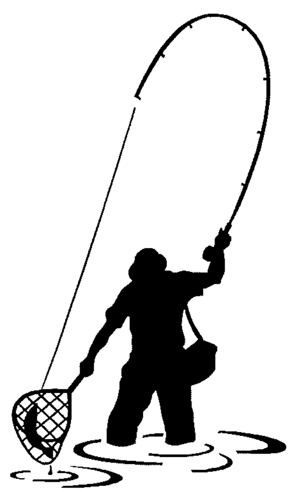
DIOXIN MONITORING PROGRAM
2002-2003

STATUS OF DIOXIN IN MAINE RIVERS



DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEPARTMENT OF HUMAN SERVICES
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TABLE OF CONTENTS PAGE

LIST OF FIGURES — PAGE

LIST OF TABLES — PAGE

DIOXIN MONITORING PROGRAM 2002-2003: STATUS OF DIOXIN IN MAINE RIVERS

OVERVIEW

This report provides an update on the status of dioxin discharges from bleached kraft pulp and paper mills to surface waters of Maine and human health implications. More specifically, the report identifies the tests that have been and will be used to determine if the mills are discharging dioxins to the waters of the state. The report also provides an initial assessment of compliance in 2003 with the 'no discharge of dioxin' provision of Maine state law. The determination of whether or not there is 'any' discharge of dioxin, is very complex and difficult. The report references conclusions drawn by two advisory groups to the Department. The report contains the data from the 2002 and 2003 Dioxin Monitoring Program, and therefore, also fulfills the annual reporting requirements of the program.

FINDINGS

HUMAN HEALTH

- Dioxin levels in fish from Maine rivers continue to decline, approaching background at some locations but still exceeding background at others.

- An evaluation of the health implications of dioxin/furan concentrations in fish in Maine Rivers requires a comparison to a health benchmark. The Bureau of Health uses a health benchmark that is expressed as a specific fish tissue concentration of dioxins and furans, referred to as a "Fish Tissue Action Level" or FTAL. For the present report, the Bureau compares the most recent data on contaminant levels in fish tissue to its current FTALs for dioxins and furans of 1.5 parts per trillion (pptr) for protection of cancer-related effects and 1.8 parts per pptr for protection of noncancer related effects. The Bureau additionally compares sampling data to a lower FTAL of 0.4 pptr, which is under consideration as a potential revision to current FTALs to account for background dietary exposure to dioxins and furans.

- All sampling locations on the Penobscot and Kennebec Rivers had average dioxin and furan levels in smallmouth bass and brown trout that were well below the current FTAL of 1.5 pptr, and below a potential lower FTAL of 0.4 pptr. Levels in white suckers were below the current FTAL of 1.5 pptr, but were generally above the potential lower FTAL of 0.4 pptr.

- With the exception of the Rumford Point sampling location on the Androscoggin River, all other down river sampling locations had average dioxin and furan concentrations in bass tissue that were below the current FTAL of 1.5 pptr. However, all sampling locations with the exception of Auburn had average levels of dioxins and furans that were above the potential lower FTAL of 0.4 pptr – though for several locations levels were only slightly above this health benchmark. Levels in suckers were above the current FTAL for several sampling locations.

- The most recent sampling data for bass and suckers on the Presumpscot and Salmon Falls Rivers indicate dioxin and furan levels below both current FTALs and the potential lower FTAL of 0.4 pptr. The most recent data for the West Branch of the Sebasticook River indicates dioxin and furans levels above current FTALs.

- The Dead River connects the Androscoggin Lake to the Androscoggin River. Androscoggin River water enters into Androscoggin Lake whenever floodwaters overtop a floodgate on the Dead River. Average dioxin and furan levels have yet to be above the current FTAL of 1.5 pptr. However, with the exception of the 2000 sampling season, all other sampling seasons have yielded average levels in fish tissue above the potential lower-bound FTAL of 0.4 pptr.

- These most recent data on dioxin and furan concentrations in bass and trout from the Kennebec and Penobscot Rivers indicate that we appear to be nearing the point where the presence of these chemicals will no long contribute to the need for additional consumption advisories beyond the statewide mercury advisory. Additional advisories may continue to be needed for suckers.

- The prognosis for consumption advisories on the Androscoggin River due to dioxins and furans is less clear. Levels generally remain elevated for suckers, and for bass at some locations.

- Four factors complicate the evaluation of the health implications of current levels of dioxins and furans in fish from Maine Rivers, and thus warrant careful consideration. These factors are:
  1) the significant background dietary exposure to these chemicals that already occurs – this being the primary reason for considering a potential lower FTAL of 0.4 pptr;
  2) the growing influence of the practice of assuming chemicals not detected are indeed present at ½ the analytical detection limit has on the estimate of the amount of dioxins and furans in fish tissue;
  3) the presence of other "dioxin-like" chemicals in the fish tissue that should be considered in evaluating the overall health implications of consuming fish with dioxins, furans, <u>and</u> coplanar polychlorinated biphenyls (PCBs); and
  4) the unexplained substantial drop in levels of dioxins and furans in bass and trout for the 2002 and 2003 versus 2001 sampling seasons, in the absence of a similar change in levels for suckers.

- The Dioxin Monitoring Program will need to continue for at least the immediate future. There is a clear need to continue monitoring the levels in fish from the Androscoggin River, West Branch Sebasticook River, and Androscoggin Lake. Sampling of bass and trout on the Kennebec and Penobscot Rivers is advisable for another year or two to confirm the recent drops in levels of contaminants. Additional monitoring of suckers on the Penobscot and possibly Kennebec Rivers are recommended, along with analyses of coplanar PCBs under the SWAT program.

- It needs to be emphasized that any formal changes in Bureau of Health fish consumption advisories involves a comprehensive review of the levels of all measured contaminants in fish tissue (e.g. mercury, PCBs). A lessened need for consumption advisories due to lower levels of dioxins and furans in fish does not necessarily translate into changes in consumption advisories for a waterbody.

DISCHARGES FROM BLEACHED KRAFT PULP AND PAPER MILLS

- There is some evidence that all 5 bleached kraft pulp and paper mills may have continuing discharges of dioxin. At each mill at least one test found increased dioxin below the mill.

- A preponderance of evidence (POE) approach, however, initially suggests that there is no discharge from the International Paper mill in Jay or the SAPPI-Somerset mill in Skowhegan.

- Since only fish tests were conducted at the other 3 mills in 2003, no initial determination can be made at this time based on a POE approach.

- A finding of no discharge for two consecutive years is necessary before a final determination can be made. Only 2 mills have a full year of data for use in a POE approach.

- The Above/Below (A/B) test will need to be continued in future years, as specified in statute, to determine final compliance of all 5 mills with the 'no discharge of dioxin' provision of the 1997 Dioxin/color law.

<u>RECOMMENDATIONS</u>

ABOVE/BELOW TEST PARAMETERS

After receiving input from the SWAT TAG and Peer Review Panel, the Department recommends that the A/B test be as follows.

1) The test will utilize 3 separate tests: a) bass, b) suckers, and c) caged mussels.
2) A preponderance of evidence (POE) approach will be used where passage of 2 of the 3 tests will be used to indicate no discharge.
3) To achieve an overall 95% confidence with the POE approach, the level of significance for each individual test is 0.135 for both type I and II errors.
4) Compounds to be measured will be 2378-TCDD and 2378-TCDF.
5) Concentrations of these compounds will be based on lipid normalized values if there is a significant (R^2=>0.5) correlation between contaminant concentration and lipid, or wet weight values if there is no significant correlation.
6) Concentrations less than the detection limit (<DL) will be calculated at ½ the DL.
7) Where all of the values for the samples at an above or below station are <DL, no statistical determination will be made.
8) Because none of the tests are very sensitive, a mill must show no evidence of a discharge for 2 consecutive years before being deemed in compliance. Periodic testing is subsequent years will also be necessary to assure continued compliance.

BACKGROUND

Dioxin was first discovered to be a problem in Maine in 1985, when the results of an analysis of fish collected in 1984 from the Androscoggin River by the Maine Department of Environmental Protection (the Department), used as a reference station for EPA's National Dioxin Study, documented significant concentrations of dioxin. Consequently, the Maine Bureau of Health issued Maine's first fish consumption advisory in 1985. Additional sampling in 1985 and 1986 found similar levels in fish from other rivers below bleached kraft pulp and paper mills, but not from rivers or lakes with no such sources, leading to inclusion of parts of the Kennebec River and Penobscot River in a revised fish consumption advisory in 1987. As a result there was a bill before the Maine legislature in 1988 to ban the discharge of dioxin, but the bill was amended to establish a monitoring program, Maine's Dioxin Monitoring Program (DMP) and enacted into law (38 MRSA section 420-A) to sunset in 1990. Discovery of continuing significant concentrations in fish from these and other rivers resulted in the DMP being reauthorized in 1990, 1995, 1997, and most recently in 2002 extending until 2007. The Department has issued reports of the results of monitoring annually. Fish consumption advisories have been issued or modified in 1985, 1987, 1990, 1992, 1994, 1997, and 2000.

DIOXIN MONITORING PROGRAM

The goal of Maine's Dioxin Monitoring Program is "to determine the nature of dioxin contamination in the waters and fisheries of the State". Charged with administration of the program, the Department is required to sample fish once a year below no more than 12 bleached pulp mills, municipal wastewater treatment plants, or other known or likely sources of dioxin. Costs for equipment, supplies, and analysis are assessed to the selected facilities annually, and could not exceed $168,000 until 1997 when the limit was raised to $250,000 to incorporate development of the Above/Below (A/B) fish test. The Department is advised by the Surface Water Ambient Toxic (SWAT) Monitoring Program Technical Advisory Group in implementation of the program. An annual report is required to be submitted to the Natural Resources Committee of the Maine Legislature by March 31 with the results from the previous year, including status of progress toward meeting the requirements of the Dioxin/Color law.

The primary objective of the Dioxin Monitoring Program is to monitor dioxin in fish for assessment of human health and ecological impact.

A second objective is to measure trends, progress toward reduction in environmental concentrations, and effectiveness and need for further controls.

1997 DIOXIN/COLOR LAW

A third objective, integrated into the DMP, comes from the Dioxin/Color law. In 1997 the Maine legislature enacted LD 1633 "An Act to Make Fish in Maine Rivers Safe to Eat and Reduce Color Pollution", the Dioxin/Color law [38 MRSA section 420(2)(I)]. The key requirement is that 'a (bleach kraft pulp) mill may not discharge dioxin into its receiving waters after December 31, 2002. To determine compliance, there are interim tests and a final test. Two interim tests, of effluent from the bleach plant require that 1) TCDD (2378-tetrachlorodibenzo-p-dioxin, the most toxic of the 17 toxic dioxins and furans) must be below 10 ppq, parts per quadrillion or picograms per gram, pg/g by July 31, 1998 and 2) TCDF (2378-tetrachlorodibenzofuran) must be below the same detection limit by December 31, 1999. As the final test to confirm that there is no discharge, by December 31, 2002 fish (or surrogate) below a bleached kraft pulp mill must have no more dioxin than fish (or surrogate) above the mill, the so-called "above/below (A/B) fish test".

Since contamination levels in fish are likely to be highest in late summer to early fall, sampling for compliance with the December 31, 2002 deadline could not occur until summer 2003. Laboratory results would not be available until several months thereafter. Therefore, in 2003 the legislature amended the 1997 Dioxin/Color law to delay the date of DEP's report by a year, to February 16, 2004. The amendment also delayed the date by which a mill must demonstrate it no longer discharges, if the Department finds that it does, for a year. The amendment also requires the mills to make the demonstration annually.

