

**RESPONSE TO COMMENTS RECEIVED
CONCERNING THE PROPOSED DIOXIN TMDL
FOR THE COLUMBIA RIVER BASIN**

February 25, 1990

Table of Contents

<u>Subject</u>	<u>Page</u>
Analytical Capabilities	2
Antibacksliding	3
Best Available Technology (BAT)	4
Canada	6
Compliance Date	6
Economy	7
Endangered Species	7
General Approach	8
Growth	9
Health Risk	10
Law	11
Losses	14
Margin of Safety	14
Mixing Zone	15
Modeling Approach	16
Other Sources	17
Permit Limits	21
Phased Approach	22
Production	23
Public Participation	24
References	24
Research	24
State Planning	25
TCDD vs TEC	25
Watershed Approach	26
WLA Approach	27
Water Quality Limited Status	30
Water Quality Standard	31

RECEIVED
MAR 04 1991

WATER QUALITY DIVISION
DEPT. OF ENVIRONMENTAL QUALITY

RESPONSE TO COMMENTS RECEIVED CONCERNING THE PROPOSED DIOXIN TMDL FOR THE COLUMBIA RIVER BASIN

ANALYTICAL CAPABILITIES

Comment. Several comments were received concerning the measurement of dioxin: who can measure it, at what levels can it be detected, can compliance with WLAs be reliably monitored?

Response. Nationally there are a limited number of analytical laboratories EPA is aware of which are capable of reliably measuring dioxins at levels of approximately 10 ppq in water samples. The Weyerhaeuser laboratory at the Weyerhaeuser Technology Center in Federal Way, Washington, is one of those facilities. Although one of the commenters supplied a Weyerhaeuser Canada article referring to the Federal Way facility having a "mass spectrometer capable of detecting molecules of chemical compounds to the parts per quintillion range," Kari Doxsee (Manager of the Analytical Chemistry Laboratories, Weyerhaeuser Technology Center) has confirmed (July 25, 1990) that their typical limit of detection for 2,3,7,8-TCDD is approximately 10 parts per quadrillion (ppq).

The limit of detection for any given sample will vary above and below the 10 ppq level depending on the interferences present in the sample. For example, Weyerhaeuser can frequently measure down to the 1 - 4 ppq range. Improvements in methodology and technology should further reduce the limit of detection in the future.

The TMDL provides the framework for achieving water quality standards in the basin by allocating permissible dioxin loadings from various sources. The ability to measure compliance with waste load allocations was a major concern during the development of this TMDL. If pulp mills exceed their long term average WLAs established in this TMDL, then, based on the assumptions made in the TMDL, individual samples from their bleached effluent would exceed 10 ppq 2,3,7,8-TCDD (i.e. they would contain measurable concentrations of 2,3,7,8-TCDD) more than 5% of the time. New NPDES permits for the pulp mills covered by the TMDL will specify effluent limits necessary to assure compliance with state water quality standards and must be consistent with this TMDL (see response to comment in "PERMIT LIMITS" section). Effluent sampling location, frequency, and analytical methods are specified in the permit, as well as any ambient monitoring requirements. The permittees are financially responsible for all monitoring required under the NPDES permits.

ANTIBACKSLIDING

Comment. What are the antibacksliding effects of the TMDL? It could be a mistake to start out with such a strict TMDL and find out later it wasn't necessary, but can't then loosen it.

Response. The TMDL itself is a management tool which is developed from available information. The TMDL may be refined as better information becomes available. Thus, allocations may be adjusted as the TMDL becomes more refined.

The concern expressed in this comment relates to whether the NPDES permit limits based on WLAs in a TMDL may be relaxed if the TMDL is revised to include a higher WLA. The most important provision of the Clean Water Act (CWA) relating to backsliding from water quality-based effluent limitations is Section 303(d)(4). This section has two parts: paragraph (A) applies to "non-attainment waters" and paragraph (B) applies to "attainment waters." The reach of the Columbia River that the TMDL applies to is currently considered to be a non-attainment water.

For non-attainment waters, the statute provides that a permittee may be allowed to backslide from a water quality-based effluent limitation if certain conditions are met. First, the existing permit limit being revised must be based on a TMDL or waste load allocation established under Section 303. Second, the revised permit limit must assure attainment of the water quality standard. These conditions would be met if, for example, after the TMDL and waste load allocations were finalized and NPDES permit limits based on the TMDL were developed, but before all the controls were implemented (to bring the waterbody into the attainment category), contributions from one of the sources was found to be less than previously estimated. Then some other allocation(s) and the permit limits based on those allocations could be increased as long as the revised TMDL would still ensure that water quality standards would be met.

In the case where the TMDL and waste load allocations have been implemented, the waterbody has become an "attainment water," and subsequent information shows that a less stringent TMDL would be adequate to meet water quality standards, waste load allocations may still be relaxed if certain conditions are met. Specifically, Section 303(d)(4)(B) provides for backsliding from water quality-based permit limitations if revisions are consistent with the state's approved antidegradation policy. In general, the national antidegradation policy states that an attained water cannot be degraded below the level necessary to protect waterbody uses that existed after 1975. In addition, an attained water cannot be degraded, unless the state finds, after satisfying public participation procedures, that the degradation is necessary to accommodate important

social or economic development. However, in this case, the water still cannot be degraded to below levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water. In addition, waters designated by states as "Outstanding National Resource Waters" may not under any circumstance suffer long-term degradation of water quality. States are required to adopt antidegradation policies consistent with the Federal policy as a part of their water quality standards. Under s303(d)(4), establishment of a new TMDL based on updated information, and recalculation of waste load allocations, could be allowed if consistent with the state's antidegradation requirements.

BEST AVAILABLE TECHNOLOGY (BAT)

Comment. There is no evidence that proposed WLAs are achievable by BAT.

Response. Waste load allocations in a TMDL are established at levels necessary to ensure attainment of water quality standards. They are not based on any given level of treatment technology and are developed because BAT has been inadequate to protect water quality [Section 303(d)]. Existing effluent guidelines for the pulp and paper industry do not address dioxin. Effluent guidelines for BAT relating to dioxin discharges from pulp mills are scheduled to be proposed in 1993 and become final in 1995. At this point we do not know whether BAT limits based on those guidelines will be more or less stringent than the limits now necessary to conform with the TMDL. Absent promulgated effluent guidelines for dioxin from pulp mills, permits are to contain Best Professional Judgement (BPJ) limits reflecting BAT. Permit limits contain limits based on WLAs only if such limits would be more stringent than those based on BPJ BAT.

Comment. 100% chlorine dioxide substitution at Weyerhaeuser Longview may not assure compliance with the proposed WLA.

Response. As pointed out above, the WLAs in the TMDL are established at levels to ensure attainment of water quality standards. They are not based on a given treatment technology. Chlorine dioxide substitution is not the only alternative to chlorine bleaching. Other alternatives such as oxygen delignification and hydrogen peroxide bleaching may be used to assist in the reduction of dioxin contamination in pulp mill effluents while still producing a white product. It is also possible that some products currently bleached need not be bleached at all.

Comment. Since there are alternative bleaching processes, no discharge of dioxins should be allowed.

Response. EPA disagrees. Regardless of the existence of alternative processes which may lead to zero dioxin discharge, WLAs established pursuant to CWA §303(d) need not be set at zero unless that is required to meet water quality standards. EPA has determined in this TMDL that water quality standards can be met while allowing small but definable WLAs to the pulp mills in the basin.

Comment. There is no established BAT for dioxin discharges from pulp mills, so no defensible 303(d) listing could be made by states.

