

# ATSDR Review of Environmental Air Data in Alexandria, Virginia near the Mirant Potomac River Generating Station

## Introduction

In 2006, the Alexandria Department of Health asked the Agency for Toxic Substances and Disease Registry (ATSDR) to review available environmental air data and determine possible health effects on people in the community near the Mirant Potomac River Generating Station (PRGS), now GenOn Energy, Inc. In 2010, ATSDR released a health consultation for public comment. In 2011, ATSDR released its final health consultation, which addresses the public comments and includes additional data. This fact sheet summarizes what ATSDR found and the steps it took.

## Summary of Conclusions

The main findings of the final report include:

- Breathing air contaminated with sulfur dioxide near the site was not expected to harm the health of the general population.
- Sulfur dioxide levels could have been high enough to cause temporary health effects in some sensitive groups, such as people with asthma. These levels occurred infrequently.
- Levels of fine particulate matter (PM<sub>2.5</sub>) were elevated, similar to levels throughout northern Virginia. PM<sub>2.5</sub> is a regional concern; it is not specific to Alexandria. Studies show that long-term exposure to elevated levels of PM<sub>2.5</sub> could be associated with adverse health effects.
- Arsenic and chromium were found in air particulate matter at levels that could cause slight health risks. Levels observed were consistent with those routinely observed in suburban and urban locations nationwide.

## 2011 report additions

In February 2009, Mirant completed a stack merge project. The purpose of this project was to allow greater dispersion of contaminants before they reached the ground, thus reducing ground-level air pollution in areas nearest the Mirant PRGS.

- The City of Alexandria and other stakeholders asked ATSDR to look at the post-stack merge sulfur dioxide data. ATSDR analyzed the Mirant monitoring data from February 2009 through May 2010 and included this information in the final health consultation.
- These additional results did not change the conclusions and recommendations published in the public comment version of the health consultation.

## Reducing Exposure

You can protect your health by taking the following actions:

- Stay informed about air pollution alerts in your area by going to <http://alexandriava.gov/link/redir.pxe?www.deq.virginia.gov/airquality/>
- Stay indoors and close windows on unhealthy days
- Avoid prolonged outdoor exertion near high traffic areas

# Conclusions and Recommendations

## Sulfur Dioxide

Sulfur dioxide is a pungent, colorless gas. Sulfur dioxide is a common pollutant in the atmosphere.

## Conclusions

Breathing air contaminated with sulfur dioxide around the Mirant PRGS is not expected to harm the health of the general population; however, sensitive populations may be affected. Sensitive people are those who may experience greater health effects from exposure to sulfur dioxide. They include:

- adults aged 65 and older
- people with asthma
- persons with chronic lung disease such as bronchitis and emphysema
- persons with existing heart disease or diabetes and
- children

