



Section 5. Risk Assessment

5.20 Nuclear Hazards

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 and counties in developing mitigation strategies. This information may also be used by the local jurisdictions as they develop their mitigation plans and assess their level of threat. The updated profile contains an enhanced discussion of the effects of the nuclear hazard as it relates to the State and its counties. Further, the vulnerability assessment has been updated.

5.20.1 Profile

Hazard Description

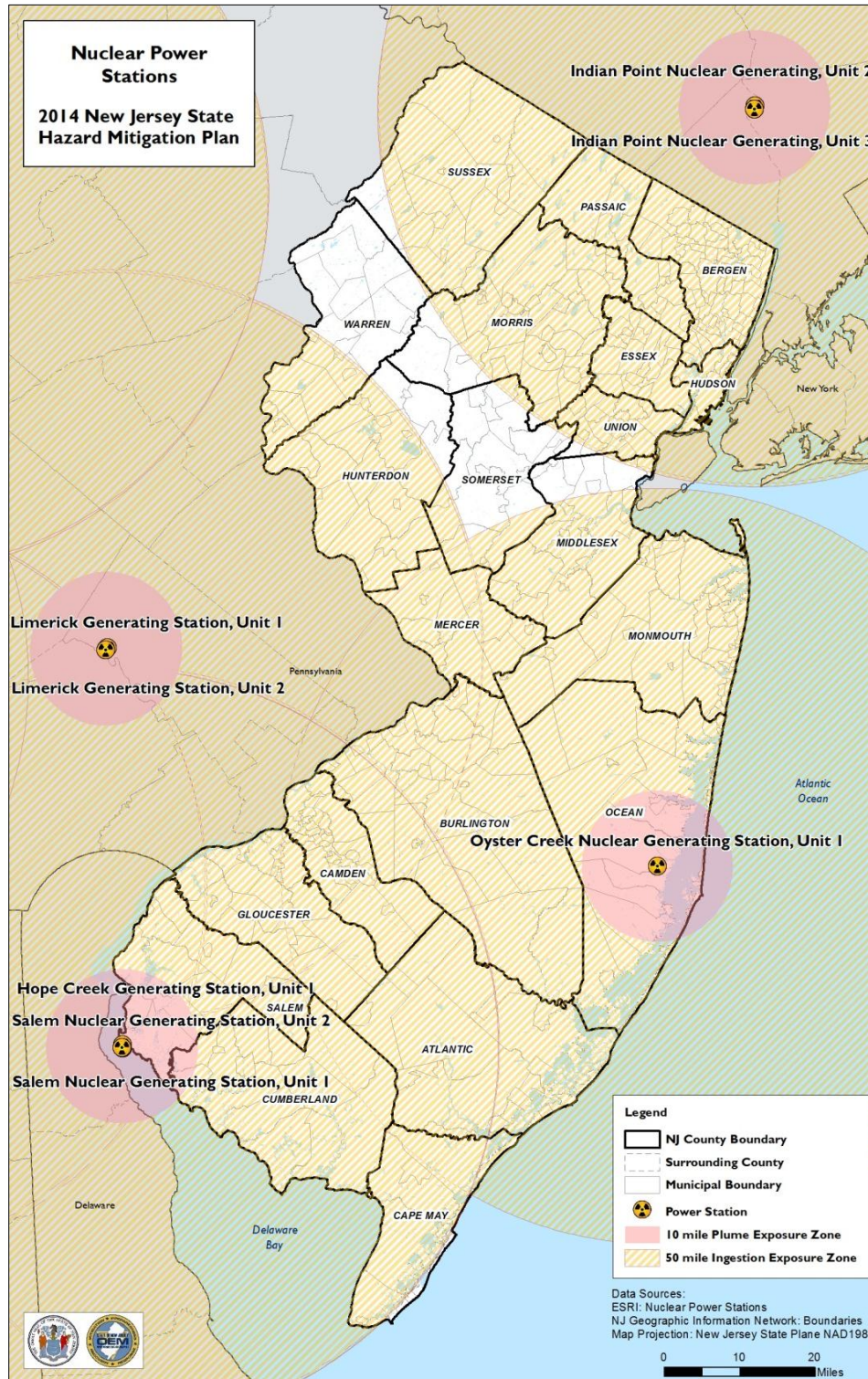
Nuclear hazards and incidents generally refer to incidents involving (1) the release of significant levels of radioactive materials or (2) exposure of workers or the general public to radiation. The primary concerns following a nuclear incident or accident is the public health impact from direct exposure to a radioactive plume, inhalation of radioactive materials, ingestion of contaminated food, water and milk, and long term exposure to deposited radioactive materials in the environment that may lead to either acute (radiation sickness or death) or chronic (cancer) health effects.

