The groundwater flow patterns pertinent to the site relate to recharge and downgradient movement for these two aquifers. Groundwater in the surficial unit tends to move in an easterly or northeasterly direction from the western boundary of the site, close to Rock Springs Road. Most of the groundwater in this unit discharges via springs and seeps into Frank's Creek or into small tributaries of that creek (for example, Erdman Brook). Groundwater recharging the weathered shale and rubble zone tends to move eastward toward the thalweg of the buried valley (the locus of the lowest points in the cross-section of the buried valley), located about 300 to 350 meters (980 to 1,150 feet) west of Buttermilk Creek. Once attaining the thalweg, the direction of groundwater movement shifts to the direction of the thalweg, about 25 degrees west, and proceeds toward the northwest (WVNS 2000b).

Wells identified near the Western New York Nuclear Service Center serve residences and farms; the maximum number of persons served per well was ten. Most of the wells are located on the higher elevations east and west of the Center, along the principal north-south county roads. A second concentration of wells is located on the lowlands north of the Center in the vicinity of Bond Road and Thomas Corners Road. The wells are upgradient of or are otherwise hydraulically isolated from groundwater at the site (WVNS 2000b).

Water supplies north of the Western New York Nuclear Service Center and south of Cattaraugus Creek derive mainly from springs and shallow dug wells completed in Defiance Outwash, which overlie the Lavery till in this area. The distribution of springs and the general geologic relationships indicate that the groundwater system here is perched above the Lavery and that flow patterns are much the same as those that characterize the North Plateau at the WVDP. This hydrostratigraphic unit clearly is disconnected from the WVDP both hydraulically and topographically. Nonetheless, water supplies developed from bedrock wells in this same area downstream and downgradient of the WVDP might be hydraulically connected to water originating on the site via the surface water system and shale exposures in the lower reaches of Buttermilk Creek (WVNS 2000b).

Supply wells on the uplands bordering the Western New York Nuclear Service Center, such as along Route 240 and Dutch Hill Road, are completed in bedrock. A nominal 15 meters (50 feet) of till overlie a fractured bedrock aquifer on the summit levels west of the site; a comparison of screen depths and static water levels indicate that the aquifer is confined (WVNS 2000b). A similar situation exists on the uplands east of the Center, except that most of these wells intersect from 20 to 45 meters (66 to 150 feet) of the Kent till and ground moraine layers above their completion depths in shale bedrock. Groundwater supplies in both of these areas can be assumed to be isolated hydraulically from groundwater in bedrock at lower elevations beneath the Center and the WVDP (WVNS 2000b).

The Lavery till and underlying lacustrine sequence currently are not drawn upon for groundwater supplies, and there is no reason to anticipate that the till, given its hydraulic properties, ever will be considered a source of groundwater (WVNS 2000b).

3.3 METEOROLOGY AND AIR QUALITY

The WVDP is situated approximately 50 kilometers (30 miles) inland from the eastern end of Lake Erie in western New York State. The climate of western New York State is of the moist continental type prevalent in the northeastern United States. The climate is diverse due to the influence of several atmospheric and geographic factors or controls (WVNS 2000b).

Western New York is exposed to a variety of air masses. Cold dry air masses that form over Canada reach the area from the northwesterly quadrant. Prevailing winds from the southwest and south bring warm, humid air masses from the Gulf of Mexico and neighboring waters of the subtropical Atlantic

Ocean. On occasion, cool, cloudy, and damp weather affects western New York through airflow from the east and northeast (WVNS 2000b).

The prevailing wind direction is southwesterly, and windspeed averages approximately 5.4 meters per second (12 miles per hour). The strongest winds occur from November through March and are generally southwesterly to west-southwesterly (DOE 1996). Figures 3-3 and 3-4 characterize the wind conditions for calendar year 2000 from onsite monitoring stations at 10 meters (33 feet) and 60 meters (197 feet) from the ground.

