Alabama Department of Environmental Management

TMDL
Eightmile Creek/Broglen River – Warrior River Basin
Organic Enrichment/Dissolved Oxygen
Ammonia

June 17, 1996
Water Quality Branch

Water Division June 17, 1996

MEMORANDUM

To: File

From: Charles Reynolds
Water Quality Branch

Subject: Eightmile Creek/Broglen River TMDL

As mandated by section 303(d) of the Clean Water Act, a TMDL has been completed for Eightmile Creek and the Broglen River in Cullman County. Eightmile Creek combines with Brindley Creek to form the Broglen River. The Broglen River is a trib to the Mulberry Fork which, in turn, is a part of the Black Warrior River basin.

Attached is a spreadsheet labeled "ADEM TMDL SUMMARY." This attachment summarizes all relevant information for the TMDL, including maximum allowable loadings. "Total LA" refers to "total load allocation" and is the maximum allowable loadings from all nonpoint sources, including tributaries, headwaters and incremental inflow (IF). "Total WLA" refers to "total waste load allocation" and is the maximum allowable loadings from all point sources. "Total Loading" is the sum of all point and nonpoint source loadings and is the maximum allowable loadings from all sources.

Two sources of water quality impairment to this creek are considered to be the Cullman WWTP and Golden Rod poultry processor. The DOMODEL desktop model was run taking both dischargers into consideration. It was run such that the F&W D.O. standard of 5 mg/l was not violated during the summer season. The summer season entails the months of June through August. The summer effluent limitations for Cullman and Golden Rod are as follows:

	CULLMAN	**GOLDEN ROD**
WASTEFLOW (mgd)	4.75	0.86
$CBOD_5$ (mg/l)	14	30
NH_3-N (mg/l)	1.4	5.8
D.O. (mg/l)	6	6

An ultimate-to-five-day CBOD ratio ($CBOD_U/CBOD_5$) of 1.5 was assumed for the Cullman effluent; 4 for the Golden Rod effluent.

Chronic ammonia toxicity to aquatic life was evaluated at both outfall locations. Using an interpolated EPA 28°C criterion, this resulted in allowable effluent NH_3-N concentrations of 1.4 and 5.8 mg/l, respectively, for Cullman and Golden Rod.

MEMORANDUM

To: Water Quality File

From: Charles Reynolds
Water Quality Branch

Subject: Eightmile Creek/Broglen River Winter TMDL

A winter TMDL has been completed for Eightmile Creek/Broglen River for $CBOD_5$ and NH_3-N. Attached is a spreadsheet labeled "ADEM WINTER TMDL SUMMARY." This attachment summarizes all relevant information for the TMDL, including maximum allowable loadings. "Total LA" refers to "total load allocation" and is the maximum allowable loadings from all nonpoint sources, including tributaries, headwaters and incremental inflow (IF). "Total WLA" refers to "total waste load allocation" and is the maximum allowable loadings from all point sources. "Total Loading" is the sum of all point and nonpoint source loadings and is the maximum allowable loadings from all sources.

Two sources of water quality impairment to this creek are considered to be the Cullman WWTP and Golden Rod poultry processor. The DOMODEL desktop model was run taking both dischargers into consideration. It was run such that the F&W D.O. standard of 5 mg/l was not violated during the winter season. The winter season entails the months of December through April. The winter TMDL effluent limitations for Cullman and Golden Rod are as follows:

	CULLMAN	**GOLDEN ROD**
WASTEFLOW (mgd)	4.75	0.86
$CBOD_5$ (mg/l)	25	74
NH_3-N (mg/l)	3	7.8
D.O. (mg/l)	6	6.

An ultimate-to-five-day CBOD ratio ($CBOD_U/CBOD_5$) of 1.5 was assumed for the Cullman effluent; 4 for the Golden Rod effluent.

Chronic ammonia toxicity to aquatic life was evaluated at both outfall locations. Using an interpolated EPA 23°C criterion, this resulted in allowable effluent NH_3-N concentrations of 3.0 and 7.8 mg/l, respectively, for Cullman and Golden Rod.

This memorandum can be considered an addendum to the June 17, 1996, memorandum to the Water Quality file. The subject of that memo was listed as "Eightmile Creek/Broglen River TMDL" and was, in reality, the summer TMDL for Eightmile Creek/Broglen River.