REPORT

Public Law 1997, Chapter 44, section 10 as amended in 2003 requires the Department of Environmental Protection and Department of Human Services to report on the progress towards the elimination of dioxin discharges from bleached kraft pulp mills as detailed below:

> The Commissioner of Environmental Protection and the Commissioner of Human Services shall report to the Governor and the joint standing committee of the Legislature having jurisdiction over natural resources matters by May 1, 2001 on progress made in achieving the requirements specified in the Maine Revised Statutes, Title 38, section 420, subsection 2. On February 16, 2004, the Commissioner of Environmental Protection and the Commissioner of Human Services shall present to the Governor and the joint standing committee of the Legislature having jurisdiction over natural resources matters a comprehensive assessment on the progress in eliminating the discharge of dioxin from bleach kraft pulp mills in this State.
>
> The assessment must report on:
>
> 1. Dioxin concentrations in fish above and below mills and the health implications of those concentrations;
> 2. Any evidence that dioxin is being discharged from any mill;
> 3. Current technology that achieves no discharge of dioxin;
> 4. The need for continuing the dioxin monitoring program; and
> 5. Other known sources of dioxin polluting rivers in this State.
>
> The commissioners shall make recommendations regarding any additional action that may be warranted.

The remainder of this report will be organized according to these five sections.

1. DIOXIN CONCENTRATIONS IN FISH ABOVE AND BELOW MILLS AND HEALTH IMPLICATIONS

A. **Concentrations in Fish**

There are 75 dioxins and 135 related furans, 17 of which are considered toxic, but with different toxicities. The total toxicity of a sample (dioxin toxic equivalents=DTE) can be calculated as the sum of the products of the concentrations and toxicity equivalency factors (TEF, relative to the most toxic dioxin, TCDD) for each of the 17 dioxin and furans. A summary of the 2002 and 2003 dioxin data for all aspects of the DMP are shown in Table 1 (see Appendices 2 and 8 for raw dioxin data, Appendix 6 for fish sample data, Appendix 7 for all historical dioxin data). DTE are presented as a range with non-detects at zero and the detection limit. Dioxin concentrations in fish generally continued to decline from previous years, but there is some year to year variation in the trends. Concentrations remained elevated above natural background levels in fish at some stations, particularly on the Androscoggin River, but approached background levels at some stations on other rivers. Implications for human health will be discussed in more detail in the following section.

Table 1. TCDD and DTE in fish from Maine rivers 2001-2003 (pg/g)

			20 01		20 02		20 03	
WATER/STATI(	SPECIES	TIS	TCDD	DTE	TCDD	DTE	TCDD	DTE
ANDROSCOGGIN LAKE								
Wayne	bn trout	f						
	bass	f	<0.1	0.1-0.8	<0.1	0.3-1.3	0.2	0.8-1.0
	w perch		0.1	0.2-0.7	<0.1	0.4-1.4	0.1	0.7-0.9
	sucker	w	<0.1	0.1-0.7				
Pocasset LAKE								
Wayne	bass				<0.1	<0.1-1.2	<0.1	<0.1-0.5
	bass comp						<0.1	0.2-0.5
	sucker						<0.1	0.3-0.6
ANDROSCOGGIN R								
Gilead	rb trout		0.8	2.1-2.5				
	bn trout		0.8	2.5-2.7				
	bass		0.3	1.0-1.4	<0.1	1.4-2.3	0.1	1.1-1.4
	juv bass				<0.1	1.9-2.8		
	sucker	w	0.1	0.7-1.1	0.1	1.4-2.2	<0.1	1.2-1.5
Rumford	bass	f	0.2	0.5-1.0	0.1	0.6-1.5	<0.1	0.6-0.9
	juv bass				<0.1	0.8-1.4		
	sucker	w	0.3	2.0-2.4	<0.1	0.4-1.5	0.2	1.8-2.1
Riley	bass		0.2	0.8-1.0	<0.1	0.2-1.3	<0.1	0.3-0.7
	sucker	w	0.3	1.9-2.1	0.1	0.6-1.6	0.2	1.9-2.1
Livermore	bass	f	0.3	0.9-1.4	0.1	0.3-1.4	<0.1	0.2-0.6
	sucker	w	0.3	1.6-1.7	0.2	0.9-1.9	0.3	1.6-1.9
	sucker comp						0.2	1.5-1.7
Livermore	bass						<0.1	0.2-0.6
	sucker						0.1	0.6-0.9
Auburn-GI	bass	f	0.2	0.4-0.9	0.1	0.2-1.3		
	sucker	w	0.2	0.6-0.9	0.3	0.8-1.2		
Lisbon Fa	bass	f	0.4	1.1-1.5				

			20 01		20 02		20 03	
WATER/STATI(	SPECIES	TIS	TCDD	DTE	TCDD	DTE	TCDD	DTE
KENNEBEC R								
Madison	bn trout	f	<0.1	<0.1-0.7				
Norridgew	bass		<0.1	0.1-0.8	<0.1	<0.1-1.3	<0.1	<0.1-0.5
	bn trout				<0.1	<0.1-1.0		
	sucker		<0.1	<0.1-0.7			<0.1	<0.1-0.5
Fairfield	bass	f	0.3	0.4-1.0	<0.1	<0.1-1.2	<0.1	<0.1-0.5
	bn trout	f	1.0	1.2-1.8	0.1	0.1-1.0		
	sucker	w	0.3	0.5-1.1			0.2	0.3-0.6
Sidney	bass	f	0.2	0.4-0.9	0.1	<0.1-1.3		
	bn trout		0.4	0.5-1.1				
PENOBSCOT R								
Woodville	bass		<0.1	0.1-0.7	<0.1	<0.1-1.0	<0.1	<0.1-0.6
	sucker		<0.1	0.1-0.7	<0.1	1.6-1.9	<0.1	0.5-0.8
Winn	bass		<0.1	<0.1-0.7	<0.1	<0.1-1.2	<0.1	<0.1-0.5
	sucker		<0.1	<0.1-0.7	0.2	1.1-1.8	<0.1	0.3-0.6
S Lincoln	bass	f	0.4	0.5-1.1	<0.1	<0.1-1.2	<0.1	<0.1-0.5
	sucker	w	0.3	0.5-1.1	0.3	1.6-2.0	0.1	0.6-0.8
Milford	bass	f	0.3	0.5-1.1	<0.1	<0.1-1.2	<0.1	<0.1-0.5
	sucker	w	0.4	0.5-1.0	0.3	1.0-1.7	<0.1	0.3-0.7
Veazie	bass	f	0.2	0.3-0.8	<0.1	>0.1-1.2	<0.1	<0.1-0.5
	sucker	w	1.3	1.7-2.2	0.4	1.4-2.0	0.1	0.2-0.6
Bangor	eel	f	1.1	1.5-2.0	0.1	0.2-1.3		
juv	eel				<0.1	0.1-1.3		

			2001		2002		2003	
WATER/STATI	SPECIES	TIS	TCDD	DTE	TCDD	DTE	TCDD	DTE
PRESUMPSCOT R								
Windham	bass	f	<0.1	0.1-0.8	<0.1	<0.1-1.5		
	sucker	w	0.2	1.4-1.5	<0.1	0.1-1.3		
Westbrook	bass	f	<0.1	<0.1-0.8	<0.1	<0.1-1.2		
	sucker	w	0.2	1.3-1.7	<0.1	0.1-1.3		
SALMON FALLS R								
S Berwick	bass	f	0.2	0.4-0.8	0.1	0.1-1.2		
	lm bass							
	pickerel	f						
SEBASTICOOK R								
Newport	bass	f	0.1	0.6-0.9				
Detroit	bass	f	0.1	0.2-0.8				
W Br Palm	bass	f	0.2	0.5-0.8	0.3	0.4-1.2	0.4	0.9-1.1

f=fillet
m=meat
t=tomalley
w=whole
DTE= dioxin toxic equivalents using WHO 98 toxic equivalency factors (TEF).
Range shown at nd=0 and nd=mdl, ie DTEo-DTEd

B. **Evaluation of the Human Health Implications**

This section presents the Department of Human Services, Bureau of Health, Environmental Health Unit's evaluation of the health implications of dioxin concentrations in fish from Maine Rivers. The evaluation is based on the most recent sampling data (2002 and 2003 sampling seasons). The focus is on data for the Androscoggin, Kennebec, and Penobscot Rivers. These are the locations where sampling efforts for dioxins and furans have been most concentrated. Recent data on sampling of fish from other rivers (e.g., Presumpscot, Salmon Falls, and Sebasticook Rivers) and Androscoggin Lake will also be discussed. As the Bureau of Health has had less than 2 months to examine most of these data, the evaluation of these data is ongoing.

Health Benchmarks for Evaluating Dioxin Concentrations in Fish from Maine Rivers

An evaluation of the health implications of dioxin and furan concentrations in fish in Maine Rivers requires a comparison to a health benchmark. Since 1990, the Bureau of Health has relied on a health benchmark expressed as a specific fish tissue concentration of dioxins and furans. This benchmark is referred to as a "Fish Tissue Action Level" or FTAL. FTALs reflect the maximum level of a chemical in fish tissue that will allow consumption at a rate of one 8-oz meal per week without exceeding a tolerable daily intake for the specific chemical. The FTALs for dioxins and furans expressed on a toxic equivalency basis are 1.5 parts per trillion (pptr) for protection of cancer-related health effects and 1.8 pptr for protection of non-cancer related health effects.[1]

These FTALs are based on an estimate of a tolerable daily intake for dioxins and furans of 0.7 picogram per kilogram-body weight per day (pg/kg/day) for protection of cancer related effects and 1 pg/kg/day for protection of non-cancer related health effects.[1] These toxicity values were derived by the Bureau of Health in 1990, and were subject to review by an external Scientific Advisory Panel.[2] A tolerable daily intake of 1 pg/kg/day remains consistent with the most recent recommendations by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) and the World Health Organization (WHO).[3,4] The U.S. Environmental Protection Agency has yet to finalize its decade-long

[1] The Bureau of Health has formally derived separate FTALs for dioxins and furans for cancer and noncancer health effects. The FTAL for cancer-related effects is 1.5 pptr, and the FTAL for noncancer related effects is 1.8 pptr. The corresponding tolerable daily intakes for cancer and noncancer effects are 0.7 and 1 pg/kg/day respectively. The derivation of these tolerable daily intakes is described in Frakes (1990). The uncertainty in both the analytical and toxicological science does not afford a level of precision to view these two numbers as significantly different, so for the purposes of the present report only the 1.5 pptr FTAL will be used as a health benchmark.

[2] Frakes, R.A. (1990). Health Based Water Quality Criteria for 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD). Final. November. Maine Bureau of Health

[3] ATSDR (1998). Toxicological Profile for chlorinated dibenzo-p-dioxins (update). US Dept. of Health and Human Services. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxprofiles/tp104.html

[4] WHO (1998) Assessment of the health risk of dioxins: re-evaluation of the Tolerable Daily Intake (TDI) WHO Consultation May 25-29 1998, Geneva, Switzerland WHO European Centre for Environment and

process of reassessing the toxicity of dioxins and furans. In its 2000 draft reassessment, EPA estimated that the amount of dioxin found in the tissues of the general human population (which is known as the "body burden") closely approaches (within a factor of 10) the levels at which adverse effects might be expected to occur.[5] For cancer, EPA estimates that the risks for the general population based on dietary intake may exceed 1-in-1,000 increased chance of experiencing cancer related to dioxin exposure. This range for cancer risk indicates an about 10-fold higher chance than estimated in EPA's earlier (1994) draft of this reassessment, and 100-fold higher than cancer risk estimates based on the Bureau of Health's current toxicity values. The most recent draft of EPA's reassessment has been submitted to the National Academy of Sciences (NAS) to provide yet an additional review to help ensure that the risk estimates contained in the draft are scientifically robust and that there is a clear delineation of all associated uncertainties.[6] Should the current draft risk assessments be supported by the NAS review, it may be necessary for the Bureau of Health to revise its cancer-related FTALs for dioxins and furans. It is the Bureau's policy to rely on toxicity values derived by USEPA that have undergone sufficient review to be listed in the Agency's Integrated Risk Information System (IRIS).