Location

New Jersey has four operating nuclear power plants located within the State. These facilities include the Salem Nuclear Generating Station Unit 1 and Unit 2, Hope Creek Nuclear Generating Station, and Oyster Creek Nuclear Generating Station. In addition to these facilities, several facilities in neighboring states are within the 50-mile ingestion pathway zone that affects portions of New Jersey. These facilities include the Indian Point Energy Center in Buchanan, New York; the Limerick Generating Station in Limerick, Pennsylvania; and the Peach Bottom Atomic Power Station in Delta, Pennsylvania. The location of these facilities in both New Jersey and in neighboring states, along with the 10-mile emergency planning zones (EPZ) and 50-mile ingestion pathway zones are highlighted in Figure 5.20-1.



Figure 5.20-1. Nuclear Power Plants in New Jersey and Neighboring States with Approximate Zones



Source: Environmental Systems Research Institute (ESRI)

Note: These zones are considered approximate to be used for planning purposes only.



Hope Creek and Salem 1 and 2

There are three nuclear power generating stations located on Artificial Island, in Lower Alloways Creek Township in Salem County. The Salem Nuclear Generating Station is composed of two pressurized water reactors, Salem 1 and Salem 2. The stations are located on the southern half of Artificial Island. The third nuclear power generating station on Artificial Island is the Hope Creek Nuclear Generating Station, which uses a boiling water reactor. It is located 0.25 mile north of Salem 1 and 2. These three generating stations are owned by Public Service Enterprise Group. The population within the 10-mile radius surrounding the Salem/Hope Creek site is 15,645.

Artificial Island is a 700-acre man-made site created by the deposition of fill from Delaware River dredging operations. Land use in the areas adjacent to the exclusion zone (as defined by 10 Code of Federal Regulations [CFR] 100) consists of commercial, government, agricultural, and residential.

To the north and east are extensive tidal marshlands and low-lying areas. Mad Horse Creek Wildlife Management Area, located to the north and east of Artificial Island, is a State government facility that supports trapping and fishing. The wildlife area is also important for migratory birds. Within 10 miles of the site is some of South Jersey's prime agricultural land. The nearest New Jersey resident to the site is 3.9 miles away (New Jersey Department of Environmental Protection [NJDEP] 2004).

Oyster Creek

The Oyster Creek Nuclear Generating Station is a single-unit, boiling-water reactor located in Lacey Township, Ocean County, near Barnegat Bay. The plant is owned and operated by Exelon Corporation (United States Nuclear Regulatory Commission [U.S.NRC] 2013; Baldauf [NJDEP] 2013).

Oyster Creek is located on 1,316 acres and is traversed by U.S. Highway Route 9. Geographically, the plant is situated in the Outer Coastal Plain near the Pinelands National Reserve. The reserve is characterized by a fragile ecosystem and a large untapped groundwater reserve. In addition, there are extensive freshwater and saltwater marshes. Barnegat Bay Inlet and the Atlantic Ocean are within 10 miles of the plant (U.S.NRC 2013)

Land use near the plant is commercial, residential, and recreational. Island Beach State Park and adjacent shore areas contribute to a large seasonal increase to the local population. The largest concentrations of residents are to the north and the northeast (retirement communities). The closest residents are 0.5 mile northeast of the plant (NJDEP 2004).

Based on the United States Census the total population within 10 miles of Oyster Creek was 133,609 in 2010, which represented an increase of 35.8% in a decade. The total population within 50 miles was 4,482,261, which represented an increase of 10.4% since 2000 (NJDEP 2004).

The Oyster Creek Plant is scheduled to close in 2019 (NJDEP 2004).

