Revised
Upper Chehalis River Basin
Dissolved Oxygen
Total Maximum Daily Load

Submittal Report

March 2000
Publication Number 00-10-018

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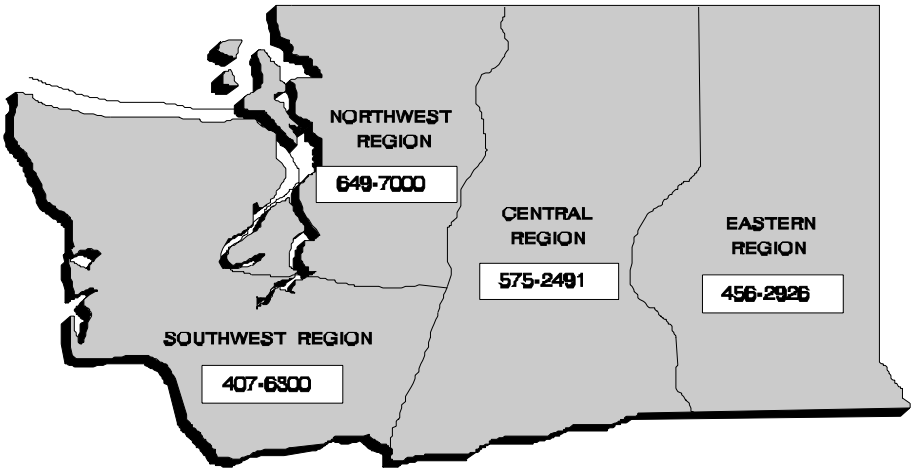

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Upper Chehalis River Basin
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Total Maximum Daily Load

Submittal Report

by

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Introduction

Section 303(d) of the federal Clean Water Act mandates that the state establish Total Maximum Daily Loads (TMDLs) for surface waters that do not meet standards after application of technology-based pollution controls. The U.S. Environmental Protection Agency (EPA) has promulgated new regulations (40 CFR 130) and developed guidance (EPA, 1991) for establishing TMDLs.

Under the Clean Water Act, every state has its own water quality standards designed to protect, restore, and preserve water quality. Water quality standards consist of designated uses, such as cold water biota and drinking water supply, and criteria, usually numeric criteria, to achieve those uses. When a lake, river or stream fails to meet water quality standards after application of required technology-based controls, the Clean Water Act requires that the state place the water body on a list of "impaired" water bodies and to prepare an analysis called a **Total Maximum Daily Load (TMDL)**.

The goal of a TMDL is to ensure the impaired water will attain water quality standards. A TMDL includes a written, quantitative assessment of water quality problems and of the pollutant sources that cause the problem. The TMDL determines the amount of a given pollutant that can be discharged to the water body and still meet standards, the **loading capacity,** and allocates that load among the various sources. If the pollutant comes from a discrete source (referred to as a **point source**) such as an industrial facility's discharge pipe, that facility's share of the loading capacity is called a **wasteload allocation**. If it comes from a diffuse source (referred to as a **nonpoint source**) such as a farm, that facility's share is called a **load allocation**.

The TMDL must also consider seasonal variations and include a **margin of safety** that takes into account any lack of knowledge about the causes of the water quality problem or its loading capacity. The sum of the individual allocations and the margin of safety must be equal to or less than the loading capacity.

The Upper Chehalis River Basin Total Maximum Daily Load (TMDL) for oxygen demanding substances, developed by the Washington State Department of Ecology (Ecology) and approved by the U.S. Environmental Protection Agency (EPA) on October 21, 1996, is being revised in response to a settlement of legal action initiated by the city of Centralia, the city of Chehalis, and WestFarm Foods (formerly Darigold Inc.). The TMDL approved by EPA restricted the discharge of biochemical oxygen demanding (BOD) material to the Upper Chehalis River (WRIA 23) from May 1 to October 31 each year. In the case of Chehalis and WestFarm Foods (formerly Darigold Inc.), the existing TMDL reduced the wasteload allocation for the Centralia Reach (that portion of the river between the Highway 6 bridge and the Skookumchuck River) during the May 1 to October 31 period to zero pounds BOD and ammonia. It provided for alternatives allowing Centralia with up to 54.33 labs of ammonia and 533.1 lbs. of CBOD loading at its discharge below the Mellon Street bridge at the lower end of the Centralia Reach.

There is no change to the original approved TMDL regarding possible future alternatives. As stated in the approved TMDL "…many other possible alternatives exist, but are beyond the scope of analysis in this report. As economic and technological feasibility are explored, other

alternative TMDL strategies can be analyzed with the Chehalis River model." The approved TMDL provides further that "The exact TMDL values depend on the relative loading levels of ammonia and CBOD, and on the location of loading sources. Therefore, modified values for the TMDL may arise as future scenarios are evaluated."