Response. CWA Section 303(d) requires that "each State shall identify those waters within its boundaries for which the effluent limitations required by section 301(b)(1)(A) and section 301(b)(1)(B) are not stringent enough to implement any water quality standard applicable to such waters."

While this section specifically provided for listing of waters under Section 303(d) when BPT and secondary treatment requirements are not stringent enough to implement water quality standards, EPA has interpreted the section as not requiring listing under Section 303(d)(1) if existing required pollution controls (including BAT requirements) are sufficiently stringent to implement water quality standards (50 FR 1775). In the absence of national effluent guidelines establishing BAT for dioxin from pulp mills, the relevant technology-based requirements which EPA reviews to determine whether a water should be listed under Section 303(d)(1) are the BPJ requirements in existing permits. BAT/BPJ effluent limits in existing permits have failed to achieve water quality standards for 2,3,7,8-TCDD. It would be too speculative to base a determination of whether water quality standards will be achieved based on BAT/BPJ limits or effluent guidelines to be developed in the future. If these technology-based limits developed in the future are more stringent than the WLA-based limits, then those limits must be complied with and the WLAs established here will have no practical effect.

Until the effluent guidelines are revised, it is not reasonable to assume that technology-based limits based on the revised guideline will result in attainment of the water quality standards for dioxin. Based on the current effluent guideline development schedule, such an assumption could lead to the water quality standard being violated for another 5 years before improvements in discharge rates were even initiated. Then, after waiting for BAT to be implemented, additional controls could still be needed, resulting in further delays. This is contrary to the very essence of Section 303(d). EPA believes that the purposes of the Act and the intent

of Section 303(d) are best achieved by its interpreting that section as requiring TMDLs where existing required pollution controls are failing to meet water quality standards.

CANADA

Comment. Several comments were received concerning the level of dioxin loading coming from Canada and the method we proposed to handle that loading in the proposed TMDL. There was considerable confusion evidenced by comments that it was unfair that EPA was proposing to allocate 2.3 mg/day to the Celgar pulp mill.

Response. EPA does not have the authority to regulate dischargers in Canada. This TMDL does not attempt to do so. However, it does recognize that there are sources of dioxin to the Columbia River basin above where the river enters Washington State. Available data indicate that as the river crosses the border it exceeds Washington's water quality standards with respect to 2,3,7,8-TCDD based upon levels observed in Lake Roosevelt fish. This would mean that past upstream loadings and sediment accumulations exceeded the loading capacity for 2,3,7,8-TCDD of the Columbia River as it crosses the border into Washington State. EPA and Washington State are currently working with Canada to reduce those dioxin loads north of the border. The Celgar mill is the only source on the Canadian side for which confirmation of 2,3,7,8-TCDD loading to the Columbia is available.

Both the Celgar mill and the British Columbia Ministry of Environment have commented that this mill will be modernizing, resulting in 2,3,7,8-TCDD discharges in 1994 which are less than 0.05 mg/day. The final TMDL reserves a higher loading of 0.31 mg/day to cover Celgar. This is not a WLA but rather an estimated loading. This estimate provides a margin of safety to cover a possible shortfall in Celgar's attainment of the projected 0.05 mg/day loading and other possible upstream sources. As additional information is assembled, this preliminary estimate may be refined.

COMPLIANCE DATE

Comment. When will compliance with the TMDL be achieved?

Response. Upon the establishment of the TMDL, the TMDL is automatically incorporated into the states' current water quality management plans [see 40 CFR § 130.7(d)]. Subsequent actions, including effluent limits in NPDES permits, must be consistent with the TMDL [40 CFR §§ 122.44(d)(1)(vii); 122.44(d)(6); 130.12(a)]. There is no compliance date set in the TMDL,

but NPDES permits which are individual control strategies (ICSs) under CWA Section 304(l) must be designed to achieve compliance with established WLAs within three years of establishment of the ICSs. All the chlorine bleaching pulp mills for which WLAs are established in this TMDL were listed under §304(l) and are subject to these requirements.

Comment. The proposed TMDL will result in delayed attainment of standards beyond Section 304(l) deadline.

Response. The Section 304(l) deadline for attainment of water quality standards in affected waters is as soon as possible but not later than three years after the establishment of the ICSs. As explained above, establishment of this TMDL does not alter that time frame.

ECONOMY

Comment. Several comments concerned the effect of the proposed TMDL on the NW economy: that it would make region's mills uncompetitive; have a negative affect on balance of trade; and cause a loss of jobs.

Response. As pointed out above, the section of the CWA which requires TMDLs is based solely on the need to achieve water quality standards. Economic considerations are not a necessary part of the process.

ENDANGERED SPECIES

Comment. The proposed TMDL will adversely affect bald eagles & therefore violates Endangered Species Act. EPA has not consulted with U.S. Fish & Wildlife Service (USFWS) about the potential effects of the continued discharge of dioxins on bald eagles in the Lower Columbia River which are listed as "threatened" by the USFWS.

Response. EPA has consulted with the USFWS regarding the effects on bald eagles of the TMDL for dioxin discharges to the Columbia River basin. While USFWS suggested that EPA participate with them in further investigations concerning the accumulation of dioxin in Columbia River eagle eggs, the USFWS concluded that there are insufficient data at this time to determine whether this species has been affected by past discharges of 2,3,7,8-TCDD, much less whether bald eagles will be affected by the reduced dioxin discharges allowed by the final TMDL. The USFWS commended EPA's action to reduce existing discharges of dioxin to the

Columbia River basin. There is insufficient information at this time to determine the impact of dioxin on eagles. However, it is EPA's position that the reduction of the existing discharges of dioxin to the system that should result from implementation of the TMDL will not adversely affect any endangered species. USFWS agreed with this position and did not indicate that any further consultation was necessary under Section 7 of the Endangered Species Act with respect to issuing the TMDL.

GENERAL APPROACH

Comment. Several commenters suggested that the TMDL is overly conservative and/or is not based on a valid scientific analysis of the issue.

Response. The legislation requiring TMDLs clearly anticipated that TMDLs be established expeditiously even in situations where there may be insufficient information. This includes uncertainty with regard to sources and their relationship to concentrations of contaminants in the receiving water. A margin of safety is to be utilized to compensate for such lack of knowledge. The focus of this comment was the fact that EPA did not use a model which predicted attenuation (losses) of dioxin from the water column through sedimentation. All information and methodology available, including evidence of attenuation, was considered in the development of this TMDL. However, inconclusive data led EPA to make conservative assumptions with respect to issues such as mechanisms of loss of dioxin from the system. The Decision Document for the Final TMDL evaluates existing and modeled fish tissue data as evidence of net attenuation and concludes that these data support the use of a conservative model at this time.

Comment. Non-CWA authorities, such as Clean Air Act, Federal Insecticide, Fungicide & Rodenticide Act, Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act, and Superfund Amendments and Reauthorization Act, need to be used to control all sources.

Response. Although this TMDL is established under the provisions of the CWA, EPA agrees that all applicable authorities should be utilized to reduce the production and discharge of dioxins where it is demonstrated to be present at levels of concern. Three wood-preserving wastes, for example, were listed as hazardous wastes under RCRA Subtitle C in November 1990. Control of nonpoint sources may also require utilization of state law and/or local ordinances.

Comment. Tissue sample data in the National Bioaccumulation Study (NBS) are not adequate to describe relative contributions from the various sources studied.

Response. EPA agrees. The NBS is primarily useful to demonstrate the range of dioxin contamination present in our nation's waters and to give a first cut at which types of activities are typically associated with the highest levels observed.

