# Ozone Monitoring Data Report

Phil Girton, Vermont Monitoring Cooperative
Rich Poirot, Air Pollution Control, Vermont Department of Environmental Conservation

Cooperators:
Vermont Department of Environmental Conservation (DEC) and the Green Mountain National Forest (GMNF)

Abstract:

Continuous ozone monitoring has been conducted at the VMC Mount Mansfield site and near the Lye Brook Wilderness Area. The work is a fundamental component of the monitoring and research activities there, providing basic information on the chemical environment.

The Vermont Department of Environmental Conservation has operated ozone monitoring stations in Bennington since April 1986 and in Underhill since 1988. CASTNet has been operating since 1994, just south of the Lye Brook Wilderness Area, providing hourly measurement of ozone concentrations.

Ozone concentration data and calculated metrics are summarized and compared between sites.

Objectives:

Continuous monitoring, at the VMC Mount Mansfield site and near the Lye Brook Wilderness Area, of the ozone concentration. Summary of data from the ozone monitoring program.

Methods:

The Vermont Department of Environmental Conservation's Air Pollution Control Division began monitoring hourly ozone concentration at the Proctor Maple Research Center (PMRC) and in Bennington to determine compliance with (1 hour) National Ambient Air Quality Standards. These stations operate from April 1st to October 31st.

The CASTNet station monitors hourly ozone level to provide air quality data specific to the Lye Brook Wilderness Area, a Class I Wilderness Area, to support research on the effects of air pollution on the Air Quality Related Values (AQRV) of the wilderness area. This station operates from May 1st to September 30th.

The following daily metrics were calculated from the hourly ozone concentration

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| ξ Average Hourly Ozone (ppb) | Daily average ozone concentration |
| ξ Maximum Hourly Ozone (ppb) | Maximum daily ozone concentration |
| ξ Minimum Hourly Ozone (ppb) | Minimum daily ozone concentration |
| ξ Daytime Mean Hourly Ozone (ppb) | Mean hourly ozone concentration between 6:00 AM and 6:00 PM. |
| Daytime Sum04 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum04 is the sum of concentrations greater than and equal to 0.04 ppm for that day. It provides an indication of the total ozone impact between 6:00 AM and 6:00 PM. |
| Daytime Sum05 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum05 is the sum of concentrations greater than and equal to 0.05 ppm for that day. It provides an indication of the total ozone impact between 6:00 AM and 6:00 PM. |
| ξ Daytime Sum06 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum06 is the sum of concentrations greater than and equal to 0.06 ppm for that day. It provides an indication of the total ozone impact between 6:00 AM and 6:00 PM. |
| Daytime Sum08 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum08 is the sum of concentrations greater than and equal to 0.08 ppm for that day. It provides an indication of the total ozone impact between 6:00 AM and 6:00 PM. |
| ξ Daytime Sum12 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum12 is the sum of concentrations greater than and equal to 0.12 ppm for that day. It provides an indication of the total ozone impact between 6:00 AM and 6:00 PM. |
| ξ Nighttime Mean Hourly Ozone (ppb) | Mean hourly ozone concentration from 6:00 PM on the date given until 6:00 AM on the following day. |
| ξ Nighttime Sum04 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum04 is the sum of concentrations greater than and equal to 0.04 ppm for that day. It provides an indication of the total ozone impact .from 6:00 PM on the date given until 6:00 AM on the following day. |

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| ξ Nighttime Sum05 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum05 is the sum of concentrations greater than and equal to 0.05 ppm for that day. It provides an indication of the total ozone impact .from 6:00 PM on the date given until 6:00 AM on the following day. |
| ξ Nighttime Sum06 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum06 is the sum of concentrations greater than and equal to 0.06 ppm for that day. It provides an indication of the total ozone impact .from 6:00 PM on the date given until 6:00 AM on the following day. |
| ξ Nighttime Sum08 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum08 is the sum of concentrations greater than and equal to 0.08 ppm for that day. It provides an indication of the total ozone impact .from 6:00 PM on the date given until 6:00 AM on the following day. |
| ξ Nighttime Sum12 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum12 is the sum of concentrations greater than and equal to 0.12 ppm for that day. It provides an indication of the total ozone impact .from 6:00 PM on the date given until 6:00 AM on the following day. |
| ξ Cumulative Sum04 (ppm-hr) | Plants are effected by chronic ozone exposure Cumulative Sum04 is the sum of concentrations greater than and equal to 0.04 ppm for the year to date. |
| ξ Hours >40 ppb | Total number of hours with ozone concentration greater than 40 ppb. |
| Sum04 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum04 is the sum of concentrations greater than and equal to 0.04 ppm for that day. It provides an indication of the total ozone impact. |
| ξ Cumulative Sum05 (ppm-hr) | Plants are effected by chronic ozone exposure Cumulative Sum05 is the sum of concentrations greater than and equal to 0.05 ppm for the year to date. |
| ξ Hours >50 ppb | Total number of hours with ozone concentration greater than 50 ppb. |

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| ξ Sum05 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum05 is the sum of concentrations greater than and equal to 0.05 ppm for that day. It provides an indication of the total ozone impact. |
| ξ Cumulative Sum06 (ppm-hr) | Plants are effected by chronic ozone exposure Cumulative Sum06 is the sum of concentrations greater than and equal to 0.06 ppm for the year to date. |
| ξ Hours >60 ppb | Total number of hours with ozone concentration greater than 60 ppb. |
| ξ Sum06 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum06 is the sum of concentrations greater than and equal to 0.06 ppm for that day. It provides an indication of the total ozone impact. |
| ξ Cumulative Sum08 (ppm-hr) | Plants are effected by chronic ozone exposure Cumulative Sum08 is the sum of concentrations greater than and equal to 0.08 ppb for the year to date. |
| ξ Hours >80 ppb | Total number of hours with ozone concentration greater than 80 ppb. |
| Sum08 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum08 is the sum of concentrations greater than and equal to 0.08 ppm for that day. It provides an indication of the total ozone impact. |
| ξ Sum12 (ppm-hr) | Plants are suspectible to different levels of ozone concentration. Sum12 is the sum of concentrations greater than and equal to 0.12 ppm for that day. It provides an indication of the total ozone impact. |
| ξ Hours >80 ppb | Total number of hours with ozone concentration greater than 120 ppb. |

Results are presented in the following figures:

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| Figure 1: Four Highest Daily 1 Hour Maximum Ozone Values | Highest hourly ozone concentration and Date/Time of occurrence are presented. |
| Figure 1a: 3 Year Comparison of Four Highest Daily 1 Hour Maximum Ozone Values | A graphical comparison of ozone highest ozone levels. |
| Figure 2: Daily Values | The maximum daily measurement for the year with the exception of Minimum Hourly Ozone. |

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| Figure 3: Cumulative Effects | Graphs comparing the cumulative ozone exposure for Sum04, Sum05, Sum06 and Sum08 between sites for the year. |
| Figure 4: Monthly Average and Maximum One Hour Ozone Values | Graph of monthly average and maximum ozone concentration for each site. |
| Figure 5: Weekly Values | Weekly average, maximum, minimum and toal values for metrics. |
| Figure 6: Annual Average Diurnal Pattern | Average ozone concentration for specific hour in the day. Averaged for the entire year for each site. |
| Figure 7: Monthly Average Diurnal Pattern | Average ozone concentration for specific hour in the day. Averaged for the the entire month for the year. |