Alabama Department of Environmental Management

TMDL
Buxahatchee Creek – Coosa River Basin
Organic Enrichment/Dissolved Oxygen

May 29, 1996
Water Quality Branch

Water Division May 29, 1996

MEMORANDUM

To: File

From: Charles Reynolds
Water Quality Branch

Subject: Buxahatchee Creek TMDL

As mandated by section 303(d) of the Clean Water Act, a TMDL has been completed for Buxahatchee Creek for $CBOD_5$ and NH_3-N. Attached is a spreadsheet labeled "ADEM TMDL DEVELOPMENT STRATEGY." 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.

One of the sources of water quality impairment to this creek is considered to be the Calera WWTP. In order to bring D.O. model predictions up to the required F&W D.O. standard of 5 mg/l, pollutant loading reductions were made to the Calera WWTP for the summer season. The summer season entails the months of May through November. Calera's current and revised summer effluent limitations are as follows:

	CURRENT	**REVISED**
$CBOD_5$ (mg/l)	10	7
NH_3-N (mg/l)	2	1
D.O. (mg/l)	6	6

The aforementioned effluent limitations are for a design wasteflow of 0.75 mgd. An ultimate-to-five-day CBOD ratio ($CBOD_U/CBOD_5$) of 1.5 was assumed for the Calera effluent.

Chronic ammonia toxicity to aquatic life was evaluated at the Calera outfall location. Using the 30°C EPA criterion, this resulted in an allowable effluent NH_3-N concentration of 1.14 mg/l for Calera.

MEMORANDUM

To: Water Quality File

From: Charles Reynolds
Water Quality Branch

Subject: Winter Buxahatchee Creek TMDL

A winter TMDL has been completed for Buxahatchee Creek for $CBOD_5$ and NH_3-N. Attached is a spreadsheet labeled "ADEM WINTER TMDL SUMMARY." This attachment summarizes all relevant information for the winter 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.

One of the sources of water quality impairment to this creek is considered to be the Calera WWTP. In order to bring D.O. model predictions up to the required F&W D.O. standard of 5 mg/l, pollutant loading reductions were made to the Calera WWTP for the winter season. The winter season entails the months of December through April. Calera's current and revised winter effluent limitations are as follows:

	CURRENT	**REVISED**
$CBOD_5$ (mg/l)	25	16
NH_3-N (mg/l)	20	3
D.O. (mg/l)	-	6.

The aforementioned effluent limitations are for a design wasteflow of 0.75 mgd. An ultimate-to-five-day CBOD ratio ($CBOD_U/CBOD_5$) of 1.5 was assumed for the Calera effluent.

Chronic ammonia toxicity to aquatic life was evaluated at the Calera outfall location. Using an interpolated 18°C EPA criterion, this resulted in an allowable effluent NH_3-N concentration of 3.10 mg/l.

ADEM SUMMER TMDL SUMMARY

Impacted Waterbody:	Buxahatchee Creek
303(d) Priority Ranking:	High
County(s):	Shelby/Chilton
Size:	10 miles
From:	Waxahatchee Creek
To:	Calera WWTP
Use Classification:	F&W
Support Status:	Non-support
Causes:	Nutrients/Organic Enrichment
Sources:	Municipal WWTP/Natural Conditions
Critical Conditions:	$7Q_{10}$ Flows & 30 Deg C Temp
Water Quality Model:	DOMODEL
MOS:	$7Q_{10}$ Flows, 30 Deg C Temp & Model Reaction Rate Coefficients
Pollutants Evaluated:	$CBOD_5$, NH_3-N & Ammonia Toxicity
Background Numbers for Ammonia Toxicity:	30 Deg C Temp & pH of 7
EPA Chronic Total Ammonia Criterion:	1.23 mg/l

TMDL LOADINGS (ppd)

Source	**$CBOD_5$**	**NH_3-N**
Headwaters	1.15	0.09
Watson Creek	5.32	0.44
Stumps Creek	0.72	0.06
Incremental Inflow (IF)	4.17	0.34
Total LA	11.36	0.93
Calera STP	43.79	6.26
Total WLA	43.79	6.26
Total Loading	55.14	7.19

WINTER TMDL: BUXAHATCHEE CREEK

	FLOW		**CONCENTRATION (mg/l)**				**LOADING (ppd)**	
SOURCE	**(cfs)**	**(mgd)**	**CBODU**	**CBOD5**	**ANOD**	**NH3-N**	**CBOD5**	**NH3-N**
Headwaters	0.16	0.10	2	1.33	0.5	0.11	1.15	0.09
Watson Creek	0.74	0.48	2	1.33	0.5	0.11	5.32	0.44
Stumps Creek	0.10	0.06	2	1.33	0.5	0.11	0.72	0.06
IF	0.58	0.37	2	1.33	0.5	0.11	4.17	0.34
Calera WWTP		0.75	10.5	7.00	4.57	1.00	43.79	6.26

