



Maryland Department of the Environment Water Management Administration

Evaluation Process for BNR/ENR Upgrades of Wastewater Treatment Plants

Presented to the Chesapeake Bay Restoration Fund Advisory Committee
by

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Biological Nutrient Removal Program (BNR)

- **Year 1985 ~ Year 2003: BNR Implementation Era**
- **Removal from 40mg/l ~ 60mg/l of total nitrogen to 8mg/l of total nitrogen (TN) as “N” on an annual average basis.**
- **Removal from 6mg/l ~ 8mg/l of total phosphorus to 2mg/l of total phosphorus as “P” on an annual average basis.**
- **Nutrient goals for 66 major wastewater treatment plants with a capacity of 0.5 mgd or greater.**
 - Explicit goal for nitrogen – 8mg/l of Total Nitrogen (TN) as “N”
 - Implicit goal for phosphorus – 2mg/l of Total Phosphorus (TP) as “P”
- **The State of Maryland has been providing about \$500 million of BNR grant funds on a 50%/50% cost sharing basis for the total project cost associated with treatment processes that perform BNR functions.**



Enhanced Nutrient Removal Program (ENR)

- **Year 2004 ~ Year 2010: ENR Implementation Era**
- **Nutrient goals were set for 66 major wastewater treatment plants as the first priority.**
 - Explicit goal for nitrogen – 3.0mg/l of total nitrogen (TN) as “N”
 - Note: ENR process is designed to meet 3.0mg/l TN at the designed capacity.
 - TN loading for each WWTP is capped at a specific total load per year that is equivalent to 4.0mg/l on the average annual basis.
 - Explicit goal for phosphorus – 0.3mg/l of total phosphorus (TP) as “P”
- **The wastewater treatment technologies for ENR process must be practical, obtainable, affordable, and cost-effective so as to remove total nitrogen from 8mg/l in the BNR effluent to 3mg/l and to remove total phosphorus from 2mg/l in the BNR effluent to 0.3mg/l.**
- **Maryland has established “Restoration Fund for the Chesapeake Bay Watershed Basin” to fund 100% of cost for ENR eligible items by levying a monthly fee of \$2.50 per household (\$30 per year), or \$2.50 for an equivalent of 250 gallons per day from the non-residential communities.**



Procedural Requirements of Technical Review

- Design capacity for growth shall be consistent with County Comprehensive Water & Sewerage Plans.
- Design capacity shall be consistent with the NPDES permit.
- Design capacity for significant facilities shall meet the following two conditions:



Procedural Requirements of Technical Review

1. A discharge permit was issued based on the plant capacity, or a letter was issued by MDE to the jurisdiction with design effluent limits based on the new capacity as of April 30, 2003.
2. Planned capacity was either:
 - (a) Consistent with the MDE-approved County Comprehensive Water and Sewerage Plan as of April 30, 2003, or
 - (b) As shown in the locally-adopted Comprehensive Water and Sewerage Plan Update; or
 - (c) Amendment to the County Comprehensive Water and Sewerage Plan, which were under review by MDE as of April 30, 2003.



Procedural Requirements of Technical Review

- If an innovative technology is proposed for BNR/ENR, a high degree of the process reliability must be substantiated and the future dependability on the manufacturers for parts must be minimized.
 - A pilot study on the innovative technology may be warranted, if and only if such a technology, at the judgment of MDE, proves to be cost effective and operational friendly.
- Design criteria of each unit process, and the capacity of major equipment specified must be shown on the plan and/or in the specifications.
 - Design criteria shall be presented in such a manner that it will be differentiable between approved design capacity of the plant that is eligible for grant and the expanded capacity for the design.



Eligibility for BNR/ENR Grant Participation

- Submission of the cost estimate on each new item/unit process included in the design with cost breakdown of the item/unit process equivalent to the eligible design capacity approved for the BNR/ENR grant participation and the expanded design capacity.
- Eligible items for grant participation will be limited to the process directly related to the functional requirement for the BNR at the rated plant capacity and the ENR at the approved design capacity.
 - The local share shall cover the cost related to secondary treatment facilities for the growth.



Eligibility for BNR/ENR Grant Participation

- The degree of grant participation on common items such as the costs for bid bond, insurance, mobilization/demobilization, yard piping, electrical modifications, etc. will be assessed on the pro-ration of grant eligibility factor calculated for other eligible items.
- Filtration process or de-nitrification filter process will be eligible only for ENR performance of the plant.
- Partial participation in sludge thickening, sludge digestion, sludge dewatering may be assessed on a case-by-case basis.



Eligibility for BNR/ENR Grant Participation

- The eligible percentage of BNR/ENR grant participation in the contract construction is calculated by the equation:

$$\text{Eligible Percentage of BNR/ENR Grant Participation} = \\ (\text{eligible cost} / \text{total contract cost}) \times 100\%$$

- BNR/ENR grant participation in non-construction activities, such as, planning, design, construction inspection, and contract management will be pro-rated on the same eligible percentage basis of the contract construction previously assessed.
- State Revolving Fund Loan (SRF) will be made available to the BNR/ENR applicants for financing the project up to the maximum amount of the local share on the project.



Evaluations of BNR/ENR Project at Plant Site

- Site evaluation of the proposed BNR/ENR project will be made subsequent to receipt of the feasibility study.
- Site evaluation is intended to assess the actual plant performance and to effectuate the expeditious progress of the project.
 1. Discussion with the plant superintendent to familiarize the plant inadequacy or problems encountered;



Evaluations of BNR/ENR Project at Plant Site

2. Review of the flow charts to determine the sustained peak flow and the peaking factor at the wet season;
3. Evaluation of each BNR/ENR related unit process in respective performance of BOD, TN, and TP removal efficiencies;
4. Assessment of the needs for facilities related to BNR/ENR requirements.
5. Appraisal of BNR/ENR Eligibility.