Extent

The U.S. NRC encourages the use of Probabilistic Risk Assessments (PRA) to estimate quantitatively the potential risk to public health and safety considering the design, operations, and maintenance practices at nuclear power plants. PRAs typically focus on accidents that can severely damage the core and that may challenge containment.

The New Jersey Office of Emergency Management (NJOEM) and the NJDEP have developed a State Radiological Emergency Response Plan with consultation from other state agencies and according to all relevant guidelines established by the Federal Emergency Management Agency (FEMA) as required by the



Radiation Accident Response Act (N.J.S.A. 26:2D-37 et seq. effective October 27, 1981). The Plan includes a 10-Mile Emergency Planning Zone (EPZ) defined as the area with a radius of approximately 10 miles around a nuclear power generating station. The 10 Mile EPZ considers potential adverse public health impacts for the Plume Exposure Pathway based on the potential for acute health effects due to radiation exposure from a catastrophic accident at a nuclear power generating station. The Plan also includes provisions for the 50 Mile Ingestion Pathway Emergency Planning Zone where additional public health impacts must be considered for long term or chronic health effects that could result from the direct exposure to deposited radioactive materials or from consumption of contaminated food, water and milk. The exact size and configuration of the 10 mile and 50 mile EPZ may vary in relation to local emergency response capabilities, topography, road networks and political boundaries (Baldauf [NJDEP] 2013).

The nuclear industry has adopted pre-determined, site-specific Emergency Action Levels (EAL). The EALs provide the framework and guidance to observe, address, and classify the severity of site-specific incidents and conditions that are communicated to off-site emergency response organizations (Nuclear Regulatory Commission 2008). Additional EALs specifically deal with issues of security, such as threats of airborne attack, hostile action within the facility, or facility attack. These EALs ensure that appropriate notifications for the security threat are made in a timely manner.

Each facility is also equipped with a public alerting system, which includes a number of sirens to alert the public located in the Plume Ingestion Pathway EPZ. This alerting system is activated by the counties of each specific EPZ. Emergency notifications and instructions are communicated to the public via the Emergency Alert System as activated by the NJOEM Emergency Operations Center. State officials also have the capability to send emergency messages as text messages to mobile devices.

Previous Occurrences and Losses

No major nuclear incidents have occurred in New Jersey. In the past 20 years, there have been two alerts at Oyster Creek and one alert at Salem/Hope Creek site (Christiansen [NJEOM] 2013).

FEMA Disaster Declarations

FEMA has made no disaster declarations related to nuclear incidents in New Jersey.

Probability of Future Occurrences

Three major nuclear reactor accidents have occurred in the history of civil nuclear power: Three Mile Island, Chernobyl, and Fukushima. Since the Three Mile Island accident, nuclear power has become heavily regulated; however, as with any industrial activity, it is not entirely risk-free. Incidents and accidents may happen that will lead to continued improvements in safety (World Nuclear Association 2013).

Severity

The potential public health impacts are greatest at locations nearest to the point of release from the nuclear power generating station. For planning purposes, a 10 Mile Emergency Planning Zone has been established as the area where the population has the potential to receive acute radiation doses from major releases of radiation from a catastrophic accident. The exposure pathways that are considered for the Early Phase of a nuclear accident are from direct radiation exposure to gamma radiation in the radioactive plume, inhalation of radioactive particles while submersed in a radioactive plume and from exposure to deposited radioactive materials on the ground. The Early Phase of an emergency may last anywhere from hours to days (Baldauf [NJDEP] 2013).



Consideration of the impact of deposited radiation in the environment begins with the Intermediate Phase. During this time, the public exposure pathways assessed are from prolonged exposure to deposited radioactive materials and from the ingestion of food, water, and milk that has become contaminated from deposited radioactive materials. Consideration is given to potential chronic health effects of long term exposure to and ingestion of radioactive materials. For planning purposes, a 50 Mile Ingestion Planning Zone is established for this phase of the accident. The Intermediate phase of an accident may last from weeks, to months or years depending on the severity of the accident and the extent of the dispersion of radioactive materials in the environment (Baldauf [NJDEP] 2013).