ADEM SUMMER TMDL SUMMARY

Impacted Waterbody: Eightmile Creek/Broglen River
303(d) Priority Ranking: Medium
County(s): Cullman
Size: 35 miles
From: Mulberry Fork
To: Eightmile Creek's Source
Use Classification: F&W
Support Status: Partial
Causes: Ammonia, Nutrients, pH, Org Enrichment, Pathogens
Sources: Industrial, Municipal, Feedlots, Animal Holding Areas
Critical Conditions: Monthly $7Q_{10}$ Flows & 28°C Temp
Water Quality Model: DOMODEL
MOS: Monthly $7Q_{10}$ Flows, 28°C Temp & Model Reaction Rate Coefficients
Pollutants Evaluated: $CBOD_5$, NH_3-N & Ammonia Toxicity
Background Numbers for Ammonia Toxicity: 28°C Temp and pH of 7
EPA Chronic Total Ammonia Criterion: 1.43 mg/l

TMDL LOADINGS (ppd)

Source	**$CBOD_5$**	**NH_3-N**
Headwaters	8.41	0.69
Ryan Creek	1.15	0.09
Loveless Creek	1.65	0.14
Whaley Mill Creek	1.51	0.12
Total LA	12.72	1.04
Cullman WWTP	555	55.46
Golden Rod WWTP	215	41.60
Total WLA	770	97.1
Total Loading	783	98.1

SUMMER TMDL: EIGHTMILE CREEK/BROGLEN RIVER

	FLOW		**CONCENTRATION (mg/l)**				**LOADING (ppd)**	
SOURCE	**(cfs)**	**(mgd)**	**CBODU**	**CBOD5**	**ANOD**	**NH3-N**	**CBOD5**	**NH3-N**
Headwaters	1.17	0.76	2	1.33	0.5	0.11	8.41	0.69
Ryan Creek	0.16	0.10	2	1.33	0.5	0.11	1.15	0.09
Loveless Creek	0.23	0.15	2	1.33	0.5	0.11	1.65	0.14

SOURCE	FLOW (cfs)	FLOW (mgd)	CONCENTRATION (mg/l) CBODU	CBOD5	ANOD	NH3-N	LOADING (ppd) CBOD5	NH3-N
Whaley Mill Creek	0.21	0.14	2	1.33	0.5	0.11	1.51	0.12
Cullman WWTP		4.75	21	14		1.40	555	55.46
Golden Rod WWTP		0.86	120	30		5.80	215	41.60

ADEM WINTER TMDL SUMMARY

Impacted Waterbody:	Eightmile Creek/Broglen River
303(d) Priority Ranking:	Medium
County(s):	Cullman
Size:	35 miles
From:	Mulberry Fork
To:	Eightmile Creek's Source
Use Classification:	F&W
Support Status:	Partial
Causes:	Ammonia, Nutrients, pH, Org Enrichment, Pathogens
Sources:	Industrial, Municipal, Feedlots, Animal Holding Areas
Critical Conditions:	Monthly $7Q_{10}$ Flows & 23°C Temp
Water Quality Model:	DOMODEL
MOS:	Monthly $7Q_{10}$ Flows, 23°C Temp & Model Reaction Rate Coefficients
Pollutants Evaluated:	$CBOD_5$, NH_3-N & Ammonia Toxicity
Background Numbers for Ammonia Toxicity:	23°C Temp & pH of 7
EPA Chronic Total Ammonia Criterion:	2.04 mg/l

WINTER TMDL LOADINGS (ppd)