Comment. Attenuation/sedimentation will result in problems being localized in areas below major sources. Therefore, developing the TMDL on basin wide basis is inappropriate. It would be more appropriate to rely on BAT or attack problems on more local basis.

Response. EPA disagrees. A solution to the problem of dioxin contamination in the Columbia River basin requires that the problem be evaluated at several levels (local, sub-basin, and whole basin) to account for multiple sources in the entire basin. While it is necessary to look at localized areas of contamination, such as through the NPDES permitting process, it is not sufficient to do so in isolation. Dioxin, due to its persistence, may be transported for considerable distances and has been measured in fish tissue taken from areas away from pulp mills. The TMDL provides for an equitable distribution of the loading capacity throughout the basin rather than allowing the entire loading capacity to be allocated to any one source to the detriment of others.

BAT limits based on BPJ, existing at the time the Columbia River was listed and approved as a §303(d) water, were not adequate to attain water quality standards. Whether BPJ limits to be developed in the future, or limitations based on future effluent guidelines for BAT, will be sufficient to attain water quality standards cannot be ascertained at this time.

GROWTH

Comments. Several comments were received relating to concerns about how future new sources or growth of existing sources would be handled through the TMDL process.

Response. EPA believes that economic growth can be accommodated in the Columbia River basin through the TMDL process. Indeed, without a plan, such as a TMDL, to achieve necessary reductions in dioxin loadings to the system, no new discharges of dioxin could be allowed. As further information is developed on the existing sources, uncertainties should

diminish and thereby lessen the magnitude of the margin of safety needed. This combination of factors may lead to further room for growth.

Proposals for activities leading to increased dioxin loadings will need to be evaluated on a case-by-case basis to determine whether allowance of the loadings is consistent with this TMDL and the requirements of the Act.

Assuming proposals meet water quality standards, additional factors which could be considered in evaluating relative priorities include the anticipated dioxin loading, efforts taken to minimize dioxin contaminated wastes, and the social/economic benefits of the proposed activity.

HEALTH RISK

Comment. One commenter expressed concern that toxics may be responsible for a number of cancers among the population on Puget Island in the lower Columbia River.

Response. EPA is not aware of any evidence linking the cancers described to any specific cause. It is a goal of the CWA and state water quality standards to protect human health as well as the environment from adverse impacts caused by contaminants in surface waters. The applicable state water quality criteria and the dioxin TMDL were established to reduce risks associated with dioxin contamination in the Columbia River basin.

Comment. Fish are being contaminated by dioxin; there is a disproportionate health risk to Indians; Indian treaties give rights to have fish to take; the federal trust responsibility requires protection of fish; commenters recommend zero dioxin discharge for WLAs for pulp mills.

Response. EPA recognizes the increased risk to people who consume greater than average amounts of fish from the Columbia River system. Estimates of those risks were given in a draft EPA report by Cleverly and McCormick ("Analysis of the Potential Populations at Risk From the Consumption of Freshwater Fish Caught Near Pulp Mills," April 23, 1990) and follow-up work is in progress. The TMDL being established for dioxin loading to the Columbia River basin is developed based on current state water quality standards. If those standards are not sufficiently protective of Indian health, changes in those standards should be sought. The states triennial review process provides one avenue for seeking such changes. See also responses to previous comments relating to the zero dioxin discharge option.

Comment. An industry sponsored study by ChemRisk (1989) confirms that there is no human health reason or environmental reason to require such strict limits. Each mill could be given WLA equivalent to 10-30 ppq in its final effluent without exceeding a risk of 1 in a million based on this study and industry modeling.

Response. EPA Region 10 does not agree with the risk estimates provided by the pulp mill industry. The goal of the TMDL is to ensure that state water quality standards are attained in the Columbia River system. The WLAs in the final TMDL, substantially lower than those which this comment suggests, are necessary to meet water quality standards according to EPA Region 10's evaluation. The Decision Document for the final TMDL provides the basis of EPA's determination. See also the response for the comment relating to the industry sponsored study under the "OTHER SOURCES" heading. Included in the administrative record for this TMDL is a letter dated March 16, 1990 from Laurence R. Foster (State Epidemiologist, Oregon Department of Human Resources, Health Division) to Llewellyn Matthews (Executive Director, Northwest Pulp and Paper Association) which summarizes several serious concerns (with which we concur) about the referenced study.

LAW

Comment. The waste load allocations (WLA) in the TMDL violate Washington state law provision RCW 90.54.020(3)(b).

Response. Section 303(d) of the CWA, 33 U.S.C. 1313(d), requires the states or EPA (upon disapproval of state submissions) to identify waters within a state's boundaries for which effluent limitations under Section 301(b)(1)(A),(B), are not stringent enough to implement water quality standards applicable to such waters. Section 303(d) also requires the establishment for these waters of a TMDL which is necessary to implement the water quality standards. A TMDL establishes allowable loadings for point source discharges into these waters (WLA) and load allocations (LA) for nonpoint sources. NPDES permits are then developed with effluent limitations, consistent with the WLA, which are designed to meet the water quality standards.

EPA is establishing a TMDL for 2,3,7,8-TCDD in the Columbia River for the states of Oregon, Idaho, and Washington. NPDES permit limits for dioxin discharges to the Columbia River basin must be consistent with the TMDL [40 C.F.R. 122.44(d)(1)(vii)(B); 122.44(d)(6); 130.12(a)]. However, Sections 301(b)(1)(C) and 510 of the CWA allow the state to implement

any more stringent limits necessary to meet state requirements.

The portion of the Washington law referred to states:

"Notwithstanding that standards of quality established for the waters of the state would not be violated, wastes and other materials and substances shall not be allowed to enter such waters which will reduce the existing quality thereof, except in those situations where it is clear that overriding considerations of the public interest will be served." (emphasis added)

It is EPA's position that the TMDL does not violate this law for two reasons. The TMDL does not authorize the discharge of dioxin to the Columbia River; that can only be done in NPDES permits. These permits must contain water quality based effluent limits consistent with the TMDL. While a permit authorizing the discharge of dioxin must be consistent with the TMDL, it may also be made more stringent to the extent the state determines that effluent limits based on the TMDL would not be sufficient to protect water quality standards or to implement other provisions of state law. CWA §301(b)(1)(C); §401(a).

Secondly, effluent limits based on the TMDL do not reduce the existing water quality. The reduction of the discharge of dioxin resulting from the implementation of this TMDL will improve the existing quality of the waters not degrade it.

Comment. One commenter challenges EPA's authority to promulgate this TMDL because there is no support in the record that the affected states determined not to establish a TMDL for dioxin on the Columbia River.

Response. Section 303(d)(2) of the CWA requires EPA to either approve or disapprove submissions by states regarding the establishment of lists of water quality limited waters and load allocations for point source discharges to these waters.

On March 21, 1990, the states of Oregon, Washington, and Idaho sent letters to the Director of the Water Division, EPA Region 10, expressly stating that they would not establish state issued TMDL's for dioxin on the Columbia River and requesting that EPA establish a TMDL as a federal action. This was based on the states' desire for consistency and equity in regulating discharges to waters in the multi-state Columbia River basin. Based on these submissions EPA, in accordance with Section 303(d)(2), disapproved these submissions and established the TMDL.

EPA has statutory authority to take this action. As a matter of law, under CWA §303(d)(2), an explicit state determination to set no TMDLs must be reviewed by the EPA and the EPA is required to approve or disapprove the submission. If EPA disapproves it must set its own TMDLs. Certainly a state's decision to not act should not defeat the intent of Congress that TMDLs be established for waterbodies meeting the listing criteria under CWA §303(d).

