

Use of NOAA Atlas 14 with AHYMO Type 1 and 2 Rainfall Distributions

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This application note describes the procedure to obtain accurate representation of *NOAA Atlas 14*, 10-min and 15-min rainfall with the Type 1 and Type 2 rainfall distributions in the AHYMO program.

With AHYMO-S4: The rainfall distributions TYPE=1 and TYPE=2 contained within the RAINFALL command of the current version of the AHYMO program (AHYMO-S4) are based on a *NOAA Atlas 14* (Bonnin et al, 2006) distribution where the 10-minute precipitation is 48.4% of the 1-hour precipitation and the 15-minute precipitation is 60.0% of the 1-hour precipitation. The *NOAA Atlas 14* distribution is automatically implemented when TYPE=1 or TYPE=2 distributions are specified in the RAINFALL command of the AHYMO-S4 program.

With AHYMO 97: The rainfall distributions TYPE=1 and TYPE=2 contained within the RAINFALL command of the previous version of the AHYMO program (AHYMO_97) were based on a *NOAA Atlas 2* (Miller et al, 1972) distribution where the 10-minute precipitation is 45% of the 1-hour precipitation and the 15-minute precipitation is 57% of the 1-hour precipitation. *NOAA Atlas 14* (Bonnin et al, 2006) is based on the 10-minute precipitation at 48.4% of the 1-hour precipitation and the 15-minute precipitation at 60.0% of the 1-hour precipitation. The following table presents the information from *NOAA Atlas 14*.

Table 4.1.3. N-minute ratios: 5-, 10-, 15- and 30-Minute to 60-Minute

	5-min	10-min	15-min	30-min
<i>NOAA Atlas 14</i> Volume 1	0.318	0.484	0.600	0.808
<i>NOAA Atlas 2</i>	0.29	0.45	0.57	0.79
<i>Arnell and Richards</i> , 1986	0.34	0.52	0.62	0.82

When using the earlier program version, AHYMO_97, it was necessary that 10 and 15-minute rainfall quantities be adjusted to be accurately represented in the computer model and obtain accurate urban storm water peak flow rates. With AHYMO_97, the *NOAA Atlas 2* distribution was included in the RAINFALL command (Distribution TYPE=1 and TYPE=2), and the one hour *NOAA Atlas 14* values could only be obtained by multiplying the P60 (60-minute rainfall) 1.064. This is "Procedure A" with the equation:

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$$P60 = \text{NOAA 14 @ 60 min} \times 1.064$$

where P60 is the one hour rainfall used as AHYMO_97 input.

An alternative method that uses the 10 and 15-minute values from *NOAA Atlas 14* could also be used. This is “Procedure B” with the equation:

$$P60 = [(\text{NOAA 14 @ 10 min} / 0.45) + (\text{NOAA 14 @ 15 min} / 0.57)] \times 0.5$$

Both Procedure A and Procedure B gave nearly the same value for P60. Only the one hour value (P60) needed to be adjusted when applying the *NOAA Atlas 14* data in the AHYMO_97 program. The six hour rainfall (P360) and one day rainfall (P1440) from *NOAA Atlas 14* was applied to the RAINFALL command without modification. If *NOAA Atlas 2* values were evaluated for a historic analysis, no adjustment was needed. The P60 adjustment specified in this section is not applicable to the RAINFALL command (TYPE=1 or TYPE=2) in the AHYMO-S4 program, because the *NOAA Atlas 14* distribution values are automatically applied with the AHYMO-S4 program.

The National Weather Service, Hydrometeorological Design Studies Center internet web page states that Volumes 4, 6, 7 and 8 (for New Mexico, Utah, Nevada and Arizona) of *NOAA Atlas 2* “have been superseded by *NOAA Atlas 14*” (<http://www.nws.noaa.gov/ohd/hdsc/currentpf.htm>) and *NOAA Atlas 2* data for New Mexico can no longer be obtained from the NWS internet site. *NOAA Atlas 2* precipitation frequency maps for New Mexico, Utah, Nevada and Arizona continue to be available from the Western Regional Climate Center, Desert Research Institute (<http://www.wrcc.dri.edu/pcpnfreq.html>). For hydrologists and engineers preparing hydrologic analyses in the *NOAA Atlas 14* area, it is recommended that they seek guidance from reviewing agencies.

References:

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- Miller, J. F., Frederick, R. H., and Tracey, R. J. (1973). “Precipitation-Frequency Atlas of the Western United States, Volume IV, New Mexico” U.S. Department of Commerce, National Weather Service, *NOAA Atlas 2*, Silver Spring, Maryland.