Section 5. Risk Assessment

5.19 Hazardous Substances

For the 2014 Hazard Mitigation Plan (HMP) update, the hazard profile and vulnerability assessment were significantly enhanced to reflect updated, best-available data, as well as to provide additional information that can be used by both the State agencies in developing mitigation strategies, and local jurisdictions as they develop their mitigation plans according to the appropriate level of threat. This hazard profile will include hazardous substances at fixed sites, in-transit, and offshore. Information regarding the frequency and severity of past occurrences as well as the probability for future incidents involving hazardous substances was enhanced.

5.19.1 Profile

Hazard Description

Hazardous substances are substances that are considered severely harmful to human health and the environment, as defined by the United States Environmental Protection Agency (USEPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Superfund Law). Many are commonly used substances which are harmless in their normal uses, but are quite dangerous if released. The Superfund law designates more than 800 substances as hazardous and identifies many more as potentially hazardous due to their characteristics and the circumstances of their release (USEPA 2013).

Superfund's definition of a hazardous substance includes the following:

- Any element, compound, mixture, solution, or substance designated as hazardous under section 102 of CERCLA.
- Any hazardous substance designated under section 311(b)(2)(a) of the Clean Water Act (CWA), or any toxic pollutant listed under section 307(a) of the CWA. There are over 400 substances designated as either hazardous or toxic under the CWA.
- Any hazardous waste having the characteristics identified or listed under section 3001 of the Resource Conservation and Recovery Act.
- Any hazardous air pollutant listed under section 112 of the Clean Air Act, as amended. There are over 200 substances listed as hazardous air pollutants under the Clean Air Act (CAA).
- Any imminently hazardous chemical substance or mixture which the EPA Administrator has "taken action under" section 7 of the Toxic Substances Control Act (USEPA 2013).

If released or misused, hazardous substances can cause death, serious injury, long-lasting health effects, and damage to structures and other properties, as well as the environment. Many products containing hazardous substances are used and stored in homes and these products are shipped daily on highways, railroads, waterways, and pipelines.

Transportation of hazardous substances on highways involves tanker trucks or trailers, which are responsible for the greatest number of hazard substance release incidents. New Jersey is composed of over 39,213 miles of highway, many of which are used to transport hazardous substances (New Jersey Department of Transportation [NJDOT] 2013). These roads cross rivers and streams at many points; hazardous substance spills on roads have the potential to pollute watersheds that serve as domestic water supplies for parts of the State. Potential also exists for hazardous substance releases to occur along rail lines as collisions and derailments of train cars can result in large spills.

Pipelines can also transport hazardous liquids and flammable substances such as natural gas and petroleum. Incidents can occur when pipes corrode, when they are damaged during excavation, incorrectly operated, or damaged by other forces. In New Jersey, most of the large pipeline leaks have been caused by marine traffic hitting or the anchors of ships effecting pipelines in the waterways.

In addition, hazardous substances can be transported by aircraft or by watercraft. Crashes, spills of materials, and fires on these vessels can pose a hazard.

Location

Hazardous Substances Fixed Site

Many years ago, numerous wastes were dumped on the ground, in rivers, or left out in the open. As a result, thousands of uncontrolled or abandoned contaminated sites were created. These sites included abandoned warehouses, manufacturing facilities, processing plants, and landfills. In response to concerns regarding health and environmental risks, Congress established the Superfund program in 1980 to clean up these sites. The Superfund program is administered by the USEPA in cooperation with individual states. In New Jersey, the Department of Environmental Protection (NJDEP) Site Remediation Program oversees the Superfund program (NJDEP 2013).

Federal regulations, include the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA) required that a National Priorities List (NPL) of sites throughout the United States be maintained and revised at least annually (NJDEP 2013).

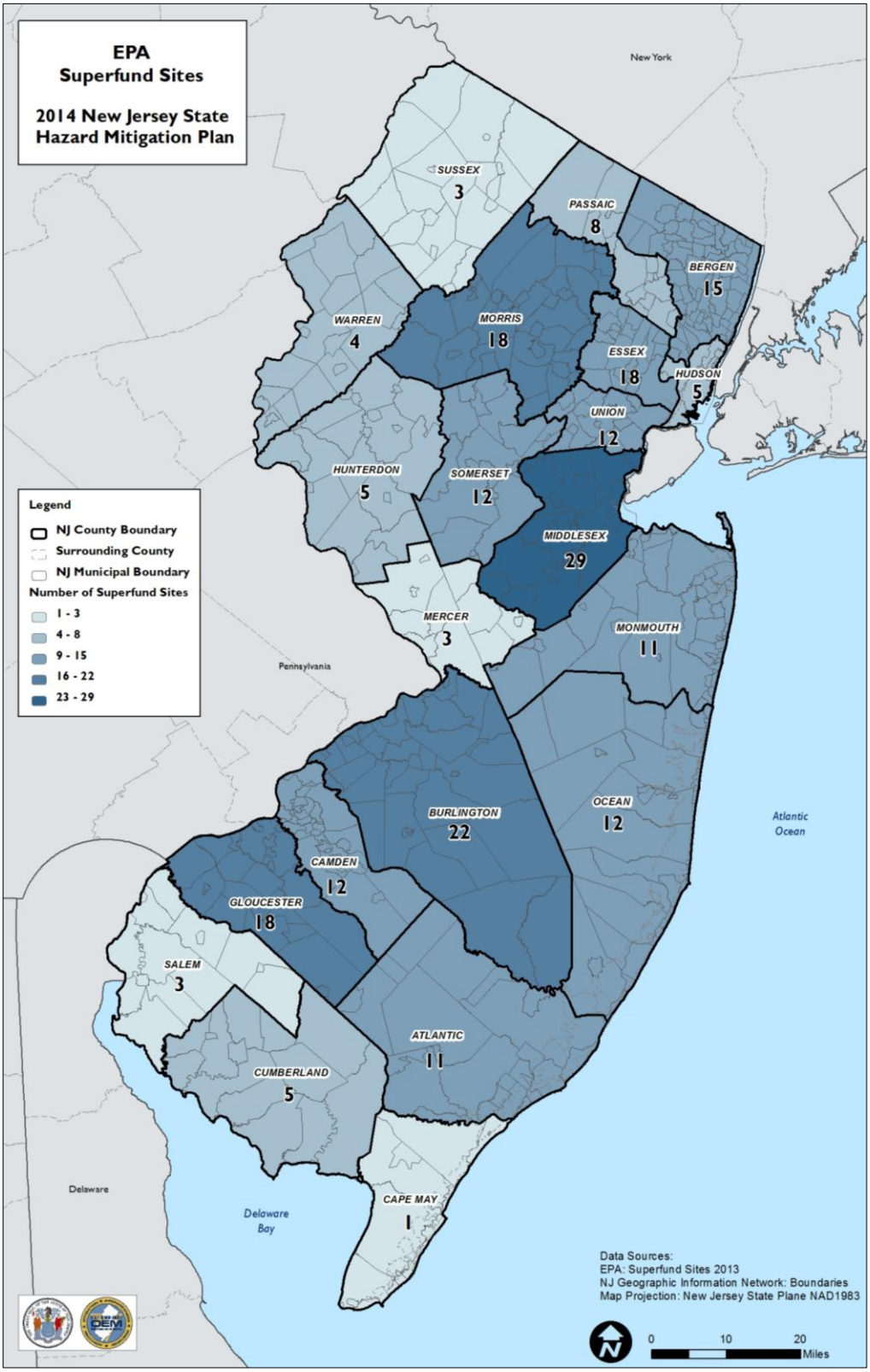
Fixed-site facilities that use, manufacture, or store hazardous substances in New Jersey pose risk and must comply with Title III of the federal SARA. SARA was signed into law on October 17, 1986. It is a federal law that applies nationwide. It must be realized that this law is linked to N.J.S.A. 34:5A, the New Jersey Worker and Community Right to Know Act. SARA requires the governor of each state to establish a State Emergency Response Commission (SERC). New Jersey's SERC was established by Executive Order on February 13, 1987. SARA also requires that the emergency planning districts be established by the SERC. The Act specified that these districts can be existing political subdivisions. The function of the emergency planning district is to facilitate preparation and implementation of emergency plans. In New Jersey, all municipalities and counties have been designated emergency planning districts (total of 588). The Local Emergency Planning Committees (LEPC) is the policy body for the emergency planning district (New Jersey Division of Fire Safety 2011).