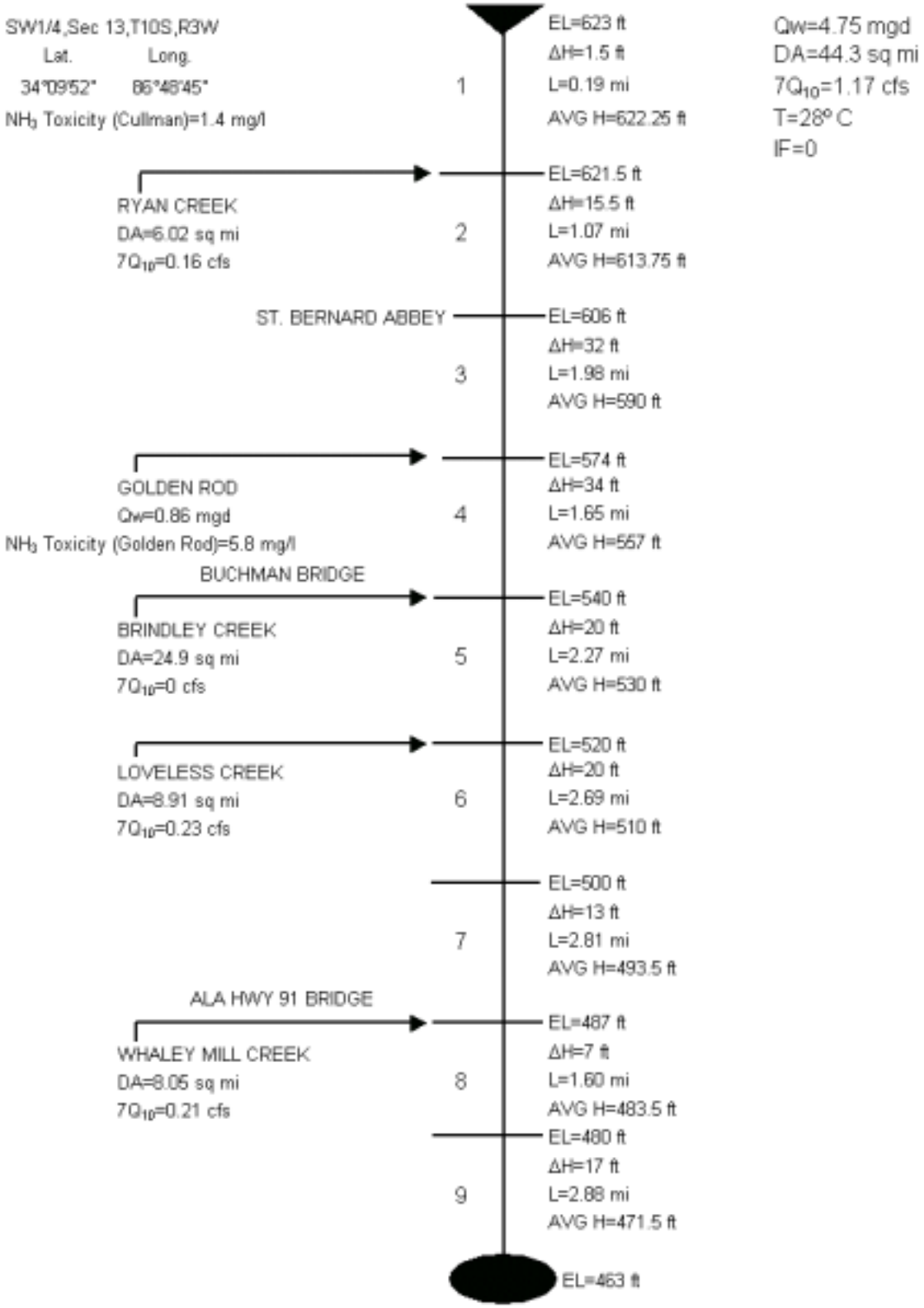
Source	**$CBOD_5$**	**NH_3-N**
Headwaters	43.27	3.55
Ryan Creek	5.89	0.48
Brindley Creek	15.10	1.24
Loveless Creek	8.70	0.71
Whaley Mill Creek	7.84	0.64
IF	18.33	1.50
Total LA	99.1	8.13
Cullman WWTP	990.4	117.3
Golden Rod WWTP	530.8	55.98
Total WLA	1521	173.3
Total Loading	1620	181.4

WINTER TMDL: EIGHTMILE CREEK/BROGLEN RIVER

	FLOW		**CONCENTRATION (mg/l)**				**LOADING (ppd)**	
SOURCE	**(cfs)**	**(mgd)**	**CBODU**	**CBOD5**	**ANOD**	**NH3-N**	**CBOD5**	**NH3-N**
Headwaters	6.02	3.89	2	1.33	0.5	0.11	43.27	3.55
Ryan Creek	0.82	0.53	2	1.33	0.5	0.11	5.89	0.48

SOURCE	FLOW (cfs)	FLOW (mgd)	CONCENTRATION (mg/l) CBODU	CBOD5	ANOD	NH3-N	LOADING (ppd) CBOD5	NH3-N
Brindley Creek	2.1	1.36	2	1.33	0.5	0.11	15.10	1.24
Loveless Creek	1.21	0.78	2	1.33	0.5	0.11	8.70	0.71
Whaley Mill Creek	1.09	0.70	2	1.33	0.5	0.11	7.84	0.64
IF	2.55	1.65	2	1.33	0.5	0.11	18.33	1.50
Cullman WWTP		4.75	37.5	25.00	13.53	2.96	990.4	117.3
Golden Rod WWTP		0.86	296	74.00	35.67	7.81	530.8	55.98

EIGHTMILE CREEK/BROGLEN RIVER - CULLMAN COUNTY



EIGHTMILE CREEK/BROGLEN RIVER - CULLMAN COUNTY - WINTER