The revised TMDL represented by this submittal modifies the seasonal restrictions on the discharge of BOD and ammonia, to restrictions based on river flows. When river flow drops below specific thresholds identified in this revised TMDL, the wasteload allocations for Chehalis and WestFarm Foods (formerly Darigold Inc.) remain exactly the same as in the TMDL previously approved by EPA -- zero. When river flows are above those low-flow thresholds, Chehalis and WestFarm Foods are allowed to discharge to the river between the Highway 6 bridge and its confluence with the Skookumchuck River at levels that protect water quality standards for dissolved oxygen.

The five elements of the Upper Chehalis River Basin TMDL as required by federal statute and regulation are summarized below:

Loading Capacity: The loading capacity of ammonia and BOD in the Upper Chehalis River is the same as those in the TMDL approved October 21, 1996.

Load Allocations: The load allocations for ammonia and BOD in the Upper Chehalis River are the same as those in the TMDL approved October 21, 1996. The load allocations are shown in the following technical reports:

Five-day BOD = Alternative #1 in Table 5.2 of the **Upper Chehalis River Dry Season TMDL study** (Pickett, 1994, Publication 94-126). A copy of this table is provided in Appendix "A".

Ammonia –N = Alternative #1 in Table 5.1 of the **Upper Chehalis River Dry Season TMDL study** (Pickett, 1994, Publication 94-126). A copy of this table is provided in Appendix "A".

Wasteload Allocation: The wasteload allocation for the cities of Centralia and Chehalis, and WestFarm Foods (formerly Darigold Inc.) varies with river flow and season. During low-flow conditions the wasteload allocations for Chehalis and WestFarm Foods for discharge to the Centralia Reach from existing outfalls is zero pounds BOD and ammonia. This is the same wasteload allocation as the TMDL approved October 21, 1996. For the city of Chehalis, a wasteload allocation has been set if the approved discharge location is below the Skookumchuck River. The wasteload allocation for Centralia is set based on a new discharge location below the Skookumchuck River rather than the location just below the Mellon Street bridge as was proposed in the original TMDL approved October 21, 1996. The low river flow wasteload allocations for the cities of Centralia and Chehalis are consistent with Tables 5.1 and 5.2 of the **Upper Chehalis River Dry Season TMDL study** (Pickett, 1994, Publication 94-126). Copies of these tables are provided in Appendix "A".

Margin of Safety: A greater margin of safety is provided by setting a minimum river flow for allowing a discharge to the to the Centralia Reach of the Chehalis River at a level that is above the flows where water quality violations have been observed. For the city of Chehalis, the minimum flow allowing a discharge to the Centralia Reach of the Chehalis River is 1000 cfs. For WestFarm Foods (formerly Darigold Inc.), the minimum flow allowing a discharge to the same segment of the Chehalis River is 500 cfs.

Seasonal Variation: The wasteload allocations are now based on the seven (7) day calculated moving average flows in the Centralia Reach of the Chehalis River rather than on seasonal calendar dates.

Background

The Upper Chehalis River Basin is a large (1,293 square miles) watershed located south of Olympia, extending from the Black Hills to the Willapa Hills (Figure 1). The watershed is identified in state rule as Water Resource Inventory Area 23. The basin area covers five counties: Lewis (60%), Thurston (24%), Grays Harbor (11%), Pacific (4%), and Cowlitz (1%). The Chehalis Tribal reservation is on the northwestern area of the basin along the mainstem Chehalis River. The river passes through the two biggest cities in the basin, Centralia with a population of over 12,000 and Chehalis with a population of about 6,500.

Land use in the basin is predominated by forested areas (83%), followed by agricultural lands (14%) and urban areas (2%). Average annual areal precipitation is 57 inches, and ranges from 30 inches near the city Chehalis to 120 inches near the headwaters of the Chehalis River in the Willapa Hills.

Major tributaries of the Upper Chehalis River are the South Fork Chehalis River, the Newaukum River, the Skookumchuck River, and the Black River. Numerous Creeks are tributary to the mainstem, of which the largest are Elk, Bunker, Stearns, Dillenbaugh, Salzer, Rock, and Cedar Creeks. The headwaters of the mainstem and South Fork Chehalis Rivers lie in the eastern Willapa Hills; the headwaters of the Newaukum and Skookumchuck Rivers lie in the Bald Hills, a western spur of the Cascade Mountain range; and the Black River and Cedar Creek drain from the Black Hills (Figure 1).

A TMDL covering several water quality parameters for the Upper Chehalis River Basin was submitted to EPA for approval in January 1996. EPA approved the TMDL on October 21, 1996. The water quality parameters covered by the TMDL varied depending on the problems identified in individual segments or tributaries of the River. The water quality parameters covered by the TMDL include pollutants that affect levels of dissolved oxygen in the water (five-day BOD and ammonia – N), total phosphorus, and fecal coliform. Temperature (or heat pollution) was also included in the TMDL package submitted to EPA, however, due to concerns raised by EPA that the temperature approach was not comprehensive enough, the temperature submittal was temporarily withdrawn. This temperature study was modified and re-submitted to EPA on October 1, 1999 as a separate TMDL.