Comment. One commenter raised questions as to the effect of the TMDL on NPDES permits and the reviewability of the TMDL in a state forum challenge to the permit.

Response. NPDES permit limits must be consistent with the waste load allocations in the TMDL. Judicial review of the TMDL must be reviewed in federal court and EPA believes that any such review would be based on the administrative record. Challenges to NPDES permits must be pursued administratively through the agency which issued the permits. See discussion under "Judicial Review" in the decision document.

Comment. The phased approach is contrary to law.

Response. See response to comments on "Phased Approach."

Comment. Weyerhaeuser (p.12 of a letter dated July 20, 1990) suggested "that a reasonable response to the data gaps in the TMDL decision document would be to postpone adoption of a 'final' TMDL ... and [instead] adopt a set of load and waste load allocations expressly labeled as provisional for the purposes of permitting only. Compliance with these provisional waste load allocations (if retained or as modified) would be due three years after permit issuance." An effective period of one year for the provisional permit was suggested during which additional information would be gathered.

Response. EPA agrees that the TMDL should be established regardless of the need for further information. However, the procedural mechanism suggested is not provided for in the CWA and EPA believes it is important that these dioxin controls be final agency action even if later modified. The TMDL developed may be modified later if new information is obtained which supports revision (see also response to comment under "ANTIBACKSLIDING"). Further studies are planned but a commitment to revising the TMDL at a specific future date would be premature at this time. The waste load allocations in the TMDL will be implemented through NPDES permits. The compliance date for dioxin in the case of the mills affected by this TMDL is dictated by Section 304(l).

LOSSES

Comment. Several commenters criticized the lack of consideration of processes leading to loss of dioxin from the system. Others commented, however, that delaying regulatory action to improve knowledge of these processes would be inappropriate.

Response. EPA agrees that the implementation of this TMDL should proceed while further data are gathered. Appendix B of the final TMDL includes an expanded discussion of available information on attenuation and the sediments as a loading source to the river system. See also the responses in the "GENERAL APPROACH" section.

MARGIN OF SAFETY

Comment. Several comments were received that the concept of a margin of safety needs clarification and that the margin of safety incorporated into the proposed TMDL was too large or too small.

Response. Section 303(d)(1)(C) of the Clean Water Act and EPA implementing regulations require each state to identify waters for which existing pollution control requirements are not stringent enough to attain water quality standards applicable to such waters. Total maximum daily loads (TMDLs) are then to be established on such water quality limited segments for appropriate pollutants of concern. This provision states that the TMDL:

"shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." (emphasis added)

The margin of safety reflects uncertainties in the development of the TMDL. Such uncertainties may relate to, for example, (1) potential sources for which measurements of pollutant loadings are not available, and (2) the uncertain fate of pollutants once introduced into the waterbody. Conceptually it involves establishing WLAs and LAs such that, even if some of the assumptions made are in error, implementation of those allocations will still result in attainment of the water quality standard.

The size of the margin of safety needed in, or that is actually provided by, a given TMDL is not easily determined and may depend to a large degree

on professional judgement. The margin of safety is not something that can be precisely calculated. For instance, using a conservative model to estimate pollutant transport and fate results in a cautious estimate of the system's loading capacity. This provides a margin of safety, but since we do not precisely know the "true" loading capacity we cannot quantify the magnitude of this component of the total margin of safety. Similarly, the fact that some sources may not fully utilize their allocation provides an additional unquantifiable margin of safety. In any TMDL, some margin of safety may be provided by establishing allocations that in total are lower than the defined loading capacity.

In the final TMDL we use a conservative model to describe transport, fate and attenuation, thus providing part of the needed margin of safety. The total of the only allocations established (the WLAs for the existing pulp mills in the basin) is also significantly less than the estimated loading capacity. The unallocated portion of the loading capacity also provides a margin of safety as noted in the Decision Document. Of course, EPA recognizes that there are existing sources of dioxin to the basin other than the chlorine bleaching pulp mills. Thus, only a fraction of the unallocated amount constitutes a margin of safety. The final TMDL estimates loadings attributable to additional sources (woodtreaters, municipal wastewater treatment facilities, and Canadian sources) to demonstrate their ability to fit within the currently unallocated portion of the TMDL. See also responses to comments in the "OTHER SOURCES" category.

MIXING ZONE

Several comments related to the relationship between the TMDL and mixing zone policies:

Comment. The water quality standard should be achieved at the point of discharge. The bioaccumulative nature of dioxin makes assumptions of dilution unreasonable; the TMDL will not adequately address "hot spots."

Comment. TMDL should include analysis of compliance with mixing zone policies.

Comment. Proposed WLAs will result in violations of standards at edge of Boise Cascade mixing zone and downstream for 1500 meters downstream.

Comment. Potlatch WLA will result in violation of the water quality standard for a considerable distance downstream.

Response. While effluent limits in NPDES permits need to be consistent with WLAs in an established TMDL, WLAs are not effluent limits. States establish mixing zone policies as a part of their water quality standards process. Where a state allowed mixing zone is less than the entire river flow, NPDES effluent limits may need to be more restrictive than the WLA would require. An

analysis of this issue, if appropriate, occurs as a part of the NPDES permitting process.

There is no evidence in the record to support assertions of nonattainment of standards outside of state allowed mixing zones. Development of analyses needed for such determinations would require time and money. In light of §304(l) and §303(d) deadlines, EPA believes it should move forward now, rather than duplicate efforts which the state should conduct during the permitting process.

One comment was that no mixing zone should be allowed due to the bioaccumulative nature of this persistent pollutant. However, this issue more directly relates to the appropriateness of existing water quality standards of the states in which the pulp mills are located and thus is not addressed in the TMDL.

MODELING APPROACH

Comment. The geometric mean flow is a better measure of average dilution available in flow regulated systems. This results in a loading capacity of 0.75 mg/day vs. 0.54 mg/day used in the proposed TMDL for the Willamette River basin.

Response. EPA's evaluation of available data suggests that the more conservative measure of the mean, the harmonic mean, more accurately represents the average dilution available in the river. EPA's Draft "Technical Support Document for Water Quality-based Toxics Control" (1990) recommends general use of the harmonic mean for this purpose. The harmonic mean is an appropriate estimate of long-term average flow in highly regulated river basins, such as the Columbia and Willamette. In a regulated river basin, the harmonic mean and the geometric mean are reasonably close. The differences suggested in the comment appear to be the result of differences in the period of record used for flow data. Flow records used to determine the loading capacity in the Columbia Basin were those reported by the U.S. Geological Survey from 1950 to present.

Comment. The TMDL should utilize available models to reflect the flow dynamics of the system, as well as the transport & fate of dioxin; at the very least a sensitivity analysis should be done.

Response. The more sophisticated a model is, the more information is needed to use it. Unfortunately, EPA does not at this time have sufficient information to justify using models requiring estimates of the dynamic processes referred to. While some parameters could perhaps be reasonably estimated,

others (such as loading from historical deposits in the sediment) would need to be given such wide ranges of values that the results from such a model would be of negligible value. Thus, EPA has chosen to use a conservative approach which reflects the amount of available data.

Comment. Less dioxin should be discharged during dry (low river flow) seasons.

