UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
7/21/2010

Ellen Gilinsky, Ph.D., Director
Division of Water Quality Programs
Virginia Department of Environmental Quality
629 E. Main Street
P.O. Box 1105
Richmond, Virginia 23218

Dear Dr. Gilinsky:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve the Total Maximum Daily Loads (TMDLs) to address the dissolved oxygen and aquatic life use impairments in the Jackson River, located in Alleghany, Bath, Craig and Highland Counties, Virginia. The TMDL Report *Benthic TMDL Development for the Jackson River, Virginia*, was submitted to EPA for review on February 11, 2010. The TMDLs were established and submitted in accordance with Sections 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Virginia's Section 303(d) List.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain the applicable water quality standards; (2) include a total allowable loading and, as appropriate, wasteload allocations for point sources and load allocations for nonpoint sources; (3) consider the impacts of background pollutant contributions; (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated); (5) consider seasonal variations; (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality); and (7) be subject to public participation. The TMDLs for the Jackson River satisfies each of these requirements. In addition, the TMDLs provided reasonable assurance that the TMDL allocations assigned to nonpoint sources can be met. A copy of EPA's Rationale for approval of these TMDLs is included with this letter.

As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL wasteload allocations pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated September 29, 1998.

If you have any questions please call me, or have your staff contact Greg Voigt, Virginia TMDL coordinator, at 215-814-5737.

Sincerely,

/S/

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: David Lazarus, VADEQ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Decision Rationale
Total Maximum Daily Load
Dissolved Oxygen and Aquatic Life Use (Benthic) Impairments in the Jackson River
Alleghany, Bath, Craig and Highland Counties, Virginia

/S/

Jon M. Capacasa, Director
Water Protection Division

Date:7/21/2010

Decision Rationale
Total Maximum Daily Load
Dissolved Oxygen and Benthic Impairments
Jackson River, Alleghany, Bath, Craig and Highland
Counties, Virginia

I. Introduction

The Clean Water Act (CWA) requires that a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a State where technology based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a Margin of Safety (MOS), which may be discharged to a water quality-limited waterbody.

This document will set forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the nutrient TMDLs developed to address dissolved oxygen (DO) and benthic impairments in the Jackson River. EPA's rationale is based on the determination that the TMDLs meet the following seven regulatory conditions pursuant to 40 CFR Part 130.

1. The TMDL is designed to implement applicable water quality standards.
2. The TMDL includes a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
3. The TMDL considers the impacts of background pollutant contributions.
4. The TMDL considers critical environmental conditions.
5. The TMDL considers seasonal environmental variations.
6. The TMDL includes a MOS.
7. The TMDL has been subject to public participation.

In addition, these TMDLs provided reasonable assurance that the TMDL allocations assigned to nonpoint sources can be achieved.

II. Background

The Jackson River is part of the James River Basin, and flows through portions of Alleghany County, Bath County, Craig County and Highland County in southwestern Virginia. The watershed is 584,686 acres (916mi^2) in size, and consists primarily of forest (89.3%) and agricultural lands (8.5%). Other land uses in the watershed include water/wetlands (0.8%), developed lands (0.9%), and transitional/recreational lands (0.5%). In 1981, the Gathright Dam was installed along the Jackson River for flood control and water quality benefits. The dam is located approximately 19 miles north of the City of Covington, and regulates stream flow in the Jackson River.

An 11.21 mile segment of the Jackson River (I09R-01-DO), extending from river mile 24.21 downstream to river mile 13.00, was originally listed as impaired for DO on Virginia's

1996 Section 303(d) List. In addition, a 24.21 mile segment of the Jackson River (I09R-01-BEN), beginning at river mile 24.21 and extending to the confluence of the Jackson River and the Cowpasture River, was originally listed as impaired on Virginia's 1996 Section 303(d) List for failing to meet the aquatic life (general standard - benthic) designated use. A complete Section 305(b)/303(d) listing history for the impaired stream segments, covered under the Jackson River nutrient TMDL, is provided in Table 1.