Warning Time

There is often warning that a nuclear accident has occurred or has the potential to occur. Nuclear facilities must notify the appropriate authorities in the incident of an accident. The Nuclear Regulatory Commission uses four classification levels for nuclear incidents (Nuclear Regulatory Commission 2008):

- **Unusual Event:** Under this category, incidents are in process or have occurred that indicate potential degradation in the level of safety of the plant. No release of radioactive material requiring off-site response or monitoring is expected unless further degradation occurs.
- **Alert:** If an alert is declared, incidents are in process or have occurred which involve an actual or potential substantial degradation in the level of safety of the plant. Any releases of radioactive material from the plant are expected to be limited to a small fraction of the United States Environmental Protection Agency (USEPA) Protective Action Guides (PAG).
- **Site Area Emergency:** A site area emergency involves incidents in process or which have occurred that result in actual or likely major failures of plant functions needed for protection of the public. Any releases of radioactive material are not expected to exceed the USEPA PAGs except near the site boundary.
- **General Emergency:** A general emergency involves actual or imminent substantial core damage or melting of reactor fuel with the potential for loss of containment integrity. Radioactive releases during a general emergency can reasonably be expected to exceed the USEPA PAGs for more than the immediate site area.

Communities across the United States use outdoor warning sirens for many purposes. Sirens are used to warn the public of many hazards including fires, flooding, and other events that warrant public notifications. For the Oyster Creek EPZ, when activated, sirens will emit a three-minute steady sound. If sirens are heard, residents should tune to one of the Emergency Alert System (EAS) stations. The siren network is tested annually with a full activation. A monthly test is also conducted which operates the sirens individually or collectively for less than a minute (ExelonGeneration 2013). For the Salem and Hope Creek EPZ, when activated, sirens will emit a three- to five-minute siren. If sirens are heard, residents should tune to one of the Emergency Alert System (EAS) stations (PSEG Nuclear LLC 2013).

Secondary Hazards

Public health emergencies and environmental impacts are secondary hazards of a nuclear incident. Information regarding these is provided in the Severity portion of this section.

Climate Change Impacts

Because nuclear incidents are not naturally occurring events, no implications for climate change are associated with this hazard.



5.20.2 Vulnerability Assessment

To understand risk, the assets exposed within the hazard area are identified. For the nuclear hazard, the ESRI nuclear plant dataset and associated 10- and 50-mile buffers were used as the hazard areas to assess risk. Please note these hazard areas are considered approximate and should be treated as such. Vulnerability and potential losses are discussed in terms of these defined zones throughout the State, according to jurisdiction and State-owned and leased facilities.

Assessing Vulnerability by Jurisdiction

As discussed earlier, the release of dangerous levels of radiation could impact the health and safety of the population located near the nuclear power plant. Populations that reside within the 10-mile EPZ as well as the 50-mile ingestion pathway zone are considered vulnerable. The total approximate population in New Jersey within the 10-mile EPZ is approximately 151,000 people. The total approximate population in New Jersey in the 50-mile ingestion zone is approximately 8.6 million people. Evacuations are a protective action within the ingestion pathway. Table 5.20-1 outlines the estimated population within New Jersey located within each zone per nuclear facility by county.

Individuals living within 10 miles of a nuclear power are the most vulnerable to the effects of nuclear hazards, and may be directly exposed to radiation during a nuclear incident. The following counties have residents located within the approximate 10-mile EPZ: Cumberland, Ocean, and Salem Counties.

Individuals located within 50 miles of a nuclear power plant are also vulnerable to the effects of a release involving the contamination of water supplies, crops, and livestock by radioactive materials. Because of the location of nuclear facilities both in New Jersey and in neighboring states, the majority of the State falls within a 50-mile radius of a facility. Individuals with pre-existing medical conditions, access and functional needs, the elderly, and those without transportation may require evacuation assistance in an incident should occur.

Assessing Vulnerability to State Facilities

Employees working in State buildings and critical facilities located within the 10-mile EPZ are considered vulnerable. Tables 5.20-2 and 5.20-3 outline the number of State buildings located within the 10- and 50-mile zones by county and agency, respectively. According to the exposure data, Ocean County has the highest number of State buildings that are located within a 10-mile radius of a nuclear power plant.

Critical facilities are important in ensuring the day-to-day function of society. These facilities include utilities, hospitals, and schools, among others similar in nature. According to the analysis, 185 facilities are located within the 10-mile EPZ of any nuclear plant, and 11,010 facilities are located in the greater 50-mile ingestion zone. Like State-owned and leased entities, these facilities need to ensure continuity of operation during a disaster. Tables 5.20-4 and 5.20-5 outline the number of critical facilities that are located in the 10- and 50-mile zones.