Western New York is bordered by two of the Great Lakes: Lake Erie on the west and Lake Ontario on the north. These exert a major controlling influence on the climate of the region. Topography also affects the climate. Elevations in western New York range from about 110 meters (350 feet) along the Lake Ontario shore in Oswego County to more than 610 meters (2,000 feet) in the southwestern highlands of Cattaraugus and Allegheny counties. The lake plain extends inland about 40 kilometers (25 miles) from Lake Ontario, but along Lake Erie it gradually narrows from about 16 kilometers (10 miles) in the Buffalo area to 8 kilometers (5 miles) or less in Chautauqua County. The southern two-thirds of the region is composed of hilly, occasionally rugged terrain with elevations generally above 300 meters (1,000 feet). This area is interspersed with numerous river valleys and gently sloping plateau areas. Such topographic features may produce locally significant variation of climatic elements within relatively short distances.

The winter climate of western New York is marked by abundant snowfall. The areas with the lightest snowfall, with average seasonal accumulations of 102 to 127 centimeters (40 to 50 inches), are the lower Chemung Valley, the western Finger Lakes, and northern Niagara County. The heaviest snowfall occurs in the eastern lee of Lake Erie, where the average total is in excess of 305 centimeters (120 inches). The snow season normally begins in mid-November and extends into mid- or late-March (WVNS 2000b).

Snowfall produced in the eastern lee of Lake Erie is a distinguishing and very important feature of western New York's climate. Heavy snow squalls frequently occur, producing from 0.3 to 0.6 meter (1 to 2 feet) of snow and occasionally as much as 1.2 meters (4 feet). Counties to the lee of Lake Erie are subject to these lake-effect snows in November and December, but in mid-winter, as the lake gradually freezes, these snows become less frequent. Areas south of Lake Ontario are exposed to heavy snow squalls well into February, as the lake generally retains considerable open water through the winter months (WVNS 2000b).

The summer season is cool in the southwestern highland but warm elsewhere. High temperatures and high humidity are infrequent during the summer and seldom persist for more than a few days at a time. Readings of 38 degrees Celsius (100 degrees Fahrenheit) or higher are rare. The range of temperature on summer days is commonly from 15 degrees Celsius (60 degrees Fahrenheit) at night to 27 degrees Celsius (the low 80s) in the afternoon (WVNS 2000b).

Summer season precipitation increases to the south, ranging from about 20 centimeters (8 inches) along the Lake Ontario shore to 25 to 30 centimeters (10 to 12 inches) in the counties along the Pennsylvania border. Showers and thundershowers account for much of the warm season rainfall, and the distribution pattern reflects the contrasting influences of the cool Lake Ontario waters to the north and the hilly terrain in the Southern Tier (WVNS 2000b).

The autumn season is marked by frequent periods of sunny, dry weather. With less cloud cover, temperatures from mid-September to mid-October frequently rise to between 15 degrees Celsius and 26 degrees Celsius (60 and 79 degrees Fahrenheit) in the daytime and cool to 1 degree Celsius below zero and 6 degrees Celsius (30s and low 40s Fahrenheit) at night. The comparatively warm waters of the

