Algonquin Incremental Market Project (AIM Project)
Spectra Energy Corp.

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Aim Project Units

- Modify 5 existing Compressor Stations
- Modify 25 existing Metering and Regulating Stations
- Construct 2 new Metering and Regulating Stations
### Emissions from Modified Compressor Stations, Volatile Organic Carbons

<table>
<thead>
<tr>
<th>Compressor Station</th>
<th>VOC tons/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stony Point, NY</td>
<td>5.9</td>
</tr>
<tr>
<td>Southeast, NY</td>
<td>2.8</td>
</tr>
<tr>
<td>Cromwell, CT</td>
<td>3.1</td>
</tr>
<tr>
<td>Chaplin, CT</td>
<td>1.8</td>
</tr>
<tr>
<td>Burrillville, RI</td>
<td>2.6</td>
</tr>
</tbody>
</table>

- Stony Point VOC emissions are larger than Minisink Compressor Station VOC emissions.
## Emissions from Modified Compressor Stations, Nitrogen Oxide

<table>
<thead>
<tr>
<th>Compressor Station</th>
<th>NOX tons/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stony Point, NY</td>
<td>45.6</td>
</tr>
<tr>
<td>Southeast, NY</td>
<td>81.4</td>
</tr>
<tr>
<td>Cromwell, CT</td>
<td>22.0</td>
</tr>
<tr>
<td>Chaplin, CT</td>
<td>16.9</td>
</tr>
<tr>
<td>Burrillville, RI</td>
<td>24.1</td>
</tr>
</tbody>
</table>

Stony Point and Southeast compressor station emissions in New York are larger than Minisink compressor station emissions for Nitrogen Oxide. Southeast compressor station emissions of Nitrogen Oxide are 1.8 times that of the Stony Point compressor station.
## Emissions from Modified Compressor Stations, SO2

<table>
<thead>
<tr>
<th>Compressor Station</th>
<th>SO2 tons/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stony Point, NY</td>
<td>3.6</td>
</tr>
<tr>
<td>Southeast, NY</td>
<td>4.1</td>
</tr>
<tr>
<td>Cromwell, CT</td>
<td>2.0</td>
</tr>
<tr>
<td>Chaplin, CT</td>
<td>1.0</td>
</tr>
<tr>
<td>Burrillville, RI</td>
<td>1.7</td>
</tr>
</tbody>
</table>

- Stony Point and Southeast compressor station emissions of SO2 in New York are the largest of AIM compressor station emissions.
Compressor stations along pipelines are used to push the natural gas through the pipeline.

The compressors release combustion products, nitrogen oxide and volatile organic hydrocarbons into the air and degrade the air quality.

The combustion products combine with the volatile organic compounds released by the compressors and heat and sunlight to produce ground level ozone.

Ground level ozone impacts the respiratory system, lung function and cardiovascular system.
Chemicals Released into the Air from Compressor Facilities

- Benzene
- Toluene
- Ethylbenzene
- Xylenes
- 1,3-Butadiene
- n-Butyl Alcohol
- Carbon Disulfide
- Carbonyl Sulfide
- Chlorobenzene
- Chloromethane
- 1, 2-Dichloroethane
- Diethyl Benzene
- Dimethyl Disulfide
- Formaldehyde
- Methyl Ethyl Disulfide
- Naphthalene
- 1,1,1, 2-Tetrachloroethane
- Trichloroethylene
- Trimethyl Benzene
- 1,2,4-Trimethyl Benzene
- Styrene
- Methane
- Ethane
- Butane
- Propane
- Nitrogen Oxide
Acute Health Impacts Experienced by Individuals Living and Working near Compressor Stations

- Irritates skin, eyes, nose, throat and lungs
- Respiratory impacts
- Sinus problems
- Allergic reactions
- Headaches
- Dizziness, Light headedness
- Nausea, Vomiting
- Skin rashes
- Fatigue
- Weakness
- Tense and Nervous
- Joint and muscle aches and pains
- Vision Impairment
- Personality changes
- Depression, Anxiety
- Irritability
- Confusion
- Drowsiness
- Weakness
- Irregular Heartbeat

90% of individuals living and working within 2–3 miles of compressor stations report experiencing odor events and health impacts
Chronic Health Impacts Experienced by Individuals Living and Working near Compressor Stations