Applicable Criteria

Within the state of Washington, water quality standards are published pursuant to Chapter 90.48 of the Revised Code of Washington (RCW). Authority to adopt rules, regulations, and standards as are necessary to protect the environment is vested with the Department of Ecology. Under the federal Clean Water Act, the EPA Regional Administrator must approve the water quality standards adopted by the state (Section 303(c)(3)). Through adoption of these water quality standards, Washington has designated certain characteristic uses to be protected and the criteria necessary to protect these uses [Washington Administrative Code (WAC), Chapter 173-201A). These standards were last adopted in November 1997.

This TMDL is designed to address impairments of characteristic uses caused by low dissolved oxygen. The characteristic uses designated for protection in Upper Chehalis River Basin streams are as follows:

"Characteristic uses. Characteristic uses shall include, but not be limited to, the following:

(i) Water supply (domestic, industrial, agricultural).

(ii) Stock watering.

(iii) Fish and shellfish:

Salmonid migration, rearing, spawning, and harvesting.

Other fish migration, rearing, spawning, and harvesting.

Clam and mussel rearing, spawning, and harvesting.

Crayfish rearing, spawning, and harvesting.

(iv) Wildlife habitat.

(v) Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).

(vi) Commerce and navigation."

[WAC 173-201A-030]

Waters of the Upper Chehalis River Basin designated as either Class A or Class AA as follows:

Class A waters

From the mouth of Porter Creek (river mile 33.8) at the lower end of the WRIA to the Newaukum River (river mile 75.2).

From Newaukum River to Rock Creek (river mile 106.7).

Chehalis River, south fork.

The water quality standards criteria for dissolved oxygen in Class A freshwaters is: "*dissolved oxygen shall exceed 8.0 mg/L."*

A special condition has been established for the Chehalis River from Scammon Creek to the Newaukum River from June 1 to September 15. During this period the criteria is "*dissolved oxygen shall exceed 5.0 mg/L."*

Class AA waters

Chehalis River from Rock Creek (river mile 106.7 to headwaters)

The water quality standards criteria for dissolved oxygen in Class AA freshwaters is "*dissolved oxygen shall exceed 9.6 mg/L."*

[WAC 173-201A-030 and 130]

Water Quality Criteria when Natural Conditions are Below the Standard

When a body of water fails to meet the assigned water quality criteria due to natural conditions, the natural conditions become the water quality criteria and no further human caused degradation is allowed.

[WAC 173-201A-070 (1) and (2)]

Water Quality and Resource Impairments

The streams and mainstem segments of the Chehalis River that are listed on the Washington State 1998 Section 303(d) list are identified in Table 1 below. This list of impaired waters includes all those identified in the dissolved oxygen TMDL approved October 21, 1996 and three additional waters **(shown in bold type)** that have been listed for dissolved oxygen since then.

Table 1: Chehalis River Mainstem segments and Tributaries Listed for Dissolved Oxygen on the 1998 Section 303(d) List of Impaired Waters.

WATERBODY SEGMENT	SEGMENT NAME	SEGMENT BOUNDARY DESCRIPTION	TMDL PARAMETERS
WA-23-1010	Chehalis River	Porter Creek (RM 33.3) to Scammon Creek (RM 65.8)	BOD – 5, Ammonia - N
WA-23-1012	Cedar Creek	Mouth at Chehalis RM 38.7 to headwaters	BOD – 5, Ammonia – N
WA-23-1013	Rock Creek	Mouth at Chehalis RM 39.2 to headwaters	BOD – 5, Ammonia – N
WA-23-1014	Garrard Creek	Mouth at Chehalis RM 45.0 to headwaters	BOD – 5, Ammonia – N
WA-23-1015	Black River	Mouth at Chehalis RM 47.0 to headwaters	BOD – 5, Ammonia – N
WA-23-1017	Independence Creek	Mouth at Chehalis RM 51.5 to headwaters	BOD – 5, Ammonia – N
WA-23-1018	Scatter Creek	Mouth at Chehalis RM 55.2 to headwaters	
WA-23-1019	**Lincoln Creek**		BOD – 5, Ammonia – N
WA-23-1020	Chehalis River	Scammon Creek (RM 65.8) to Newaukum River (RM 75.2)	BOD – 5, Ammonia – N
WA-23-1023	Salzer Creek	Mouth at Chehalis RM 69.4 to headwaters	BOD – 5, Ammonia – N
WA-23-1024	**Coal Creek**		BOD – 5, Ammonia – N
WA-23-1027	Dillenbaugh Creek	Mouth at Chehalis RM 74.5 to headwaters	BOD – 5, Ammonia – N
WA-23-1050	Skookumchuck River	Mouth at Chehalis RM 66.9 to headwaters	BOD – 5, Ammonia – N
WA-23-1070	Newaukum River	Mouth at Chehalis RM 75.2 to confluence of N.F. and S.F.	BOD – 5, Ammonia – N
WA-23-1100	Chehalis River	Newaukum River (RM 75.2) to Rock Creek (RM 106.7)	BOD – 5, Ammonia – N
WA-23-1102	Stearns Creek	Mouth at Chehalis RM 78.1 to headwaters	BOD – 5, Ammonia – N
WA-23-1104	Bunker Creek	Mouth at Chehalis RM 84.8 to headwaters	BOD – 5, Ammonia – N
WA-23-1106	Chehalis River , S.F.	Mouth at Chehalis RM 88.3 to headwaters	BOD – 5, Ammonia – N
WA-23-1108	Elk Creek	Mouth at Chehalis RM 100.2 to headwaters	BOD – 5, Ammonia – N
WA-23-1110	Chehalis River	Rock Creek (RM 106.7) to	BOD – 5, Ammonia – N