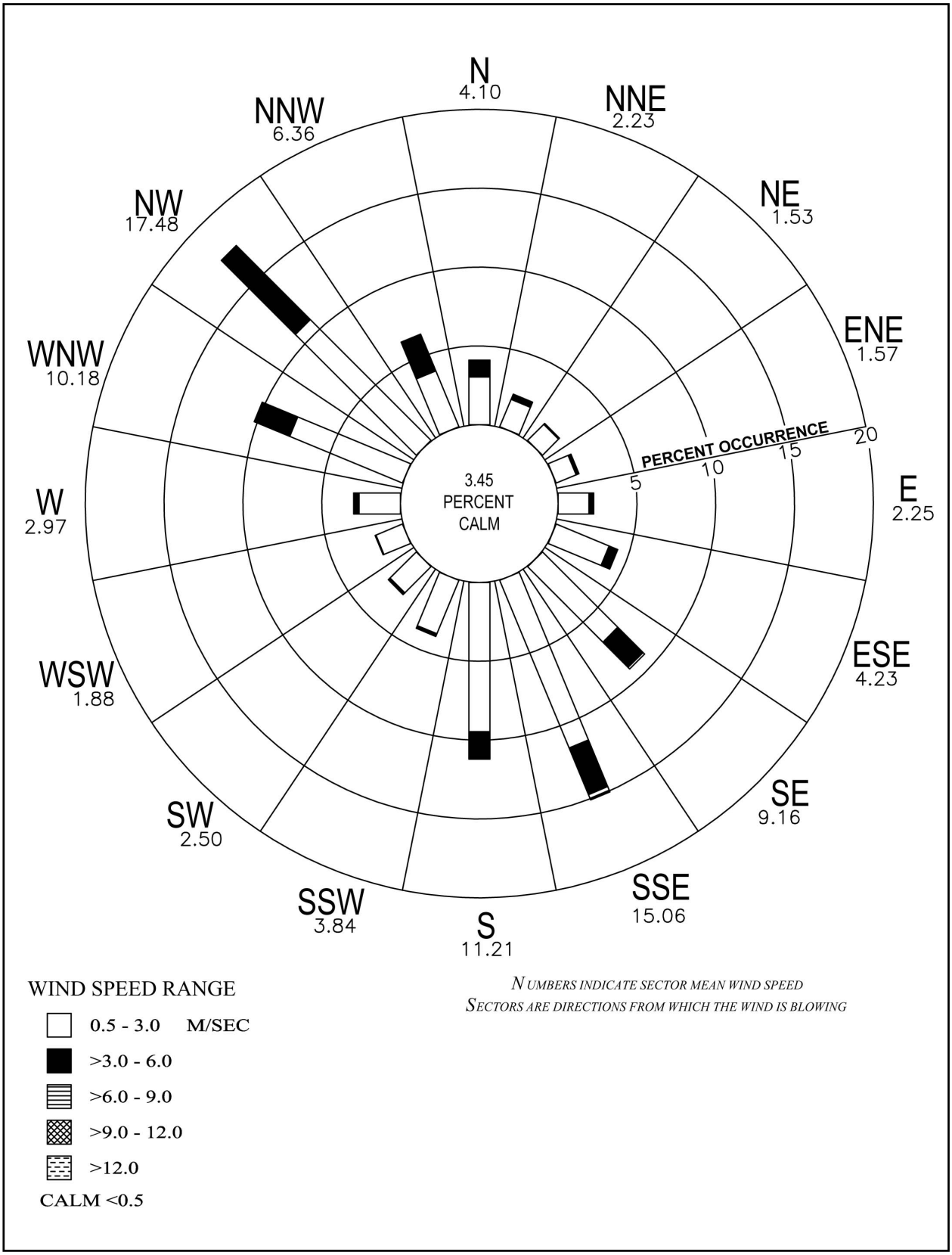

Figure 3-3. 10-Meter Wind Frequency Rose

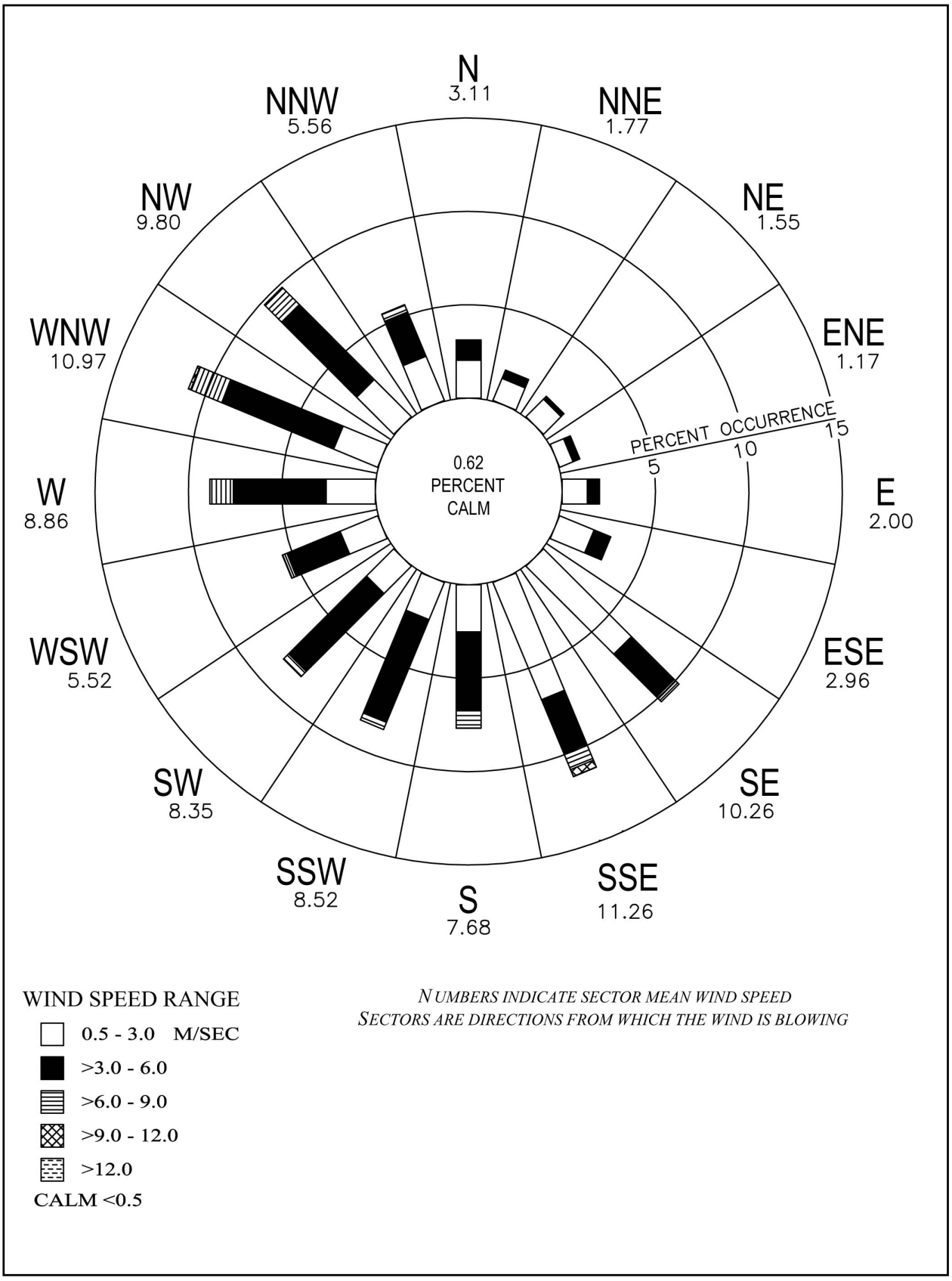

Figure 3-4. 60-Meter Wind Frequency Rose

Great Lakes reduce cooling at night to the extent that freezing temperatures in lakeside counties are normally delayed until mid-October or later (WVNS 2000b).

3.3.1 Severe Weather

The lack of significant amounts of recorded data at and near the West Valley site make it difficult to assess past occurrences of extreme winds. Large-scale factors such as intense low-pressure systems passing near the area have produced winds in excess of 27 meters per second (60 miles per hour) at Buffalo, New York, and would probably lead to similar conditions at the WVDP. Strong winds associated with the remnants of tropical storms and hurricanes do occasionally occur in western New York, but damaging winds due to these storms are extremely rare.

Locally, severe thunderstorms would be the most likely event to cause wind damage at the site, particularly in late spring and summer. Thunderstorms occur about 30 days per year, with the most thunderstorms occurring in June, July, and August. Severe thunderstorms, with winds in excess of 22 meters per second (50 miles per hour), do occur in western New York every year (WVNS 1993c).

The frequency and intensity of tornadoes in western New York are low in comparison to many other parts of the United States. An average of about two tornadoes of short and narrow path length strike New York State each year. From 1950 to 1990, 17 tornadoes were reported within 80 kilometers (50 miles) of the WVDP site (WVNS 2000b).

3.3.2 Ambient Air Quality

New York is divided into nine regions for assessing state ambient air quality. The WVDP site is located in Region 9, which is comprised of Niagara, Erie, Wyoming, Chatauqua, Cattaraugus, and Allegany counties. The WVDP site and the surrounding area in Cattaraugus County are in attainment with the National Primary and Secondary Ambient Air Quality Standards contained in 40 CFR 50 and New York State air quality standards contained in 6 NYCRR 257. The city of Buffalo, located about 48 km (30 mi) from the WVDP site, is a marginal nonattainment area for ozone (EPA 2002).

Air emissions of radionuclides from WVDP, are regulated by the EPA under the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, 40 CFR Part 61, Subpart H, National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities. Annual reporting of the radionuclide emissions for calendar year 2000 was less than 0.1 percent of EPA's standards (WVNS 2001).