Separately from USEPA's dioxin reassessment activity, the Bureau of Health has been evaluating whether to revise its current noncancer related FTAL of 1.8 pptr for dioxins and furans. The Bureau's motivation has had less to do with questions about its current toxicity values, as these values remain supported by U.S. ATSDR and WHO. Rather, the motivation has been to ensure that cumulative dioxin and furan exposures to do substantially exceed the estimated tolerable daily intake for these chemicals. The Bureau's current FTAL for dioxins and furans apportions 100% of the tolerable daily intake for these chemicals from the consumption of a single fish-meal per week. Any additional intake to these chemicals from sources other than fish would result in cumulative exposures potentially above the tolerable daily intake. As all dioxin like compounds (including coplanar PCBs) are ubiquitous in animal fats (e.g., beef, pork, poultry, dairy in addition to fish), the potential for other dietary foods to significantly contribute to daily intake of dioxins and furans should be considered.

Figure 1 illustrates a recent summary of detectable levels of dioxins and furans on a toxic equivalency basis for a number of common dietary foods.[7] For comparison purposes, these levels are compared with the most recent monitoring data for levels of dioxins and

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Health International Programme on Chemical Safety http://www.who.int/pcs/docs/dioxin-exec-sum/exe-sum-final.html

[5] See: ***Dioxin:*** *Summary of the Dioxin Reassessment Science*: Information Sheet 1, May 25, 2001 Update, U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. http://www.epa.gov/ncea/pdfs/dioxin/factsheets/dioxin_short2.pdf

[6] See: ***Dioxin:*** *Dioxin Reassessment Process: What is the Status of the Reassessment and How Was the Reassessment Developed.* Information Sheet 3, October 29, 2003 Update, U.S. Environmental Protection Agency, Office of Research and Development, Washington DC. http://www.epa.gov/ncea/pdfs/dioxin/factsheets/infosheet3.pdf

[7] NAS (2003). Dioxins and Dioxin Like Compounds in the Food Supply. Strategies to Decrease Exposure. National Academy Press, Washington, DC.

furans in smallmouth bass from three Maine Rivers. One notable feature of Figure 1 is that dioxin and furan levels in bass from the Androscoggin River remain high relative to most other protein sources. In contrast, levels of these chemicals in game fish from the either the Kennebec or Penobscot Rivers are now low relative to other dietary sources of protein.

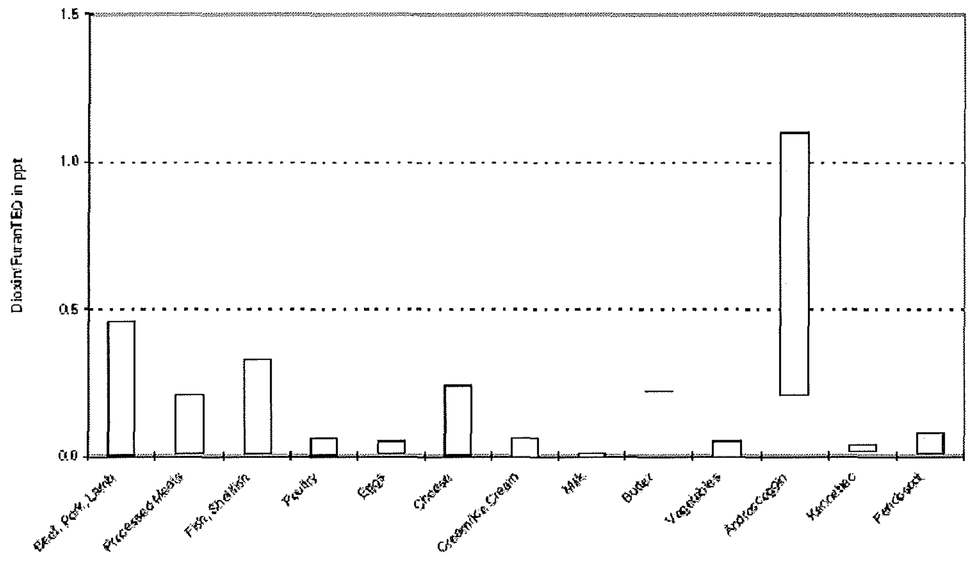

Figure 1. Typical levels of dioxins and furans on a toxic equivalency basis found in common dietary foods, as compared against the range of levels reported for smallmouth bass caught in three Maine rivers – the Androscoggin, Kennebec, and Penobscot Rivers.

The data shown in Figure 1 can be combined with data on typical U.S. food consumption rates to generate estimates of average U.S. population dietary exposure to dioxins and furans, both cumulatively as well as by type of dietary food. Figure 2 shows one such compendium of the fractional contribution of various dietary foods to average U.S. exposure to dioxins and furans, which was prepared for a report by the National Academy of Sciences.[7] This particular figure was generated using typical dietary food intakes averaged over a lifetime. The fractional contributions would look somewhat different for other averaging periods (e.g., infants, young children, adolescents, and adults).

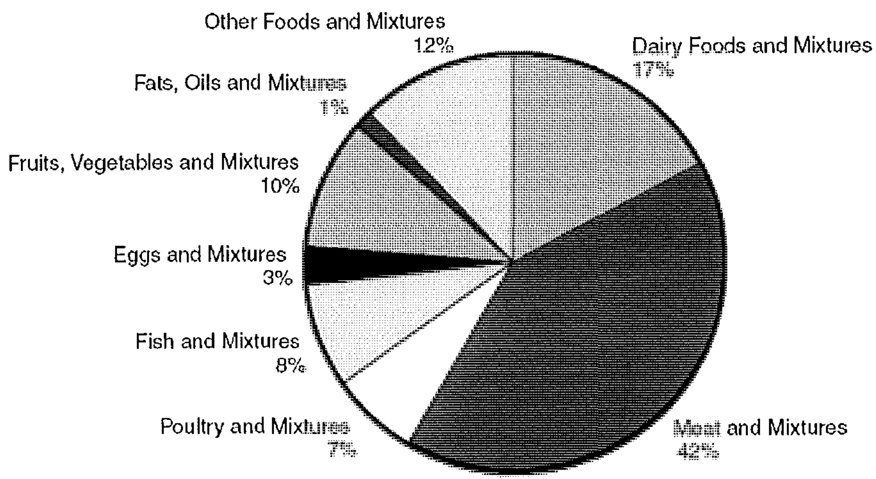

Figure 2. Estimated percent contribution of various dietary foods to lifetime cumulative exposure to dioxin-like compounds for males and females averaged over lifetime exposure. *Reproduced from NAS (2003).*

The estimated cumulative exposure to dioxins and furans associated with Figure 2 ranges from a low of 0.3 pg/kg/day to a high of 0.8 pg/kg/day.[8] The range results from two factors: a) whether individuals are low or high consumers of meat, poultry and fish; and b) assumptions about the presence of dioxins and furans below analytical limits of detection. USEPA has provided guidance on how to account for background exposures when developing fish consumption advisories or ambient water quality criteria.[9,10] Should

[8] NAS (2003). Dioxins and Dioxin Like Compounds in the Food Supply. Strategies to Decrease Exposure. National Academy Press, Washington, DC. See Table 5-3.
[9] EPA (1999). Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 2. Risk Assessment and Fish Consumption Limits. Third Edition, Draft. August. EPA 823-R-99-008
[10] EPA (2000). Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000). Office of Water. October. EPA-822-00-004

the Bureau choose to follow this methodology to account for background dietary exposure to dioxins and furans, the FTAL for non-cancer related effects would be reduced from 1.8 pptr to between 0.4 and 1.3 pptr.[11] The following discussion about the health implications of dioxin concentrations in fish from Maine Rivers will reference both the current FTALs of 1.5 and 1.8 pptr, along with a potential lower-bound value of 0.4 pptr.

Science-Policy Issues in Preparing Fish Tissue Data for Comparison with Health Benchmarks

Before discussing the most recent data on dioxin and furan levels in fish tissue from Maine rivers, it should be noted that a number of science-policy issues arise in working up such data. All of these science-policy issues arise out of the need to confront scientific uncertainty. These issues include the need to: a) account for the different toxicity of individual dioxin and furan compounds in the absence of complete data on each; b) account for statistical uncertainty in estimates of average (i.e., mean) concentrations due to small numbers of fish collected at any given location; and c) account for laboratory analytical limitations in the ability to detect trace levels in fish tissue. The Bureau of Health relies on the Vandenberg et al. (1998) Toxic Equivalency Factors (TEFs) for generating a single toxicity-weighted sum of all the dioxin and furan congeners present in any given sample.[12] This toxicity-weighted sum is referred to as Toxic Equivalents (TEQs) or Dioxin Toxic Equivalents (DTE) in parts per trillion of dioxin. The effect of sample size on confidence in the estimated mean concentrations of chemicals in fish tissue is addressed by using the 95th percentile upper confidence limit (UCL) on the mean as the point of comparison to the FTAL.[13] The larger the sample size, the less the difference between the sample mean and the 95th percentile UCL. With these most recent data, there is generally less than a 20% difference between the observed sample mean and the 95th percentile UCL on the sample mean. If a chemist does not find a chemical above its analytical detection limit, it does not necessarily mean the chemical is not found in the sample. The true level of the chemical in the sample could be zero, just below the detection limit or anywhere in between. It is standard practice in human health assessment to assume that any non-detect is found at ½ the detection limit. It should additionally be noted that the lower analytical detection limits reported for the 2003 data were assumed applicable for the 2002 data. The laboratory analyzing the 2002 data reported higher detection limits for some dioxin and furan congeners than the

[11] One approach is to subtract out the estimated background exposure from the tolerable daily intake. Under this approach, the estimates of background dietary exposure ranging from 0.3 pg/kg/day to 0.8 pg/kg/day could be subtracted from the tolerable daily intake of 1 pg/kg/day. The FTAL would then be calculated using the remaining increment of the tolerable daily intake.

[12] Van den Berg, et al. 1998. Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environmental Health Perspectives. 106(12):775-792

[13] The Bureau of Health has a policy of using a statistical upper confidence limit on the estimated mean concentration from a sample of fish. The intent of this policy is two-fold: a) to conservatively account for uncertainty inherent in environmental sampling, and b) to provide an incentive for collecting larger sample sizes. The difference between the mean and upper confidence of the mean will decrease as a function of the square root of the number of fish collected.

laboratory analyzing the 2003 data. Yet the actual detected levels of dioxins and furans were quite similar for these two years. The issue of detection limits is discussed further in a following section. All of the above science-policy issues intended to respond to scientific uncertainty are standard practice used by BOH in developing fish consumption advisories.

Comparison of Data on Dioxin Concentrations in Fish from Maine Rivers with Health Benchmarks

Figures 3 and 4 summarize the average levels of dioxins and furans in smallmouth bass (Figure 3) and suckers (Figure 4) collected from the Androscoggin, Kennebec and Penobscot Rivers during the 2002 and 2003 field seasons. With the exception of the Rumford Point sampling location on the Androscoggin River, all other sampling locations show average dioxin and furan concentrations in smallmouth bass that were well below the current FTAL of 1.5 pptr. This observation is fairly consistent for both years. Historically, the Gilead sampling location on the Androscoggin River (near the Maine – New Hampshire border) has also had fish levels of dioxins and furans above 1.5 pptr. More recent data for Gilead were not available. Average levels of dioxins and furans at sampling locations on the Kennebec and Penobscot Rivers were additionally below the potential lower-bound FTAL of 0.4 pptr. This was not the case for sampling locations on the Androscoggin River. All sampling locations with the exception of Auburn had average levels of dioxins and furans that were above the potential lower bound FTAL of 0.4 pptr, though for several locations levels were only slightly above this health benchmark.