Table 1. Section 305(b)/303(d) Listing History for Impaired Stream Segments Covered under the Jackson River Nutrient TMDL

Waterbody (Impairment)	1996-2002 303(d) ID	2004 303(d) ID	2006 303(d) ID	2008 303(d) ID	305(b) Assessment Units
Jackson River (Benthic)	*VAW-I04R	VAW-I04R-01	00458	I09R-01-BEN	VAW-I09R_JKS04A00 VAW-I09R_JKS02A00 VAW-I09R_JKS03A00 VAW-I09R_JKS01A00 VAW-I09R_JKS05A00 VAW-I09R_JKS06A00
Jackson River (DO)	*VAW-I04R	VAW-I04R-01	00280	I09R-01-DO	VAW-I04R_JKS01A00
Jackson River (Benthic)	*VAW-I04R	VAW-I04R-01	00457	I09R-01-BEN	VAW-I09R_JKS04A00 VAW-I09R_JKS02A00 VAW-I09R_JKS03A00 VAW-I09R_JKS01A00 VAW-I09R_JKS05A00 VAW-I09R_JKS06A00
Jackson River (DO)	*VAW-I04R	VAW-I04R-01	00281	I09R-01-DO	VAW-I04R_JKS01A00

*Consent Decree ID

The Jackson river is classified as a Class IV "Mountainous Zone" waterbody, as defined in Virginia's Water Quality Standards (9 VAC 25-260-50). All Class IV waters must have a minimum DO concentration of 4.0 milligrams per liter (mg/L) and a minimum daily average DO concentration of 5.0 mg/L. Data obtained from DEQ monitoring stations along the Jackson River indicate multiple violations of the minimum DO standard of 4.0 mg/L.

Additionally, all surface waters in Virginia are required to meet the Commonwealth's general water quality standard for the aquatic life designated use. VADEQ's assessment of the degree of support for the aquatic life designated use is based on the Virginia Stream Condition Index (VASCI). This index is derived from eight benthic bio-monitoring metrics, which are used to calculate a VASCI score between zero and 100. A score of 100 represents the healthiest benthic community sites. VADEQ's current Water Quality Assessment Guidance classifies "non-impaired" waters as those with a VASCI score of 60 or above, and "impaired" waters as those with a score below 60. Based upon data collected between 1994 and 2008, VASCI scores calculated at three VADEQ monitoring stations within the benthic-impaired segment of the Jackson River have been consistently below 60.

Although biological assessments are indicative of the impacts of pollution, the specific pollutant(s) and source(s) are not necessarily known based on biological assessments alone. Accordingly, a stressor analysis was performed to identify the most probable stressor(s) to the benthic community. In the Jackson River, excessive periphyton growth and accumulation was identified as the most probable stressor. The stressor analysis concluded that high nutrient concentrations in the Jackson River stimulate excessive periphyton growth, leading to eutrophic conditions, high organic loading, and decreased dissolved oxygen concentrations. Consequently, TMDLs for Total Phosphorus (TP) and Total Nitrogen (TN) were developed to limit nutrient loadings in the water. These TMDLs will address both the benthic and dissolved oxygen impairments. Tables 2 and 3 summarize the annual and daily TP and TN TMDLs for the Jackson River.

Table 2. Annual Phosphorus and Nitrogen Loads for the Jackson River Nutrient TMDLs

Pollutant	WLA (lbs/growing season*)	LA (lbs/growing season)	MOS (lbs/growing season)	TMDL (lbs/growing season)
Total Phosphorus	72,955	2,880	Implicit	75,835
Total Nitrogen	220,134	24,160	Implicit	244,294

*Growing Season = June 1st – October 31st

Table 3. Daily Phosphorus and Nitrogen Loads for the Jackson River Nutrient TMDLs

Pollutant	WLA (lbs/day)	LA (lbs/day)	MOS (lbs/day)	TMDL (lbs/day)
Total Phosphorus	476.8	18.8	Implicit	495.6
Total Nitrogen	1,438.8	157.9	Implicit	1596.7

The TMDL Report also recommends that the existing flow schedule for the Gathright Dam be modified to restore natural stream flow variability in the Jackson River. The flow augmentation study, insuring that the Virginia aquatic life standards will be met, is being implemented and finalized through an Army Corps of Engineers (USACE) §216 study.

This TMDL was developed by the VADEQ as part of a 1999 Consent Decree commitment between EPA, the American Canoe Association and the American Littoral Society. The U.S. Fish and Wildlife Service has been provided with a copy of the TMDL Report.