		confluence of E.F. and W.F.	
WA-23-2010	Mima Creek	Mouth at Black RM 12.4 to headwaters	BOD – 5, Ammonia – N
WA-23-2020	Beaver Creek	Mouth at Black RM 18.1 to headwaters	BOD – 5, Ammonia – N
WA-23-2021	Littlerock Ditch	Mouth at Black RM 18.11 to headwaters	BOD – 5, Ammonia – N
WA-23-2060	**Demsey Creek**		BOD – 5, Ammonia - N

Dissolved oxygen levels are typically low during the warm summer months when river flows are low and water temperatures are high. In some areas of the Upper Chehalis River Watershed, dissolved oxygen levels are limited by natural conditions. Washington State Water Quality Standards state that whenever the natural conditions of a body of water are of a lower quality than the criteria assigned, the natural conditions become the water quality criteria. This TMDL calls for reduction of BOD and ammonia to a level that will not cause dissolved oxygen to fall below the class "A" criterion of 8.0 mg/liter or the special condition of 5.0 mg/l established for the Chehalis River from Scammon Creek to Newaukum River. A separate temperature TMDL for the Upper Chehalis Basin was submitted to EPA on October 1, 1999.

Modeling Approach

The TMDL approved by EPA restricted the discharge of biochemical oxygen demanding (BOD) material from May 1 to October 31 each year. The revised TMDL represented by this submittal modifies the seasonal restrictions on the discharge of BOD and ammonia to restrictions based on calculated river flows for the Centralia Reach.

The WASP5 computer model was used to evaluate the effects of the changes proposed in this TMDL. This is the same computer model that was used to develop the original TMDL. Ecology shared the original model and data with the consultants for Centralia, Chehalis, and Darigold Inc. (now WestFarm Foods) during the negotiations of the agreement that set the basis for this revision. (Using this same model, the city of Chehalis demonstrated there is some capacity for ammonia and BOD in the Centralia Reach which is consistent with modeling done by Washington Department of Ecology.)

Table 2 describes the agreements reached during negotiations, provides the justification for the agreement, and describes the documentation that would be needed to support the agreement. The documentation and the results of modeling are attached as Appendix B.

TABLE 2: Chehalis TMDL Negotiations -- Agreements, Justification and Documentation

Decision	Justification	Documentation
Use regression formula to calculate flows in the Centralia Reach using flows measured at Grand Mound to determine when various discharge limit "triggers" take effect	• The USGS gauging station provides quick, dependable data. • We have over 29 years of historical flow data from the Grand Mound flow station • The regression equation was developed by Ecology using the original TMDL flow balance submitted to EPA.	• Spreadsheet with regression flow balances (Ecology will provide) • Exhibit "A" from the consent decree. (Ecology will provide)

Decision	Justification	Documentation
There is capacity in the Centralia Reach for discharges from Chehalis and WestFarm Foods (formerly Darigold Inc.) at any time of the year when flows are greater than 1000 cfs. When river flows exceed 1000 cfs, Chehalis will be allocated this capacity. Chehalis will not be provided wasteload allocations for the existing discharge to the Centralia Reach below 1000cfs, regardless of time of year.	• Stratification is not present at flows greater than 1000 cfs. • Historical record shows only 1 violation of dissolved oxygen criteria at the Mellon Street bridge when flows are greater than 1000cfs. • Most violations occur during the dry season with river flows below 700 cfs. • The average number of days per year the river is protected increases from 184 days to 201 days • 80% of the time during the period from May 1 to October 31 flows are less than 1000 cfs; 20% of the time they are greater than 1000 cfs and there is no degradation of water quality at the current level of permitted discharge. • Chehalis and Centralia effluent flows begin to increase significantly when river flows are above 1000 cfs.	• 29 years of flow graphs (Dischargers or consultants provide) • Table with number of days/year with "dry weather" limits (Ecology will provide) • Model results showing D.O. at critical low flow and 1000cfs (Consultants provide) • Graph of D.O. at Mellon St. (Ecology will provide) • Summary table of flows when stratification was observed (Ecology will provide) • Graph with cumulative probability of flows from May through October (Ecology will provide) Graph of Chehalis effluent flow versus river flow.
There is capacity in the Centralia Reach for discharges from WestFarm Foods at any time of the year when flows are greater than 500 cfs. WestFarm Foods will be allocated this capacity when river flows exceed 500 cfs and at any flows from November through April. WestFarm Foods will not be provided wasteload allocations below 500cfs between May through October.	• WestFarm Foods has very low loading levels and model results show degradation less than 0.2 mg/L • Historical problems have only been observed at flows below 300 cfs. • Trigger levels correspond to periods when land application of wastewater is feasible	• Model Results (Consultants provide, see table 3 for specifics)
Four different tiers will be provided for effluent ammonia limits.	• The process of ammonia nitrification is subject to weather and flow conditions. • Model results show effluent ammonia limits will meet the tiered WLAs	• Model Results (Consultants provide, see table 3 for specifics)