The State enacted the Toxic Catastrophe Prevention Act (TCPA), N.J.S.A. 13:1K-19 et seq. Currently, implementation of the requirements established under this Act is facilitated by the TCPA Program. Certain industrial facilities using materials considered extraordinarily hazardous must take steps to prevent releases and protect public safety. New Jersey has also mandated that facilities storing large quantities of hazardous substances take preventative measures to reduce the likelihood of a leak or discharge. Established under the New Jersey Spill Compensation and Control Act (N.J.S.A. 58:10-23.11), these requirements include testing and inspection of storage tanks, training of employees, and emergency response planning. The Discharge Prevention Containment and Countermeasure (DPCC) program facilitates implementation of these requirements. Regulations related to reporting of chemical and petroleum discharges are also administered under this program. The Program is sometimes referred to by the acronym DPCC, which refers to an important preparedness document that major facilities develop under the program (NJDEP 2012).

The Community Right to Know (CRTK) program collects, processes, and disseminates the chemical inventory, environmental release and materials accounting data required to be reported under the New Jersey

Worker and Community Right to Know Act, N.J.S.A.34:5A and the federal Emergency Planning and Community Right to Know Act of 1986 (EPCRA). EPCRA is also known as Title III of the SARA. This information is used by the public, emergency planners, and first responders to determine the chemical hazards in the community (NJDEP 2012). Figure 5.19-1 shows the total number of Superfund sites in each county of New Jersey.

Figure 5.19-1. Superfund Sites in New Jersey



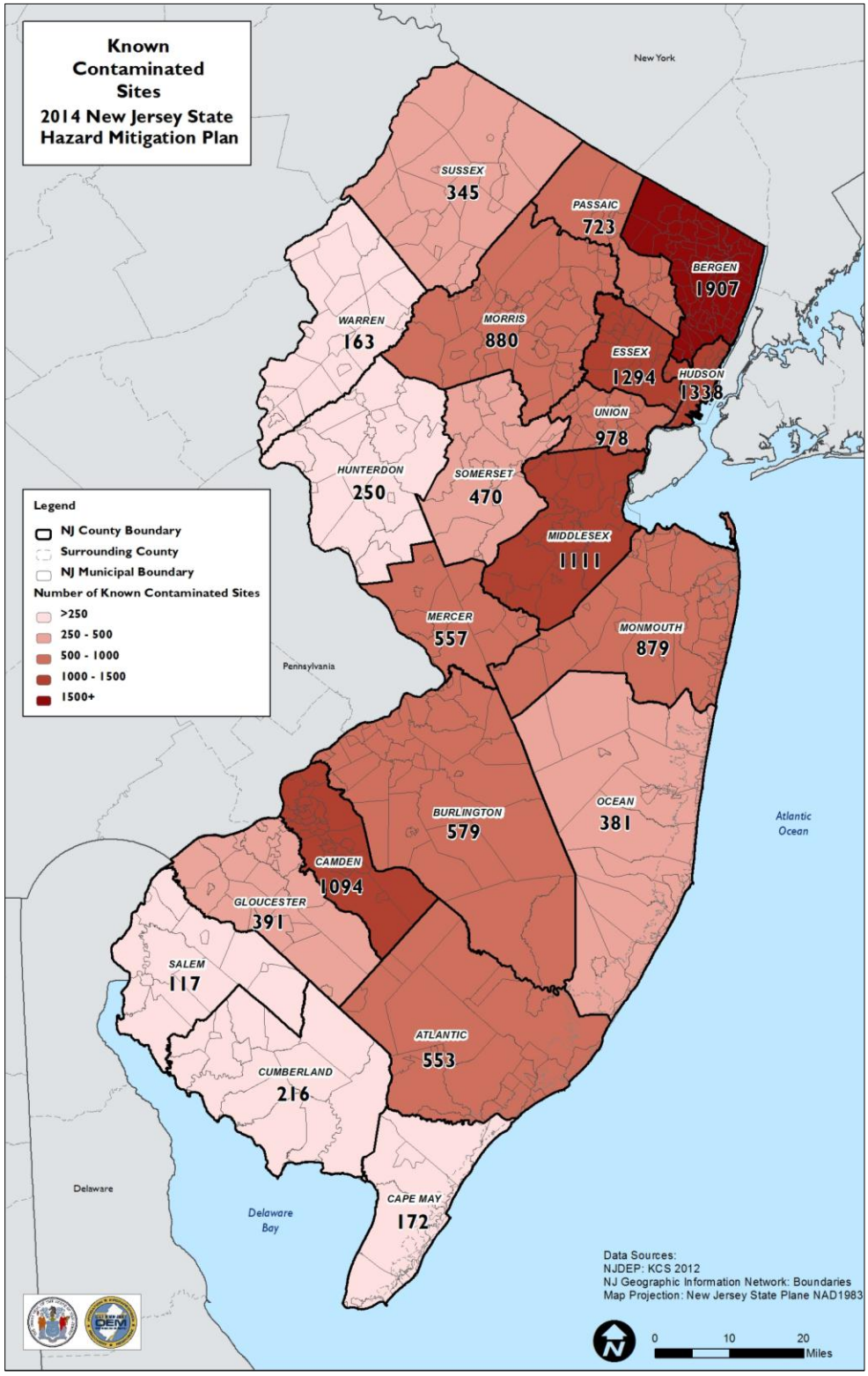
Source: USEPA 2013

New Jersey employers, whose businesses are assigned covered North American Industry Classification System (NAICS) codes listed in the New Jersey Worker and Community Right to Know (CRTK) regulations, are required to submit CRTK surveys listing the environmental hazardous substances (EHSs) present at their facilities in quantities that exceed 500 pounds, unless the EHS is on the federal Emergency Planning and Community Right to Know Act (EPCRA) Section 302 list of extremely hazardous substances with a lower reporting threshold. In addition, Section 312 of EPCRA requires owners and operators of federal facilities and private sector facilities that are subject to the United States Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard to report their inventories of any chemical that requires a Materials Safety Data Sheet (MSDS) and is present on site in quantities that exceed 10,000 pounds, unless the chemical is an Extremely Hazardous Substance with a lower reporting threshold (NJDEP 2011).

Owners and operators of manufacturing, and select non-manufacturing companies, having the equivalent of 10 or more full-time employees, and manufacturing, importing, processing or otherwise using toxic chemicals listed on the EPCRA Section 313 (TRI) list in quantities that exceed specified thresholds, are required to annually report their releases of these chemicals for the previous year. Approximately 500 New Jersey companies are required to file federal Toxic Chemical Release Inventory (TRI) forms. TRI Form R requires the listing of environmental releases, on-site waste management and off-site transfers while the simplified Form A Certification Statement requires the listing of the chemical only. These companies are also required to submit to NJDEP the Release and Pollution Prevention Report (RPPR) listing the quantities of environmental release, on-site waste management, waste transfer, and chemical throughput information. Most of these facilities are also subject to Pollution Prevention Planning Requirements and, therefore, required to report pollution prevention progress information on the RPPR (NJDEP 2011).

The NJDEP maintains a list of Known Contaminated Sites of New Jersey (KCSNJ). It is an inventory that includes all sites in the State where contamination is known to exist. The remediation for these sites is currently active or pending in the NJDEP's Site Remediation Program (SRP). As of April 12, 2012, there are over 13,000 KCSNJ sites in New Jersey. Figure 5.19-2 shows the total number of KCSNJ for each county.