Response. The water quality standard which is the basis of the TMDL is based on the human health effects of a long term (70 year) exposure to dioxin through consumption of contaminated fish and drinking water. Seasonal variations in river flow are thus not of great significance. The TMDL, therefore, calculates the loading capacity of the system based on harmonic mean flows which reflect the average dilution provided by the river.

OTHER SOURCES

Comment. Dioxins/furans in Portland Harbor are not from the Pope & Talbot, Halsey Pulp Mill (based on "fingerprinting").

Response. Region 10 acknowledges that there are likely to be sources of dioxin loading to the Willamette basin in addition to the Halsey mill. One such source may be contributions from sediments contaminated by past dischargers. However, this does not reduce the need to control the discharges from current known sources, including the Pulp & Talbot mill. It does, however, support the acknowledged need to gather further information to quantify the contributions from these other sources.

Comment. There is a clear need for additional evaluation of other sources, including dredging and nonpoint sources.

Response. Region 10 agrees. As controls on the pulp mills are being implemented, further information will be collected concerning other possible sources (see discussion on phased approach). The Corps of Engineers is considering work which will evaluate the effects of dredging.

Comment. Site specific data on sources such as woodtreaters in the Columbia basin are not needed to estimate the magnitude of their dioxin discharges relative to the unallocated portion of the total loading capacity. National data can be used for this purpose.

Response. Region 10 agrees that information describing loadings from similar activities in other locations would be useful in evaluating the potential magnitude of contribution from those same activities in the Columbia River basin. The final TMDL uses some national data combined with small amounts of Regional data to estimate dioxin loadings from two additional source categories.

Besides chlorine bleaching pulp mills, the source for which the best information exists is municipal wastewater treatment facilities. National data demonstrate that the sludges removed from some municipal plants contain dioxins and furans. Octa-chlorinated forms predominated the dioxins found in these sludges. Presumably where sludges are contaminated, the wastewater discharges (which contain suspended solids) would also contain these compounds. Of the five municipal facilities whose sludges were examined in the Columbia basin only one had detectable levels of 2,3,7,8-TCDD. The highest 2,3,7,8-TCDD concentration measured for that facility was 3.3 ng/kg. The national average was similar at 2.8 ng/kg. If we assume that the suspended solids in the effluent from the facilities in our Region also contain that concentration of 2,3,7,8-TCDD, a loading can be estimated based on the Total Suspended Solids (TSS) discharge data reported for the facilities in the basin. This approach results in an estimated loading of 0.2 mg/day 2,3,7,8-TCDD to the entire basin from these facilities (see Appendix B of the Decision Document for the Final TMDL). As additional information is assembled, this preliminary estimate may be refined.

Another likely source of dioxins is the woodtreating industry. We know that pentachlorophenol (PCP), one of the chemicals used in this industry, is frequently contaminated with varying amounts of dioxins. This is one of the source categories which we plan to study further in our efforts to control dioxin loadings to the Columbia R. At this time, however, we have no direct information on how much dioxin from these facilities may ultimately be transported to surface waters. Process wastewaters from these sources are generally not permitted for discharge. The most likely mechanisms of transport of 2,3,7,8-TCDD contaminated PCP are stormwater and subsurface flow from retention ponds near surface waters. PCP has been monitored, but not limited, under NPDES permits covering stormwater discharges from some of these facilities. Based on that data and an assumed ratio of 2,3,7,8-TCDD to PCP in the discharge, it is estimated that 1 - 2 mg 2,3,7,8-TCDD/day could be originating from woodtreating operations in the Columbia River basin (see Appendix B of the Decision Document).

A third potential source category is non-chlorine bleaching pulp mills and other potential industrial sources. An estimate of loadings from these

sources cannot be determined at this time because no data has been identified which describes 2,3,7,8-TCDD in either effluents or sludges. As additional information is gathered, it will be possible to estimate loadings from these sources. See also Appendix B of the Decision Document for the Final TMDL.

Comment. EPA is ignoring available information of other sources of dioxin. EPA must use existing data to estimate waste loads from these sources.

Response. The public notice of the proposed TMDL specifically requested that any relevant information in the possession of commenters be provided. We have carefully reviewed the supplied information and have found little additional data of use in establishing WLAs for sources outside of the pulp mill category. However, the final TMDL estimates potential contributions from two additional source categories (see response above).

Comment. Lack of dates and commitments for State and EPA action regarding collection of further data on other sources, indicates that the phased approach is a pretense.

Response. The phased approach results from EPA's recognition that needed reductions in loadings from the pulp mills should not be delayed while gathering information on other sources. The high expense of analyzing dioxins, budgetary constraints, and uncertainties relating to the results of future monitoring, make it difficult to predict the rate of progress in gathering further information and making any necessary adjustments to the TMDL. (See also the response to comments in the "Phased Approach" category.) EPA has developed this TMDL recognizing the limited information available, and has incorporated a margin of safety into the analysis such that, notwithstanding the current limits on information, water quality standards are expected to be attained.

Comment. An industry sponsored fish study (Beak Consultants, 1989) shows higher fish tissue concentrations above the mills than below; other sources need to be accounted for.

Response. The existence of other sources is recognized by EPA and is the reason that WLAs to the pulp mills were limited to less than loading capacity of the system. The industry sponsored study had several weaknesses in its design which make it difficult to draw conclusions about the relative significance of pulp mill discharges versus other sources of dioxin to the system. The most critical problem with this study was the location of sampling sites. For example, the referenced study took no samples from

the reservoir above McNary Dam directly downstream of Wallula. The nearest downstream samples were taken from below McNary Dam. Based on the 104 Mill Study, however, the Boise Cascade mill at Wallula contributed the highest dioxin loading to the river of any mill in the Region. Fish from the reservoir above McNary Dam, into which this mill discharges its wastewater, also had some of the highest tissue concentrations of TCDD in the Pacific Northwest.

Comment. The proposed TMDL does not address how much dioxin toxicity is in the river system already (e.g. available from sediments), as well as loading from all sources.

Response. The final TMDL has an expanded discussion of other sources of dioxin to the system including bottom sediments (see Appendix B of the TMDL).

Comment. What input might there be from pulp mill air emissions to the Columbia River?

Response. Since dioxins are formed in combustion processes, one would expect them to be produced in the boilers at pulp mills. The Region is aware of the analysis of dioxins and furans in one sample of boiler fly ash (from an Alaskan pulp mill). The results of that analysis showed total TCDD levels of ~74.6 ppb; 2,3,7,8-TCDD was not analyzed separately. Thus, although air emissions are likely to contain dioxins and other chlorinated organics, we do not know enough to estimate potential contributions to the Columbia River from these air emissions. Given the probable wide dispersal of the air particulates, only a small fraction would be expected to fall on water directly. Dioxin's affinity for solids would also mean that direct erosion would be required to transport dioxin contaminated solids settling on land to surface waters. Thus, the transport of dioxin contaminated pulp mill boiler emissions is probably a minor source relative to their direct wastewater discharges. EPA believes that any contribution from this source is more than adequately covered by the margin of safety built into the TMDL.

Comment. Application of the TMDL concept to dredging and disposal activities is inappropriate as these activities are sufficiently regulated under Section 404 and 401 of the CWA of 1977 and Section 103 of the Ocean Dumping Act of 1972.

Response. The TMDL process should take into consideration all sources of the pollutant of concern. To the extent that dredging of sediments results in the transfer of dioxin from those sediments to the water column, that

activity is using some of the loading capacity which is, therefore, not available for other users of the system. Of course, if dredging and disposal activities are regulated under Section 404 such that there are no associated discharges of dioxin, then any future TMDL would have no effect on these activities.

