

**AMBIENT AIR QUALITY ANALYSIS**

**POTOMAC RIVER GENERATING STATION**

**ALEXANDRIA, VIRGINIA**

**Presented to:**

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## Ambient Air Quality Analysis – Potomac River Generating Station – Alexandria, Virginia

### Executive Summary

This analysis calculates the air quality impacts of the Potomac River Generating Station (PRGS) in Alexandria, Virginia and compares results against health-based National and Virginia ambient air quality standards (AAQS). This analysis uses procedures prescribed by US EPA for ambient air quality analysis, and recommended by Virginia Department of Environmental Quality within written comments specific to this facility. This analysis uses AERMOD-PRIME, the most comprehensive and accurate US EPA-approved model for calculating air quality impacts from industrial complexes where downwash of plumes due to the presence of onsite and offsite structures significantly affects results. A US EPA-approved algorithm that was recently reformulated for use in AERMOD-PRIME was used to calculate the dimensions of down-washing structures.

Impacts were calculated at locations, i.e., called receptors, to which the public has access to a distance of 7.5 kilometers from the site (an extent approximately equal to the facility's significant impact area). These receptors include elevated receptors on nearby residential towers, receptors along the facility's fence line, and receptors within the City of Alexandria where residents are likely to be young, elderly or health-compromised. Results derive from application of AERMOD-PRIME using five years of local meteorological conditions and topography and surface conditions representative of the immediate and surrounding area. Emission rates primarily derive from site-specific emission rates and factors; US EPA's emission factors were used when plant-specific data were not available. Maximum short-term impacts derive from maximum potential short-term emissions from the PRGS's five boilers and its coal and ash yard operations; annual impacts for the five boilers correlate to averages of the PRGS's own historical annual emissions for the years 2002 and 2003 as reported to VADEQ.

Results show that for the criteria pollutants of  $PM_{2.5}$ ,  $PM_{10}$  and  $SO_2$ , maximum short-term impacts exceed the respective AAQS by between five and eighteen times. Areas of noncompliance are widespread and severe; for  $SO_2$ , short-term impacts exceed the AAQS by three to five times to distances beyond 600 meters from the PRGS fence line; for  $PM_{2.5}$ , short-term impacts exceed the AAQS by two or more times to a distance of 800 meters; and for  $PM_{10}$ , short-term impacts do not fall below the AAQS within 400 meters from the facility. Results indicate that violations of the AAQS are frequent; for the full area of noncompliance extending to beyond one kilometer in several directions, results show that on average, 24-hour impacts of  $SO_2$  from the PRGS (exclusive of background) exceed the AAQS one of every six to seven days, with the average impact on that day equal to three times the AAQS. At offsite and fence line locations, 24-hour impacts of  $SO_2$  exceed worker protection standards, indicating the potential for OSHA violations within plant boundaries.

Annual impacts based on actual historical emissions from the facility show widespread, chronic public exposure to levels in excess of the AAQS, with maximum annual impacts for  $NO_2$ ,  $PM_{2.5}$ ,  $PM_{10}$  and  $SO_2$  exceeding the AAQS by between three and twelve times. For  $NO_2$ , annual impacts exceed the AAQS to 700 meters north of Marina Towers (the most closely-located residential structure) and to 200 meters from the facility's southwest fence line. For  $PM_{2.5}$ , annual impacts exceed the AAQS by two or more times to distances up to 600 meters from the facility. For  $PM_{10}$ , areas where impacts exceed the annual standard extend to 200 meters from the facility.

Impacts of toxic air pollutants from the PRGS's main boilers were also evaluated. For the acid gases hydrogen chloride and hydrogen fluoride, maximum impacts by PRGS exceed Virginia's guideline standards. For hydrogen chloride, this exceedance is severe, at levels equal to five times the guideline standard.

This analysis shows that the PRGS's maximum impacts of CO, arsenic, cadmium, mercury and other toxic air pollutants comply with the respective AAQS and guideline levels.