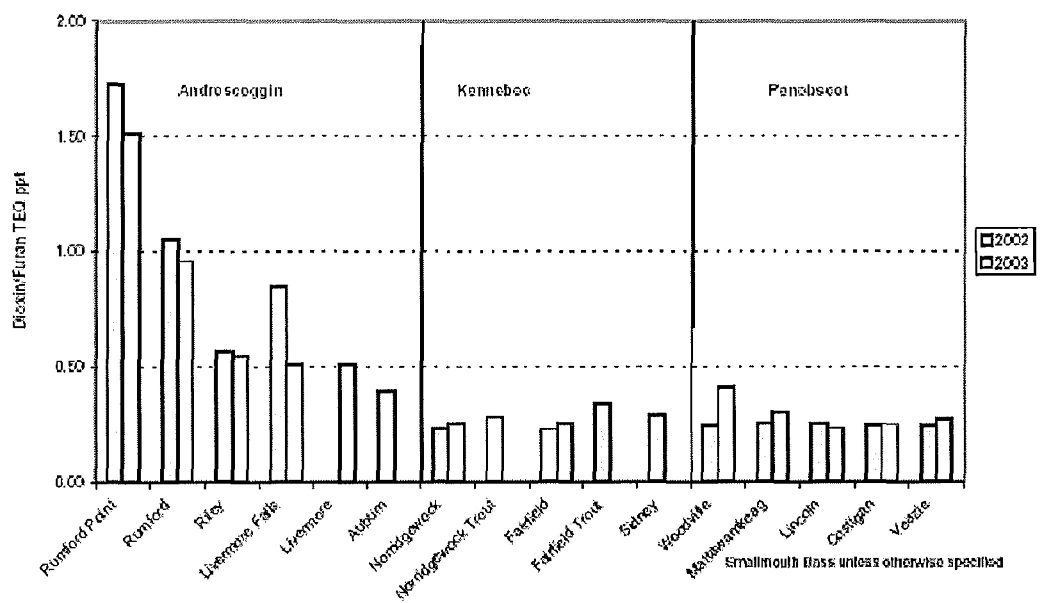

Figure 3. Average levels of dioxins and furans in smallmouth bass and brown trout for sampling locations along three Maine Rivers. Levels are reported on a toxic equivalency basis in parts per trillion (pptr), and are computed assuming congeners below analytical detection limits are present at ½ the detection limit. To account for sample size limitations, the 95th percentile upper confidence limit on the sample mean is shown, rather than the sample mean itself.

In general, levels of dioxins and furans were considerably higher in filet tissue of white suckers (Figure 4). Suckers from most sampling locations on the Androscoggin River had average levels of dioxins and furans that were above the current FTAL of 1.5 pptr. The levels in suckers from Rumford were quite different between the 2002 and 2003 sampling seasons. This appears to be related in part to the collection of two fish (out of 10) with particularly high levels of dioxins and furans and high lipid content. The other sampling locations with data for both 2002 and 2003 were fairly similar. The levels of dioxins and furans in suckers from sampling locations on the Kennebec and Penobscot Rivers were below the current FTAL of 1.5 pptr, but generally above the potential lower-FTAL of 0.4 pptr (suckers from Norridgewock and Veazie were the exception). Sampling data for sucker filet tissue were not available for the 2002 sampling season.

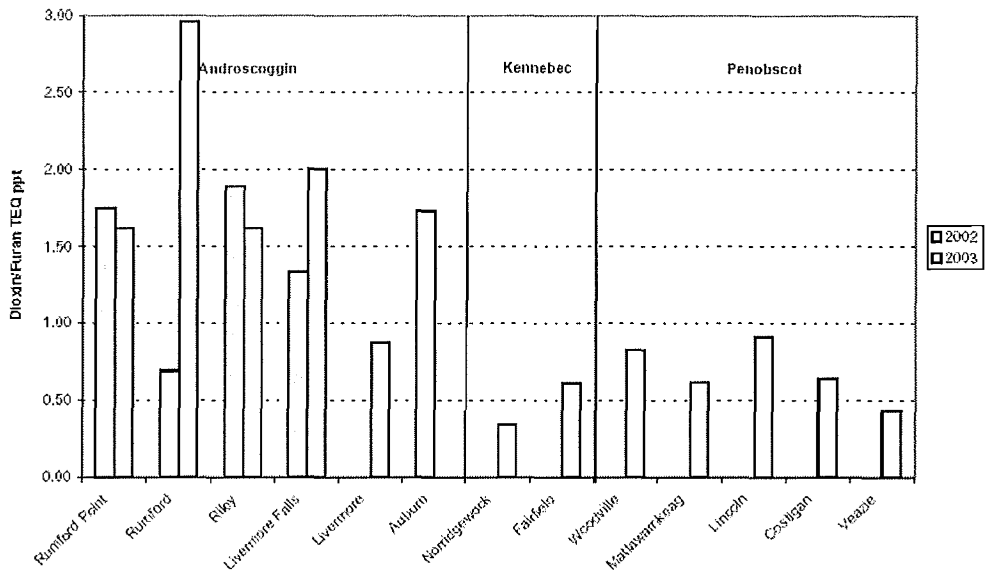

Figure 4. Average levels of dioxins and furans in white suckers for sampling locations along three Maine Rivers. Levels are reported on a toxic equivalency basis in parts per trillion (pptr), and are computed assuming congeners below analytical detection limits are present at ½ the detection limit. To account for sample size limitations, the 95th percentile upper confidence limit on the sample mean is shown, rather than the sample mean itself.

Caveats to Evaluating Health Implications of Current Dioxin and Furan Levels

Three factors complicate the evaluation of the health implications of current levels of dioxins and furans in fish from Maine Rivers. One of the factors concerns the growing influence of assuming chemicals not detected are actually present at ½ the analytical detection limit, on the estimate of the amount of dioxins and furans in smallmouth bass. This growing influence is illustrated in Figure 5. Figure 5 shows the relative contribution of actual detected dioxin and furan concentrations versus the amount added by the policy of assuming that congeners not detected above analytical reporting limits are present at ½ the detection limit. More than 80% of the dioxin and furan toxic equivalents in small-mouth bass from the Kennebec and Penobscot River sampling locations can be viewed as uncertain estimates arising from constraints on analytical detection limits. Thus, one cannot rule out that actual levels of dioxins and furans in smallmouth bass may indeed be substantially lower than levels illustrated in Figure 3. The effect on reported levels for fish collected from the Androscoggin River was less of an issue.

In general, treatment of nondetects was less of an issue for white suckers (Figure 6). However, for three sampling locations the effect was significant (Norridgewock on the Kennebec, and Costigan and Veazie on the Penobscot), and for most locations on the Kennebec and Penobscot Rivers, actual detected levels were less than the potential 0.4 pptr FTAL.

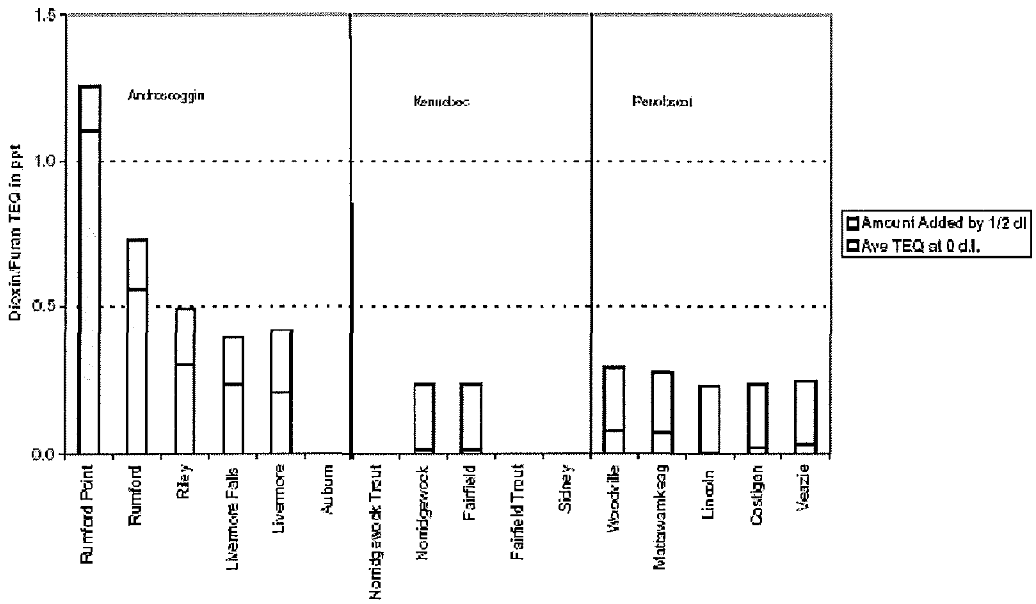

Figure 5. Relative contribution of detected dioxin and furan levels in smallmouth bass versus the amount added by the policy of assuming that congeners reported as non-detect are present at ½ the analytical detection limit. Data are from the 2003 sampling season. Levels are averages for sampling locations.

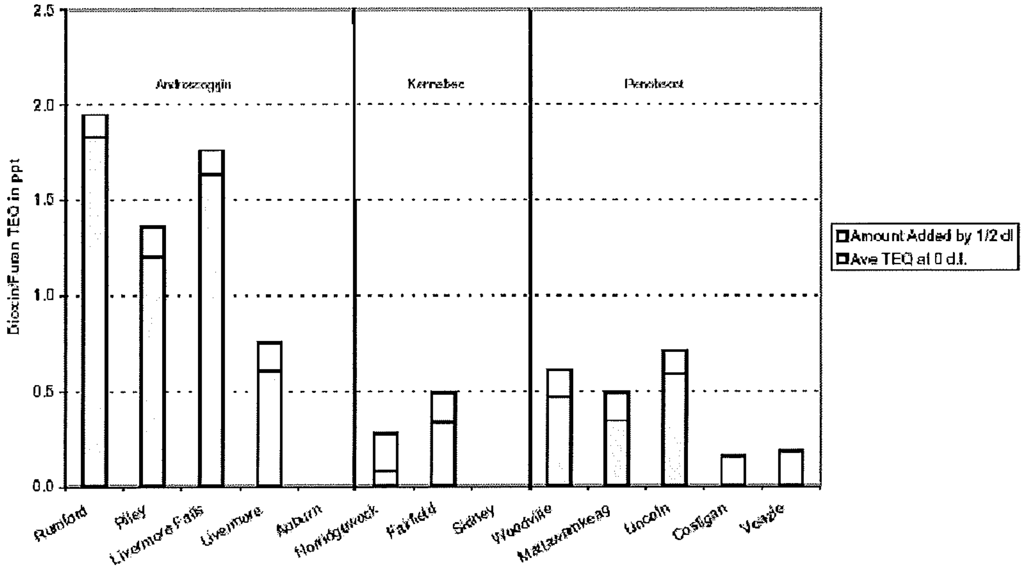

Figure 6. Relative contribution of detected dioxin and furan levels in white suckers versus the amount added by the policy of assuming that congeners reported as non-detect are present at ½ the analytical detection limit. Data are from the 2003 sampling season. Levels are averages for sampling locations.

The second factor complicating evaluation of the health implications of current levels of dioxins and furans in fish concerns the presence of other "dioxin-like" chemicals. Most notable has been the presence of coplanar polychlorinated biphenyls (PCBs) in fish tissue. Coplanar PCBs are believed capable of operating by the same toxicological mechanism as the dioxins and furans (i.e., binding to the same biochemical receptor). Toxic equivalency factors have been developed for coplanar PCBs so that they can be combined with dioxins and furans on a common toxicity-weighted scale.[14]

In assessing the health implication of levels of contaminants in fish tissue, it has been the Bureau of Health's policy to evaluate the cumulative effects of dioxins, furans, and coplanar PCBs when assessing the non-cancer related hazard for these chemicals, using the FTAL of 1.8 pptr as the health benchmark.[15] Figure 7 shows the cumulative toxic equivalents for dioxins, furans, and coplanar PCBs in smallmouth bass for the latest year data on coplanar PCBs were available (2002). Coplanar PCBs substantially add to the total dioxin-like toxic equivalents at all sampling locations, often more than doubling levels. The fact that the calculation of toxic equivalents from coplanar PCBs is largely not affected by treatment of non-detects makes their contribution even more impressive.