The Corps of Engineers (COE) recently completed analyses of TCDD in sediments in areas to be dredged in the Columbia River. Columbia River sediment had non-detect TCDD in areas with mostly sandy, silty sand, or sandy silt sediments. TCDD was found at two stations in the Willamette River in low ppt concentrations. These stations, however, also contain other pollutants at levels of concern, which will be considered in making dredging and dredged material disposal decisions.

The Final TMDL emphasizes the control of point source discharges of dioxin through NPDES permits. While uncertainty about the release of dioxin from sediments contributes to the need for a significant margin of safety, the Final TMDL does not provide specific allocations for dredging activities.

Comment. The TMDL must identify quantities assigned to WLAs, LAs, margin of safety, and reserve capacity.

Response. The final TMDL identifies WLAs for chlorine bleaching pulp mills, estimates loadings from other sources, and leaves unallocated a portion of the loading capacity. As described in response to the "MARGIN OF SAFETY" comment, the margin of safety cannot be precisely quantified as it is comprised of a variety of conservative assumptions made in estimating the loading capacity and evaluating contributions from the various sources as well as the unallocated loading capacity.

PERMIT LIMITS

Comment. Concentration and flow limits could unfairly penalize mills that practice extensive recycling.

Response. The Final TMDL includes no concentration or flow limits for pulp mills. The TMDL specifies allowable loadings (WLAs) for the pulp mills in the basin. In order to be equitable, the WLAs are proportional to quantities of bleached product produced. The factor ($0.257 \mu\text{g}/\text{ton}$) used to arrive at the WLA was based on an assumed concentration of 2,3,7,8-TCDD (10 ppq maximum or 4.7 ppq long term average) and an average flow of 14,470 gallons of wastewater discharged per ton of bleached product. If a

mill uses extensive wastewater recycling to reduce discharge flows from the chlorinated wastestreams, they could have higher concentrations of 2,3,7,8-TCDD in the discharged wastewater while still being in compliance with the loading limit and the WLA. NPDES permits based on this TMDL should include dioxin load limitations consistent with the WLAs, not the concentration which was assumed in its derivation.

Comment. The TMDL should be specific about how permit limits should be derived from WLAs and how compliance will be measured. How will below detection or below quantitation limit results be handled?

Response. The TMDL is specific in describing WLAs as a long term average loading limit. There are several ways in which the states could translate the WLAs into permit requirements. As long as the NPDES permits include limits consistent with the TMDL and compliance is effectively monitored, the states will be allowed flexibility in how they achieve that goal. WLAs have been established at levels such that inadequate plant performance will lead to individual samples having concentrations which are measurable.

Comment. If 2,3,7,8-TCDD is the only pollutant addressed by the TMDL, polluters will be liable for CWA penalties for discharging other chlorinated organics.

Response. The response to comments under the heading "TEC vs TCDD" addresses the reasons why this TMDL focuses on 2,3,7,8-TCDD. The CWA liability of dischargers for various pollutants in their wastestreams is a question of compliance with the limits in their NPDES permit(s).

PHASED APPROACH

Comment. Several comments were received relating to the legality, timing, and effects of the phased approach discussed in the proposed TMDL.

Response. It appears that the "phased approach" terminology led to considerable confusion. The TMDL now being established is "final." It reflects EPA's best professional judgement given the information available at this time. The law requires that a TMDL be established at a level which reflects existing uncertainties. As further information is obtained, however, the TMDL may also be modified or revised through the same process used to develop it in the first place. The levels of uncertainty involved in this TMDL are not insignificant. Therefore, EPA chose to not only acknowledge those uncertainties, but to also state its intention to actively gather additional data to improve our knowledge with respect to certain issues. There is no required time frame for this next "phase" and, given budgetary

constraints and other uncertainties, we cannot at this time predict when this TMDL might be revised.

One concern expressed was whether a revised TMDL could conceivably result in reduced WLAs to the pulp mills. If new information indicates that, contrary to our present evaluation, other uncontrollable sources of dioxin are more significant than the present TMDL assumed, further reductions would be necessary in the existing WLAs.

Another comment was that, while this TMDL is in effect, further efforts should be undertaken to eliminate chlorine bleaching. As EPA begins to implement its pollution prevention initiative, this would seem to be a possible direction for the future. However, EPA does not believe at this time that it is necessary to eliminate all chlorine bleaching of paper products to meet water quality standards.

PRODUCTION

Comment. Weyerhaeuser Longview produces 407 tons per day (TPD) of bleached fine paper grades and 639 TPD of bleached paper board = 1046 TPD total bleached product (1026 TPD was used in proposed TMDL).

Response. Our production estimates are based on those used by the Washington Department of Ecology in developing their draft permit for Weyerhaeuser Longview. As of August 31, 1990, Ecology was still estimating Kraft fine paper production at 400 TPD and 626 TPD of Kraft paperboard production. These are the only products listed which are bleached at the plant. The suggested change represents only a 2% difference and would need to be corroborated before it could be accepted. No change in production figures is justified at this time.

Comment. Boise Cascade, St. Helens, produces over 1100 tons/day pulp and is in the midst of a \$400 million renovation which will increase production.

Response. The 1035 ton/day figure used in the TMDL is based on Oregon Department of Environmental Quality's draft permit dated May 25, 1990, for the City of St. Helens. A final permit just issued was consistent with this figure. Boise Cascade has submitted no information to revise this estimate and made no comment relating to its production rates during the comment period.

PUBLIC PARTICIPATION

Comment. Several comments were received about the adequacy of the public comment process for the proposed TMDL. Those making these comments felt that a longer comment period was needed or that workshops with industry should have been held to discuss technical issues.

Response. EPA and the states have been very open in the process of developing the proposed TMDL. Both industry and environmental groups have had copies of earlier drafts (December 22, 1989 and April 20, 1990) of the TMDL which were very similar to the proposed version. In fact we received informal comments on these drafts. The effective comment period for these parties was, therefore, much longer than the formal 35 day period held after the Public Notice on June 15, 1990, and more than adequate in the opinion of EPA. EPA also believes that the 35 day period was itself adequate in light of statutory deadlines for Agency action on such matters under CWA §303(d) and §304(l).

Although industry and others were able to provide information and comment to EPA, as were all parties, we did not feel it was appropriate to hold workshops with industry. The only way that industry workshops could have served any useful function, other than that already available, was if EPA provided information to industry which was not publicly available. That would clearly have been inappropriate.

REFERENCES

Comment. The TMDL needs more reference information to support river flows used, effluent flows, TCDD data used, justification for Coefficient of Variation used.

Response. The final TMDL decision document contains more complete references for data and assumptions used.

RESEARCH

Comment. Additional research on sources, effects, and analytical methods should be done by an independent group, but funded by those who are contaminating public waters.

Response. Additional research is planned by a number of entities on related subjects.

Such work will include, but not be limited to, monitoring by the pulp mills given WLAs in the final TMDL.

STATE PLANNING

Comment. EPA needs to clarify how the TMDL fits in with state water quality planning efforts.

Response. Upon the establishment of the TMDL, it automatically becomes a part of the Water Quality Management Plans of the affected states. Subsequent NPDES permitting actions requiring state or federal approval will need to be consistent with the TMDL. State water quality planning efforts will also need to be consistent with the TMDL. Since the TMDL is subject to change as further knowledge is gained, state water quality planning efforts will need to react to future changes in the TMDL or, in some cases, may cause such changes.

TCDD VS TEC

Comment. Several comments related to the appropriateness of regulating just 2,3,7,8-TCDD at this time. Some thought that other organochlorines, including other dioxins and furans, should be covered by the TMDL.

