

STORM BULLETIN 15

SPECIFYING EFFECTIVE SEDIMENT WASH-OFF EVENTS

A 1972 EPA demonstration project by Sartor & Boyd included simulated sediment wash-off events on new asphalt pavement. Events were 1.5 hours in duration at constant rainfall intensity. The mass of fine sand wash-off at a rainfall intensity of 0.80"/hr was approximately 60 times greater than at a rainfall intensity of 0.20"/hr. This suggests that the mass of wash-off approximately increases with the cube of the rainfall intensity. In addition, only a minute fraction of the available sediment was washed off at rainfall intensity of 0.20"/hr. While for an intensity of 0.80"/hr, the wash-off of fine sand and silt was essentially complete within 10-15 minutes.

Based on this work, a reasonable specification for an effective wash-off event is a rational method intensity of 0.80"/hr and peak rational method runoff flow of 0.70 ft³/sec/impervious acre. Using NRCS TR-55 and the NRCS SCS Curve Number for a Type 2 storm, the equivalent peak flow correlation would be 1.4 ft³/sec /impervious acre/inch runoff and 0.50" of runoff. The table below suggests that this type of event could occur approximately 7 times per year.

The key point of this rationale is that throughout the annual spectrum of rainfall events, only certain events have adequate intensity to generate significant sediment wash-off. Basing treatment capacity on the percent of annual rainfall volume treated does not necessarily include these events. This is also the case when establishing treatment capacity on the "90%" event.

When calculating peak runoff, one can use an elaborate computer model. However, the variability and unpredictability of rainfall and sediment wash off do not justify this level of complexity. Simplified correlations such as those given above give a reasonable approach and should be used whenever possible. An important benefit of simplified correlations is that the design can be easily reviewed by outside parties.

TYPICAL ANNUAL RAINFALL DISTRIBUTION FOR NORTHEAST UNITED STATES

The 10-yr summary of 2-hr rainfall samples from the northeastern United States has been used to develop a typical "annual rainfall process". NRCS SCS runoff has been calculated for the impervious area (pervious area runoff can be assumed to be insignificant for minor storm events at sites with over 70% impervious area):

Samples per year	120	17	7	3	2	0.7	0.6	0.5	0.4	0.3
Per Cent of Total Rainfall, inches	78	10	4.7	2	1.3	0.5	0.40	0.3	0.25	0.2
SCS runoff, inches	0.11	0.32	0.55	0.79	1.04	1.28	1.53	1.78	2.03	2.28