III. Discussion of Regulatory Conditions

EPA finds that Virginia has provided sufficient information to meet all seven of the basic requirements for establishing nutrient TMDLs for the Jackson River. Additionally, Virginia provided reasonable assurance that the TMDL allocations assigned to nonpoint sources can be achieved. EPA is therefore approving the TMDL. EPA's approval is outlined according to the regulatory requirements listed below.

1) The TMDL is designed to meet the applicable water quality standards.

Dissolved Oxygen

The Jackson river is classified as a Class IV "Mountainous Zone" waterbody, as defined in Virginia's Water Quality Standards (9 VAC 25-260-50). Virginia's water quality criterion for DO in Class IV waters is a minimum concentration of 4.0 mg/l and a minimum daily average concentration of 5.0 mg/l. Data obtained from DEQ monitoring stations along the Jackson River indicate multiple violations of the minimum DO standard of 4.0 mg/L, as indicated in Section 3.2.1.1 of the TMDL Report.

General Standard - Benthic

Virginia State law 9VAC25-260-10 (Designation of uses) indicates:

> *All state waters, including wetlands, are designated for the following uses: recreational uses, e.g., swimming and boating; the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g., fish and shellfish.*

The General Standard**,** as defined in Virginia State law 9 VAC 25-260-20, states:

> *State waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.*

The General Standard is implemented and assessed by VADEQ through application of the VASCI. Since 2008, VADEQ has used the VASCI to measure and classify the health of benthic macroinvertebrate communities. The biological assessments conducted on the Jackson River indicate that some pollutant(s) is interfering with attainment of the General Standard. Using data collected between 1994 and 2008, VASCI scores calculated at three VADEQ monitoring stations within the benthic-impaired segment of the Jackson River have been consistently below 60, as indicated in Tables 3-5 of the TMDL Report.

The process outlined in EPA's Stressor Identification Guidance was used to identify the most probable benthic stressor(s) for the Jackson River. A list of potential stressors was developed and evaluated based upon available monitoring data, field observations, and consideration of potential sources in the watershed. In the Jackson River, excessive periphyton growth and accumulation was identified as the most probable stressor to the benthic community. Periphyton are a type of algae that grow on the bottom of stream beds and represent the dominant type of algal biomass in riverine ecosystems. In addition to contributing to high organic loading, excessive periphyton can also impair benthic macroinvertebrate assemblages by covering the interstitial spaces between rocks and cobble that provides habitat for many types of macroinvertebrates. The stressor analysis therefore concluded that high nutrient concentrations in the Jackson River stimulate excessive periphyton growth, leading to eutrophic conditions,

high organic loading, and decreased dissolved oxygen concentrations. Consequently, TMDLs for TN and TP were developed to limit nutrient loadings that will address both the dissolved oxygen and benthic impairments in the Jackson River.

As part of TMDL development, a numeric endpoint for nutrients was developed to represent the water quality goal that is to be achieved through implementation of the TMDL. Virginia currently does not have numeric water quality standards for nutrients, therefore an alternative approach for determining the nutrient endpoint for this TMDL was utilized.

To determine the nutrient TMDL endpoint, an appropriate level of benthic chlorophyll *a* – a photosynthetic pigment in algae that is frequently used as an indicator of algal biomass – was selected that was deemed amenable to restoring the benthic community in the Jackson River. A literature review revealed that chlorophyll *a* levels in streams that range from 100-150 milligrams per square meter (mg/m^2) are considered excessive. Consequently, a chlorophyll *a* level of 100 mg/m^2 was selected as the chlorophyll *a* TMDL endpoint for the Jackson River.

In addition, the selected chlorophyll *a* TMDL endpoint of 100 mg/m^2 was used to calculate corresponding nutrient concentrations and TMDL endpoints. Using extensive monitoring data collected between 2000 and 2002, an empirical regression analysis was performed to identify the concentrations of total dissolved nitrogen (TDN) and orthophosphorus (PO_4-P) that corresponded to a chlorophyll *a* concentration of 100 mg/m^2. The regression analysis demonstrated that orthophosphorus explains approximately 60 percent of the variation in benthic biomass in the Jackson River, therefore only PO_4-P was used to develop the nutrient TMDL endpoint. The regression analysis also indicated that an average PO_4-P concentration 0.038 milligrams per liter (mg/L) corresponds to an average chlorophyll *a* concentration of 100 mg/m^2. Accordingly, a PO_4-P concentration of 0.038 mg/L was selected as the nutrient TMDL endpoint for the Jackson River. Table 4 provides the TMDL endpoints for chlorophyll *a*, PO_4-P, and the corresponding TN:TP ratio for each endpoint. Additional details on the methodology used to calculate the TMDL endpoints is provided in section 5.0 of the TMDL report.

