

TMDL APPROVAL

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Project:

Roanoke River TMDL for Dissolved Oxygen (DO)

Location:

The TMDL encompasses the mainstem of the Roanoke River in North Carolina from Roanoke Rapids to Hamilton.

Scope/Size:

The water quality model simulates DO concentrations for approximately 74 miles of the mainstem Roanoke River.

Applicable Water Quality Standard(s):

The model represents a fresh water portion of the Roanoke River. The daily average dissolved oxygen standard is 5.0 mg/l.

Water Quality Issue(s):

The water quality model estimates the current carbonaceous and nitrogenous BOD assimilative capacity of the Roanoke River at existing permitted loads and will be used to develop a water quality management strategy that incorporates environmental concerns and population/economic growth issues. Currently, the permitted loads in combination with the headwater loading do not result in violations of the DO criterion.

Water Quality Model:

The QUAL2E model was used to determine the oxygen-consuming waste assimilative capacity of the lower Roanoke River. The model was calibrated using intensive survey data which included time-of-travel data, instream water quality data and effluent data. River cross sections were also measured. The report: "A QUAL2E-UNCAS Application to the Roanoke River from Roanoke Rapids Dam to Hamilton in North Carolina, June 26, 1996", is available for review.

Critical Conditions:

The model was run under critical summer conditions of low flow and warm temperatures. The model was calibrated at 1507 cfs (intensive survey time-of-study average streamflow at NC 48) which is very close to the 1500 cfs minimum release used in the allocation runs. Temperature records for the NC 48 NCDEM ambient station were obtained for the period April-October 1990-1994. The 75th percentile

observed at this station was chosen as the headwater temperature.

TMDL:

The current permit limits in the table below, in combination with the headwater loading, result in a minimum DO concentration of about 6.0 mg/l.

WASTELOAD ALLOCATION (WLA) BREAKDOWN

Receiving Stream	Discharger	Flow MGD	CBODU mg/l (lbs/day)	NH3-N mg/l (lbs/day)
Roanoke River	Champion 003	2.8	-	-
	Champion 001	28.0	279.0 (65,152)	20.0 (4670)
	Champion 002	12.7	-	-
	Champion 004	0.01	-	-
"	Roanoke Rapids WWTP	8.34	140.0 (9738)	20.0 (1391)
"	Weldon WWTP	1.2	46.5 (465)	20.0 (200)
"	Halifax WWTP	0.075	114.0 (71)	20.0 (12.5)
"	Odom WWTP	0.070	45.0 (26)	20.0 (12)
"	Caledonia WWTP	0.8	168.0 (1121)	20.0 (133)
"	Perdue	3.0	130.21 (3258)	16.0 (400)

Load Allocation (LA) Breakdown

The nonpoint source loading was accounted for in the water quality model by using headwater or background conditions based on instream data. The model was run under critical summer conditions of low flow and warm temperatures. The following table summarizes the headwater allocation conditions.

Receiving Stream	Flow cfs	CBODU mg/l (lbs/day)	NH3-N mg/l (lbs/day)	Org N mg/l (lbs/day)	NO3-N mg/l (lbs/day)
Roanoke River at NC 48	1391	2.4 (17,995)	0.05 (375)	0.22 (1,650)	0.1 (750)

Tributaries were considered point loads in all the model runs. However, summer 7Q10 flow statistics obtained from USGS indicated that the tributaries do not have significant flow (i.e, less than 4.0 cfs), so these were modeled without any contribution to the system.

Margin of Safety (MOS)

The model was run under critical summer conditions of low flow and warm temperatures. The model indicates that existing permitted oxygen-consuming wastes, including headwater conditions, result in a minimum DO concentration of about 6.0 mg/l.

The model further predicts that additional loads of 41,000 lbs/day for CBODU and 8000 lbs/day for ammonia are needed to depress the minimum instream concentration to 4.9 mg/l (which is below the 5.0 mg/l DO criterion) at the most downstream DO sag. Thus, approximating a total maximum daily load (TMDL) for CBOD and ammonia of about 139,000 lbs/day and 16,000 lbs/day, respectively.

Availability for Public Comment:

The NPDES permit limits for the above dischargers are public noticed prior to permit issuance. In addition, three public meetings were held to obtain input on the draft Roanoke River Basinwide Water Quality Management Plan in the cities of Henderson, Williamston and Yanceyville in mid to late April, 1996. Chapter 6 of the basin plan contains North Carolina's draft TMDL strategies. Written comments were accepted until May 31, 1996.

Date Submitted:

The draft Roanoke River Basinwide Water Quality Management Plan containing the Roanoke River modeling results was sent to EPA on March 22, 1996. A final plan is scheduled to be taken before the Environmental Management Commission for approval in September, 1996.

This TMDL is hereby approved as meeting the requirements of Section 303(d) of the Clean Water Act (CWA).

Technical Approver

Technical Reviewer

Approved

Date

John A. Knodip
Wm. M. Knodip
R. F. McGhee
Robert F. McGhee, Director
Water Management Division
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