Decision	Justification	Documentation
Use of a moving average to determine when the triggers for different discharge limits take effect. Dry Weather Limits for All parameters other than Ammonia (Centralia and Chehalis): Dry weather limits take effect when the 7 day moving average falls below 1000 cfs, but no sooner than March 15. Dry Weather Limits for Ammonia (Centralia and Chehalis): Dry weather limits take effect when two criteria have been met: 1) 14 days after the 7 day moving average falls below 1000 cfs and 2) after March 15. Wet Weather Limits Centralia and Chehalis: stay out of the Centralia Reach until 7-day moving average is above 1000 cfs with at least one day above 2500 cfs. WestFarm Foods: between May 1 and September 15 WestFarm Foods may resume discharge to the river if flows go above 1000 cfs for 3 consecutive days. WestFarm Foods shall again cease discharge on the next day after the river flow drops below 500 cfs. WestFarm Foods: From September 16 through October 31 WestFarm Foods may discharge to the Centralia Reach if flows go above 500 cfs for 3 consecutive days. Once this threshold is met WestFarm Foods can continue to discharge until Dry weather limits again apply the following year.	• In order to prepare for removing discharges from the Centralia Reach, or to "ramp up" treatment processes, the treatment plant operators need a forecasting tool. • Use of a seven-day moving average to control when discharges return to the Centralia Reach of the river protects against the effects of nonpoint source "first flush" events. This occurs when rainfall leading to increased runoff begins in earnest late in the year.	• Spreadsheet with decision rules programmed in (Ecology will provide) • Narrative justification (Consultants and Ecology)

Loading Capacity Analysis

Identification of the loading capacity is an important step in developing TMDLs. The loading capacity provides a reference for calculating the amount of pollutant reduction needed to bring a water into compliance with water quality standards. By definition, a TMDL is the sum of the allocations. An allocation is defined as the portion of a receiving water's loading capacity that is assigned to a particular source. EPA defines the loading capacity as "the greatest amount of loading that a water can receive without violating water quality standards."

The loading capacity of ammonia and BOD in the Upper Chehalis River is the same as those in the TMDL approved October 21, 1996. For a detailed discussion of loading capacity, see Chapter 5 of the original **Upper Chehalis River Dry Season TMDL**, Ecology Publication # 94-126.

Load Allocations

The Load Allocations for ammonia and BOD in the Upper Chehalis River under this TMDL are the same as those in the TMDL approved October 21, 1996. The load allocations are shown in the following technical reports:

Five-day BOD = Alternative #1 in Table 5.2 of the **Upper Chehalis River Dry Season TMDL study** (Pickett, 1994, Publication 94-126). A copy of this table is provided in Appendix "A"

Ammonia –N = Alternative #1 in Table 5.1 of the **Upper Chehalis River Dry Season TMDL study** (Pickett, 1994, Publication 94-126). A copy of this table is provided in Appendix "A"

Wasteload Allocations

This revised TMDL primarily defines flow conditions in the river and establishes wasteload allocations to protect water quality as the river flows decline towards critical conditions. The final effluent limits in this TMDL that apply during the critical conditions remain unchanged from those approved by EPA in the original TMDL for the same discharge locations. This TMDL adds a wasteload allocation for a new discharge location below the Skookumchuck River. This new discharge location will be used by Centralia year-round in place of its current discharge just below the Mellon Street bridge when it completes construction of a new wastwater treatment facility. This new discharge location may also be used by Chehalis when river flows drop below 1000 cfs unless a suitable option can be found. The wasteload allocation was set based on both Centralia and Chehalis using the new discharge outfall.

This TMDL changes the calendar based (May 1 to October 31) allocations described in the original TMDL Fact Sheet to flow-based allocations that more adequately protect river water quality. This TMDL also established tiers of allocations that apply when river flows exceed critical conditions. The tiers of allocations are based on the relationship between actual river flow and the assimilative capacity of the river at those flows, include a margin of safety, and reflect practical considerations due to treatment processes. The tiers developed in this TMDL are:

- For Chehalis and Centralia, three tiers of BOD limits that apply at flows less than 200 cfs; 200 to 1000 cfs; and greater than 1000 cfs.

- For Chehalis and Centralia, four tiers of ammonia limits that apply at flows less than 200 cfs (March 15 through November 30); 200 to 1000 cfs (March 15 through November 30); less than 1000 cfs (December 1 through March 14); and greater than 1000 cfs.

- For WestFarm Foods, two tiers of limits that apply at flows less than 500 cfs (May through October); and at flows greater than 500 cfs (May through October) or any time November through April. From September 16 through October 31, WestFarm Foods may discharge to the river if flows go above 500 cfs for three consecutive days. Once this threshold is met WestFarm Foods can continue to discharge until Dry weather limits again apply the following year.