With the addition of coplanar PCBs, the levels of total dioxin-like toxic equivalents in smallmouth bass remain below the Bureau's FTAL of 1.8 pptr for noncancer effects at most sampling locations. The exceptions are two sampling locations on the Androscoggin River (Rumford Point and Livermore Falls). As before, it remains appropriate to consider the cumulative effect of concurrent dietary exposure. Compared against the lower potential FTAL of 0.4 pptr, all sampling locations have levels of total dioxin-like compounds above the lower health benchmark. The levels of coplanar PCBs alone typically contribute in excess of 0.4 pptr to total dioxin-like equivalents. It should be noted that there are limited data on levels of coplanar PCBs in dietary foods, but by some estimates may contribute 50 percent of the dioxin-like toxic equivalents.[16] Taking background exposure to all dioxin-like compounds into account (including coplanar PCBs) will further argue for a FTAL in the range of 0.4 pptr for protection of non-cancer related effects. There are no recent data on coplanar PCBs in white suckers. Based on analogy to the bass data, it is reasonable to expect that the addition of coplanar PCBs to total dioxin-like compounds will result in cumulative toxic equivalents above current FTALs for most locations on the Androscoggin River. Levels on the other rivers would likely be above 1 pptr and therefore well above the potential FTAL of 0.4 pptr.

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[14] Van den Berg, et al. 1998. Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environmental Health Perspectives. 106(12):775-792

[15] When considering the cumulative effect of dioxins and furans and coplanar PCBs, the Bureau of Health focuses on the non-cancer related health benchmark. This policy is based on an assumption of a threshold-type response for non-cancer effects, and the public health policy of preventing this threshold from being exceeded by the cumulative exposure of chemicals operating by a common toxicological mechanism. In contrast, the cancer related FTAL is based on an incremental lifetime cancer risk, set low (i.e., one per hundred thousand) in part to allow for the cumulative effect of exposure to other carcinogens.

[16] NAS (2003). Dioxins and Dioxin Like Compounds in the Food Supply. Strategies to Decrease Exposure. National Academy Press, Washington, DC. See Appendix B.

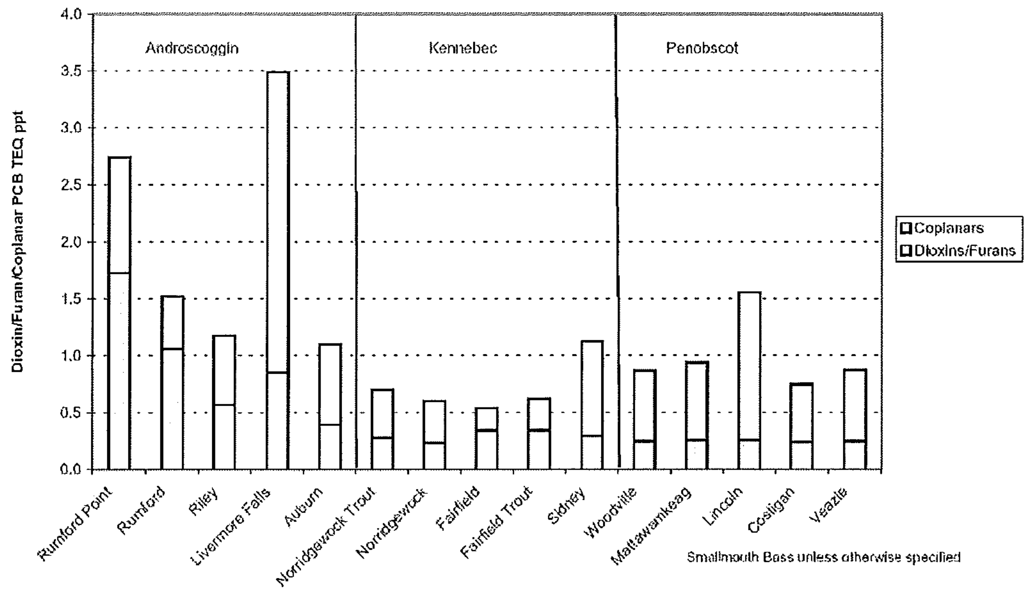

Figure 7. Contribution of coplanar PCBs to total dioxin-like toxic equivalents for smallmouth bass and brown trout. Data are from the 2002 sampling season.

The third factor complicating the evaluation of the health implications of current levels of dioxins and furans in fish concerns the substantial drop in levels in these contaminants when compared to the data from the 2001 sampling season. This drop is illustrated in Figure 8 for smallmouth bass and trout. Most sampling locations, though not all, had substantially higher levels of dioxins and furans in bass collected in 2001 as compared to the 2002 and 2003 sampling seasons. It should be noted that this is not solely a quantitative change, but a qualitative one as well. Inspection of the specific dioxin and furan congener profiles indicates that 2,3,7,8-TCDD, the most toxic of the dioxin congeners is now rarely detected in bass from sampling locations on the Kennebec and Penobscot Rivers, as compared to samples collected in 2001 and earlier.

In contrast to the bass data, levels of dioxins and furans in white sucker did not show major changes for the 2001 versus 2002 and 2003 sampling seasons (Figure 9). It has yet to be fully explained whether the drop in dioxin and furan levels in bass is related to true changes in the environment versus laboratory analytical artifacts. Questions have been raised about the reliability of some of the past dioxin and furan data.[17] However, all analytical data submitted to the Department of Environmental Protection have been reported to meet their quality assurance and quality control standards.

[17] Tier III data validation report: BIA Penobscot River Study – Data Validation for Dioxin/Furans Fish Tissue Samples. U.S. Environmental Protection Agency, Region I, Boston, MA. TO No. 09, Task No. 2, TDF NO. 0302.

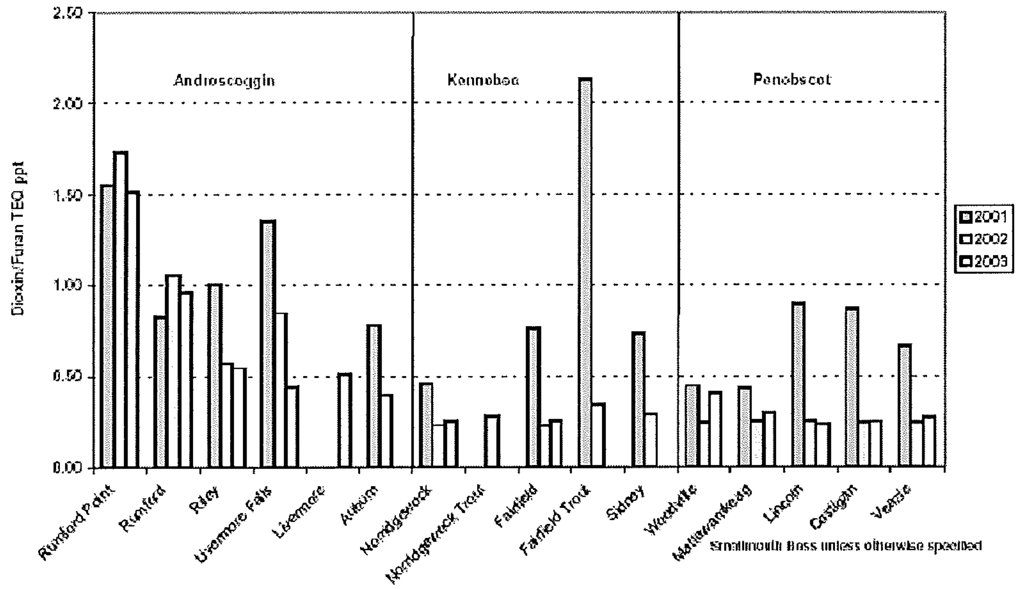

Figure 8. Average levels of dioxins and furans in smallmouth bass and brown trout for sampling locations along three Maine Rivers for the 2001 through 2003 sampling season. Levels are reported on a toxic equivalency basis in parts per trillion (pptr), and are computed assuming congeners below analytical detection limits are present at ½ the detection limit.

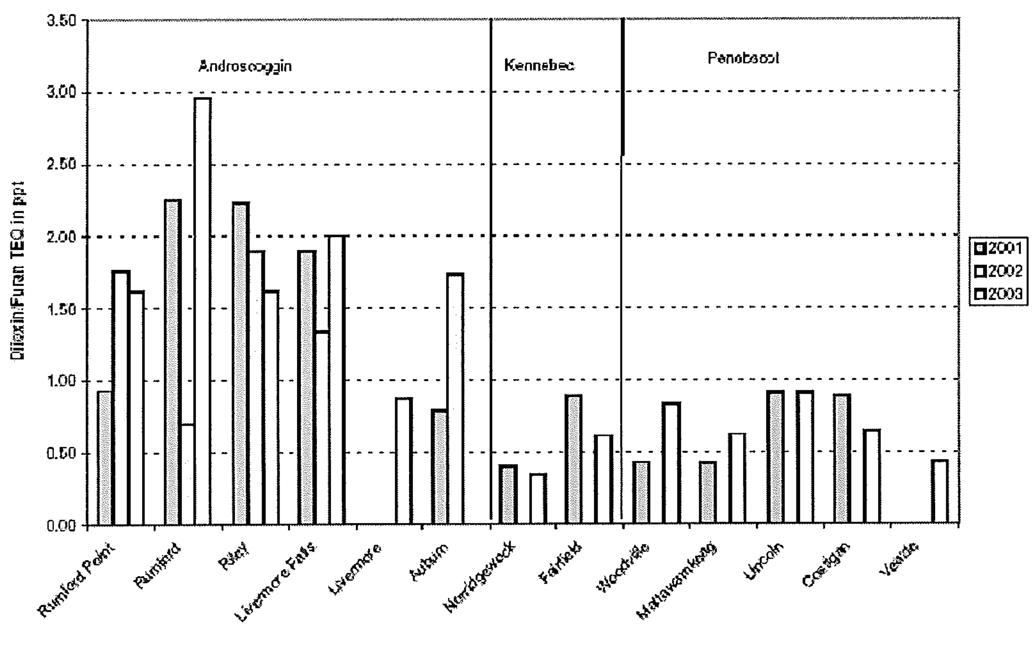

Figure 9. Average levels of dioxins and furans in white suckers for sampling locations along three Maine Rivers for the 2001 through 2003 sampling season. Levels are reported on a toxic equivalency basis in parts per trillion (pptr), and are computed assuming congeners below analytical detection limits are present at ½ the detection limit.

Dioxin and Furan Levels in Fish Other Maine Waters

Other Rivers

Figure 10 shows the most recent data from sampling on the Salmon Falls, Presumpscot and West Branch Sebasticook Rivers. The Presumpscot River has historically received a discharge from a pulp and paper mill, whereas the other two rivers have not. The West Branch of the Sebasticook River has historically received discharges from the Irving Tanning Company whereas the Salmon Falls River received discharge from Prime Tanning Company.[18]

The 2002 data for both the Salmon Falls and Presumpscot Rivers show dioxin and furan levels in smallmouth bass and suckers that are below both current FTALs and a potential lower FTAL of 0.4 pptr. This is not the case for the Sebasticook River, where both 2001 and 2002 average dioxin and furan levels in bass are above the potential 0.4 pptr FTAL, and the most recent 2003 data exceed the current FTAL of 1.5 pptr. The substantial increase in levels on the Sebasticook between the 2002 and 2003 seasons can be explained in part due to differences in fish lipid content.