Response. EPA Region 10 does not believe it is appropriate to use a toxicity equivalency concentration (TEC) approach for including other compounds in the TMDL for the following reasons:

- 2,3,7,8-TCDD is the most toxic of all dioxin and furan compounds, and thus is the chemical of greatest concern. Controlling 2,3,7,8-TCDD discharges will greatly reduce the risk posed by dioxins and furans in general.
- It is expected that actions taken to reduce 2,3,7,8-TCDD discharges will also reduce the production of other dioxins and furans. This is supported by recent information supplied by three pulp and paper mills in the Columbia River basin (Boise-Cascade at Wallula, Potlatch at Lewiston, and James River at Camas) indicating that as effluent concentrations of dioxins have decreased, the concentrations of furans have also decreased.
- There does not appear to be sufficient information available on other dioxin/furan congeners upon which to base a numeric water quality

criterion or a TMDL for TEC. For example, while relative toxicities of other dioxins/furans have been estimated, little is known regarding their tendency to be taken up and bioconcentrated in fish tissues. Additionally, little is known regarding whether or not other dioxins and furans are metabolized by fish or other organisms, which would affect their persistence.

- It is not clear that states intend to regulate carcinogenic substances in wastewater discharges at a cumulative level of one increased incidence of cancer for all (or a group of) chemicals. For example, in Oregon's Water Quality Standards, water quality criteria for carcinogenic substances are set at a concentration which would result in one additional cancer per one million people on a chemical by chemical basis. Thus permit limits are generally based on a chemical by chemical basis using the "one in a million increased cancer risk" criteria. Historically, carcinogenic substances have been regulated in Washington and Idaho on a chemical by chemical basis as well, rather than attempting to regulate for all chemicals on a cumulative basis. While regulation on a cumulative basis may be desirable at some point in the future, states must first develop methodologies for such actions, as well as a determination as to whether cumulative evaluations would be based on the same cancer risk endpoint of one additional cancer per million people.
- EPA also does not believe there is adequate information available at this time to factor PCBs, DDTs, or other related compounds into a single toxicity equivalency approach.

WATERSHED APPROACH

Comment. Several people commented on the TMDL approach of evaluating the whole Columbia River basin and the use of watershed targets for major sub-basins. For the most part, commenters were supportive of this broad approach. One commenter, however, felt that the WLAs for the pulp mills were inequitable, since they constituted differing fractions of the loading capacity for each of the watersheds. Another commenter thought that since the Willamette River basin was entirely within Oregon, that state should have the responsibility to allocate loadings in that basin.

Response. It is true that the sum of the WLAs to the pulp mills in the various watersheds varied as a percentage of the loading capacity for the watershed. This resulted from treating each of the pulp mills equitably based on existing bleached pulp production. This approach should not, however, give any one state an economic advantage over others, beyond

that which accrues from having greater water volumes available for dilution. To the extent that existing pulp mills utilize more of the loading capacity in a given watershed, there will be less room for other sources or growth in that watershed.

This TMDL establishes a WLA to one source on the Willamette River (Pope & Talbot at Halsey). However, because the Willamette Basin is entirely within Oregon, the Oregon Department of Environmental Quality has the option, within the context of a TMDL, to adjust allocations for specific sources which would still meet this watershed target. See also discussion under "Watershed Targets" in the Decision Document.

WLA APPROACH

Comment. The most equitable allocation method to pulp mills is that based on production rates.

Response. EPA Region 10 agrees and has followed this approach.

Comment. WLAs are inequitable since they result in differing concentration limits for the various pulp mills.

Response. Since the pulp mills in the Columbia River basin differ in the efficiency with which they use water, WLAs cannot be established which are equitable on both a production rate basis and a concentration in effluent basis. Since the ultimate goal of the TMDL is to control mass loading to the basin, not the concentration in the effluent, the production basis was selected for establishing the WLAs for pulp mills. Use of a concentration basis for the WLAs would also be counterproductive with respect to a general EPA goal of minimizing water usage in and pollutant discharge from industrial processes.

Comment. WLAs should be based on production capacity rather than actual production.

Response. Basing WLAs purely on production capacity would allow plants with substantial unused capacity to discharge greater amounts of dioxin per amount of bleached product produced than would be allowed for mills operating at capacity. This would be counter to EPA's effort to be equitable to the mills while establishing WLAs that will lead to attainment of water quality standards. Where plans for substantial production increases are proposed and confirmed, however, EPA will consider changing WLAs on a case-by-case basis within the context of this TMDL. See also the

response to comment in the "GROWTH" section.

Comment. Each mill should be given WLA equivalent to 10-30 ppq in final effluent; this would have risk less than 1 in a million based on industry modeling. Process for further refinement of TMDL could be incorporated.

Response. See response under "Health Risk."

Comment. The allowable discharge should be based on ability to avoid discharge rather than receiving water's capacity.

Response. EPA agrees that ability to avoid discharges should be considered in establishing effluent limits. That is the technology-based approach to regulating point sources and is the goal of BAT. For the pulp mill industry EPA plans to promulgate in 1995 revised BAT effluent guidelines which will minimize the production and discharge of dioxin based upon technological consideration. The TMDL, in accordance with Section 303(d) of CWA, is required to achieve water quality standards in waters where existing pollution control requirements (including existing technology-based limits) have not been adequate to do so. (See also response under "BAT").

Comment. Proposed WLAs will not achieve a sufficient reduction of 2,3,7,8-TCDD, based on fish tissue concentrations, to fit within defined loading capacity.

Response. The water quality standard which is the basis of this TMDL is itself based on the health effects of 2,3,7,8-TCDD. Although the standard is expressed as a concentration of 0.013 ppq in the water, it is primarily based on a fish tissue concentration (0.07 ppt) which is predicted to cause one excess cancer per one million people (10^{-6}) who consume an assumed quantity of this fish over 70 years. Thus, the 10^{-6} risk level, a fish concentration of 0.07 ppt and a water concentration of 0.013 ppq are, in the context of the 2,3,7,8-TCDD criterion, equivalent. This comment points out the fact that measured dioxin levels in fish sampled in the National Bioaccumulation Study in many cases exceeded the acceptable level (0.07 ppt) by a greater factor than that required by the TMDL as a reduction in the pulp mill discharges. This interpretation of the data is one which EPA was aware of in its development of the TMDL. It is one of the reasons that the agency chose to conservatively assume no net attenuation in its model of the system. However, the dioxin loadings the NBS fish tissue data reflect are not known. They may, in fact, be the result of even higher historic loadings than were measured in the "104 Mill Study." EPA, therefore, chose not to estimate needed loading reductions based on the fish tissue data.

Comment. The proposed TMDL is inconsistent in that it assumes pulp mills are only 34% of the current dioxin loading and yet a 95% reduction in loading by that category alone will result in meeting standards.

Response. EPA disagrees with the interpretation of the proposed TMDL made by this commenter. WLAs in the TMDL do not represent EPA's assumptions of existing dioxin discharges by industry, but rather an apportioning of the load they will be allowed to contribute in the future. The proposed TMDL pointed out that there were several weaknesses in trying to use the NBS data to estimate relative loadings of various source categories. EPA does not assume that the pulp mills have contributed 34% of the past or current loading to the system. Based on currently available information, EPA believes that the pulp mills have contributed a higher share of the loading in the past and that other sources will fit within the reserved capacity. However, EPA does not now have sufficient information to accurately estimate the exact fraction of the total dioxin loading to the Columbia River contributed by the pulp mills in the past. The final TMDL allocates approximately 35% of the loading capacity to chlorine bleaching pulp mills in the Region. If future information shows that other sources can not be controlled to the levels estimated in the final TMDL as adequate to cover their loadings, the TMDL will need to be modified. In the mean time, EPA believes that the requirements of the TMDL (approximately a 95% reduction in pulp mill dioxin discharges relative to the year 1988) will result in water quality standards being met. See response to comments on "Other Sources."