Figure 5.19-2. Known Contaminated Sites of New Jersey



Source: NJDEP KCS 2012

Hazardous Substances In-Transit

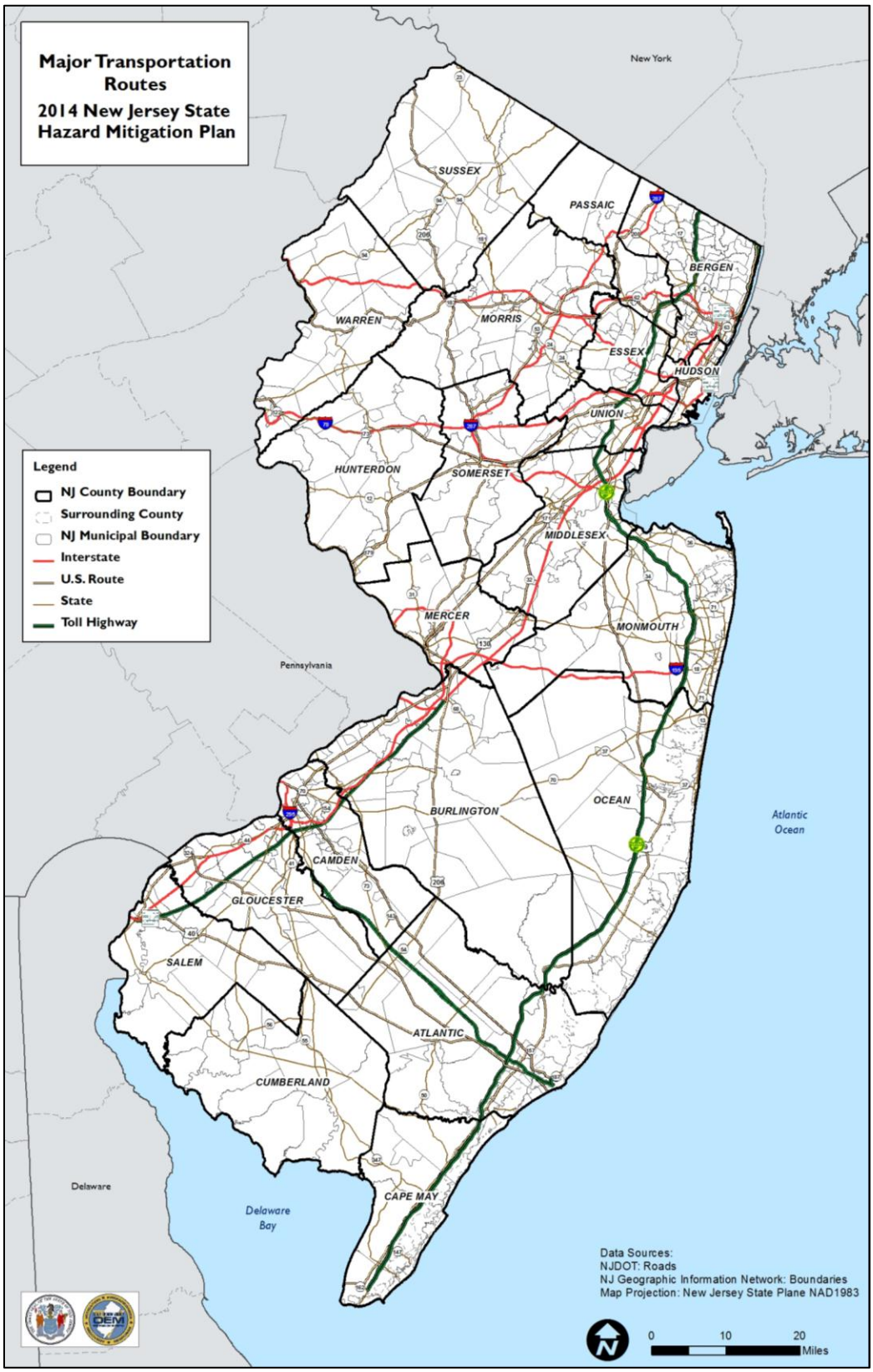
Incidents involving hazardous substances in transit can occur anywhere in the State. New Jersey has several major transportation corridors on which thousands of vehicles transporting hazardous substances travel daily. Major transportation routes include the Garden State Parkway; Atlantic City Expressway; Palisades Interstate Parkway; New Jersey Turnpike; Interstates I-280, I-95, I-295, I-195, I-80, I-78, and I-287; and Routes 1, 33, and 66. Table 5.19-1 outlines the number of miles of roadway per county in the State. Additionally, Figure 5.19-3illustrates major roadways throughout the State.

Table 5.19-1. Miles of Public Roads in New Jersey as of 2011

County	Jurisdiction					Total
	NJDOT	Authority	County	Municipal	Park	
Atlantic	144	56	373	1,359	19	1,952
Bergen	106	40	440	2,409	0	2,995
Burlington	156	38	501	2,117	219	3,031
Camden	102	28	376	1,541	7	2,054
Cape May	75	31	199	734	21	1,060
Cumberland	89	0	539	660	0	1,288
Essex	59	19	212	1,392	0	1,682
Gloucester	152	20	402	1,121	0	1,696
Hudson	35	21	49	517	0	622
Hunterdon	115	1	238	1,071	15	1,439
Mercer	119	13	172	1,227	10	1,540
Middlesex	137	40	294	2,125	9	2,605
Monmouth	205	27	364	2,906	25	3,527
Morris	162	0	296	2,108	16	2,582
Ocean	141	39	616	2,289	110	3,194
Passaic	55	5	234	1,030	10	1,334
Salem	86	9	361	425	5	886
Somerset	104	0	230	1,399	0	1,734
Sussex	111	1	314	905	101	1,431
Union	68	20	176	1,157	6	1,427
Warren	103	5	261	690	76	1,134
Total	**2,323**	**411**	**6648**	**29,182**	**649**	**39,213**

Source: NJDOT 2011

Figure 5.19-3. Major Transportation Routes in New Jersey

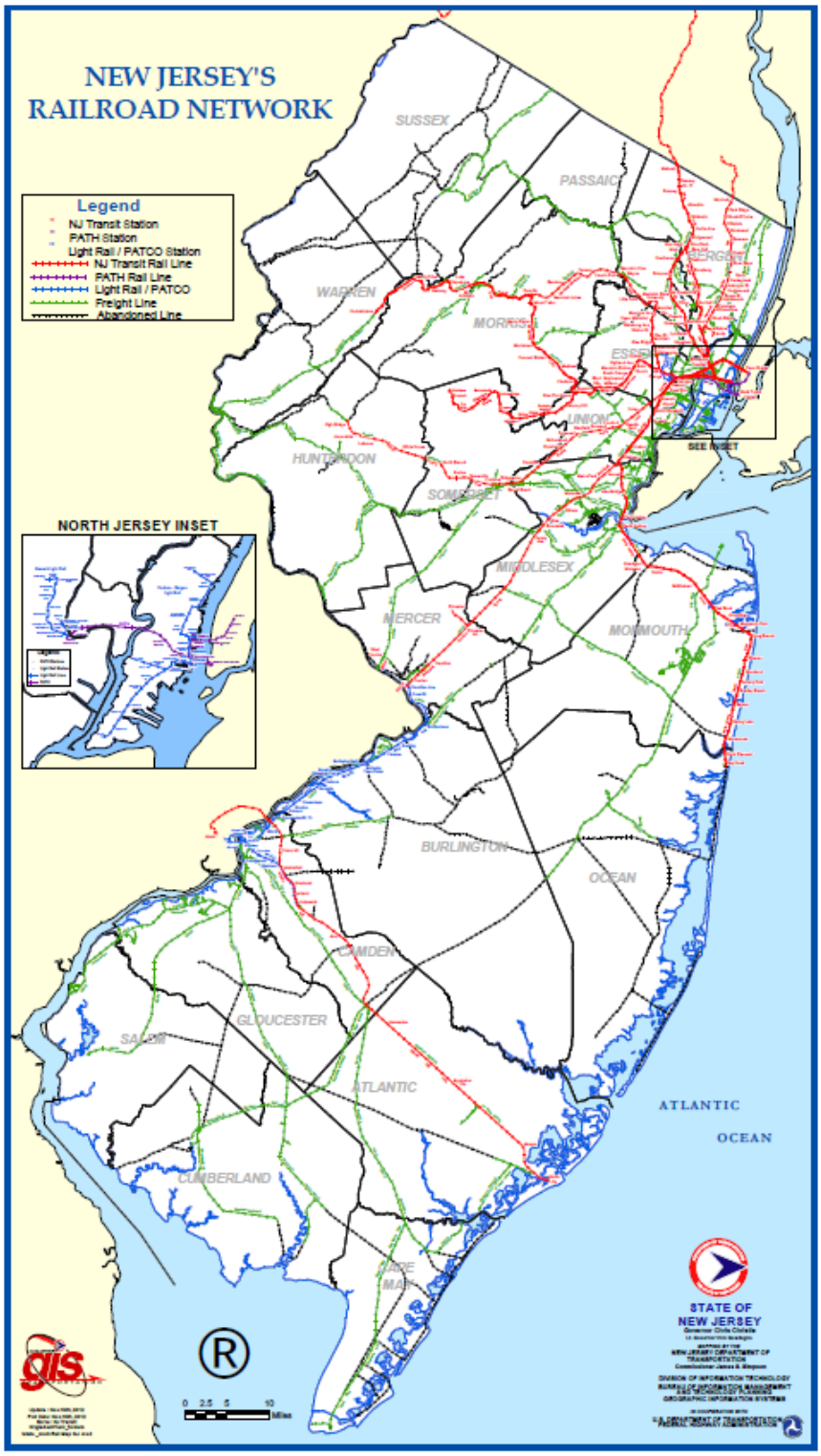


Source: NJDOT

Hazardous substances incidents may also occur along railways across the State. NJDOT has a vital interest in preserving and improving the rail freight part of its transportation network. The State has approximately 1,000 miles of rail freight lines and is served by short-line regional and national railroads.