Table 4. TMDL Endpoints and N:P Ratios for the Jackson River Nutrient TMDLs

PO_4-P TMDL Endpoint	Chlorophyll *a* TMDL Endpoint	N:P Ratio
0.038 mg/L	100 mg/m^2	11.7

A combination of two models was used in the development of the Jackson River nutrient TMDLs. EPA's Water Quality Simulation Program Version 7.2 (WASP7.2) was used to simulate and allocate nutrient loads to point sources. WASP7.2 includes a euthrophication module that was used to represent nitrogen and phosphorus cycling, dissolved oxygen-organic matter interactions, as well as phytoplankton and periphyton kinetics in the Jackson River watershed. The model was calibrated and validated using extensive monitoring data collected from 2000 through 2001, a period during which the Jackson River experienced the most excessive periphyton growth on record.

In addition, a modified version of the Hydrological Simulation Program -- FORTRAN (HSPF), developed by EPA specifically for the Chespeake Bay watershed, was used to simulate

and allocate nutrient loads to nonpoint sources in the Jackson River watershed. HSPF is a continuous, physically-based, lumped-parameter model which simulates hydrology, sediment, and chemical pollutants in soil and in streams. HSPF also includes a nutrient simulation module that was used to calculate nutrient loads from a variety of different land use types. The model was calibrated using monitoring data collected from 1985 through 1999, and was validated against data collected from 2000 through 2003.

The results of the modeling indicate that the selected PO_4-P endpoint of 0.038 mg/L and the corresponding chlorophyll *a* target of 100 mg/m^2 cannot be reached in the Jackson River with nutrient reductions alone. This is due to the fact that the Jackson River is not a free flowing river, and also due to the fact that MeadWestvaco, the main nutrient contributor to the Jackson River, has reached its limits of technology in terms of phosphorus reductions. The remaining option that will help the Jackson River achieve the TMDL endpoints and a healthy, balanced biologic community is to mimic the natural hydrology and flows that existed before the operation of the Gathright Dam.

Since it is unlikely that the pre-Gathright Dam hydrologic regime will be fully re-established, VADEQ proposed that flow be periodically released from the dam to provide periphyton scouring that will help reach the identified TMDL endpoints. Consequently, in October 2007, VADEQ, in cooperation with MeadWestvaco, the Philadelphia Academy of Natural Sciences (ANS) and the USACE implemented and developed a flow release study on the Gathright Dam. The primary objective of the study was to assess the level of periphyton biomass scouring resulting from flow augmentation. The other objective was to identify the number and level of the flow pulses that can be technically feasible. The flow pulse study indicated that the flow releases from the Gathright Dam will help the Jackson River meet the identified endpoints, and recommended that six flow pulses of 3,000 cubic feet per second (cfs) be performed during the growing season.

To demonstrate that the proposed flow releases will help restore the benthic community in the Jackson River, modeling scenarios were developed which indicated that the recommended flow pulses, combined with the nutrient reductions required by the TMDLs, will result in an average chlorophyll *a* level of 101 mg/m^2 in the main stem of the Jackson River. This is comparable to the chlorophyll *a* TMDL endpoint of 100 mg/m^2 and will allow the Jackson River meet the aquatic life use.

Before the flow releases recommended in the 2007 flow-pulse study can be permanently implemented, a USACE §216 study must be completed to assess the feasibility and evaluate the environmental impact of flow augmentation in the Jackson River during the growing season. The primary focus of the study will be directed to fine tuning the water release procedures from Gathright Dam during low flow conditions by incorporating new techniques, such as pulsing, to better mimic natural stream conditions that occurred before the dam existed. The USACE and VADEQ have signed an official agreement to fund the §216 study and insure that the flow augmentation study will be implemented and completed within the next three years. In addition**,** a Feasibility Cost Sharing Agreement between the USACE Norfolk District and the Commonwealth of Virginia, the study's local sponsor, was executed in December 21, 2009. A Project Management Plan was also approved outlining all the steps necessary to complete the §216 study, and memorandums of understanding were executed between VADEQ,

MeadWestvaco and the Virginia Department of Game and Inland Fisheries for the development of a monitoring Quality Assurance Project Plan and the development of the monitoring plan itself.