Modeling results show that the flow-based limits have environmental advantages. Flow-based limits are more exact, providing protection to the river during those times when that protection is needed. Analysis of river flow records predicts that the average overall number of days per year that the river is protected under the flow-based regime increases from 184 days to 201 days. Eighty percent of the time during the period from May 1 to October 31 flows are less than 1000 cfs (and effluent discharge limitations apply). Twenty percent of the time, river flows are greater than 1000 cfs and no degradation of water quality below state water quality standards would occur at the level of permitted discharge. It is also during this 20 percent of the time that effluent flows for Chehalis and Centralia significantly increase over low-flow conditions. It becomes extremely expensive for Chehalis to develop the capacity to treat and transport the effluent during these higher flows.

TABLE 3: Seasonal Variation of Centralia Reach Seven-Day Average River Flows and Actions Triggered

Flow Triggering Action	Actions Taken
Flow greater than 1000 cfs: • Wet weather (high-flow) limits apply.	Centralia, Chehalis and WestFarm Foods (formerly Darigold Inc.) may discharge at permitted wet weather limits.
Flows less than 1000 cfs, but greater than 500 cfs: • Dry weather (low-flow) limits apply to Centralia and Chehalis. • Chehalis ceases discharge to Centralia Reach.	**Warm-weather conditions:** • Chehalis not discharging to its existing outfall in the Centralia Reach of river. • WestFarm Foods still discharging to Centralia Reach. • Centralia and Chehalis discharging below the Skookumchuck River at dry weather limits or to another location as approved in the General Sewer Plan or Facility Plan **Cold-weather conditions:** (December 1 through March 14 ammonia limits apply) • Chehalis not discharging to its existing outfall in the Centralia Reach of river. • WestFarm Foods discharging to Centralia Reach. • Centralia and Chehalis discharging below the Skookumchuck River at dry weather limits or to another location as approved in the General Sewer Plan or Facility Plan
Flows less than 500 cfs, but greater than 200 cfs: • WestFarm Foods ceases discharge to river. *Continued*	**Warm-weather conditions:** • Chehalis not discharging to its existing outfall in the Centralia Reach of river. • WestFarm Foods not discharging to Centralia Reach of river between May 1 and Sept. 15. • Centralia and Chehalis discharging below the Skookumchuck River at dry weather limits or to another location as approved in the General Sewer Plan or Facility Plan. **Fall/Spring conditions:** • WestFarm Foods can resume discharging to Centralia Reach regardless of flows after November 1. • Chehalis not discharging to its existing outfall in the Centralia Reach of river. • Centralia and Chehalis discharging below the Skookumchuck River at dry weather limits or to another location as approved in a General Sewer Plan or Facility Plan.

	Cold-weather conditions: (December 1 through March 14 ammonia limits apply) • Chehalis not discharging to its existing outfall to the Centralia Reach of river. • WestFarm Foods discharging to Centralia Reach. • Centralia and Chehalis discharging below the Skookumchuck River at dry weather limits or to an alternative location as approved in the General Sewer Plan or Facility Plan.
Flows less than 20 cfs: • More strict dry weather (low-flow) limits apply: Centralia and Chehalis implement additional treatment for BOD, TSS and ammonia removal from March 15 to November 30.	**Warm-weather conditions with additional treatment:** • Chehalis not discharging to its existing outfall in the Centralia Reach of river. • WestFarm Foods not discharging to Centralia Reach of river between May 1 and Sept. 15. • Centralia and Chehalis discharging at more stringent dry weather effluent limits for some pollutants below the Skookumchuck River or to another location as approved in the General Sewer Plan or Facility Plan. **November 1 conditions with additional treatment:** • WestFarm can resume discharging to Centralia Reach regardless of flows. • Chehalis not discharging to its existing outfall in the Centralia Reach of river. • Centralia and Chehalis discharging at more stringent dry weather effluent limits for some pollutants below the Skookumchuck River or to another location as approved in the General Sewer Plan or Facility Plan. **Cold-weather conditions:** (December 1 through March 14 ammonia limits apply). • Chehalis not discharging to its existing outfall in the Centralia Reach of river. • WestFarm Foods discharging to Centralia Reach. • Centralia and Chehalis discharging at dry weather limits below the Skookumchuck River or to another location as approved in the General Sewer Plan or Facility Plan.

TABLE 4: Seasonal Variation of Centralia Reach River Flows and Wasteload Allocations