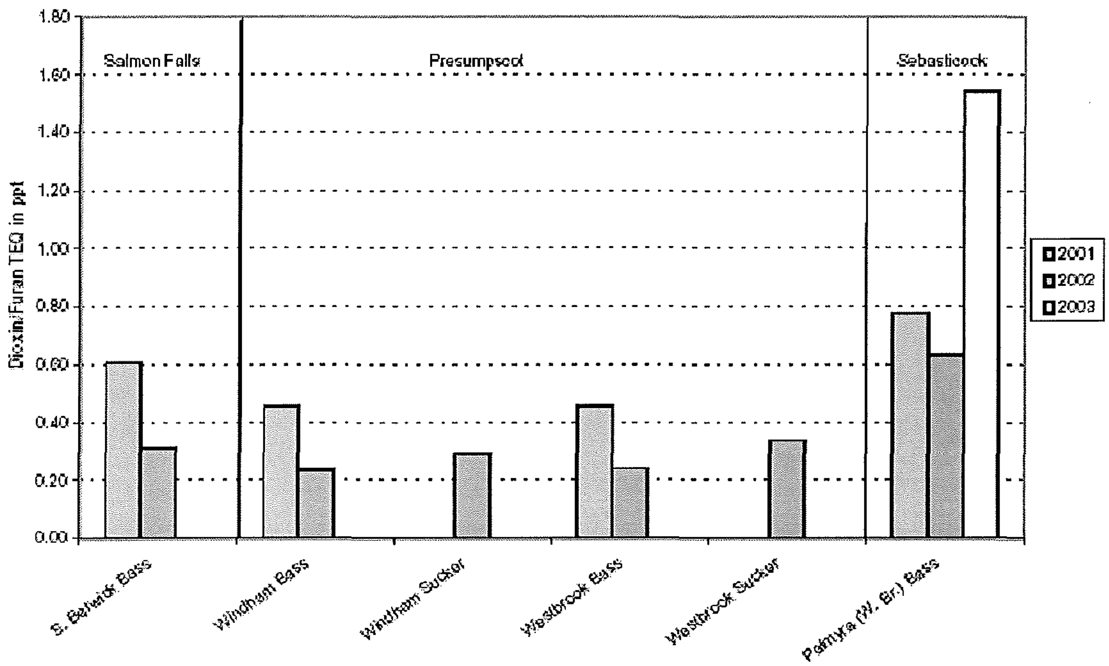

Figure 10. Average levels of dioxins and furans in fish for sampling locations on the Salmon Falls, Presumpscot, and W. Br. Sebasticook Rivers. Levels are reported on a toxic equivalency basis in parts per trillion (pptr), and are computed assuming congeners below analytical detection limits are present at ½ the detection limit. To account for sample size limitations, the 95th percentile upper confidence limit on the sample mean is shown, rather than the sample mean itself.

[18] Mower B, Dioxin Monitoring Program 2001, DEPLW0528, Maine Department of Environmental Protection, Augusta, ME, August 2002.

Androscoggin Lake

While this report has focused on dioxin and furan levels in fish collected from Maine rivers, it is appropriate to comment upon the level of these contaminants in fish collected from Androscoggin Lake. The Dead River connects the Androscoggin Lake to the Androscoggin River. It has been estimated that 2 to 3 times a year Androscoggin River water overtops a floodgate on the Dead River and flows into Androscoggin Lake.[19] Levels of dioxins and furans have been monitored in fish collected from Androscoggin Lake. Figure 11 shows results from sampling smallmouth bass and white perch since 1998. No sampling season was associated with average levels of dioxins and furans above the current FTAL of 1.5 pptr. However, with the exception of 2000, all were above the potential lower-bound FTAL of 0.4 pptr. Although these data show no consistent evidence of a decline in dioxin levels, TCDD and DTEo (TEQ) levels with where non-detects are zero do show a general decline since first sampled in 1996 in both bass and suckers (Appendix 7, Table 1) with the exception that concentrations of DTEo are slightly higher in bass since 2002. This general decline is similar to that of the nearest upstream sampling location on the Androscoggin River (Livermore Falls). The source of the year-to-year variation in levels of dioxins and furans shown in Figure 11 is partly due to the practice of using ½ the detection limit and varying detection limits from year to year. Year-to-year variation in fish lipid content is not a major factor; the lipid normalized data show a similar pattern.

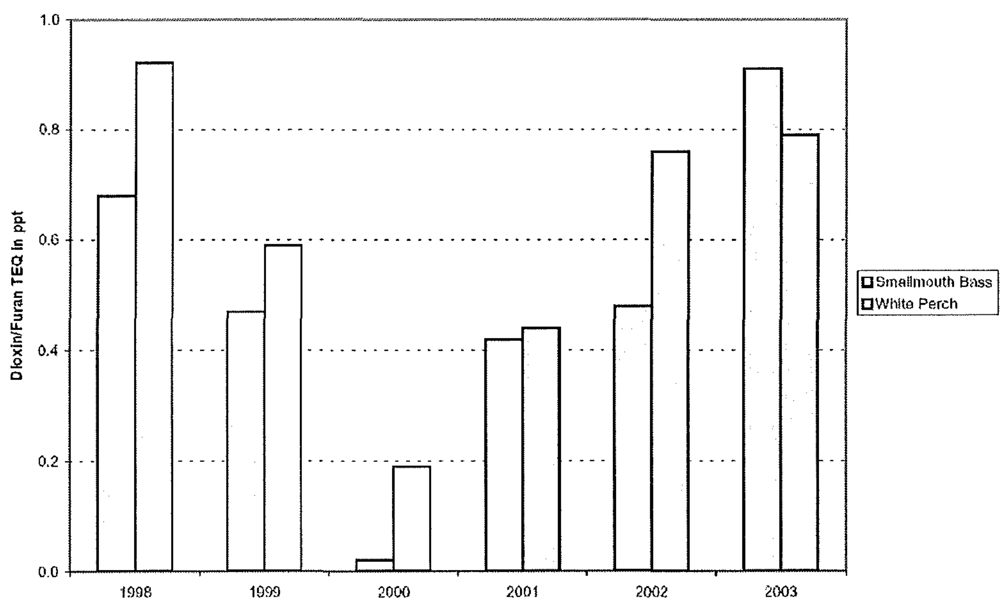

Figure 11. Average levels of dioxins and furans in game fish collected from Androscoggin Lake for the 1998 – 2003 sampling seasons. Levels are reported on a toxic equivalency basis in parts per trillion (pptr), and are computed assuming congeners below analytical detection limits are present at ½ the detection limit.

[19] Lane O and Evers D, Androscoggin Lake Wildlife Risk Assessment: 2001 Pilot Study Report, Report BRI2002-12, BioDiversity Research Institute, Falmouth, Maine, May 15, 2002.

Summary of Human Health Implications

These most recent data on dioxin and furan concentrations in bass and trout from the Kennebec and Penobscot Rivers indicate that we appear to be nearing the point where the presence of these chemicals will no long contribute to the need for additional fish consumption advisories beyond the statewide mercury advisory. This will be the case even after the Bureau adopts a lower FTAL to account for background dietary exposure to these chemicals. The presence of coplanar PCBs in fish tissue is becoming the primary concern for dioxin-like compounds on these waters. Unfortunately, this favorable development for bass and brown trout does not extend to white suckers. These bottom feeders tend to have higher levels than the either bass and trout. The addition of coplanar PCBs, for which we currently do not have data, may cause these fish to have cumulative levels of dioxin-like compounds in excess of current FTALs and will be in excess of the a potential lower FTAL of 0.4 pptr.

In general, the prognosis for changes in the contribution of dioxin and furan levels to the need for consumption advisories on the Androscoggin River and Androscoggin Lake is less clear. Levels are generally below current FTALs for bass, but are above for suckers. All sampling locations have levels above the potential lower FTAL of 0.4 pptr for both bass and suckers, though levels in bass are approaching this lower potential FTAL at a number of sampling locations. The cumulative effect of dioxins, furans and coplanar PCBs results in levels in bass that exceed even current FTALs for two sampling locations on the Androscoggin River.

It needs to be emphasized that any formal changes in Bureau of Health fish consumption advisories involves a comprehensive review of the levels of all measured contaminants in fish tissue (e.g., methylmercury, PCBs, lead, and DDT in addition to dioxins and furans). Consumption advisories are based on the most limiting contaminant. Consequently, a lessened need for consumption advisories due to lower levels of dioxins and furans in fish does not necessarily translate into changes in consumption advisories for a waterbody, especially given the statewide consumption advisory due to the presence of methylmercury in fish tissue. It should also be emphasized that should some other chemical (e.g., methylmercury) become the limiting contaminant, this does not imply that levels of dioxins and furan are necessarily no longer of any health concern.

Elevated fish tissue levels of dioxins and furans can also be found on waters that do not receive paper industry discharges, but do receive effluent from tannery mills. The most recent data from the West Branch Sebasticook River indicate levels that are above current FTALs based on dioxins and furans alone (i.e., absent coplanar PCBs).

Clearly, the Dioxin Monitoring Program will need to continue for at least the immediate future. There is a need to continue monitoring the levels in fish from the Androscoggin River, West Branch Sebasticook River, and Androscoggin Lake. Sampling of bass and trout on the Kennebec and Penobscot Rivers is recommended for another year or two in order to confirm the recent drops in levels of contaminants. Additional monitoring of suckers on the Penobscot and possibly Kennebec Rivers is advisable, along with analyses of coplanar PCBs under the SWAT program.

2. EVIDENCE THAT DIOXIN IS BEING DISCHARGED FROM ANY MILL-THE A/B TEST

SWAT TECHNICAL ADVISORY GROUP AND PEER REVIEW PANEL

As required by statute, the Department has sought the advice of the SWAT Technical Advisory Group (TAG) about the DMP since the inception of the TAG in 1994 and about the A/B test since its inception in 1997. In 2003, the Natural Resources Committee requested that the Department also seek the advice of a Peer Review Panel regarding the A/B test. Recommendations from both groups, which are not always similar, will be presented in this report, along with DEP's final recommendations.

INTERIM TESTS

Concentrations of TCDD and TCDF were below the nominal detection limit, 10 pg/l (ppq) in the bleach plant effluents from all mills by the required dates, July 31, 1998 and December 31, 1999 respectively (Appendix 4). This means that all mills met the interim limits of the 1997 Dioxin/Color law.

FINAL TEST: ABOVE/BELOW (A/B) TEST

The statute specifies that "a (bleach kraft pulp) mill may not discharge dioxin into its receiving waters after December 31, 2002". The final test is that fish (or suitable surrogate) below a mill may not have any more dioxin than fish (or surrogate) above a mill; this is known as the Above/Below (A/B) test. There is no analytical or statistical test available that would ensure that there is absolutely no discharge, however. Therefore, to determine any virtual discharge, a good statistical test must be sensitive enough to detect relatively small differences, called the minimum detectable difference or minimum significant difference (MSD).

Following the advice of the SWAT TAG, the Department submitted an interim report to the Natural Resources Committee on March 31, 2003 that designated filets of smallmouth bass and white suckers as the best A/B test for 2003 to determine compliance with the statute. Since the fish test is relatively insensitive and monitoring for more than one year is necessary, the legislature made the test an annual one. The report also stated that the Department would continue to investigate other methods in 2003 in an attempt to develop a more sensitive test for compliance.

Statistical analyses

The statute specifies the use of 95% statistical confidence, which requires the use of statistical hypothesis testing using appropriate tests. Statistical confidence measures the probability of making incorrect conclusions, known as type I (α) and type II (β) errors, from the data. Type I error is the probability of the test finding that there is a difference above/below when there really is no difference, while type II error is the probability of the test finding that there is no difference when there really is one ($1-\beta$ is the power of the test). It is in the interest of the DMP to minimize both types of error to the extent possible. Since the legislation does not distinguish between the two, then they must be set equally at 0.05 (95% confidence).

The MSD, is related to type I and II errors, sample size, and the variability in the data as shown in the following equation.

$$MSD^2 = \frac{(t_\alpha + t_\beta)^2 * \sigma^2}{n}$$

where

t_α is the t statistic for a type I error rate (0.05 specified)
t_β is the t statistic for a type II error rate (0.05 specified)
σ^2 is the variance (population and analytical) of the sample
n is the sample size

To make the MSD be as small as possible, given that the type I and II errors are specified by statute, and that the variance is not totally controllable, then the sample size (n) must be as large as possible. But there is a limit on how many fish can be caught from a waterbody within a reasonable time and effort and without depleting the population. And there is the relatively high analytical cost per fish sample ($500-1000 each). These two factors limit how small the MSD can be.

In 1997, during its testimony in support of the law, the Department stated that it would try to develop a test sensitive enough to detect the MSD between concentrations in fish above and below a discharge of no more than 10% of background or as low as possible to signal virtual elimination of discharges. Although the DMP had successfully detected differences above and below discharges in past years, as the amount of dioxin discharged is reduced, the DMP needed to be modified to allow an enhanced ability to detect smaller MSDs. MSDs are normalized to mean concentrations at upstream stations to provide a relative measure of differences, since units and scales are different for different congeners, test types, species, and tissues.