2) The TMDL includes a total allowable load as well as individual wasteload allocations and load allocations.

Total Allowable Loads

Virginia indicates that the total allowable loading is the sum of the loads allocated to nonpoint and point sources. Tables 2 and 3 in this Decision Rationale provide the total allowable loads for TP and TN in the Jackson River, calculated on an annual and daily basis.

Wasteload Allocations

EPA regulations require that an approvable TMDL include individual WLAs for each point source. According to 40 CFR §122.44(d)(1)(vii)(B), "the permitting authority shall ensure that … effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR §130.7." Furthermore, EPA has authority to object to the issuance of any National Pollutant Discharge Elimination System (NPDES) permit that is inconsistent with the WLAs established for that point source.

In the nutrient TMDLs for the Jackson River, there are a total of 31 permitted nutrient point sources, including five industrial facilities that currently hold individual Virginia Pollutant Discharge Elimination System (VPDES) permits, eight municipal facilities with individual VPDES permits, three Domestic Sewage facilities covered under a VPDES general discharge permit, and 15 facilities covered under a VPDES general stormwater permit. Annual point source WLAs were developed consistent with EPA's guidelines for future nutrient discharges to the Chesapeake Bay, as explained in Section 7.4.2 of the TMDL Report, and were calculated by multiplying the design flow or calculated runoff and the permitted concentration of TP and TN for each facility. Since the Jackson River is dominated by point source loads with relatively constant discharge flows, the daily WLAs were calculated by dividing the annual WLAs by 153 (the number of days in a growing season). WLAs for the 15 facilities covered under a VPDES general stormwater permit were expressed as an aggregate. Tables 4 and 5 provide breakdowns of the WLAs for the Jackson River TP and TN TMDLs, respectively.

Table 5. Wasteload Allocations for Permitted Point Sources in the Jackson River Total Phosphorus TMDL

NPDES ID	NPDES Name	Pollutant	Annual WLA (lbs/growing season*)	Daily WLA (lbs/day)
VA0003646	MeadWestvaco Packaging Resource Group	TP	66,991.0	437.85
VA0025542	Covington City STP	TP	1,914.0	12.51
VA0027979	Alleghany County - Low Moor STP	TP	440.0	2.88
VA0090671	Alleghany County Lower Jackson River WWTP	TP	1,659.0	10.84
VA0003450	Applied Extrusion Technologies	TP	178.4	1.17
VA0006076	Clifton Forge Water Treatment Plant	TP	8.9	0.06
VA0003344	CSX Transportation Inc - Clifton Forge	TP	4.5	0.03
VA0091324	DGIF Paint Bank Fish Cultural Station	TP	517.3	3.38
VA0088544	Boys Home Inc STP	TP	305.8	2.00
VA0032115	Morris Hill STP	TP	191.1	1.25
VA0088552	Sponaugle Subdivision	TP	203.9	1.33
VA0090646	Tanglewood Manor Home for Adults	TP	229.3	1.50
VA0075574	VDOT I-64 Rest Area - Alleghany County	TP	191.1	1.25
VAG402026	Rothe, Martin Residence	TP	13.0	0.08
VAG402094	Shirley Residence	TP	13.0	0.08
VAG402098	Rogers Residence James O and Iris L	TP	13.0	0.08
15 Stormwater General Permits (Aggregate WLA)		TP	82.0	0.54
VAR102964	Kim Stan Landfill Superfund Site			
VAR050759	Alleghany Asphalt Plant - Lowmoor			
VAR050765	Bennett Lodging and Lumber Inc			
VAR050713	Bradley Saw Mill			
VAR051383	Clifton Forge Water Treatment Plant			
VAR051361	Covington Wastewater Treatment Plant			
VAR050182	General Chemical LLC			
VAR050408	Kestersons Used Parts			
VAR050415	Lear Corp - Covington			
VAR050440	Martin Coal Corp - Coal Handling Facility Inc			
VAR051392	Peters Mountain Landfill			
VAR050393	Westvaco - Low Moor Converting Plant			
VAG840047	Boxley Materials Company - Alleghany Plant			
VAG842020	Boxley Materials Company - Alleghany Plant			
VAG110170	Cliftondale Redi Mix			
Total			**72,955**	**476.8**