ADEM WINTER TMDL SUMMARY

Impacted Waterbody:	Buxahatchee Creek
303(d) Priority Ranking:	High
County(s):	Shelby/Chilton
Size:	10 miles
From:	Waxahatchee Creek
To:	Calera WWTP
Use Classification:	F&W
Support Status:	Non-support
Causes:	Nutrients/Organic Enrichment
Sources:	Municipal WWTP/Natural Conditions
Critical Conditions:	$7Q_2$ Flows & 18 Deg C Temp
Water Quality Model:	DOMODEL
MOS:	$7Q_2$ Flows, 18 Deg C Temp & Model Reaction Rate Coefficients
Pollutants Evaluated:	$CBOD_5$, NH_3-N & Ammonia Toxicity
Background Numbers for Ammonia Toxicity:	18 Deg C Temp & pH of 7
EPA Chronic Total Ammonia Criterion:	2.54 mg/l

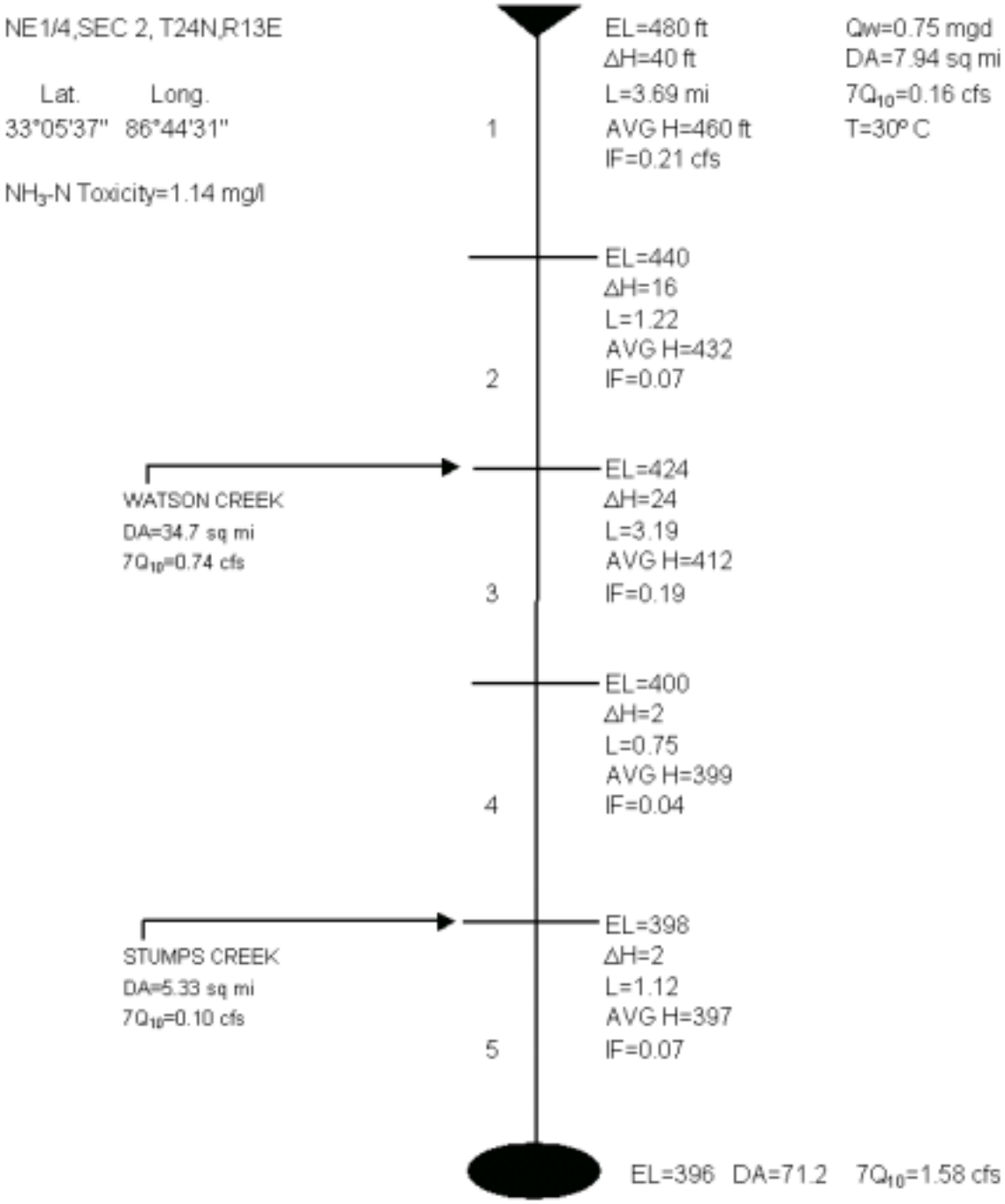
TMDL LOADINGS (ppd)

Source	**$CBOD_5$**	**NH_3-N**
Headwaters	4.10	0.34
Watson Creek	16.32	1.34
Stumps Creek	2.80	0.23
Incremental Inflow (IF)	8.91	0.73
Total LA	32.13	2.64
Calera STP	100.1	18.77
Total WLA	100.1	18.77
Total Loading	132.2	21.4