Table 5.20-1. New Jersey Population within the 10-Mile and 50-Mile Radii

County	Oyster Creek		Hope Creek 1/ Salem 1 & 2		Indian Point		Limerick 1 & 2		Peach Bottom 2 & 3	
	10-Mile EPZ	50-Mile Zone	10-Mile EPZ	50-Mile Zone	10-Mile EPZ	50-Mile Zone	10-Mile EPZ	50-Mile Zone	10-Mile EPZ	50-Mile Zone
Atlantic	-	274,549	-	98,485	-	-	-	-	-	-
Bergen	-	-	-	-	-	905,116	-	-	-	-
Burlington	-	448,734	-	211,480	-	-	-	376,917	-	-
Camden	-	513,657	-	513,657	-	-	-	500,033	-	-
Cape May	-	24,082	-	70,535	-	-	-	-	-	-
Cumberland	-	51,826	744	156,898	-	-	-	16	-	-
Essex	-	-	-	-	-	783,969	-	-	-	-
Gloucester	-	176,341	-	288,288	-	-	-	266,905	-	12,419
Hudson	-	-	-	-	-	634,266	-	-	-	-
Hunterdon	-	-	-	-	-	-	-	110,798	-	-
Mercer	-	365,256	-	-	-	-	-	289,839	-	-
Middlesex	-	521,701	-	-	-	41,333	-	-	-	-
Monmouth	-	630,380	-	-	-	-	-	-	-	-
Morris	-	-	-	-	-	457,654	-	-	-	-
Ocean	138,543	576,567	-	-	-	-	-	-	-	-
Passaic	-	-	-	-	-	501,226	-	-	-	-
Salem	-	1,333	11,777	66,083	-	-	-	55,926	-	42,241
Somerset	-	65,977	-	-	-	18,003	-	12,078	-	-
Sussex	-	-	-	-	-	148,283	-	-	-	-
Union	-	-	-	-	-	496,395	-	-	-	-
Warren	-	-	-	-	-	186	-	59,072	-	-
Total	138,543	3,650,403	12,521	1,405,426	-	3,986,431	-	1,671,584	-	54,660

Source: United States Census 2010

Notes: 10-Mile EPZ = 10-Mile Plume Exposure Pathway Emergency Planning Zone; 50-Mile Zone = Ingestion Exposure Pathway Zone



Table 5.20-2. Number of State Buildings Located within the 10-Mile and 50-Mile Radii by County

County	Oyster Creek		Hope Creek 1/ Salem 1 & 2		Indian Point		Limerick 1 & 2		Peach Bottom 2 & 3	
	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone
Atlantic	-	87	-	48	-	-	-	-	-	-
Bergen	-	-	-	-	-	46	-	-	-	-
Burlington	-	345	-	13	-	-	-	193	-	-
Camden	-	69	-	69	-	-	-	40	-	-
Cape May	-	15	-	112	-	-	-	-	-	-
Cumberland	-	75	-	367	-	-	-	-	-	-
Essex	-	-	-	-	-	74	-	-	-	-
Gloucester	-	30	-	46	-	-	-	41	-	6
Hudson	-	-	-	-	-	22	-	-	-	-
Hunterdon	-	-	-	-	-	-	-	333	-	-
Mercer	-	390	-	-	-	-	-	370	-	-
Middlesex	-	133	-	-	-	96	-	-	-	-
Monmouth	-	162	-	-	-	-	-	-	-	-
Morris	-	-	-	-	-	96	-	-	-	-
Ocean	45	103	-	-	-	-	-	-	-	-
Passaic	-	-	-	-	-	71	-	-	-	-
Salem	-	-	8	56	-	-	-	50	-	32
Somerset	-	17	-	-	-	1	-	11	-	-
Sussex	-	-	-	-	-	63	-	-	-	-
Union	-	-	-	-	-	33	-	16	-	-
Warren	-	-	-	-	-	-	-	-	-	-
Total	45	1,426	8	711	-	502	-	1,054	-	45

Source: NJOMB 2013

Notes:

10-Mile EPZ = 10-Mile Plume Exposure Pathway Emergency Planning Zone

50-Mile Zone = Ingestion Exposure Pathway Zone.



