Denitrification

By: Harvey H. Harper

January 2026

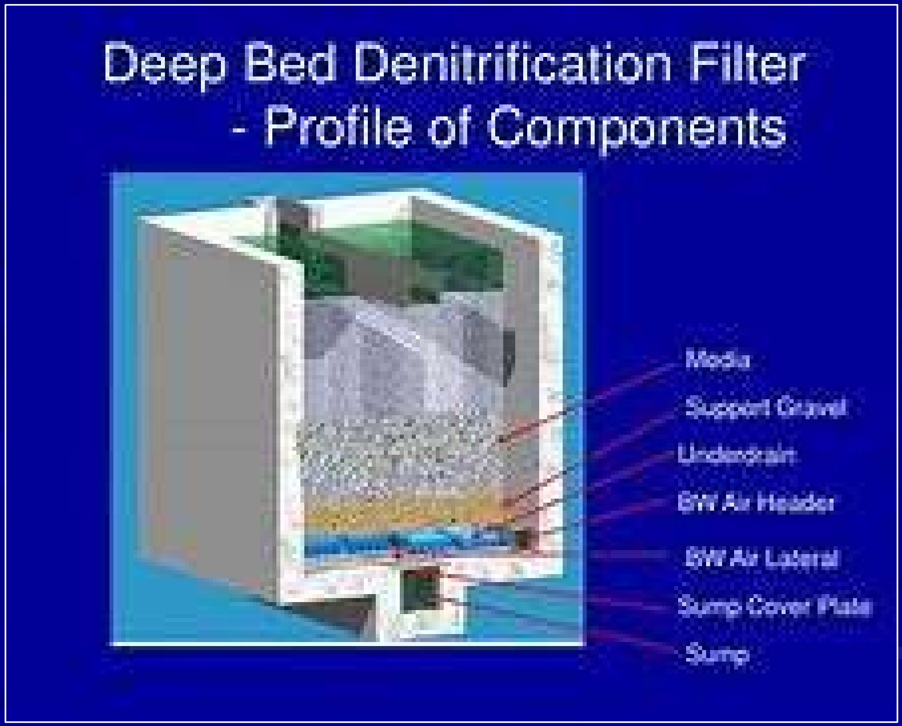
BMPFast

ERD
Water Quality Engineering

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

University of Central Florida

Denitrification

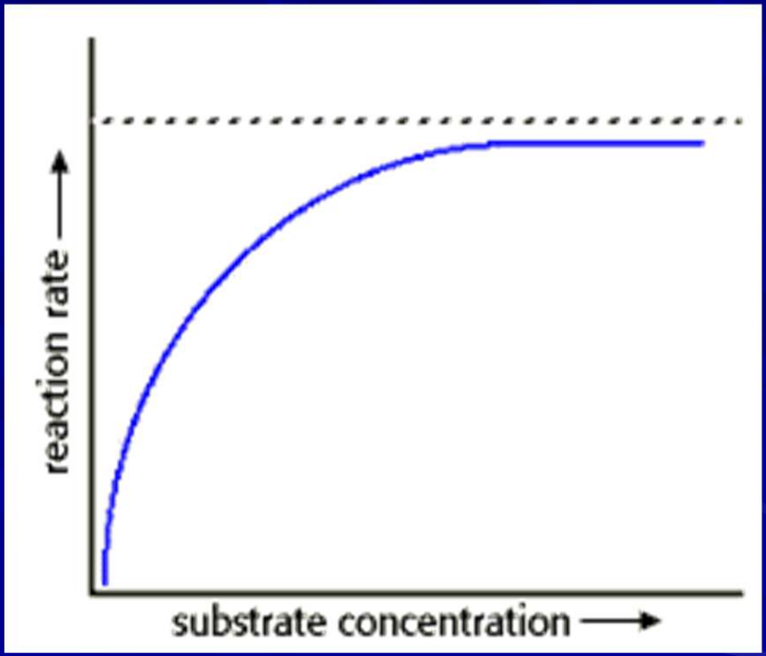


Denitrification Requirements

- Degradable carbon source
  - Carbon source must be easily degradable - BOD
  - WWTPs use simple organics such as methanol and acetic acid
  - Urban runoff generally contains low BOD
- Reduced anoxic environment
  - Minimum redox potential (Eh) of -100 to -200
- Significant nitrate source
  - Urban runoff may not contain sufficient nitrate
- Proper environmental conditions
  - pH
    - Optimum range: 7.0 – 8.5
  - Temperature
    - Optimum range: 5 - 30°C
  - Water-based environment
- Contraindicated conditions
  - High color water with low pH
  - Sources with low nitrate concentrations

Denitrification Requirements – cont.

- Denitrification involves exchange of electrons – redox reaction
  - Carbon source is used as an electron donor
  - Carbon availability can limit denitrification
- Denitrification reaction is a first-order reaction
  - Rate of denitrification decreases logarithmically as nitrate concentrations decrease
  - Slow process
    - ~ 90% complete in 3-4 days
- Nitrate concentration is the single most important factor regulating denitrification rate
  - Optimum denitrification rates: NO_3^- conc. 280 – 840 ug/L
  - Essentially stops at NOx conc. <100 ug/l
- ERD has monitored 4 denitrification beds
  - 3 had insufficient NO_x for denitrification to occur to any significant extent
  - Presence of significant NO_x must be verified prior to design



Denitrification

By: Harvey H. Harper

January 2026

BMPFast

ERD Water Quality Engineering

Florida Department of Environmental Protection

University of Central Florida