Comment. Pulp mill allocations for the main part of the Columbia River (that excluding the Snake River, Willamette River and Canada) should not exceed 34%.

Response. It is not clear why the commenter proposed the 34% figure as a maximum, but it seems to be based on either (1) the belief that pulp mills contribute about 34% of the current loading to the basin, or (2) that the proportion of the mainstem part of the Columbia allocated to pulp mills should not exceed the proportion of the loading capacity for the entire basin allocated to Region 10 pulp mills.

(1) As pointed out in responses to other comments, although the NBS data might seem to indicate that pulp mills contribute approximately 34% of the total load, this results from an inappropriate assumption. Region 10 believes that in the Columbia River Basin, pulp mills are, in fact, the most significant contributor of 2,3,7,8-TCDD (even after the reductions in their contribution they have already achieved).

(2) Although the proposed TMDL allocated about 34% of the basin loading capacity to Region 10 pulp mills, Canadian sources should be considered if one is trying to look at the industry's allocated proportion of the total loading capacity. Including Celgar's loading raises the total pulp mill contribution on a basin-wide basis to about 40% of the loading capacity. In any event, the fact that there is a concentration of mills along the lower Columbia River combined with equity of WLAs among the pulp mills, leads to a higher proportion of the loading capacity in that area allocated to the pulp mills than in other basins with fewer pulp mills.

Comment. The proposed TMDL allocation of 34% to mills is inconsistent with 304(l) determination that receiving water for Longview Fibre's discharge (& other mills) is water quality limited "due entirely or substantially" to its discharge.

Response. The allocation of 34% of the loading capacity to the future discharges from pulp mills in Region 10 does not imply that 34% is the portion of current or past loading contributed by those sources. Although even 34% would constitute a substantial proportion of the total loading, EPA believes that pulp mills have been responsible for a greater share in the past.

WATER QUALITY LIMITED STATUS

Comment. No state submissions of water quality limited segments were ever made.

Response. Since the National Bioaccumulation Study results became known, it has been generally acknowledged that the fish tissue concentrations indicated that the Columbia, Willamette, and Snake Rivers were water quality limited for dioxin (2,3,7,8-TCDD). This, combined with dilution analyses of measured pulp mill waste concentrations, was the basis for the states initiating the TMDL process. When Ecology, ODEQ, and IDEQ each requested that EPA Region 10 establish the TMDL as a federal action, the letters (dated March 21, 1990) they sent each recognized "the designation of this river as water quality limited for dioxin ..." The 1990 Water Quality Assessment (Section 305(b)) reports from both Washington and Oregon also list the applicable portions of the Columbia, Willamette, and Snake Rivers as water quality limited under Section 303(d) of the Clean Water Act due to dioxin contamination.

Comment. The Washington state water quality standard is not equal to .013 ppq.

Response. While it is true that Washington has not adopted a numeric criterion for

2,3,7,8-TCDD, it currently has what is called a "narrative standard" which applies to most toxic substances including dioxin. The state has interpreted this standard consistently with EPA's water quality criterion at the 10^{-6} risk level in both their section 304(l) and 305(b) listing processes. In accordance with the EPA criteria, this corresponds to a concentration of 0.013 ppq. See response to previous comment.

Furthermore, even without a narrative criterion for the state of Washington, EPA would have used .013 ppq as the basis for the TMDL because of the need to ensure that the TMDL will protect the waters of the state of Oregon, where the .013 ppq criterion is a part of the state's water quality standards. See the discussion in Appendix A of the Decision Document for the final TMDL.

Comment. There is no established BAT for dioxin discharges from pulp mills, so no defensible §303(d) listing could be made by states.

Response. See response to comment under BAT section.

WATER QUALITY STANDARD

Comment. Several comments were received concerning the appropriateness of the water quality standard for dioxin used in the development of the TMDL.

Response. The existing state standards are the legal basis for the whole TMDL process. As such, the TMDL must be designed to ensure compliance with those standards. Comments on the appropriateness of water quality standards are best addressed to the respective states for consideration in their triennial review process. As a regional authority, EPA Region 10 is responsible for ensuring that all state water quality standards are met. In the case of the Columbia River system, that means that Washington state's standards affect activities in Idaho. It also means that along the Washington-Oregon border, where water travels back and forth between those states, the most stringent of the state standards must be achieved. As the Decision Document for the proposed TMDL explained, Oregon has explicitly adopted a standard of 0.013 parts per quadrillion for 2,3,7,8-TCDD. Washington has a narrative standard which the Department of Ecology has indicated should be interpreted as equal to EPA's federal criterion at the 10^{-6} risk level, the same as Oregon's standard. (See also comment and response under "WATER QUALITY LIMITED STATUS" section.)

Comment. Bioaccumulation factor should be 0.03 to 0.8 rather than 5,000 as used in EPA criterion derivation.

Response. The bioconcentration factor of 5000 referenced in the comment was that used by EPA in the development of its water quality criterion for 2,3,7,8-TCDD. This bioconcentration factor relates the concentration of 2,3,7,8-TCDD in the water to concentrations in fish tissue. Since the state of Oregon has adopted EPA's criterion in its water quality standards, and the states of Washington and Idaho are using EPA's criterion as the basis for implementing their narrative criteria for toxic substances, EPA Region 10 must use the national criterion, and the bioconcentration factor used in its derivation, as the basis for the TMDL.

The commenter cites an EPA study on TCDD in Lake Ontario sediments, water, and fish as the basis for his comments. However, this study used an approach which is different from, and not directly comparable to, that used in developing EPA's water quality criterion for 2,3,7,8-TCDD. The bioaccumulation factor (BAF) recommended by the commenter (0.03 to 0.8) was based upon the relationship between 2,3,7,8-TCDD concentrations in sediments to those observed in fish tissue, rather than comparing water and fish tissue. In order to apply BAFs based upon sediment/fish tissue relationships, the concentrations of dioxin in the sediments must be known, as well as the contribution of specific discharges to the overall 2,3,7,8-TCDD concentration in the sediments. This information is not available at this time. In addition, the results of the referenced study in Lake Ontario indicate that the study results, including the BAFs, are site-specific, even within Lake Ontario. Thus it would not be appropriate to apply the bioaccumulation factors from that study directly to a system such as the Columbia River, which has very different dynamic processes than Lake Ontario.

As a final note, the authors of the Lake Ontario study reach a very different conclusion from their data than does the commenter. The study reports a bioaccumulation factor of 11,000 (relating the concentrations of TCDD in water to fish tissue) based on their laboratory studies, and a bioconcentration factor of 140,000 based on field results. The authors further note that "...If the laboratory BAFs are applied to best estimates of Lake Ontario water dioxin concentration, rather than to the laboratory exposure water TCDD concentrations, lake trout TCDD residues are underestimated by a factor of fourteen. Since the best available models indicate that a large proportion of TCDD present in Lake Ontario water should be bioavailable, the reported Lake Ontario BAF of 140,000 is a reasonable estimate. A Lake Ontario lake trout BAF based on the predicted dissolved TCDD concentration would be 180,000."