Table 5.20-3. Number of State Buildings Located within the 10-Mile and 50-Mile Radii by Agency

Agency	Oyster Creek		Hope Creek1 / Salem 1 & 2		Indian Point		Limerick 1 & 2		Peach Bottom 2 & 3	
	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone	10-Mile EPZ	50-Mile Ingestion Zone
Agriculture	-	1	-	-	-	-	-	-	-	-
Banking And Insurance	-	1	-	-	-	-	-	1	-	-
Chief Executive	-	-	-	-	-	1	-	-	-	-
Children and Families	-	44	1	15	-	31	-	18	-	2
Community Affairs	-	4	-	1	-	5	-	3	-	-
Corrections	-	227	-	221	-	110	-	353	-	2
Education	-	52	-	4	-	8	-	51	-	-
Environmental Protection	28	132	5	87	-	45	-	68	-	11
Health	-	3	-	-	-	-	-	3	-	-
Human Services	-	200	-	159	-	51	-	147	-	-
Judiciary	-	2	-	1	-	2	-	2	-	-
Juvenile Justice Commission	5	148	-	10	-	7	-	63	-	-
Labor and Work Force Development	-	4	-	-	-	2	-	2	-	-
Law and Public Safety	-	7	-	1	-	4	-	5	-	-
Legislature	-	4	-	-	-	-	-	4	-	-
Military and Veterans Affairs	1	169	-	37	-	57	-	48	-	-
Miscellaneous Commissions	-	1	-	1	-	-	-	1	-	-
Motor Vehicles Commission	2	36	2	19	-	17	-	22	-	2
Personnel	-	1	-	-	-	-	-	1	-	-
State	-	9	-	-	-	-	-	8	-	-
State Police	1	86	-	22	-	18	-	49	-	1
Transportation	8	281	-	135	-	142	-	192	-	20
Treasury	-	14	-	-	-	2	-	13	-	-
Total	45	45	45	45	-	45	-	45	-	45

Source: NJOMB 2013

Notes:

10-Mile EPZ = 10-Mile Plume Exposure Pathway Emergency Planning Zone

50-Mile Zone = Ingestion Exposure Pathway Zone.



Table 5.20-4. Number of Critical Facilities Located within a 10-Mile Radius of a Nuclear Facility

County	Total Count	Airport	Special Needs	Communication	Correctional Institutions	Dam	Electric Power	EMS	EOC	Ferry	Fire	Highway Bridge	Highway Tunnel	Light Rail Facility	Medical	Military	Natural Gas	Oil	Police	Port	Potable Water	Rail Facility	Rail Tunnel	School	Shelter	Storage of Critical Records	Wastewater	
Atlantic	388	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bergen	1,148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Burlington	747	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Camden	701	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cape May	229	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cumberland	251	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Essex	784	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gloucester	346	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hudson	493	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hunterdon	328	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mercer	538	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Middlesex	816	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Monmouth	905	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Morris	913	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ocean	621	-	7	-	-	17	1	31	1	-	23	-	-	-	1	-	-	-	12	-	-	-	-	43	-	1	2	
Passaic	648	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Salem	201	-	1	-	-	6	-	7	-	-	9	-	-	-	1	-	-	-	3	-	-	-	-	8	7	-	1	
Somerset	539	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sussex	542	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Union	607	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Warren	351	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	12,096	0	8	0	0	25	1	38	1	0	32	0	0	0	2	0	0	0	15	0	0	0	0	0	51	7	1	3



Table 5.20-5. Number of Critical Facilities Located within a 50-Mile Radius of a Nuclear Facility