WINTER TMDL: BUXAHATCHEE CREEK

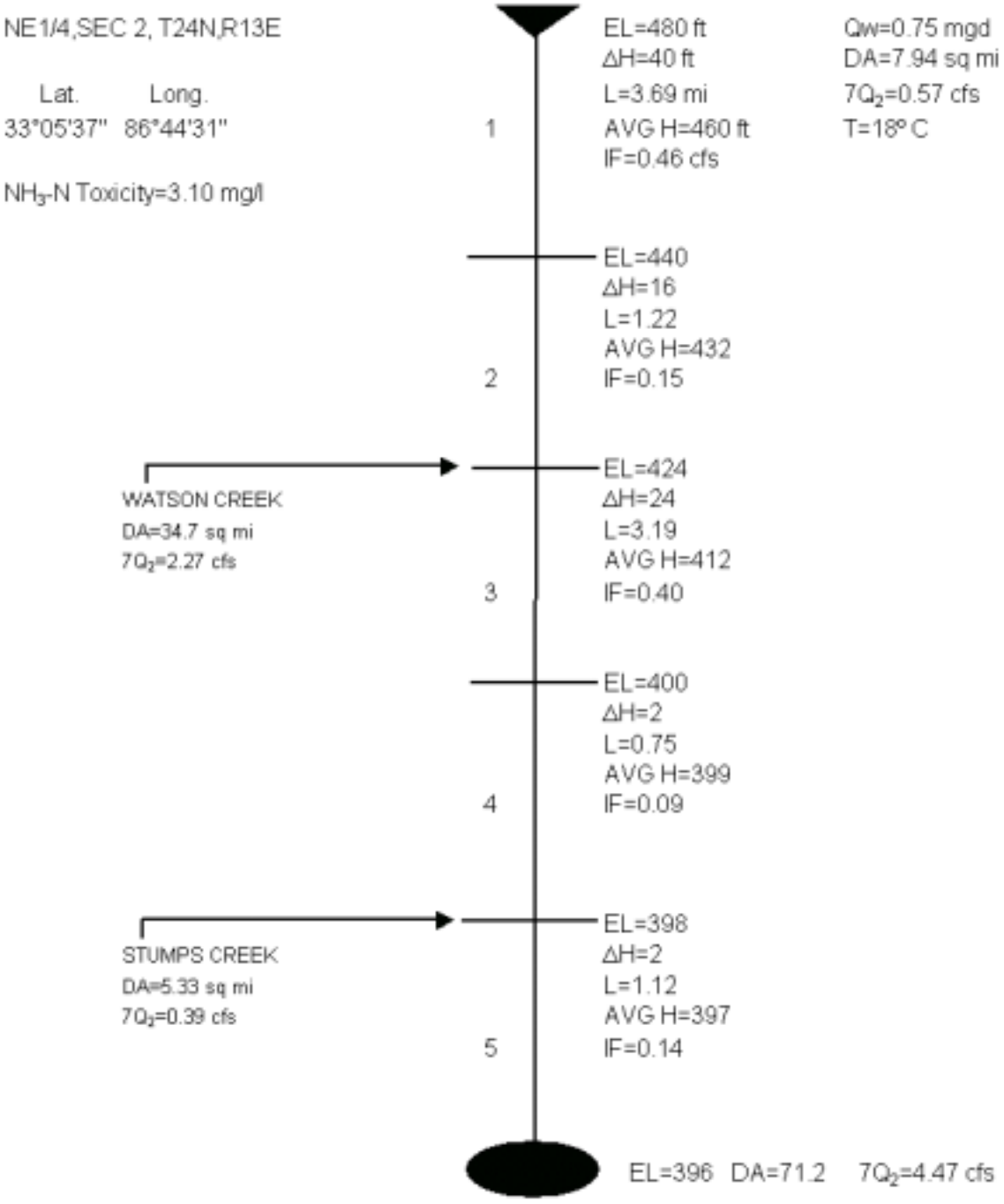
	FLOW		**CONCENTRATION (mg/l)**				**LOADING (ppd)**	
SOURCE	**(cfs)**	**(mgd)**	**CBODU**	**CBOD5**	**ANOD**	**NH3-N**	**CBOD5**	**NH3-N**
Headwaters	0.57	0.37	2	1.33	0.5	0.11	4.10	0.34
Watson Creek	2.27	1.47	2	1.33	0.5	0.11	16.32	1.34
Stumps Creek	0.39	0.25	2	1.33	0.5	0.11	2.80	0.23
IF	1.24	0.80	2	1.33	0.5	0.11	8.91	0.73
Calera WWTP		0.75	24	16.00	13.71	3.00	100.1	18.77

BUXAHATCHEE CREEK - SHELBY/CHILTON COUNTIES



WAXAHATCHEE CREEK

BUXAHATCHEE CREEK - SHELBY/CHILTON COUNTIES - WINTER



WAXAHATCHEE CREEK