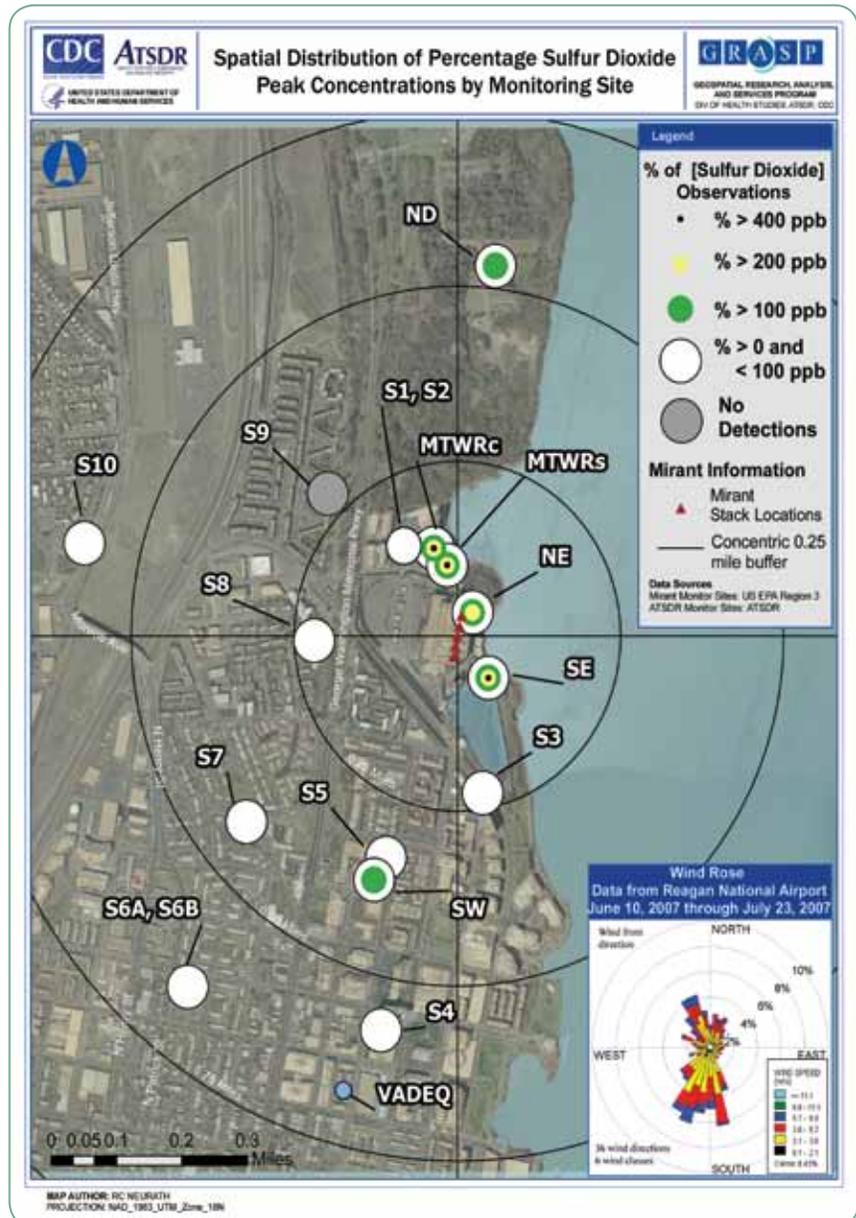
### Peak (5-minute) Sulfur Dioxide Levels:

Peak exposures (five minute periods when sulfur dioxide is the highest) could harm the health of sensitive persons, such as those with asthma, when they breathe deeply during activities such as exercising, working outdoors, gardening, or climbing steps.

Sensitive persons may experience lung symptoms if they are exposed to peak sulfur dioxide concentrations greater than 400 parts per billion (ppb) when breathing deeply, such as while exercising. These levels have been very infrequent, limited to areas within ¼-mile of Mirant PRGS, and generally have occurred between noon and 5 pm.

Lung symptoms may include coughing, wheezing, or chest tightness, and are likely reversible. Even at high breathing rates, sensitive persons may not experience symptoms when concentrations are less than 400 ppb sulfur dioxide.

