APPENDIX

N. A Rationale for Stormwater Rule Standards

N. A RATIONALE FOR STORMWATER RULE STANDARDS

The following is an excerpt from a paper titled "The Evolution of Florida's Stormwater / Watershed Management Program" by Eric H. Livingston, FDEP.

The overriding standards of the Stormwater Rule are the state's water quality standards and appropriate regulations established in other FDEP rules. Therefore, an application for a stormwater discharge permit must provide reasonable assurance that stormwater discharges will not violate state water quality standards. Because of the potential number of discharge facilities and the difficulties of determining the impact of any facility on a waterbody or the latter's assimilative capacity, the Department decided that the Stormwater Rule should be based on design and performance standards.

The performance standards established a technology-based effluent limitation against which an applicant can measure the proposed treatment system. Compliance with the rule's design criteria created a presumption that the desired performance standards would be met which, in turn, provided a rebuttable presumption that water quality standards would be met. If an applicant wanted to use Best Management Practices (BMPs) other than those described in the rule, then a demonstration must be made that the BMP provides treatment that achieves the desired pollutant removal performance standard. The actual design and performance standards are based on a number of factors which will subsequently be discussed.

1. Stormwater Management Goals - Stormwater management has multiple objectives including water quality protection, flood protection (volume, peak discharge rate), erosion and sediment control, water conservation and reuse, aesthetics and recreation. The basic goal for new development is to assure that the post-development peak discharge rate, volume, timing and pollutant load does not exceed pre- development levels. However, BMPs are not 100% effective in removing stormwater pollutants while site variations can also make this goal unachievable at times. Therefore, for the purposes of stormwater regulatory programs, the Department (water quality) and the state's regional Water Management Districts (flood control) have established performance standards based on risk analysis and implementation feasibility.

2. Rainfall Characteristics - An analysis of long term rainfall records was undertaken to determine statistical distribution of various rainfall characteristics such as storm intensity and duration, precipitation volume, time between storms, etc. It was found that nearly 90% of a year's storm events occurring anywhere in Florida produce a total of 1 inch of rainfall or less. Also, 75% of the total annual volume of rain falls in storms of 1-inch or less. Finally, the average inter-event time between storms is approximately 80 hours (5).

3. Runoff Pollutant Loads - The first flush of pollutants refers to the higher concentrations of storm water pollutants that characteristically occur during the early part of the storm with concentrations decaying as the runoff continues. Concentration peaks and decay functions vary from site to site depending on land use, the pollutants of interest, and the characteristics of the drainage basin. Florida studies (6, 7) indicated that for a variety of land uses the first .5 inch of runoff contained 80-95 percent of the total annual loading of most stormwater pollutants. However, first flush effects generally diminish as the size of the drainage basin increases and the percent impervious area decreases because of the unequal distribution of rainfall over the watershed and the additive phasing of inflows from numerous small drainages in the larger watershed. In fact, as the drainage area increases in size above 100 ac the annual pollutant load carried in the first flush drops below 80% because of the diminishing first flush effect.

4. BMP Efficiency and Cost Data - Numerous studies conducted in Florida during the Section 208 program generated information about the pollutant removal effectiveness of various BMPs and the costs of BMP construction and operation. Analysis of this information revealed that the cost of treatment increased exponentially after “secondary treatment” (removal of 80% of the annual load) (8).

   Selection of Minimum Treatment Levels - After review and analysis of the above information, and after extensive public participation, the Department set a stormwater treatment objective of removing at least 80% of the average annual pollutant load for stormwater discharges to Class III (fishable/swimmable) waters. A 95% removable level was set for storm water discharges to sensitive waters such as potable supply waters (Class I), shellfish harvesting waters (Class II) and Outstanding Florida Waters. The Department believed that these treatment levels would protect beneficial users and thereby establish a relationship between the rule’s BMP performance standards and water quality standards.

References:

5. Wanielista, M.P., et. al. Precipitation, Inter-event Dry Periods, and Reuse Design Curves for Selected Area of Florida. Final report submitted to Florida Department of Environmental Regulation, 1991.

6. Wanielista, M.P., et. al. Stormwater Management Practices Evaluations. Reports submitted to East Central Florida Regional Planning Council, 1977.

7. Miller, R.A. Percentage Entrainment of Constituent Loads in Urban Runoff, South Florida, USGS WRI Report 84-4329, 1985.

8. Wanielista, M.P., et. al. Stormwater Management Manual. Prepared for Florida Department of Environmental Regulation, 1982.