*Growing Season = June 1st – October 31st

Table 6. Wasteload Allocations for Permitted Point Sources in the Jackson River Total Nitrogen TMDL

NPDES ID	NPDES Name	Pollutant	Annual WLA (lbs/growing season*)	Daily WLA (lbs/day)
VA0003646	MeadWestvaco Packaging Resource Group	TN	165,245.0	1080.03
VA0025542	Covington City STP	TN	22,968.0	150.12
VA0027979	Alleghany County - Low Moor STP	TN	5,359.0	35.03
VA0090671	Alleghany County Lower Jackson River WWTP	TN	19,906.0	130.10
VA0003450	Applied Extrusion Technologies	TN	395.0	2.58
VA0006076	Clifton Forge Water Treatment Plant	TN	19.7	0.13
VA0003344	CSX Transportation Inc - Clifton Forge	TN	9.9	0.06
VA0091324	DGIF Paint Bank Fish Cultural Station	TN	1,145.4	7.49
VA0088544	Boys Home Inc STP	TN	1,223.1	7.99
VA0032115	Morris Hill STP	TN	764.4	5.00
VA0088552	Sponaugle Subdivision	TN	815.4	5.33
VA0090646	Tanglewood Manor Home for Adults	TN	917.3	6.00
VA0075574	VDOT I-64 Rest Area - Alleghany County	TN	764.4	5.00
VAG402026	Rothe, Martin Residence	TN	51.0	0.33
VAG402094	Shirley Residence	TN	51.0	0.33
VAG402098	Rogers Residence James O and Iris L	TN	51.0	0.33
15 Stormwater General Permits (Aggregate WLA)		TN	448.0	2.93
VAR102964	Kim Stan Landfill Superfund Site			
VAR050759	Alleghany Asphalt Plant - Lowmoor			
VAR050765	Bennett Lodging and Lumber Inc			
VAR050713	Bradley Saw Mill			
VAR051383	Clifton Forge Water Treatment Plant			
VAR051361	Covington Wastewater Treatment Plant			
VAR050182	General Chemical LLC			
VAR050408	Kestersons Used Parts			
VAR050415	Lear Corp - Covington			
VAR050440	Martin Coal Corp - Coal Handling Facility Inc			
VAR051392	Peters Mountain Landfill			
VAR050393	Westvaco - Low Moor Converting Plant			
VAG840047	Boxley Materials Company - Alleghany Plant			
VAG842020	Boxley Materials Company - Alleghany Plant			
VAG110170	Cliftondale Redi Mix			
Total			**220,134**	**1,438.8**

*Growing Season = June 1st – October 31st

Load Allocations

According to Federal regulations at 40 CFR §130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading. Wherever possible, natural and nonpoint source loads should be distinguished.

The LA portion of the Jackson River nutrient TMDLs represent the contributions from all nonpoint sources. The nonpoint sources modeling, presented in Section 6.0 of the TMDL report, resulted in an average PO_4-P load during the growing season of 1,930 lbs. This corresponds to a

TP load of 2,880 lbs during the growing season. Similarly the modeling resulted in a total nitrogen load of 24,160 lbs during the growing season. No reductions are applied to the nonpoint source loads.

3) The TMDLs consider the impacts of background pollution.

Natural background was included as a component of the LAs for the Jackson River nutrient TMDLs. The LAs were developed using the calibrated EPA Chesapeake Bay Watershed Model HSPF, where the nutrient loads include the naturally occurring as well as human-induced contributions. The model was calibrated to water quality data that represents the cumulative impact from both naturally-occurring and human-induced sources.

4) The TMDLs consider critical environmental conditions.

According to EPA's regulation 40 CFR §130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of the Jackson River is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards[1]. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable "worst case" scenario condition. For example, stream analysis often uses a low flow (7Q10) design condition because the ability of the waterbody to assimilate pollutants without exhibiting adverse impacts is at a minimum.

The nutrient TMDLs for the Jackson River considered critical conditions because all of the allocations were developed during the periphyton growing season spanning June to October. The growing season is the most critical time in the Jackson River where conditions such as low flow and high temperature are most favorable to periphyton growth.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in stream flow and loadings as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flows normally occur in early spring from snow melt and spring rain, while seasonally low flows typically occur during the warmer summer and early fall drought periods.