Current WVDP operations use two Cleaver Brooks boilers. These boilers are used to generate steam for heating and other processes at the site, and each have a capacity of 20.2 million British thermal units per hour. Together, these boilers use about 2 million cubic meters (70 million cubic feet) of natural gas and about 24,000 liters (6,300 gallons) of No. 2 fuel oil per year, and emit some criteria pollutants - nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter. The other two criteria pollutants, lead and ozone, are produced in insufficient quantities by the boilers for consideration in this analysis.

As shown in Table 3-1, the concentrations of criteria pollutants from the WVDP site emissions are well below the National Primary and Secondary Ambient Air Quality Standards contained in 40 CFR 50 and the New York State air quality standards contained in 6 NYCRR 257. It should be noted that the background concentrations used in Table 3-1 were from near Buffalo, New York; actual background concentrations near the WVDP site would be lower. WVDP emissions of nitrogen dioxide and sulfur dioxide are also well below the New York State Department of Environmental Conservation's annual

Table 3-1. Criteria Pollutant Concentrations from WVDP Boiler Emissions and Regional Background

Criteria Pollutant	Averaging Time	Standard[a,b]	Concentration From WVDP Emissions[b,c]	Background Concentration[b,d]	Total Concentration[b]	Percent of Standard
Nitrogen dioxide	Annual	100[g,h,i] (0.053 ppm)	1.5	41	42	42
Carbon monoxide	1 hour	40,000[g,i] (35 ppm)	15	5,800	5,800	14
Carbon monoxide	8 hours	10,000[g,i] (9 ppm)	11	3,200	3,200	32
Sulfur dioxide	Annual	80[g,i] (0.03 ppm)	0.10	17	17	22
Sulfur dioxide	24 hours	365[g,i] (0.14 ppm)	0.50	63	64	17
Sulfur dioxide	3 hours	1,300[h,i] (0.5 ppm)	1.1	160	160	12
Particulate matter[e]	Annual	50[g,h]	0.11	21	21	42
Particulate matter[f]	24 hours	150[g,h]	0.56	61	61	41
Ozone	1 hour	235[g,h] (0.12 ppm)	(--)	210	210	89
Lead	Quarterly	1.5[g,h]	(--)	0.03	0.03	2

a. Standards from 40 CFR 50, National Primary and Secondary Ambient Air Quality Standards and 6 NYCRR 257, Air Quality Standards. Comparisons to the standards for particulate matter with an aerodynamic diameter less than 2.5 micrometers and the 8-hour ozone standard were not made because these standards have been remanded to the U.S. Environmental Protection Agency by the U.S. Court of Appeals.
b. Units in micrograms per cubic meter. Parts per million not calculated for substances that do not exist as a gas or vapor at normal room temperature and pressure.
c. The maximum criteria pollutant concentrations from WVDP boiler emissions were located 1,379 meters (4,524 feet) from the WVDP site.
d. Source: EPA 2001. Background concentrations were measured near Buffalo, New York.
e. Annual state standard is 45 to 75 micrograms per cubic meter according to level designation.
f. 24-hour state standard is 250 micrograms per cubic meter.
g. National primary ambient air quality standard.
h. National secondary ambient air quality standard.
i. New York State air quality standard.

emission cap of 90,700 kilograms (100 tons). Additionally, all other conditions of the permit continue to be met for other criteria pollutants (WVNS 2001). A more detailed analysis of these emissions is included in Section C.9 of this EIS.

3.4 ECOLOGICAL RESOURCES

This section describes the existing ecology at the Project Premises and surrounding areas.

The Western New York Nuclear Service Center lies within the northern hardwood forest region. Its climax community forests are characterized by the dominance of sugar maple, beech, and Eastern hemlock. At present, the site is about equally divided between forestland and abandoned farm fields. Plant communities found on the site have been categorized into five cover types: mixed hardwood forest, pine-spruce community, successional creek bank communities, late oldfield successional areas, and fields-meadows. The plant communities found on the site are characteristic of western New York. The relatively undisturbed nature of large portions of the Western New York Nuclear Service Center has allowed for natural succession of previous agricultural areas within its boundaries. Because neither the