County	Total Count	Airport	Special Needs	Communication	Correctional Institutions	Dam	Electric Power	EMS	EOC	Ferry	Fire	Highway Bridge	Highway Tunnel	Light Rail Facility	Medical	Military	Natural Gas	Oil	Police	Port	Potable Water	Rail Facility	Rail Tunnel	School	Shelter	Storage of Critical Records	Wastewater
Atlantic	388	2	19	1	0	48	2	51	1	0	59	9	0	0	8	1	0	0	24	0	1	4	0	103	52	0	3
Bergen	1,148	1	46	0	1	81	4	101	1	1	142	1	0	0	9	0	0	0	74	0	3	30	0	419	228	0	6
Burlington	747	1	29	1	2	164	0	75	1	0	73	4	0	11	8	4	0	0	39	0	1	0	0	179	137	0	18
Camden	701	0	31	0	2	80	1	95	1	0	76	3	0	6	10	0	0	0	45	1	1	3	0	231	112	0	3
Cape May	229	2	10	0	0	16	0	25	1	1	27	2	0	0	1	1	0	0	9	1	1	0	0	32	56	0	6
Cumberland	251	1	9	1	6	37	0	28	1	0	25	0	0	0	6	0	0	0	15	0	0	0	0	70	49	0	3
Essex	784	2	43	0	2	33	1	57	2	0	63	2	0	17	15	0	0	0	42	3	4	22	0	360	109	1	6
Gloucester	346	0	17	0	0	68	0	43	1	0	55	1	0	0	3	0	0	0	26	0	0	0	0	120	9	0	3
Hudson	493	0	16	1	2	3	2	37	1	8	54	3	2	24	9	0	1	0	24	4	2	8	1	186	96	0	7
Hunterdon	328	0	5	0	3	83	0	33	1	0	33	0	0	0	2	0	0	0	18	0	1	3	0	58	40	0	2
Mercer	538	1	25	2	3	95	1	35	3	0	37	0	0	3	12	1	0	0	24	0	3	4	0	157	119	7	6
Middlesex	816	0	26	0	4	37	1	70	2	0	64	5	0	0	9	0	0	1	24	0	5	5	0	213	105	1	4
Monmouth	905	1	55	1	1	122	1	128	1	2	124	1	0	0	7	2	0	0	55	2	3	14	0	328	48	0	10
Morris	913	1	39	0	1	216	3	83	1	0	85	0	0	0	10	1	0	0	37	0	5	18	0	231	94	0	13
Ocean	621	0	50	1	0	99	1	93	1	0	80	5	0	0	9	0	0	0	34	0	2	2	0	208	32	1	3
Passaic	648	0	29	2	0	146	1	58	1	0	57	0	0	0	6	0	0	0	21	0	12	9	0	215	87	1	3
Salem	201	0	10	1	1	47	1	22	1	0	25	1	0	0	2	0	0	0	8	0	0	0	0	40	39	0	3
Somerset	539	0	4	0	0	26	1	8	0	0	10	0	0	0	0	0	0	0	1	0	0	2	0	33	28	0	0
Sussex	542	1	8	0	0	244	0	38	1	0	43	0	0	0	2	0	0	0	16	0	0	0	0	69	92	0	2
Union	607	0	22	0	1	29	1	50	1	0	43	2	0	0	8	0	0	0	25	5	3	15	0	223	137	0	5
Warren	351	0	5	1	1	21	0	15	1	0	19	2	0	0	1	0	0	0	8	0	0	0	0	32	46	0	2
Total	12,096	13	498	12	30	1695	21	1145	24	12	1194	41	2	61	137	10	1	1	569	16	47	139	1	3507	1715	11	108



Estimating Potential Losses by Jurisdiction

The majority of New Jersey lies within a 50-mile radius of a nuclear power plant (Figure 5.20-1). Housing may become uninhabitable because of continued exposure from deposited radiation in the environment, depending on the extent of irradiation of particulate matter or other materials during the incident. Property may become unusable for agricultural purposes because of contaminated soil or water sources used for irrigation. A total risk exposure would be equal to the full replacement of each building and property (Baldauf [NJDEP] 2013).

Estimating Potential Losses to State Facilities

As noted, the majority of the State is located within the 50-mile radius. Public and private infrastructure may be lost due to contamination from a nuclear incident. The type of infrastructure impacted would depend on the nature of the event and the extent of its effects. The estimated total replacement value of all State buildings located within the 10-mile radius is \$47 million.

Environmental Impacts

The impact on the environment that a radiological event will have depends on where the event is located and the extent of irradiation. The animals, plants and other wildlife surrounding the radiological event will certainly be impacted. Underground water and soil can become contaminated when exposed to radiological material (NJ State HMP 2011).