The Jackson River nutrient TMDLs considered seasonal environmental variations by linking two dynamic/continuous models: HSPF and WASP. These two models explicitly account for seasonal variations in hydrology, climatic conditions, and watershed activities in order to establish the TMDL allocations. Therefore, the development of the Jackson River

[1]EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

benthic TMDL effectively considered seasonal environmental variations.

6) The TMDLs include a Margin of Safety.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. The MOS may be implicit; built into the modeling process by using conservative modeling assumptions, or explicit; taken as a percentage of the WLA, LA, or TMDL.

An implicit MOS was used for the Jackson River Nutrient TMDLs by using conservative target-setting assumptions. As described in Section III(1) of this decision rationale, benthic chlorophyll levels in streams ranging from 100-150 mg/m^2 are considered excessive and at nuisance level. The Jackson River TMDL uses a conservative periphyton target of 100 mg/m^2, which is the low-end of the recommended non-impaired periphyton range of 100-150 mg/m^2. Therefore, the TMDL target in this TMDL is conservative.

7) The TMDL has been subject to public participation.

EPA requires that TMDLs be subject to public participation. Public participation was included throughout the development of the Jackson River TMDL, as explained in Chapter 8.0 of the TMDL report. An initial public meeting was held to inform the public of the TMDL effort on September 28, 2006. Once a draft of the TMDL was available, a second public meeting was held on March 4, 2010, to solicit public comment on the draft. A thirty-day comment period was also initiated. No written responses were received during the comment period.

IV. Discussion of Reasonable Assurance

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

As indicated in Section III (2) of this Decision Rationale, no reductions were applied to the existing nonpoint source nutrient loads in the Jackson River watershed. Therefore, no reasonable assurance is required for the load allocations prescribed by the TMDLs.

The issuance of an NPDES permit(s) provides the reasonable assurance that the wasteload allocations prescribed by the TMDLs will be achieved. This is because 40 CFR §122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL. Virginia will utilize the VPDES program, which typically includes consideration of Virginia's 1997 Water Quality Monitoring, Information and Restoration Act requirements during the permitting process, to implement the WLA portion of the TMDLs.

USACE Section 216 Study

The Jackson River TMDL is recommending the existing flow augmentation schedule for the Gathright Dam be modified to restore natural stream flow variability. The proposed flow release modification is intended to remediate current water quality problems by simulating or mimicing natural storm events, particularly during the critical growing period of the periphyton. The TMDL modeling and monitoring studies have demonstrated pulses during critical periods can and do scour and flush excess periphyton downstream. This action results in improved biological communities in the river below Covington. Therefore, this TMDL is unique because implementation will require an increase in flow in the main stem of the Jackson River. The flow augmentation study, insuring that the Virginia aquatic life standards will be met, is being implemented and finalized through a Section 216 study authorized by Section 216 of the River and Harbor and Flood Control Act of 1970 (Public Law 91-611), dated 31 December 1970, which states:

> *"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest."*

The overall purpose of the flow augmentation feasibility study is to ensure the timely and economical completion of a quality Feasibility Report that will review the existing conditions of the Gathright Dam and Lake Moomaw Federal project to determine if any changes to release procedures would significantly enhance habitat and benefit water quality downstream of the project on the Jackson River to the confluence with the head of the James River. The primary focus of the study will be directed to fine tuning the water release procedures during low flow conditions by incorporating new techniques, such as pulsing, to better mimic natural stream conditions that occurred before the project existed. These release modifications shall be developed to protect the in-lake fishery and downstream fisheries. Habitat enhancement shall address benthic organisms, siltation, and water quality. The Feasibility Study shall be fully consistent with and in support of the goals, mandates, and direction of the Chesapeake Bay Agreement and other pertinent State and Federal statutes and initiatives.

There is a reasonable assurance that the §216 study will be implemented through a flow augmentation in the main stem of the Jackson River leading to the attainment of the identified endpoint. The USACE and the VADEQ entered and signed an official agreement funding the §216 study which ensures that the flow augmentation study will be implemented and completed in the next three years. Further, a Feasibility Cost Sharing Agreement between the USACE Norfolk District and the Commonwealth of Virginia, the study's local sponsor, was executed in December 21, 2009. A Project Management Plan was also approved which outlines the steps necessary for the completion of the 216 study. Additionally, memorandums of understanding were executed between VADEQ, MeadWestvaco and the Virginia Department of Game and Inland Fisheries for the development of a monitoring Quality Assurance Project Plan and the

coordination of the monitoring plan itself.