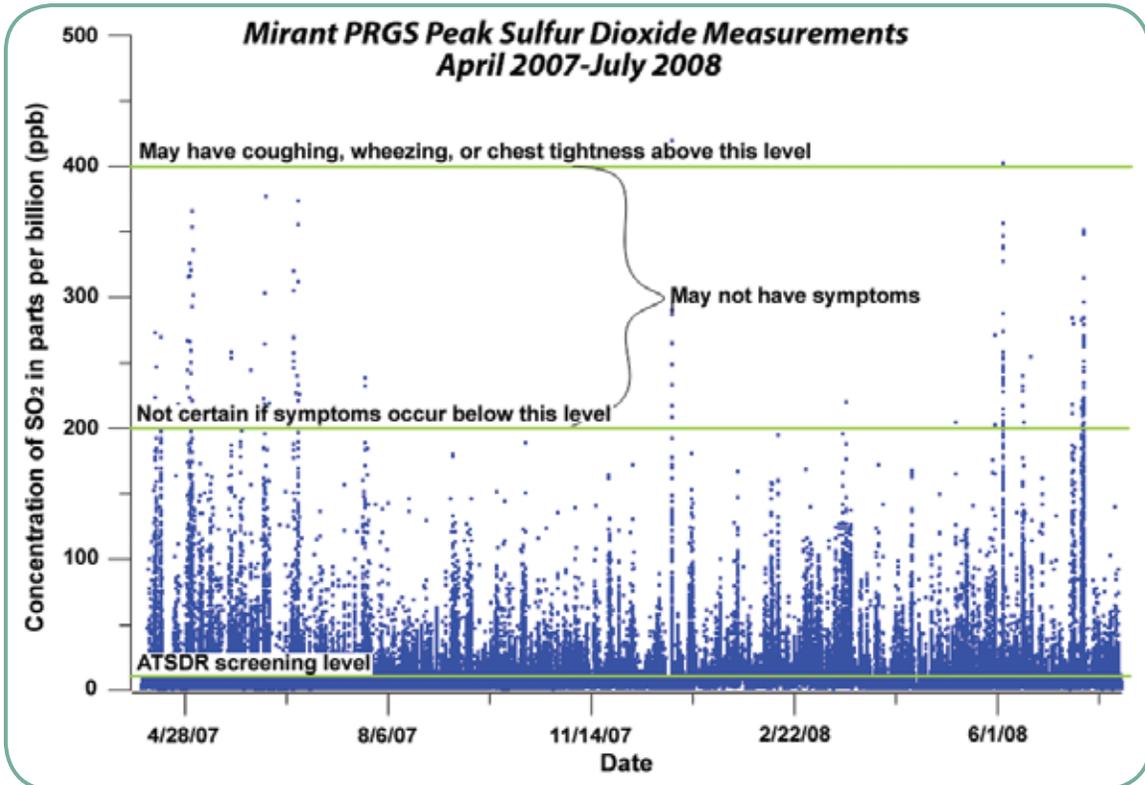
At lower sulfur dioxide concentrations (less than 400 ppb), sensitive persons may experience adverse health effects that are not strong enough to cause lung symptoms, but may reduce the ability to experience additional exposure without causing symptoms. Persons not sensitive to sulfur dioxide will not be affected at these concentrations.



## Sulfur Dioxide Data

<b>Sulfur dioxide health effects in sensitive individuals: 5-minute exposures</b>		
<b>Sulfur Dioxide Level (ppb)</b>	<b>Health Effect in Sensitive Person</b>	<b>Frequency of Occurrence near Mirant PRGS</b>
> 500	May need to take medication, see medical attention, or stop physical activity	<0.001%
> 400	Symptoms may be present such as coughing, wheezing, chest tightness	<0.001%
200 - 400	May not have symptoms	<0.02%
< 200	Not certain if health effects occur below this level	~ 11%

ppb = parts per billion = 0.000000001  
 1 ppb = one drop of ink in a large oil tanker