The Peer Review Panel report (Adams et al, 2004) recommends use of multiple statistical tests to reduce the MSD and still meet the 95% confidence requirement. The report recommends use of a preponderance of evidence (POE) approach, where 2 of 3 tests determine the outcome. Allowing the type I and type II error rates to be equal at 0.135, the overall error rates will be 0.05 and the MSD will be lower (72% of t-test SD, standard deviation) than that for single tests (110%). Similarly, use of EPA's Principle of Independent Applicability (PIA) approach, where all 3 tests must be passed, also allows overall error rates to be 0.05 while the type I and II error rates are adjusted to achieve a lower MSD (0.83% t-test standard deviation -SD). In the PIA approach, the type I and II error rates are unequal, 0.017 and 0.368 respectively. Considering the above, this all would seem to favor the use of the POE approach, which would be appropriate if all 3 tests were of equal sensitivity. The Department believes that if all tests are not equally sensitive, then discarding one, perhaps the most sensitive one, could result in an inaccurate determination of whether or not there is a discharge, particularly since the relative sensitivity of each test is not known before the test. The Peer Review Panel did not directly address the issue of sensitivity, but feels that each test has strengths and weaknesses and each test complements the others. The Department will use the POE approach.

DEVELOPMENT OF THE ABOVE/BELOW TEST

Fish

Since the development of the Above/Below (A/B) test began in 1997, the Department has conducted tests for the presence of TCDD, TCDF, and DTEo on both a wet and lipid weight basis using juvenile bass, single and composite mature bass filets, bass livers, juvenile and mature whole suckers, single and composite sucker filets, single and composite sucker livers, single and 2 composites of SPMDs, and caged mussels. This amounts to a total of 78 different types of tests. No one test has been consistently the most sensitive by producing the lowest MSDs, but in general, tests with fish filets were as sensitive or more so than the others. No single species always gave the lowest MSDs; in about 53% of the tests, either juvenile or mature bass had the lowest MSDs, while in the remaining 47% of the tests, white suckers has the lowest MSDs. But MSDs for all tests were 50-400 % of background, much higher than the 10% target, and not considered to be sensitive enough to accurately determine that there is no discharge in all cases. Details have been reported in the annual DMP reports that have been submitted to the Legislature as required, the latest two of which are also available at http://www.state.me.us/dep/blwq/docmonitoring/dioxin/index.htm .

Even though the fish test is not very sensitive, in the past it was good enough to detect the relatively large differences in fish concentrations above/below discharges where there was no other upstream discharge. The fish test has detected significantly more dioxin in fish below these mills than above these mills every year tested . Although there is a trace of TCDF in fish everywhere, there has been significantly more below these mills.

TCDD has not been detected in fish above these mills, but was detected in fish below these mills until 2002. Since then, TCDD has not been detected in some fish below some mills. The use of TCDD requires use of a different model than hypothesis testing and was debated by the TAG. Where most of the values are below detection (ND) then statistical comparisons cannot be made without assigning a surrogate value. But assignment of a surrogate results in an artificial distribution with less variance, that is not representative of the actual distribution. The use of a presence/absence test for TCDD as a common sense approach was considered, but it ignores the fact that there is a real distribution of values below the detection limit. The Department has determined that it will calculate mean concentrations only when there are some detectable concentrations of TCDD in fish at both the above and below stations. A surrogate value of ½ the detection level will be used for the non-detects.

The Peer Review Panel proposes to use the sum of the concentrations of TCDD, TCDF, PeCDD, and PeCDF, which would give essentially the same result as use of DTEo, since these four congeners are the only ones with a significant Toxicity Equivalency Factor (TEF) used in calculating the DTEo. TCDD and TCDF are considered by EPA as the predominant congeners discharged by pulp and paper mills in its draft Dioxin Reassessment (2000). PeCDD and PeCDF are the next most abundant congeners discharged by the mills, and do have relatively high toxicities, but are much less abundant..The mills state that the EPA data are based on old bleaching technology using hypochlorite, and that newer technology using chlorine dioxide has no fingerprint, or dioxin congener specifically related to their discharge.

There is some concern that concentrations in fish may represent historical rather than recent discharges. There are two mechanisms by which this could theoretically occur. First, dioxins in fish tissue could simply be residual accumulations from past years. The half-life of dioxin in fish has been reported to range from months to a few years, but the most reports indicate that it is less than 1 year. The DMP collects fish of a standard size, and hence likely the same age, at each location. For mature bass, fish of a legal size (>12 inches in length) are collected and these are probably 3-4 years old. Assuming a half-life of dioxin in fish of 1 year, then 3-4 years after cessation of the discharge of dioxin any residual concentrations would have been reduced by 87.5-95 % from the original concentrations simply through depuration. Any more than that or any more than in fish from background stations after that is an indication that dioxin is still being discharged. Mature suckers caught for this test are 6-8 years old and may take longer to purge the dioxins from their tissue and come to a new lower equilibrium with the new discharges. Yearling bass and suckers, however, do show current concentrations in the river. Comparative tests with yearling fish from 1999-2001, showed similar differences above/below as did mature fish. Consequently it appears that mature fish do represent current river concentrations.

Whether current river concentrations represent current or historical discharges may be influenced by a second mechanism. Historically contaminated sediments may be the cause of current concentrations in water and/or food resulting in contaminated fish. Fine-grained organic sediments are necessary for accumulation of organic contaminants like dioxin. Recent studies on these rivers have failed to find much of these sediments. The reasons are that improved wastewater treatment has resulted in a lower discharge of organic solids, the rivers have more oxygen which hastens breakdown of accumulating organic solids, and spring floods which move the fine grained solids downstream. Because the areal extent of find grained sediments is such a small proportion of the total amount of sediments in the river, it is unlikely that sediments are contributing much of the dioxins that are being measured in fish. If sediments were a continued source, then there is some thought that the white suckers, that inhabit the bottom waters and feed in and on the sediment, might reflect historical dioxin discharges. On the contrary, smallmouth bass, that live and feed more in rocky areas not conducive to storage of dioxin, may be more likely to show current discharges. But the extent that this happens in Maine rivers is not known for sure.

Semi-Permeable Membrane Devices (SPMDs)

Semi-permeable membrane devices (SPMDs) hold promise to be more sensitive than fish since the SPMDs are manufactured and should theoretically have less variability than fish. Variability is the most important and uncontrollable determinant of sensitivity of any test. Beginning in 1999, annual testing with SPMDs by the University of Maine Environmental Chemistry Lab has not shown any less variability than have fish tests. In fact, some early SPMDs tests have failed to show the large differences in dioxin concentrations above/below seen in the fish tests, while more recent tests, sometimes show results more similar to those from the fish tests. The variability in the 2003 samples was much lower than in the past and much lower than in fish or caged mussels.

The 2003 SPMDs did not have any detectable amount of TCDD at any location, but did have detectable amounts of TCDF and PeCDFs (Appendix 5). The SWAT TAG recommended that SPMDs be continued to be used. The Peer Review Panel report recommended that the SPMDs are not sensitive since they did not detect any TCDD and the fish and caged mussels did. In fact TCDD was found in some, but not all, fish samples, more so in suckers than in bass. TCDD was found in 0/35 caged mussel samples on the Androscoggin and initially in only 2/18 samples on the Kennebec, but the two detects were considered questionable and the sample results were rechecked. An error was found in identification of the TCDD peak from the chromatogram, and in fact there was no TCDD in these two or any of the mussel samples from either river.

Caged Mussels

A caged mussel test conducted in 2000 did not find any TCDD or TCDF where fish samples did. Possible reasons include poorer performance of mussels due to lower trophic level of the mussels and/or shorter exposure time, or the fact that the fish show historical discharges rather than current discharges. The Peer Review Panel report recommends caged mussels as the best way to monitor current discharges, since they can be deployed away from the surface and therefore presumably avoid monitoring sediment levels. There is some question, however, about whether or not sediments could redissolve or resuspend dioxin into the water where it would be taken up by mussels downstream. The Peer Review Panel report does state that the exposure time is adequate for the mussels to come to equilibrium with the dioxin in the river. The Peer Review Panel also states that the trophic level concern is insignificant since mussels do not metabolize dioxins like fish do. But it is uncertain whether or not this fact may be enough to overcome the effect of different trophic levels, which is a well known phenomenon in contaminant studies. In fact, in the 2000 studies, TCDD and TCDF were found in the fish and not in mussels from the same stations on the Kennebec. In 2003 TCDD was found in 10/50 bass samples and 37/50 sucker samples and 0/53 caged mussel samples from both the Androscoggin and Kennebec rivers (Appendix 5). This could be interpreted as meaning that the mussels are not as effective in bioaccumulation of dioxin as are fish. Alternatively, this could also mean that the fish, particularly suckers, bioaccumulate historically discharged dioxin and the mussels bioaccumulate currently discharged dioxin. TCDF was found in 36/50 bass samples and 50/50 sucker samples, and in 39/53 mussel samples.

The 2003 caged mussel tests utilized a gradient design, which was different than that used in 2000. The theory behind the gradient design is that maximum contaminant levels immediately below the discharge followed by a decline in concentration of contaminant progressing downstream is indicative of a discharge. This assumes there is no significant increase in dilution, which was true for both rivers. Other important factors that influence uptake, such as temperature and total suspended solids, should also be similar. These factors were not the same above and below the mills in the 2003 study, and it is unknown how much they influenced the results. The data were analyzed two ways. Comparing TCDD and TCDF levels at stations immediately above and below the mills discharges, the Department found no significant difference between the above/below stations. Likewise, using the same parameters there was no gradient below the mills that indicated any discharge.

Analyses of the data was also conducted by Michael Salazar of Applied Biomonitoring, the consultant that conducted the test, in a separate report that represents his views (Applied Biomonitoring, 2004). He found no evidence that either mill was a likely discharger of TCDD and TCDF. He did see a decreasing gradient below the SAPPI mill on the Kennebec, based on total dioxins and furans, largely because of the OCDD and OCDF, the two most abundant but least toxic of the 17 toxic dioxins and furans in the samples. But the EPA draft Dioxin Reassessment shows that OCDD and OCDF are products of combustion commonly emitted from oil fired boilers and auto and truck exhaust and not discharged to any great extent from the bleach plants of pulp and paper mills. The TAG, Peer Review Panel, and the Department all agree with EPA that total dioxins are not an appropriate measure of discharge of dioxins from pulp and paper mills. Applied Biomonitoring did find increased induction of vitellin, a reproductive protein biomarker, which indicates endocrine disruption in the mussels below the mill.

<u>Wet Weight vs Lipid Weight</u>

The Peer Review Panel had initially considered recommending the use of only lipid weight based data, but in the final report had concerns about the lipid data and made no such recommendation. A discussion by the TAG of whether to use wet weight and/or lipid weight based contaminant values resulted in agreement to look at the relationship between percent lipid and contaminant level to decide. A strong relationship (R^2=>0.5) would require that lipid normalized data be used, but a weak relationship would result in wet weight based data be used.

<u>Data below the detection limit (Non-detects)</u>

The issue of what to do about non-detects (NDs) was discussed by the TAG and the Peer Review Panel. The National Council for Air and Stream Improvement, a research group of the pulp and paper industry, recommended substituting a range of surrogate values for NDs, from zero to the detection limit (DL) to capture all possible outcomes. The peer review panel has stated that use of zero is more protective of the environment and use of the DL or 0.5 DL is more protective of the industry. NCASI gave an example of how that is not always the case. The Department has always used zero for these comparisons. The TAG generally favored zero but one member wanted a statement included to say it was arbitrary and explain why. The Peer Review Panel chose to try to avoid the issue by using suggested the use raw values for the 4 congeners (TCDD, PeCDD, TCDF and PeCDF) as a way to address the issue of non-detects, but this approach essentially chooses a surrogate value of zero for non-detects.

2003 A/B TEST

In 2003, bass and suckers were collected and analyzed above and below all 5 mills. Caged mussels and SPMDs were deployed above and below only the International Paper Co mill on the Androscoggin River and the SAPPI Somerset mill on the Kennebec River. Additional monitoring will be needed at all mills in 2004 and beyond for some mills before compliance with the 'no discharge' provision of the 1997 Dioxin/Color law can be determined. Results of the 2003 A/B test are summarized in Table 2 followed by a more detailed discussion for each mill.