Rail shipments allow cost-effective movement of goods with less stress on the State's highway system. Major commodities shipped by rail entail petrochemicals (including plastic pellets), construction materials, food products, raw materials, and finished goods for manufacturers. Of concern for this hazard are rail cars carrying hazardous substances. An accident or release could pose a public safety hazard to the community. Figure 5.19-4 shows railways that run throughout New Jersey.

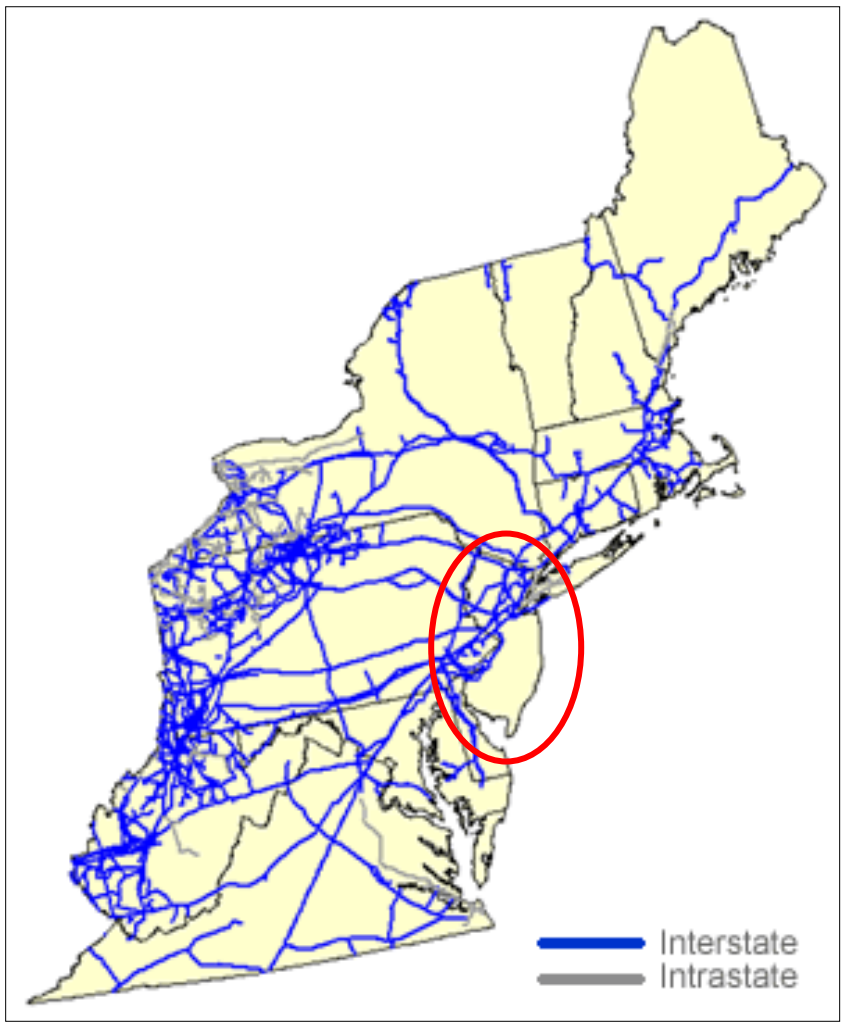
Figure 5.19-4. Railways in New Jersey



Source: NJDOT 2013
Notes:
PATCO = Port Authority Transit Corporation
PATH = Port Authority Trans-Hudson

Hazardous substances can also be transported via pipeline across the State. New Jersey has an extensive network of natural gas and petroleum pipelines. Several of the petroleum pipelines originate in the Gulf Coast region (Colonial Pipeline and Buckeye Pipeline). Figure 5.19-5 shows the extent and locations of pipelines throughout the northeastern United States, with New Jersey highlighted.

Figure 5.19-5. Interstate Natural Gas Pipelines in the Northeast



Source: US Energy Information Administration 2008

Hazardous Substances Offshore

Offshore hazardous substance incidents have the potential to affect New Jersey because of its vast coastline consisting of rivers, bays, and oceans. New Jersey is a vital link in marine transportation in the Northeast. The State has 14 ports, including the Port of New York and New Jersey, which are a critical link for shipping worldwide. The potential for a hazardous substances incident offshore is possible given the volume of shipping traffic around the State.

New Jersey features the Port of New York and New Jersey system, which includes the New Jersey Ports of Port Newark, Elizabeth-Port Authority Marine Terminal, and Port Jersey. The Port of New York and New Jersey is the gateway to one of the most concentrated and affluent consumer markets in the world. It is the largest port on the east coast, and the third-largest port in the nation. In 2010, the Port of New York and New

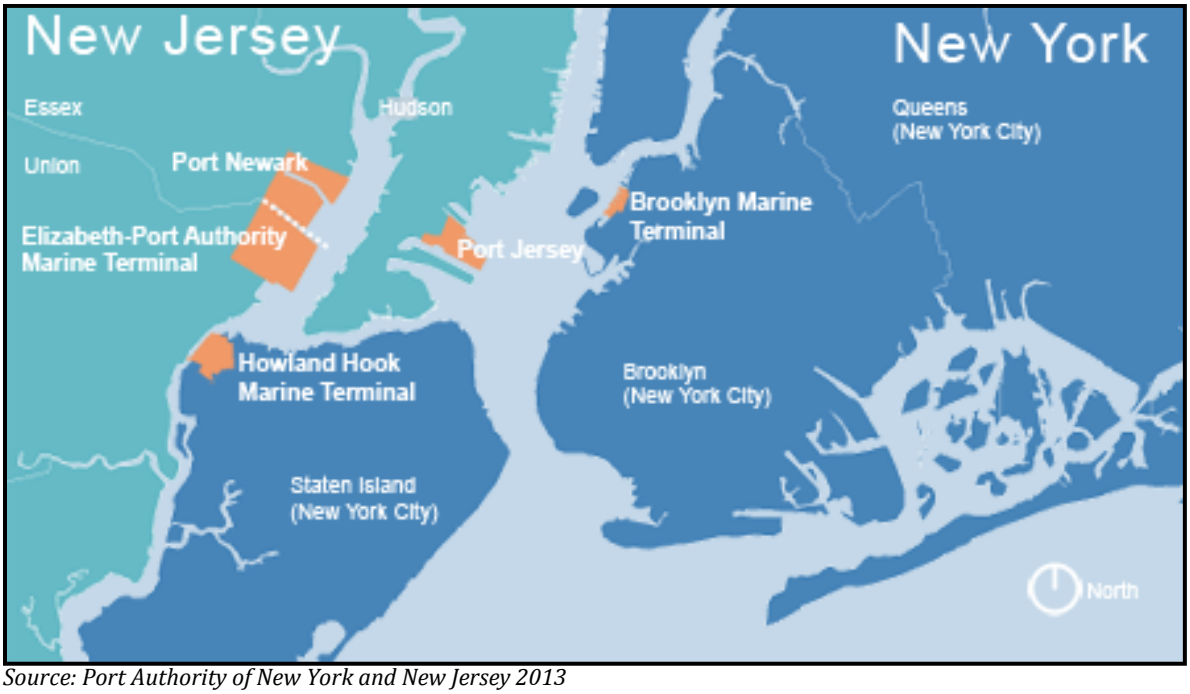
Jersey handled 5.3 million loaded and unloaded 20-foot equivalent units (TEU), a 16% increase in total container traffic from 2009. Loaded containerized cargo volumes rose 12.6%, led by continued growth in trade with Asia and North Europe. The dollar value of all cargo that moved through the port exceeded $175 billion (Port Authority of New York and New Jersey 2013). The Port ships a variety of goods, many of which are hazardous.