- Damage to Liver and Kidneys
- Damage to Lungs
- Damage to Cardiovascular System
- Damage to Developing Fetus
- Reproductive Damage
- Mutagenic Impacts
- Developmental Malformations
- Damage to Nervous System
- Brain Impacts
- Leukemia
- Aplastic Anemia
- Changes in Blood Cells
- Impacts to Blood Clotting Ability
Health Impacts Associated With Living near Compressor Stations and Gas Metering Stations Along Gas Transmission Pipelines

- Nasal Irritation
- Throat Irritation
- Eyes Burning
- Frequent Nausea
- Sinus Problems
- Bronchitis
- Increased Fatigue
- Muscle Aches and Pains
- Severe Headaches
- Dizziness
- Weakness and Tired
- Decreased Motor Skills
- Depression
- Frequent Irritation
- Severe Anxiety

61% of Health Impacts are associated with chemicals present in the air in excess of Short and Long Term Health Screening Levels
Health Impacts Associated With Living near Compressor Stations and Gas Metering Stations Along Natural Gas Transmission Pipelines

- Health Symptoms Associated With Chemicals Detected in the Air
  - Allergies
  - Persistent Cough
  - Shortness of Breath
  - Frequent Nose Bleeds
  - Sleep Disturbances
  - Joint Pain
  - Difficulty in Concentrating
  - Nervous System Impacts
  - Forgetfulness
  - Sores and Ulcers in Mouth
  - Thyroid Problems
In order to evaluate the mechanisms to be used to regulate and monitor the operations of the pipeline, there is a need to:

- Evaluate the ability of the monitoring equipment along the pipeline to determine changes in flow rates and pressure and the time frame for detecting leaks.
- Determining the maximum time needed to shut down the pipeline during an emergency pipeline event and the maximum quantity of product that could be released from the pipeline into the environment.
Monitor Pipeline Operations Cont’d

- Evaluate the distance between valve stations and the number and size of sensitive environments located between the valve stations.
- Model the areas of impact from the maximum amount of product possible to be released by the pipeline.
- Determine the schedule for preventive maintenance and monitoring of the pipeline and associated units such as compressors stations, pigging stations, monitoring and flow measurements.
Compressor stations are an explosive hazard, a fire hazard and a toxic hazard.

The methane/natural gas and associated hydrocarbons such as ethane, propane, butane and pentane, transported in the pipelines are vented and released in large quantities at the compressor station locations during blow down events and during accidental release events.

Methane is an explosion and fire hazard. When Methane being released into the air comes in contact with a spark source, a major explosion and fire can occur.

Compressor stations also are the site of leaks and spills of toxic chemicals used in the compressor station operations. Such leaks and spills contaminate soils, surface and ground water resources and surrounding flora and fauna.

The Marcellus shale has large quantities of radioactive components such as Radium 226 and 228. The radioactive components contaminate the natural gas stream and build up in the units of compressor facilities. Radium 226 is a bone seeker and causes bone and lung cancer.
The county emergency response agency is usually the first responder to the event. The agency is also responsible for issuing an evacuation order or a shelter in place order.

Responding to events at compressor stations can be a complex situation. Explosive methane can be present in the air. Toxic chemicals can be present in the air, in containers on site and as spills and leaks on the surface of the facility.

Emergency responders need to be aware, trained, equipped and prepared to address multiple threats when responding to events at compressor stations. They must be equipped with explosive level monitoring equipment, appropriate fire fighting equipment and monitors for radioactive components when responding to compressor station events.
The local government should identify resources, equipment, training and staffing needed to properly respond to pipeline events. The local government should establish a mechanism for local governmental agencies to quickly recover cost of pipeline response activities from the responsible parties.

Compressor stations are regulated by state environmental agencies and the U. S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Pipelines are regulated by the Federal Energy Regulatory Commission (FERC) and the U. S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Frequently state and federal regulatory programs and available resources are not adequate to regulate and monitor the rapidly developing shale technologies and infrastructure development being implemented.
Pipeline infrastructure is being developed in the North East to:

- Provide natural gas to North East consumers
- Encourage use of natural gas to replace fuel oil for heating
- Fuel natural gas fired electric generating plants
- Provide natural gas to LNG export facilities
- Provide natural gas to Gas to Liquid and Gas Fracturnation facilities
In order to address the impacts due to pipeline infrastructure development in the North East, testing and surveying of air quality, surface and ground water resources, soil and sediments and health impacts are needed to establish background or baseline levels.

Assessing the impacts of the infrastructure being developed and implemented can best be tracked if background levels are established. When environmental and/or human health impacts begin to occur, it is difficult to go back and document the situation before these impacts occurred.