### Recommendations

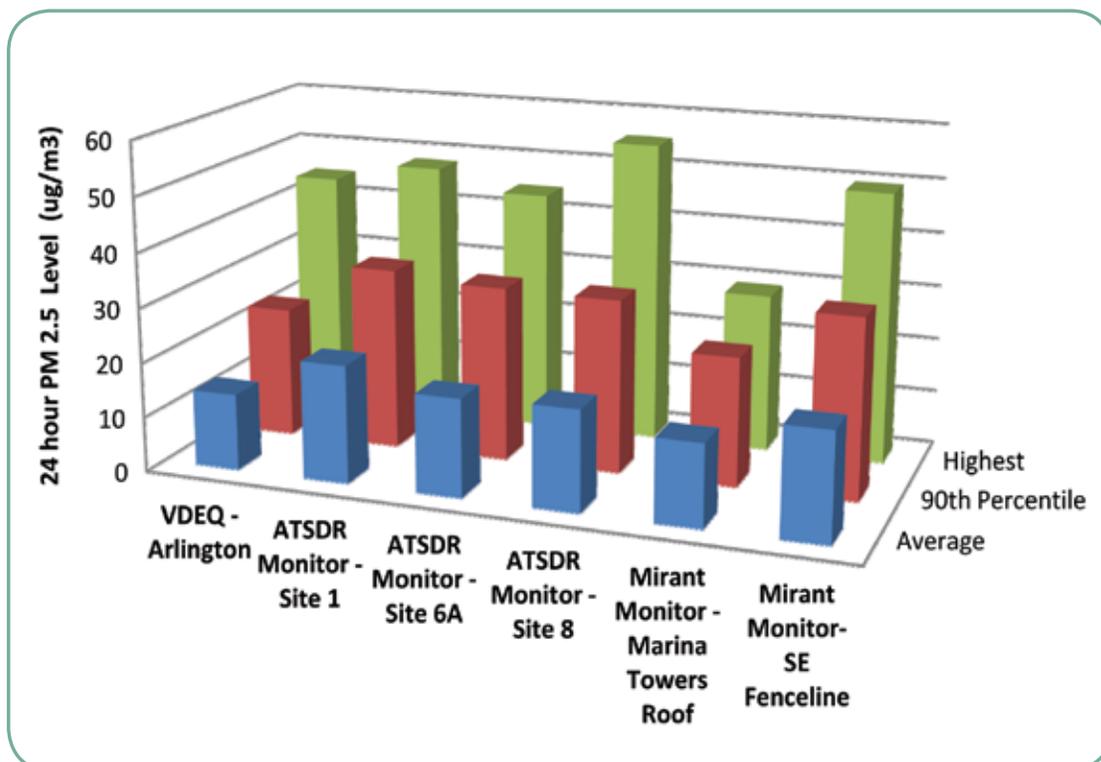
The Virginia Department of Environmental Quality should continue efforts to reduce peak sulfur dioxide emissions from the Mirant PRGS.

## Particulate Matter

Particulate matter, or particles in the air, is a mixture of very small particles and liquid droplets. It is generally made up of a mixture of substances which include dust, smoke, metals, soil, soot, diesel exhaust particles, organic and inorganic chemicals and other particles. The composition of particulate matter will vary depending on the source. Particulate matter is a common pollutant in the atmosphere. Fine particles are 2.5 microns or less in diameter and are called PM<sub>2.5</sub>. A micron is 1 millionth of a meter.

## Conclusions

- The PM<sub>2.5</sub> levels observed in the local Alexandria area are similar to levels measured in many locations throughout northern Virginia. Thus PM<sub>2.5</sub> levels in the Alexandria area are in fact a regional concern. A range of factors contributes to this, including Mirant PRGS emissions.
- ATSDR compared reported levels of PM<sub>2.5</sub> in ambient air with epidemiological studies of people exposed to similar outdoor air conditions. The studies concluded that people may experience some adverse health effects if, average concentrations over several years were in the range of those reported in or near Alexandria.
- Long term (months to years) elevations of particulate matter in the region may affect persons with heart or respiratory disease. Short term (24 hour average) exposure may worsen existing lung and heart conditions.



Monitoring Program	Monitoring Station	Date Range (in 2007)	Summary Statistics for 24-Hour Average PM <sub>2.5</sub> Concentrations (µg/m <sup>3</sup> )			
			Average	Median	90th Percentile	Highest
VDEQ	Arlington	Jan. 1 – Dec. 31	13.9	12.4	23.9	44.5
ATSDR Monitors	Site 1	June 8 – July 23	21.5	20.0	33.3	48.0
	Site 6A		17.9	16.6	31.9	44.4
	Site 8		18.4	15.9	31.7	55.3
Mirant PRGS	Marina Towers Roof	June 8 – July 23	15.0	14.9	23.5	29.0
	Southeast Fenceline		19.7	20.1	32.8	49.6

Source: VDEQ, 2009; EPA, 2009b; ATSDR, 2009; Mirant, 2008.

Notes: The averaging period for the EI spans several weeks.

For comparison purposes, this table uses the same averaging period for the Mirant PRGS data, even though Mirant PRGS's monitors collected additional PM<sub>2.5</sub> measurements in 2007. Data are presented for VDEQ's Arlington monitoring station (for the entire calendar year) as a reference.