The cities of Linden and Elizabeth, located on New Jersey's highly industrialized northeast coast, are home to Conoco Phillips' Bayway Refinery (formerly owned by Exxon). The northernmost refinery on the east coast of the United States, Bayway processes 238,000 barrels (10 million gallons) of crude oil per day. The crude oil is brought in by tanker ships from the North Sea, Canada, and West Africa. Once processed, 145,000 barrels of gasoline and 110,000 barrels of distillates per day are transported to east coast customers via pipeline transport, barges, railcars, and tank trucks. In addition, a petrochemical plant produces lubricants and additives and a polypropylene plant produces over 775 million pounds per year of polypropylene (American Littoral Society 2013).

The Delaware River shoreline is home to six major petroleum refineries that process nearly one million barrels of crude oil per day, as well as other chemicals associated with the refining process, producing 70% of the Northeast's oil and gasoline. Collectively, the Ports of Philadelphia; South Jersey; and Wilmington, Delaware; combined are the largest general cargo port complex in the nation.

Figure 5.19-6 shows the location of the Port of New York and New Jersey.

Figure 5.19-6. Port of New York and New Jersey



Source: Port Authority of New York and New Jersey 2013

In addition to the Port of New York and New Jersey, there are numerous other ports throughout the State. The status of and extent of commercial or private shipping varies greatly across the State. Table 5.19-2 lists the ports of New Jersey.

Table 5.19-2. Ports in New Jersey

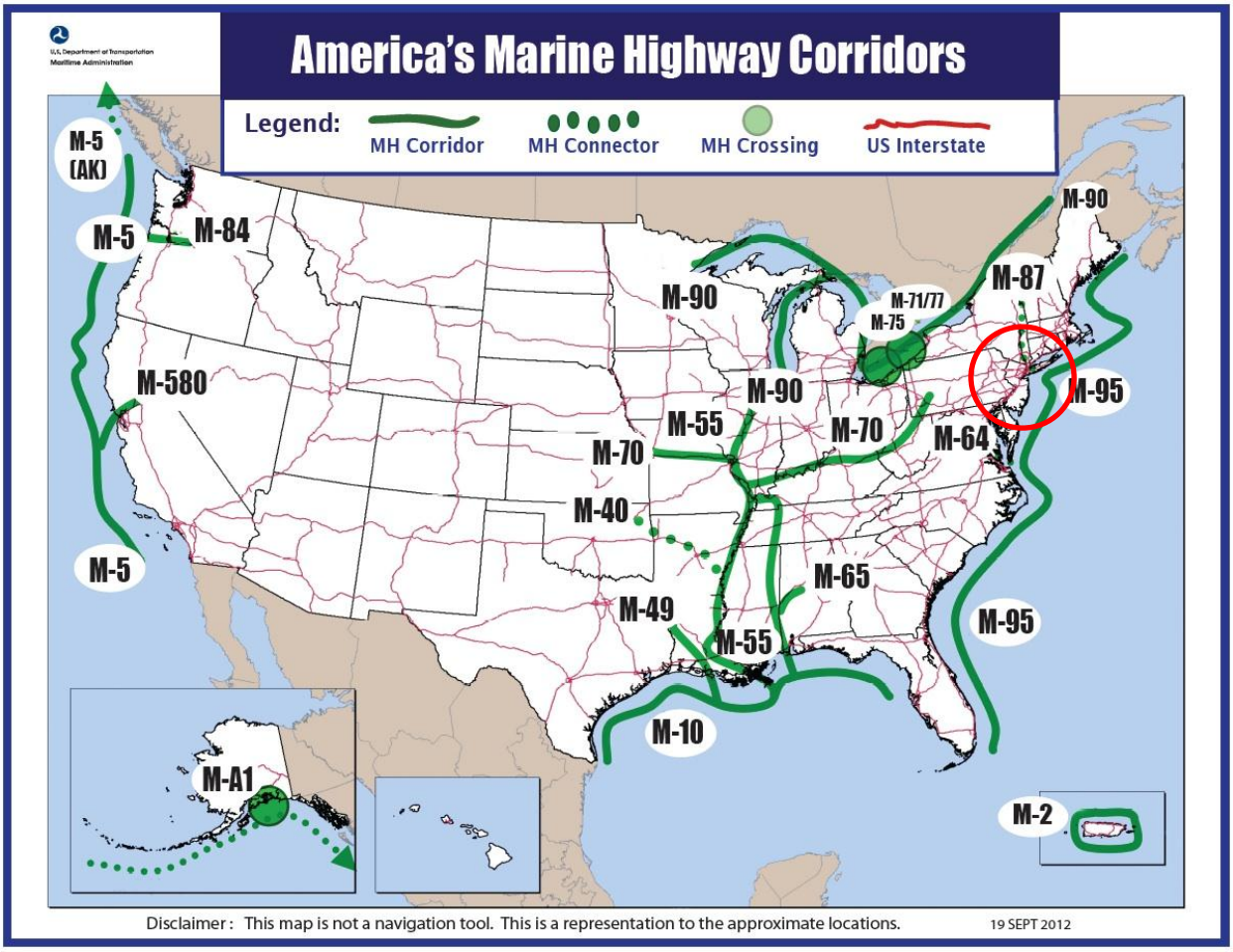
County	Port Name	Owner
Bergen	Port of Hackensack	City of Hackensack
Camden	Port of Camden	South Jersey Port Corporation
	Port of Pennsauken*	Delaware River Port Authority
Cape May	Cape May Harbor	City of Cape May
	Cape May Terminal	Delaware River and Bay Authority
Cumberland	Port Norris Harbor	
Essex	Port Newark*	Port Authority of New York and New Jersey
Gloucester	Gloucester Marine Terminal	Holt Logistics
	Port of Paulsboro	Borough of Paulsboro
Hudson	Port Jersey	Port Authority of New York and New Jersey
Mercer	Port of Trenton	
Middlesex	Port of Perth Amboy	
Salem	Deepwater Point	
Union	Elizabeth-Port Authority Marine Terminal	Port Authority of New York and New Jersey

Source: World Port Source 2013
** Indicates that container liner service is available.*

Aside from ports, New Jersey features several maritime-based transportation routes that also have the potential to cause a hazardous substances incident at sea. America's Marine Highways consist of over 29,000 nautical miles of navigable waterways including rivers, bays, channels, the Great Lakes, and Saint Lawrence Seaway System and coastal routes. The Marine Highway system is a robust and efficient means of moving freight in terms of cost per ton-mile—and yet, it is the most underutilized of our transportation modes. These all-water routes consist of 11 corridors, four connectors, and three crossings that serve as extensions of the surface transportation system.

Port authorities that participate in the project can apply for grants and incentives to build capacity at Ports. The Port of New York and New Jersey would become a key player in this system. Two major routes, the M-95 and M-87 routes would have a direct effect on New Jersey. Figure 5.19-5 illustrates the proposed maritime highway corridors, with New Jersey circled.

Figure 5.19-7. America's Marine Highway Corridors



Source: United States Department of Transportation (USDOT) 2013

Extent

The extent of a hazardous substance release will depend on whether it is from a fixed or mobile source, the size of impact, the toxicity and properties of the substance, duration of the release, and the environmental conditions (for example, wind and precipitation, terrain, etc.).

Previous Occurrences and Losses

This section presents the previous occurrences of hazardous substances incidents in New Jersey. The section is divided by the different forms of hazardous substance release (fixed site, in-transit, and offshore). If applicable, each section begins with a discussion of significant incidents followed by a table outlining other notable incidences that occurred and affected New Jersey. The previous occurrence section is based on best known and available data, as well as from anecdotal information from the planning team.