Flow	Centralia	Chehalis	WestFarm Foods (Darigold)
Greater than 1000 cfs (Wet Weather)	BOD & TSS: 2530 lbs./day Ammonia: 657 lbs./day	BOD & TSS: 2330 lbs./day Ammonia: 644 lbs./day	BOD & TSS: 95 lbs./day Ammonia: 30.02 lbs. Day
Less than 1000 cfs but greater than 500 cfs (Dry Weather)	BOD & TSS: 925 lbs./day Ammonia: March 15 through November 30 123 lbs./day December 1 through March 14 463 lbs./day	**At current outfall:** BOD & TSS: Zero (0) lbs./day Ammonia: Zero (0) lbs./day **Below the Skookumchuck River or at another approved discharge location:** BOD & TSS: 751 lbs./day Ammonia: March 15 through November 30 100 lbs./day **December 1 through March 14:** 375 lbs./day	No change
Less than 500 cfs but greater than 200 cfs (Dry Weather) *Continued*	No change	No change	**May 1 through September 15:** BOD & TSS: Zero (0) lbs./day Ammonia: Zero (0) lbs./day **September 16 through October 31 after 3 consecutive days of flow > 500 cfs:** BOD & TSS: 95 lbs./day Ammonia: 30.02 lbs./day **November 1 through April 30:** BOD & TSS: 95 Lbs./day Ammonia: 30.02 lbs./day

Flow	Centralia	Chehalis	WestFarm Foods (Darigold)
Less than 200 cfs (Dry Weather – Additional Treatment)	<u>BOD & TSS:</u> 826 lbs./day <u>Ammonia:</u> March 15 through November 30 110 lbs./day December 1 through March 14 463 lbs./day	**At current outfall:** <u>BOD & TSS:</u> Zero (0) lbs./day <u>Ammonia:</u> Zero (0) lbs./day **Below the Skookumchuck River or at another approved discharge location:** <u>BOD & TSS:</u> 626 lbs./day <u>Ammonia:</u> March 15 through November 30 83 lbs./day December 1 through March 14 375 lbs./day	No Change

Margin of Safety

The statute requires that a margin of safety be identified to account for uncertainty when establishing a TMDL. The margin of safety can be explicit in the form of an allocation, or implicit in the use of conservative assumptions in the analysis. Several assumptions and critical conditions used in the modeling analysis of the Upper Chehalis River TMDL provide an inherent margin of safety over uncertainty as required by the statute. These conservative assumptions and critical conditions are listed below:

A margin of safety is provided by setting the minimum river flow for allowing a discharge from the existing outfall locations to the to Centralia Reach at a level that is above the flows where water quality violations under critical conditions have been observed. For the cities of Chehalis and Centralia the minimum flow allowing a discharge from their existing outfalls to the Centralia Reach of the Chehalis River is 1000 cfs. For WestFarm Foods (formerly Darigold Inc.) the minimum flow allowing a discharge to the same segment of the Chehalis River is 500 cfs. The safety factor provided by this criteria is significant since surface water D.O has only been observed to fall below W.Q. Standards when flows have been less than 400 cfs.

- The original conservative assumptions of the model are retained. Maximum temperatures and minimum flows for the seasonal period are used for model inputs.

- Trigger levels were chosen that were significantly higher than flows where significant effects were observed. At the trigger level of 1000 cfs, stratification does not occur in the Centralia Reach (when verifying the effects on the river using the computer model, ignore the lower layer results when river flows are over 1000 cfs). Dissolved oxygen below the standards has only been observed once at flows above 400 cfs.

- The evaluation of WQ standards with the computer model was based on a 0.2 mg/L degradation, rather than comparison to the dissolved oxygen criterion itself. Use of degradation adds to the margin of safety because it more stringent than meeting the criteria when actual conditions are more than 0.2 mg/L above the criteria.

- A moving average to forecast flow trends when moving from wet season flow limits to dry season flow limits smoothes out the day-to-day variations in the flow data. The tiered “trigger levels” were selected to ensure that flows do not drop to critical levels before the more restrictive limits take effect. The use of moving averages also alerts treatment plant operators to the fact that average river flows are approaching the point when more restrictive limits take affect. This gives them time to “ramp up” treatment processes to meet the more restrictive limits.

- A moving average at the transition from dry season flows to wet season flows protects against the effects of nonpoint source “first flush” events which occur when rainfall begins in earnest late in the year leading to increased runoff.

Summary Implementation Strategy

The changes in this TMDL re-submittal only apply to the point source discharges of the city of Centralia, the city of Chehalis, and WestFarm Foods (formerly Darigold Inc.). The wasteload allocations will be implemented through revised NPDES permits for these facilities. The schedule for compliance with the wasteload allocations provided in this TMDL is eight years from the date the consent decree settling the lawsuits filed by Centralia, Chehalis, and Darigold (now WestFarm Foods) is finalized by the court.