## Recommendations

ATSDR recommends VDEQ and the City of Alexandria continue to reduce particulate matter emissions in the City of Alexandria and the State of Virginia. This includes steps to reduce and monitor particulate matter emissions as specified in the City of Alexandria–Mirant PRGS settlement agreement.

## Multiple Chemicals

### Conclusions

ATSDR cannot determine if exposure to sulfur dioxide and PM<sub>2.5</sub> together will harm people's health more than exposure to sulfur dioxide or PM<sub>2.5</sub> alone.

### Recommendations

ATSDR recommends state and local agencies continue their efforts to reduce exposure to sulfur dioxide peaks and particulate matter. These reductions are expected to reduce the likelihood of harmful effects from multiple contaminant exposures.

## Select Metals

### Conclusions

Measured levels of metals found in the air near Mirant PRGS were generally lower than previously estimated by air models. With two exceptions, every metal measured in the air samples was below levels of potential health concern.

Arsenic and chromium were found at levels that could present a slight to low increase in the estimated risk for developing cancer in the population. However, the arsenic and chromium levels observed were consistent with those routinely observed in suburban and urban locations nationwide. They likely reflect contributions from many emissions sources.

### Recommendations

ATSDR recommends reducing particulate matter exposures. This should also reduce exposure to arsenic and chromium.

### ATSDR Activities

#### *Reviewed Modeling Data*

In January 2006, the City of Alexandria's health department asked ATSDR to review the existing air modeling data for Mirant PRGS emissions. Based on this review, ATSDR expressed public health concern for potential exposures to 5-minute peak concentrations of sulfur dioxide in sensitive individuals. These findings were provided to the Alexandria Health Department in January 2007.

#### *Monitored Short-term Air Exposures*

To address the concern for potential exposures to 5-minute peaks, in summer 2007, ATSDR set up air monitoring stations in areas where people live and work around Mirant PRGS. ATSDR monitored for sulfur dioxide, particulate matter, and selected metals.

#### *Data Evaluation*

ATSDR monitors used new technology for measuring sulfur dioxide in 2007, and they did not perform to the manufacturing specifications. Therefore, the agency used ATSDR monitors to only evaluate data for particulate matter and metals data at this site. The City negotiated with Mirant to obtain the facility's more comprehensive set of sulfur dioxide monitoring data from 2007-2008 as part of their settlement agreement in 2008. The City provided these data to ATSDR. ATSDR included both the Mirant and Virginia Department of Environmental Quality data for sulfur dioxide and particulate matter in this evaluation.

#### *Evaluation Time Period*

ATSDR evaluated sulfur dioxide air monitoring data from April 2007- July 2008, before the Mirant PRGS stack merge in February 2009. ATSDR evaluated post stack merge sulfur dioxide data through May 2010. The information is included in Appendix I of the final health consultation released in 2011.

### Peer Review

ATSDR sent a draft of its report for external peer review. Peer review means the report was reviewed by science experts external to ATSDR who have no conflict of interest with this project. These experts independently review the report and provide written comments to ATSDR. External peer review ensures that the evaluation performed in the report was done using the best science given the nature of the available information.

The final report includes information about the peer review process, the questions posed to the peer reviewers, their comments (verbatim), and ATSDR's responses to their comments.

### Public Comment Review

ATSDR released a draft report for public comment in July 2010. ATSDR received written comments during the public comment period from the City of Alexandria, the U.S. Environmental Protection Agency, and the Utility Air Regulatory Group. These comments and ATSDR's response to the comments are contained in the final health consultation. In response to public comments, ATSDR evaluated post stack merge sulfur dioxide data. These additional results did not change the conclusions and recommendations published in the public comment version of the report and summarized in the final health consultation.

ATSDR is a Federal public health agency located in Atlanta, GA. Our mission is to provide communities with information they can use to protect their health. ATSDR often assists state and local health departments with environmental public health issues. ATSDR is an advisory agency. ATSDR staff conducts public health activities to provide regulatory authorities such as the Environmental Protection Agency (EPA) and health departments with information needed to guide their decision-making.