Hazardous Substances Fixed Site

The following section outlines past occurrences of hazardous substances incidents occurring at fixed sites. It begins with a discussion of significant past occurrences as well as the total number of pounds of chemicals released from facilities maintained by the EPA.

Motiva Oil Spill – 2012

A tank of diesel fuel failed due to being hit by the storm surge from Superstorm Sandy at a storage facility owned by Motiva Enterprises LLC in Woodbridge Township. Approximately 349,000 gallons of diesel fuel spilled mostly into the Arthur Kill (a narrow waterway that separates New Jersey and Staten Island) and Smith's Creek.

Hazardous substances incidents occurring onsite occur frequently across the State, and are typically small, localized events. EPA maintains records of the amount of chemicals released at facilities each year. Table 5.19-3 presents the total number of pounds of chemicals released from facilities per county between 2007 and 2011.

Table 5.19-3. Pounds of Chemicals Released On-Site 2007-2011

County	2007	2008	2009	2010	2011	2007-2011 Total	Annual Average
Atlantic	25,022	23,286	3,138	4,432	6,847	62,725	12,545
Bergen	115,381	117,571	113,361	97,631	79,921	523,865	104,773
Burlington	430,047	420,943	283,611	288,462	173,589	1,596,652	319,330
Camden	37,630	23,877	21,139	10,865	8,644	102,155	20,431
Cape May	338,001	304,874	113,633	162,291	135,195	1,053,994	210,799
Cumberland	436,899	446,289	374,712	449,237	128,973	1,836,110	367,222
Essex	95,466	109,178	77,250	69,776	67,130	418,800	83,760
Gloucester	1,121,695	1,444,624	1,111,816	1,079,806	1,382,157	6,140,098	1,228,020
Hudson	1,515,591	199,858	186,909	145,619	17,193	2,065,170	413,034
Hunterdon	1,417	1,376	633	559	1,471	5,456	1,091
Mercer	3,036,382	1,559,879	1,268,004	1,110,668	11,892	6,986,825	1,397,365
Middlesex	608,925	457,347	360,306	307,752	302,767	2,037,097	407,419
Monmouth	16,652	10,254	11,868	13,774	14,142	66,690	13,338
Morris	45,636	41,563	42,420	40,699	43,597	213,915	42,783
Ocean	12,789	21,713	16,467	15,655	17,663	84,287	16,857
Passaic	92,219	37,904	29,142	26,945	24,393	210,603	42,121
Salem	5,288,130	6,556,214	3,742,655	5,881,876	5,184,965	26,653,840	5,330,768
Somerset	44,410	32,501	22,743	44,269	25,798	169,721	33,944
Sussex	16,204	9,571	6,711	11,291	10,327	54,104	10,821
Union	3,297,890	3,678,219	2,520,935	2,936,058	3,151,649	15,584,751	3,116,950
Warren	551,789	479,174	416,295	419,407	399,034	2,265,699	453,140
Total	17,128,175	15,976,215	10,723,748	13,117,072	11,187,347	68,132,557	13,626,511
State Average	815,627	760,772	510,655	624,622	532,731	3,244,407	648,881

Source: USEPA 2013

Hazardous Substances In-Transit

The following section outlines past occurrences of hazardous substances incidents occurring in transit. It begins with a discussion of significant past occurrences as well as hazardous substances releases reported to the EPA.

Arthur Kill Pipeline Leak – 1990

In 1990, a leaking pipeline resulted in a release of 0.5 million gallons of oil into the environment. The leak occurred at an Exxon facility and had a devastating impact on the environment. This incident affected hundreds of birds in the Kill waters and hundreds of marine organisms in the mud and wetlands of the Arthur Kill tributaries, and had indirect impacts on organisms across the region. The incident prompted improvements in leak detection, enforcement, and existing laws (Kane 1990).

Paulsboro Train Derailment – 2012

On November 30, 2012, a train carrying hazardous substances plunged into the Mantua Creek in Paulsboro Gloucester County. Three cars fell into the creek. One of the tank cars released approximately 23,000 gallons of vinyl chloride into the air as vapor. The incident occurred approximately 1.5 miles from its confluence with the Delaware River, and very close to the Philadelphia International Airport (EPA 2012).

Vinyl chloride, a colorless gas industrial chemical with a sweet odor, is known to be highly toxic, flammable, and carcinogenic. It is primarily used in the production of polyvinyl chloride (PVC) plastic. Short-term exposure to high levels of vinyl chloride in the air can cause dizziness, drowsiness, and headaches. Exposure to very high levels can result in death (EPA 2012).

The incident forced approximately 200 homes in the area to be evacuated until the release was contained (Forand 2013). Figure 5.19-8 shows the rail cars involved in this incident.

Figure 5.19-8. Paulsboro Train Derailment

Source: National Transportation Safety Board (NTSB) 2013
Note: Conrail incident in Paulsboro

In addition to these large incidents, hazardous substances releases occur regularly in smaller quantities. Table 5.19-4 outlines the annual amount of pounds of chemicals released per county reported to EPA from 2007 to 2011.

Table 5.19-4. Pounds of Chemicals Released Off-site 2007-2011

County	2007	2008	2009	2010	2011	2007-2011 Total	Annual Average
Atlantic	110,001	110,000	120,000	120,000	140,000	600,001	120,000
Bergen	39,796	63,012	71,338	68,641	73,256	316,043	63,209
Burlington	798,860	148,172	12,413	6,127	2,218	967,790	193,558
Camden	65,388	68,584	69,025	44,513	39,478	286,988	57,398
Cape May	19	5,322	2,344	2,155	1,150	10990	2,198
Cumberland	10,854	44,156	56,344	83,003	11,681	206,038	41,208
Essex	128,421	193,969	249,355	396,788	90,230	1,058,763	211,753
Gloucester	120,058	151,438	75,733	247,062	208,434	802,725	160,545
Hudson	104,863	326,236	272,197	418,210	606,138	1,727,644	345,529
Hunterdon	155,477	199,520	134,963	125,208	80,256	695,424	139,085
Mercer	291	149	85	2,112	892	3529	706
Middlesex	729,820	377,463	730,612	865,765	572,807	3,276,467	655,293
Monmouth	296	104	548	83	849	1880	376
Morris	275,947	180,716	153,644	150,652	57,221	818,180	163,636
Ocean	10,995	21,312	18,085	19,975	27,225	97,592	19,518
Passaic	38,173	10,565	6,468	3,764	14,892	73,862	14,772
Salem	91,817	110,617	49,116	215,954	578,689	1,046,193	209,239
Somerset	9,952	4,930	933	3,785	5,175	24,775	4,955
Sussex	0	0	0	0	0	0	0
Union	98,671	163,612	214,361	235,926	166,351	878,921	175,784
Warren	728,645	370,255	289,008	539,977	342,621	2,270,506	454,101
Total	3,518,344	2,550,132	2,526,572	3,549,700	3,019,563	15,164,311	3,032,862
State Averages	167,540	121,435	120,313	169,033	143,789	722,110	144,422

Source: EPA 2013

In addition to the EPA reporting, the USDOT maintains data on accidents involving hazardous substances. Table 5.19-5 outlines air, highway, and rail incidents involving hazardous substances in the past 5 years. Data from 2013 were excluded because data from the year is incomplete, which would potentially affect annual averages.

