for the state and environmental cleanup agencies to handle. Additionally, in March of 2009, Wind Gap Borough in Northampton County was impacted by the spill of hydrogen fluoride following a motor vehicle accident. The incident took place on PA Route 33 just south of the Borough of Wind Gap. The truck was carrying over 33,000 pounds of chemical product when it rolled onto its side. The response to this incident included the evacuation of over 5,000 residents and the closure of a major roadway in the Lehigh Valley for hours.

4.3.15.3 Past Occurrence

The Lehigh Valley's location between two major metropolitan areas provides for an increase in transportation of hazardous materials through rail, air, and road. These routes of transportation combined with the large number of fixed facilities and end users of hazardous materials have provided for an incidence of frequent chemical and petroleum product releases with several being deemed as serious. The past decade brought about an increase in incidents based upon the population growth and business development.

Environmental hazard incidents within the Lehigh Valley occur on a regular basis with the majority being handled by the local responders with guidance from the PADEP. In total, the region reported 1,961 incidents to the Pennsylvania Emergency Management Agency (PEMA) over the last decade.

Table 4.3.15-1 below depicts the number of reported environmental hazards incidents to PEMA. It should be noted that the figures provided below are not a comprehensive listing, as the reporting requirements from the state changed in 2007, allowing state agencies to categorize the incident as something other than “Hazardous Materials.” For instance, a vehicle collision resulting in a spill of petroleum products (e.g., gasoline, motor oil) may be reported as a vehicle accident instead of a hazardous materials release.

Table 4.3.15-1. Reported Release of Hazardous Materials 2001-2011

County	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Lehigh	38	44	42	48	40	40	44	37	352	340	256	1281
Northampton	7	8	10	8	8	15	35	40	89	223	237	680
Total	45	52	52	56	48	55	79	77	441	563	493	1961

Source: Pennsylvania Emergency Incident Reporting System (PEIRS); Knowledge Center, County 9-1-1 Databases

**Due to archiving processes and reporting requirements prior to 2007, databases are not complete and do not accurately represent the total number of reported incidents **

Additionally, the age of infrastructure in the region has led to an increase in reported explosions, primarily based on gas utility failures. These incidents range from simple building property incidents through large scale loss of life, property, economy and environment. In December of 2010, the City of Allentown, in Lehigh County was impacted by a catastrophic failure of a large gas main under a row of residential structures in the 500 Block of North 13th Street. The explosion took the lives of five individuals and destroyed six residential structures. The incident forced the evacuation of hundreds of residential and commercial properties, including a senior living complex on the adjoining block. Since that incident, the Lehigh Valley has been impacted by numerous failures of infrastructure causing smaller explosions with less impact.

The Lehigh Valley was also impacted in 1999 by a large commercial building explosion that led to the deaths of 5 employees and to 14 injuries. The incident was caused by the failure of a containment vessel that was in the process of distilling a hazardous material. The explosion damaged numerous buildings within the industrial park and residential structures in the adjacent area. As a result of this incident, the expansion of Local Emergency Planning Committees (LEPC) was established throughout the country. In addition, the Commonwealth of Pennsylvania adopted Act 165, the Hazardous Materials Emergency Planning, and Response Act. These changes in planning were implemented to establish a mechanism to ensure planning, training, and funding within local communities for facilities utilizing hazardous materials (U.S. Chemical Safety and Hazard Investigation Board, 2002).

Table 4.3.15-2 below provides a total number of reportable explosion type incidents within the Lehigh Valley. It should be noted that the figures provided below are not a comprehensive listing, as the explosive event may not be the primary incident. Rather, the incidents may be based on the events that led up to an explosion.

Table 4.3.15-2: Reported Explosion Incidents 2001-2011

County	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Lehigh	0	0	1	0	1	1	0	0	0	1	1	5
Northampton	0	0	0	1	0	1	1	1	1	3	0	8

County	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Total	0	0	1	1	1	2	1	1	1	4	1	13

Source: PEIRS; Knowledge Center, County 9-1-1 Databases

**Due to archiving processes and reporting requirements prior to 2007, databases are not complete and do not accurately represent the total number of reported incidents **

4.3.15.4 Future Occurrence

Due to the wide scope of definition of environmental hazards, ranging from a small spill to a large release of a highly volatile or toxic hazardous material, incidents can and will happen at any time. Based upon Risk Factor Methodology Probability Criteria, the likelihood of future occurrences within the Lehigh Valley remains at *Highly Likely* (see Table 4.3.15-3). The below table shows the expected number of incidents reported based on an average of the data compiled over the previous decade.

Based upon the Risk Factor Methodology Probability Criteria, using the he numbers of reported explosion incidents over the previous decade (shown in Table 4.3.15-2); the likelihood of an explosion incident is considered *Possible* (see Table 4.3.15-3). The projected frequency of these events overall is less than one occurrence reported per year. While the severity of the occurrence is significant, the probability based on historical data is not as significant.

Table 4.3.15-3: Likelihood of Future Occurrence of Environmental / Explosion Hazard

County	Avg. #/Year	% Probability	Category
Environmental Hazards			
Lehigh	128.1	100	Highly Likely
Northampton	68	100	Highly Likely
Explosion			
Lehigh	<1	50	Possible
Northampton	<1	80	Possible

Source: PEIRS; Knowledge Center, County 9-1-1 Databases

**Due to archiving processes and reporting requirements prior to 2007, databases are not complete and do not accurately represent the total number of reported incidents **

4.3.15.5 Vulnerability Assessment

Environmental hazards have the greatest impact on the residential population within the Lehigh Valley. The majority of incidents reported within the Lehigh Valley are the result of motor vehicle incidents or spills within a residential structure.

The economic loss from environmental hazards and explosion incidents ranges from non-recordable to losses exceeding millions of dollars. The impact on the local economy from a single incident is almost impossible to measure due to the complexity of work lost, revenue losses, and loss of future business.

4.3.15.6 Programs to Manage Risk

Facilities that produce, use, or ship hazardous materials within the Commonwealth of Pennsylvania are required to comply with regulations set forth within the federal SARA and the Emergency Planning and Community Right to Know Act (EPCRA), and the Commonwealth of Pennsylvania reporting requirements under the Hazardous Materials Emergency Planning and Response Act (Act 165). Additionally, the established LEPCs are tasked with the development, maintenance and update of all off-site emergency response plans for facilities that have Extremely Hazardous Substances (EHS). These

plans provide information on the materials, quantities, locations, impacts on the area, and evacuation routes for each facility in an attempt to maintain a safe environment within a jurisdiction.