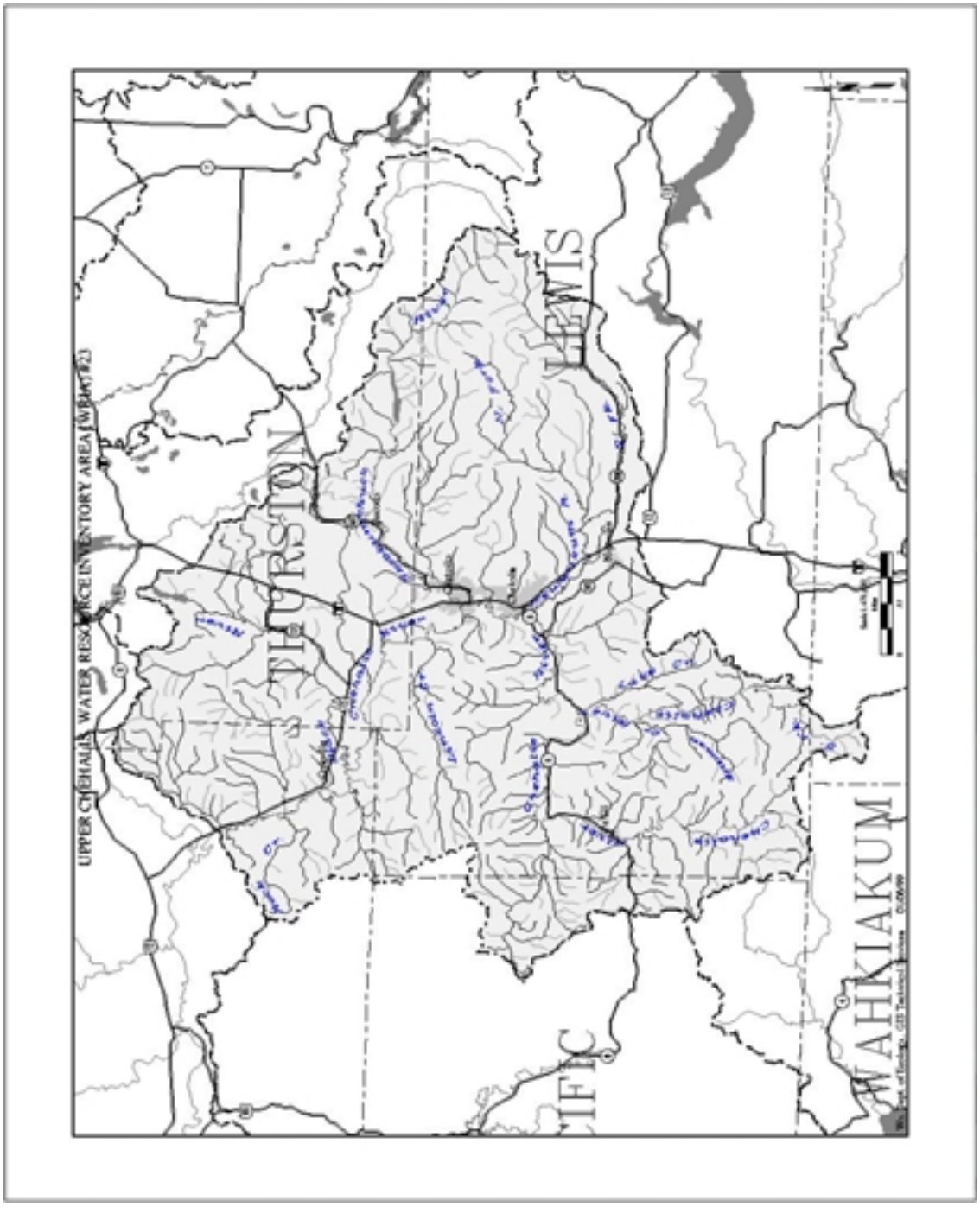
Load allocations under this TMDL remain the same as those in the original TMDL approved by EPA in October 1996. The implementation of nonpoint source pollution controls will continue as described in the **Nonpoint Source Pollution Control Strategy for the Upper Chehalis River TMDL** dated July 1, 1996 and approved by EPA with the original TMDL in October 1996. A copy of this strategy is provided in Appendix C.

References Cited

Pickett, P.J., 1994. Upper Chehalis River Dry Season Total Maximum Daily Load Study. Publication No. 94-126. Washington Department of Ecology, Olympia, WA.

Figures

FIGURE 1: Map of the TMDL Study Area (WRIA 23)



Appendix A

Tables 5.1 and 5.2 From the Upper Chehalis River TMDL
Document 94-126, July 1994

Appendix B

Documentation for Revised TMDL

This appendix consists of the Technical Memorandum **"Discharge Limits for Chehalis River TMDL Collaborative Negotiation"** (including a CD with supporting calculations) prepared by CH2MHILL and the following documentation provided by Ecology:

CD copy of electronic information (see Table of Electronic Files within):

- Spreadsheet with regression flow balances
- Graph showing dissolved oxygen levels a the Mellon Street bridge
- Dissolved oxygen spreadsheet with decision rules programmed in
- Table showing the number of days/year with "dry weather" limits
- Graph showing cumulative probability of flows from May to October
- Table showing flows when stratification in the River has been observed
- Table showing when violations of dissolved oxygen criteria have been observed

Exhibit "A" from the consent decree

Paper Copies of printable electronic information from the CD provided by Ecology:

- Graph showing dissolved oxygen levels a the Mellon Street bridge
- Table showing the number of days/year with "dry weather" limits
- Graph showing cumulative probability of flows from May to October
- Table showing flows when stratification in the River has been observed
- Table showing when violations of dissolved oxygen criteria have been observed

Appendix C

Nonpoint Source Pollution Control Strategy

July 1, 1996

Appendix D

Public Notice Materials

Appendix E

Responses to Comments Received

Appendix F

Consent Decree

Appendix G

Modified NPDES Permits