Table 5.19-5. Accidents Involving Hazardous Substances 2008 – 2012

County	Type	2008	2009	2010	2011	2012	2008-2012 Total	Annual Average
Atlantic	Air	0	0	0	2	4	10	2
	Highway	1	1	1	0	1		
	Rail	0	0	0	0	0		
Bergen	Air	2	1	0	1	1	152	30.4
	Highway	44	24	27	29	20		
	Rail	0	0	3	0	0		
Burlington	Air	1	1	0	0	0	134	26.8
	Highway	22	22	24	21	38		
	Rail	1	0	3	1	0		
Camden	Air	1	1	1	0	0	177	35.4
	Highway	79	25	29	17	15		
	Rail	3	2	2	0	2		
Cape May	Air	0	0	0	0	0	0	0
	Highway	0	0	0	0	0		
	Rail	0	0	0	0	0		
Cumberland	Air	0	0	0	0	0	21	4.2
	Highway	6	6	2	4	1		
	Rail	2	0	0	0	0		
Essex	Air	19	13	10	24	31	185	37
	Highway	8	18	19	20	20		
	Rail	1	0	1	1	0		
Gloucester	Air	0	0	0	0	0	19	3.8
	Highway	1	2	3	3	3		
	Rail	0	1	0	0	6		
Hudson	Air	1	1	1	2	2	255	51
	Highway	49	38	41	54	61		
	Rail	0	1	2	0	2		
Hunterdon	Air	0	0	0	0	0	5	1
	Highway	0	1	0	2	2		
	Rail	0	0	0		0		
Mercer	Air	0	2	3	1	1	40	8
	Highway	14	4	5	5	5		
	Rail	0	0	0	0	0		
Middlesex	Air	7	5	7	5	1	509	101.8
	Highway	83	102	95	105	93		
	Rail	1	2	2	0	1		
Monmouth	Air	1	3	1	0	2	25	5
	Highway	8	4	3	2	1		
	Rail	0	0	0	0	0		
Morris	Air	4	0	1	5	2	102	20.4
	Highway	22	18	16	18	16		

County	Type	2008	2009	2010	2011	2012	2008-2012 Total	Annual Average
	Rail	0	0	0	0	0		
Ocean	Air	1	1	0	0	0	11	2.2
	Highway	3	2	2	1	1		
	Rail	0	0	0	0	0		
Passaic	Air	0	0	0	0	0	10	2
	Highway	0	0	3	3	4		
	Rail	0	0	0	0	0		
Salem	Air	0	0	0	0	0	6	1.2
	Highway	2	1	2	0	0		
	Rail	1	0	0	0	0		
Somerset	Air	1	4	1	3	1	85	17
	Highway	10	13	19	13	7		
	Rail	2	2	3	2	4		
Sussex	Air	0	0	0	0	0	2	.4
	Highway	0	0	1	0	1		
	Rail	0	0	0	0	0		
Union	Air	1	2	1	3	3	42	8.4
	Highway	9	5	3	3	7		
	Rail	1	0	1	3	0		
Warren	Air	0	0	0	0	0	5	1
	Highway	2	0	2	0	1		
	Rail	0	0	0	0	0		
Total	**Air**	**39**	**34**	**26**	**46**	**48**	**1,795**	**359**
	Highway	**363**	**286**	**297**	**300**	**297**		
	Rail	**12**	**8**	**17**	**7**	**15**		

Source: USDOT 2013

Hazardous Substances Offshore

Several petroleum-based incidents have occurred in and around New Jersey's coastline. Although there is no offshore drilling off the coast of New Jersey, the State's system of ports are vulnerable to hazardous substances incidents because of the cargo shipped throughout the region. The following section discusses past occurrences of hazardous substances incidents in New Jersey.

Motor Tanker (M/T) ATHOS I Oil Spill – 2004

On November 26, 2004, the M/T ATHOS I (Athos) struck a large, submerged anchor while preparing to dock at a refinery in Paulsboro, New Jersey. The anchor punctured the vessel's bottom, resulting in the discharge of nearly 265,000 gallons of crude oil into the Delaware River and nearby tributaries (National Oceanic and Atmospheric Administration [NOAA] 2006).

The Athos departed Venezuela for the Citgo Asphalt Refinery in Paulsboro, New Jersey on November 20, 2004, carrying approximately 13 million gallons of crude oil. At approximately 9:30 pm on 26 November 2004, tug operators assisting the *Athos* with docking at the refinery notified the United States Coast Guard (USCG) that the tanker was leaking oil. The vessel had struck several submerged objects while maneuvering through Anchorage #9 to its berth. Within minutes, the ship lost power and listed approximately eight degrees to the vessel's port side (NOAA 2006).

Surveys of the river bottom following the incident found several submerged objects in the area, including an 18,000-pound anchor, large concrete block, and pump casing. The USCG's investigation of the incident determined that the anchor punctured the vessel's number seven center cargo and port ballast tanks (USCG 2006). The bulkhead between the cargo and ballast tanks was also damaged, allowing product to migrate into the ballast tank and then into the river (USCG 2005).

Figure 5.19-9 shows the M/T ATHOS during the incident.

Figure 5.19-9. M/T ATHOS Oil Spill Incident

Source: NOAA 2006

Hazardous Substances Incidents in New Jersey

The following table outlines the history of hazardous substances incidents in New Jersey.

Table 5.19-6. Hazardous Substances Incidents in New Jersey

Date(s) of Event	Event Type	Counties Impacted	Description
January 1990	Hazmat - offshore	Hudson and Union	An Exxon underwater pipeline ruptured and released 567,000 gallons of No. 2 fuel oil into the Arthur Kill. The leak occurred from a 5-foot gash in the 12-inch pipeline that connects the Bayway Refinery at Linden, New Jersey, to the Bayonne Plant in Bayonne, New Jersey. The spill occurred near the New Jersey coast, but tides and winds moved the oil to the three islands in the Kill and the Staten Island coastline.
March 1990	Hazmat - offshore	Hudson	Approximately 240,000 gallons of oil spilled from a barge into the Kill van Kull between Bayonne, closing the waterway and blocking ships from Port Newark.
June 8, 1990	Hazmat - offshore	Hudson	260,000 gallons of oil spilled from a ruptured tanker docking in Bayonne into New York Harbor
May 10, 1996	Hazmat – offshore	Hunterdon	The T/V Anitra released 42,000 gallons of oil into Big Stone Anchorage, Delaware Bay. Over 50 miles of beaches were oiled over a 2-week period.
November 26, 2004	Hazmat - offshore	Gloucester	The M/T ATHOS I (Athos) struck a large, submerged anchor while preparing to dock at a refinery in Paulsboro, New Jersey. The anchor punctured the vessel's bottom, resulting in the discharge of nearly 265,000 gallons of crude oil into the Delaware River and nearby tributaries.
January 13, 2012	Hazmat – fixed site	Gloucester	A malfunctioning fuel pump gasket for a New Jersey Transit facility spilled 26,000 gallons of diesel fuel into Grenloch Lake and surrounding waterways including Big Timber Creek and the Delaware River.
November 30, 2012	Hazmat – in transit	Gloucester	A freight train derailment in Paulsboro caused a spill of vinyl chloride. The freight train consisted of two locomotives and 82 cars; seven cars derailed while traveling over a moveable bridge spanning Mantua Creek. Four tanks cars, three containing vinyl chloride and one containing ethanol, were dumped into the Creek. One of the cars released approximately 20,000 gallons of vinyl chloride into the Creek and surrounding area. Over 40 people were treated at the hospital. Estimated equipment damage was multi-millions of dollars.

Source: New York Times 1990; Anitra Oil Spill Natural Resource Trustees 2004; RT.com 2012; National Transportation Safety Board (NTSB) 2012; NTSB 2009

FEMA Disaster Declarations

The Federal Emergency Management Agency (FEMA) has not issued any disaster declarations resulting from hazardous substances incidents.

Probability of Future Occurrences

Hazardous Substances Fixed Site

Hazardous substances incidents at on-site facilities occur occasionally, typically without significant negative consequence. As indicated in the Previous Occurrence section, on-site chemical releases occur rather frequently. Small spills will occur on site throughout the course of the year. Thus, the probability for future events is high. However, the risk of a major on-site hazardous substances incident in a given year is rather low.

Hazardous Substances In-Transit

As demonstrated by the Past Occurrences section, incidents involving hazardous substances in transit occur rather frequently. The 5-year annual average is approximately 350 incidents per year in all counties. The size and scope of these incidents vary from very small to large amounts of chemicals being spilled. However, as indicated by the Paulsboro train derailment incident, transportation incidents involving hazardous substances can be rather severe. Given the vast road and rail networks throughout the State, and the quantity of hazardous substances transported regularly through the State, the probability for future events in a given year is high.

Hazardous Substances Offshore

Significant hazardous substances occurring offshore are rather rare in New Jersey. As discussed in the Previous Occurrences section, several incidents have occurred over the past couple decades. While these incidents have been rather rare, New Jersey's port systems and waterways are vast and the possibility for an incident does exist. Given the factors noted, past occurrences, and the State's water network, the probability for future incidents in a given year is low.

Severity

Hazardous substance releases can contaminate air, water, and soils, possibly resulting in death and/or injuries. Dispersion can take place rapidly when the hazardous substance is transported by water and wind. While often accidental, releases can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events. Hazardous substances can include toxic chemicals, radioactive substances, infectious substances, and hazardous wastes. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas.

With a hazardous substance release, whether accidental or intentional, several potentially exacerbating or mitigating circumstances will affect its severity or impact. Mitigating conditions are precautionary measures taken in advance to reduce the impact of a release on the surrounding environment. Primary and secondary containment or shielding by sheltering-in-place measures protects people and property from the harmful effects of a hazardous substance release. Exacerbating conditions, characteristics that can enhance or magnify the effects of a hazardous substance release, include:

> Weather conditions, which affect how the hazard occurs and develops
> Micro-meteorological effects of buildings and terrain, which alters dispersion of hazardous substances on-compliance with applicable codes (such as building or fire codes) and maintenance failures (such as fire protection and containment features), which can substantially increase the damage to the facility itself and to surrounding buildings

As discussed earlier, the severity of the incident is dependent not only on the circumstances described above, but also with the type of substance released and the distance and related response time for emergency response teams. The areas with the closest proximity to the releases are generally at greatest risk; however, depending on the agent, a release can travel great distances or remain present in the environment for a long period of time (e.g. centuries to millennia).

The severity of offshore hazardous substances incidents will vary based on the amount of hazardous substance spilled, the location of the spill, and the prevailing currents. The effects of an accident can have a devastating impact on the environment. An example of the worst-case scenario was the Deepwater Horizon oil spill in 2010, which affected the gulf and the coastline from Texas to Florida and was one of the worst environmental disasters in the United States.

Warning Time

Hazardous Substances Fixed Site

The warning time for an incident occurring at an on-site or fixed facility will vary. Incidents may be sudden without any warning such as an explosion, or may be slowly developing such as a leaking container. Facilities that store extremely hazardous substances are required to notify local officials when an incident occurs. Local emergency responders and emergency management officials would determine the need to evacuate the public or to advise to shelter in place.

Hazardous Substances In-Transit

Similarly to on-site hazardous substances incidents, the amount of warning time for incidents associated with hazardous substances in transit varies based on the nature and scope of the incident. If an explosion did not occur immediately following an accident, there may be time for warning of adjacent neighborhoods and enough time to facilitate appropriate protective actions.

Hazardous Substances Offshore

Offshore hazardous substances incidents will generally have enough warning time and will not be an immediate threat to health and life. In most cases the environmental impacts of hazardous substances incidents will develop slowly as the full extent of the accident may occur over the course of several weeks or months. As was the case with the 2010 Deepwater Horizon incident in the Gulf of Mexico, the immediate impact was limited to the crews stationed on the oil rig, and the greater environmental impact occurred days to weeks into the incident.

Secondary Hazards

Hazardous Substances Fixed Site

The secondary impacts associated with on-site hazardous substances releases include those impacting the health of the community and environment. If spilled, hazardous substances can contaminate wells, kill wildlife, and impact the ecosystem. Hazardous substance incidents also can cause acute and chronic health issues and have an impact on long-term public health. The secondary impacts have the potential to occur regardless of the mode (fixed site, in transit, or offshore) or the source of release.

Hazardous Substances In-Transit

In addition to the secondary impacts noted for the fixed-site hazard, other impacts include damage to the infrastructure such as road beds or bridges may occur.

Hazardous Substances Offshore

Aside from the general impacts noted with the fixed-site hazard, offshore incidents present unique challenges and secondary impacts. The secondary impacts associated with offshore incidents were witnessed in 2010 during the Deepwater Horizon spill occurring in the Gulf of Mexico. The incident had tremendous impacts on the environment, wildlife, and the economy. A significant incident would have a devastating impact on all of these sectors. A significant portion New Jersey's economy is reliant on tourism, as well as near-shore and off-shore fisheries, thus an impact to the shore would be devastating.

Climate Change Impacts

Hazardous substance incidents are non-natural incidents; therefore, there are no implications for impacts from climate change.

5.19.2 Vulnerability Assessment

This section addresses New Jersey's vulnerability, in a qualitative nature, to the hazardous substances hazard. A consequence analysis for this hazard was also conducted and presented in Section 9. Impacts on the public, responders, continuity of operations, and delivery of services; property, facilities, and infrastructure; and the environment, economic condition of the State, and the public confidence in the State's governance is discussed in Section 9 in accordance with Emergency Management Accreditation Program (EMAP) standards. This section addresses assessing vulnerability and estimating potential losses by jurisdiction and to State facilities.

Assessing Vulnerability by Jurisdiction

As presented in Table 5.1-2 in Section 5.1 (Risk Assessment Overview), 12 of the 20 Counties with HMPs included hazardous substances either at fixed sites or in transit as hazards of concern. The decision to include and profile this hazard in their mitigation plans indicates the presence of risk from this hazard. Of these 12, only Essex County categorized the hazard into high/medium/low ranking and considers this a medium-to-highly ranked hazard.

All counties in New Jersey have at least one facility that stores hazardous substances, according to USEPA SARA Title III facilities data. Depending on the type and quantity of chemicals released and the weather conditions, an incident can affect larger areas that cross jurisdictional boundaries.

When hazardous substances are released in the air, water or on land they may contaminate the environment and pose greater danger to human health. The general population may be exposed to a hazardous substances release through inhalation, ingestion or dermal exposure. Exposure may be either acute or chronic, depending upon the nature of the substance and extent of release and contamination.

The majority of the New Jersey population is vulnerable to the effects of hazardous substances incidents. Populations located along major transportation routes (such as I-95 and I-295) are more vulnerable because of the quantities of chemicals transported on these major thoroughfares. Further, populations residing along New Jersey's coast are vulnerable to offshore hazardous substances incidents.

The closure of waterways, railroads, airports and highways as a result of a hazardous substance incident has the potential to impact the ability to deliver goods and services efficiently. Potential impacts may be local, regional, or statewide depending on the magnitude of the event and level of service disruptions.

Assessing Vulnerability to State Facilities

Because of the number of facilities storing hazardous substances throughout the State, all State and critical facilities are exposed to hazardous substances incidents.

Estimating Potential Losses by Jurisdiction

If a significant hazardous substances incident occurred, the economy of New Jersey would be affected. A significant incident in an urban area could force businesses to close for an extended period of time because of contamination or direct damage caused by an explosion, if one occurred. The exact impact of hazardous substances incidents on-site and the State's vulnerability to such an incident is difficult to determine, given the uncertain nature of the size and scope of incidents.

If an incident occurred that would require one of the State's major highways to close, the impact on the economy could be significant if a long-term closure occurred. Given the scope and importance of New Jersey's transportation routes to the greater northeastern United States, the vulnerability of New Jersey's economy is significant.

New Jersey's economy is particularly vulnerable to hazardous substances incidents that may occur offshore. Such an event would impact shipping and access to New Jersey's ports as well as the tourism industry, which relies on summer beach network as a significant portion of the State's economy.

A significant portion of the New Jersey economy relies on the State's waterways and shoreline, thus the economy is vulnerable to the impacts of hazardous substances occurring offshore. Tourism associated with the Jersey Shore is critical to the overall economy. If an incident occurred similar to the 2010 Deepwater Horizon spill in the Gulf of Mexico, the impact on the economy would be disastrous. Additionally, if a hazardous substances incident forced the closure of shipping lanes or one of New Jersey's ports, the State would lose millions of dollars in revenue. New Jersey's commercial fishing industry would suffer tremendous losses from a major spill or other hazardous substances incident. Given the importance of New Jersey's waterways to the State's economy, it is clear that the State is vulnerable to hazardous substances incidents occurring offshore.

Estimating Potential Losses to State Facilities

Potential losses to State facilities and critical facilities caused by a hazardous substances incident are difficult to quantify. Potential losses may include inaccessibility, loss of service, contamination and/or potential structural and content losses if an explosion occurs.

Environmental Impacts

A hazardous substance release, whether on site, in transit, or offshore, can negatively impact the environment. Depending on the nature and amount of the substance, the release may contaminate the air, water, or soil potentially causing concern for direct human and animal exposure (whether through inhalation, ingestion or dermal exposure), recreational usage, crop irrigation, and fish and wildlife consumption (USEPA 2011).