Table 2. Evidence of dioxin discharge from 5 pulp and paper mills in 2003, Yes / No

	MeadWestvaco	International Paper	SAPPI Somerset	Lincoln P&P	Georgia Pacific
Bass	N	N	N	N	Y
Suckers	Y	Y	Y	Y	N
Mussels	NS	N	N	NS	NS
SPMDs	NS	N	N	NS	NS
POE	ND	N	N	ND	ND

NS = Not sampled
ND = Not determined

MeadWestvaco in Rumford
Examination of the 2003 data, shows that suckers below the MeadWestvaco mill in Rumford had significantly higher TCDDw (wet weight based) than suckers above the mill (Appendix 5). TCDF in suckers and TCDD and TCDF in bass, however, were not higher below the mill. The relatively high MSDs show that the tests were not very sensitive, however. These results indicate a possible discharge of dioxin, but, since only the fish tests were conducted in 2003, a POE analysis could not be conducted (Table 2). Additional sampling will be needed in future years before a determination can be made.

International Paper Co in Jay
Examination of the 2003 data, shows that suckers below the International Paper mill in Jay had significantly higher TCDDl (lipid weight base) than suckers above the mill (Appendix 5). TCDF in suckers and both TCDD and TCDF in bass, however, were not higher below the mill. Caged mussel data and SPMD data did not show any TCDD or any elevated concentrations of TCDF below the mill. A POE approach suggests that there is no discharge. The relatively high MSDs for all tests show that the tests were not very sensitive overall, however (Appendix 5). Additional sampling will be needed in future years before a final determination can be made.

SAPPI in Skowhegan
Examination of the 2003 data, shows that suckers below the SAPPI mill in Skowhegan had significantly higher TCDDw and TCDFl (lipid weight base) than suckers above the mill (Appendix 5). Caged mussel data did not indicate a discharge either by use of a standard above/below analysis or gradient analysis using either measure of dioxin. SPMD data did not show any elevated concentrations below the mill. A POE approach suggests that there is no discharge (Table 2). The relatively high MSDs for all tests show that the tests were not very sensitive overall, however (Appendix 5). Additional sampling will be needed in future years before a final determination can be made.

Lincoln Pulp and Paper Co. in Lincoln

Examination of the 2003 data, shows that TCDDw (wet weight based) was higher in suckers below the mill than above (Appendix 5). TCDFw in suckers and both measures in bass, however, were not higher below the mill. The relatively high MSDs show that the tests were not very sensitive, however. These results indicate a possible discharge of dioxin, but, since only the fish tests were conducted in 2003, a POE analysis could not be conducted (Table 2). Additional sampling will be needed in future years before a determination can be made.

Georgia Pacific Corp. in Old Town

Examination of the 2003 data, shows that bass below the Georgia Pacific's mill in Old Town had significantly higher TCDFw (wet weight based) than bass above the mill (Appendix 5). TCDD in bass and both TCDD and TCDF in suckers, however, were not higher below the mill. The relatively high MSDs show that the tests were not very sensitive, however. These results indicate a possible discharge of dioxin, but a POE analysis could not be conducted since only the fish tests were conducted in 2003 (Table 2). Additional sampling will be needed in future years before a final determination can be made.

3. CURRENT TECHNOLOGY THAT ACHIEVES NO DISCHARGE OF DIOXIN

In 2003 the Department retained N. McCubbin Consultants, Inc. of Quebec, Canada to present current information on technologies available to the pulp and paper industry to reduce or eliminate dioxin from their wastewater effluent. Mr. McCubbin was one of the principle authors of EPA's cluster rule that sets performance standards for the discharge of dioxin from the pulp and paper industry. As such he is an internationally recognized expert in pulp and paper technology and related pollution control technologies.

The McCubbin report (N McCubbin Consultants, 2003) was submitted to the Natural Resources Committee in March 2003 and describes several technologies available that would reduce dioxin discharges by significant fractions. Some of these technologies, such as ozone bleaching and improved process control, could increase mill profitability. Other technologies could have a negative impact on mill profitability. While some technologies are relatively expensive investments, they could offer other environmental benefits such as reduction in biological oxygen demand (BOD), color and phosphorous in mill effluent. Actual reductions in dioxin and the economic impact on mill profitability would depend on individual mill circumstances.

The McCubbin report concludes that while it would be technically possible to eliminate dioxin formation and discharges from Maine mills by converting to Totally Chlorine Free (TCF) bleaching processes, the capital costs would not likely be offset by reductions in operating costs sufficient to support such an investment.

4. THE NEED FOR CONTINUING THE DIOXIN MONITORING PROGRAM

As discussed above, continued monitoring within the DMP is necessary in future years to determine initial and continued compliance with the 'no discharge' provision of the 1997 Dioxin/Color law. A 2003 amendment to the law requires the mills to demonstrate compliance annually. The DMP is currently authorized through 2007.

For human health assessment of the need for fish consumption advisories, there are several issues made clear from the previous discussions that point to the need for continued monitoring through the Dioxin Monitoring Program. Since background dietary sources of dioxin/furan exposure are significant, the rivers need to be monitored to identify when fish tissue concentrations become consistent with other dietary sources of protein. Background locations do have levels of dioxins/furans that are reasonably consistent with other dietary protein sources. While the dioxin/furan concentrations in Maine's major rivers have decreased substantially over time and are low at some stations below discharges, they are still elevated compared to the current and future FTALs (figures 3,4,10,11). Additionally, as should be clear from figure 7, the inclusion of coplanar PCBs with dioxins results in concentrations in fish that may continue to require fish consumption advisories.

5. OTHER KNOWN SOURCES OF DIOXIN POLLUTING MAINE RIVERS

There are traces of dioxins throughout the environment, including in the effluents of publicly owned treatment works (POTWs), but the amounts are low unless there are certain industrial sources, such as pulp and paper, tannery, or textile mill discharges, contributing to the facilities influent. Since its inception in 1988, the DMP has required the Department to sample fish below facilities with 'known or likely dioxin contamination' in their discharged effluent. These facilities have been identified by finding of dioxins in wastewater or sludge from the wastewater treatment plants (Appendices 3 and 4) or by initial surveys of fish downstream of facilities similar to those showing discharge of dioxins (Appendix 7). Facilities that have been found to discharge dioxins have included paper mills that procure pulp from somewhere else, recycle paper mills, textile mills, and tanneries. Some of these were Scott Paper Mill in Winslow, American Tissue (formerly Statler Tissue) in Augusta, Eastland Woolen Mill in Corinna, all of which have gone out of business. The Eastland Woolen Mill site on the East Branch of the Sebasticook River is now a Superfund site, because of contamination by chlorobenzenes, a dioxin precursor. Currently, Prime Tanning in Berwick, Irving Tanning in Hartland, and Huhtamaki in Waterville, all of which discharge to the local POTW, are also considered sources.

In an effort to disassociate itself with the dioxin issue, in November 2002, Huhtamaki became certified by the Chlorine Free Products Association as the first foodservice manufacturer to offer processed chlorine free (PCF) packaging. The Chlorine Free Products Association is a unique trade association representing companies dedicated to implementing advanced technologies, and/or, groups supporting products free of chlorine chemistry. PCF means that, among a number of other requirements, no chlorine is added during processing. However, because PCF requires the use of at least 30% post-consumer fiber, there is the possibility that fiber may have been previously bleached with chlorine and contain dioxin.

The SAPPI Westbrook mill ceased its pulping and bleaching operation in 1999, but still procures pulp, some of which may be kraft pulp, for its paper making. Although recent studies have showed no significant discharge of dioxin, periodic monitoring is warranted to ensure no changes occur. Interestingly, the Domtar (formerly Georgia Pacific) mill in Woodland does not seem to be a significant source based on several years of fish data. The reason it is not a source like all the other bleached kraft pulp and paper mills is unknown but may be a result of the fact that it uses hardwood pulp rather than softwood pulp.

References

Adams, S.M., W. Halteman, C. Mattingly, and D. Page, 2004. Dioxin Monitioring Program, Review Panel Report, a report to the Maine Department of Environmental Protection and Natural Resources Committee, Augusta, Maine. 43pp.

Applied Biomontoring, 2004. Final report, 2003 Androscoggin River caged mussel study, submitted to International Paper Co, Loveland, OH. 24 pp.

Applied Biomontoring, 2004. Final report, 2003 Kennebec River caged mussel study, submitted to Friends of Merrymeeting Bay, Richmond, Me. 71 pp.

N. McCubbin Consultants, 2003. Review of Current Technology for Control of Dioxin Discharge in Effluents from Kraft Pulp Mills, a report to the Maine Department of Environmental Protection, Augusta, Maine. 53pp.

APPENDIX 1. FISH CONSUMPTION ADVISORIES

MAINE BUREAU OF HEALTH

WARNING About Eating Freshwater Fish

Warning: Mercury in Maine freshwater fish may harm the babies of pregnant and nursing mothers, and young children.

SAFE EATING GUIDELINES

Pregnant and nursing women, women who may get pregnant, and children under age 8 SHOULD NOT EAT any freshwater fish from Maine's inland waters. Except, for brook trout and landlocked salmon, 1 meal per month is safe.

All other adults and children older than 8 CAN EAT 2 freshwater fish meals per month. For brook trout and landlocked salmon, the limit is 1 meal per week.

It's hard to believe that fish that looks, smells, and tastes fine may not be safe to eat. But the truth is that fish in Maine lakes, ponds, and rivers have mercury in them. Other states have this problem too. Mercury in the air settles into the waters. It then builds up in fish. For this reason, older fish have higher levels of mercury than younger fish. Fish (like pickerel and bass) that eat other fish have the highest mercury levels.

Small amounts of mercury can harm a brain starting to form or grow. That is why unborn and nursing babies, and young children are most at risk. Too much mercury can affect behavior and learning. Mercury can harm older children and adults, but it takes larger amounts. It may cause numbness in hands and feet or changes in vision. The Safe Eating Guidelines identify limits to protect everyone.

See http://www.maine.gov/dhs/ehu/fish/2KFCA.shtml

Warning: Some Maine waters are polluted, requiring additional limits to eating fish.

Fish caught in some Maine waters have high levels of PCBs, Dioxins or DDT in them. These chemicals can cause cancer and other health effects. The Bureau of Health recommends additional fish consumption limits on the waters listed below. Remember to check the mercury guidelines. If the water you are fishing is listed below, check the mercury guideline above and follow the most limiting guidelines.

SAFE EATING GUIDELINES

Androscoggin River Gilead to Merrymeeting Bay:------------------6-12 fish meals a year.
Dennys River Meddybemps Lake to Dead Stream:------------------1-2 fish meals a month.
Green Pond, Chapman Pit, & Greenlaw Brook
(Limestone):---Do not eat any fish from these waters.
Little Madawaska River & tributaries
(Madwaska Dam to Grimes Mill Road):-------------Do not eat any fish from these waters.
Kennebec River Augusta to the Chops:-------------Do not eat any fish from these waters.
Shawmut Dam in Fairfield to Augusta:-------5 trout meals a year, 1-2 bass meals a month.
Madison to Fairfield: ---1-2 fish meals a month.
Meduxnekeag River: --- 2 fish meals a month.
North Branch Presque Isle River--2 fish meals a month.
Penobscot River below Lincoln:---------------------------------------1-2 fish meals a month
Prestile Stream:---1 fish meal a month.
Red Brook in Scarborough: --- 6 fish meals a year.
Salmon Falls River below Berwick: -----------------------------------6-12 fish meals a year.
Sebasticook River (East Branch, West Branch & Main Stem)
(Corinna/Hartland to Winslow):---------------------------------------2 fish meals a month.

APPENDIX 2. DIOXIN AND FURAN CONCENTRATIONS IN 2002 AND 2003 FISH SAMPLES

SPECIES CODES

BNT	brown trout
EEL	eel
LMB	largemouth bass
RBT	rainbow trout
SMB	smallmouth bass
WHP	white perch
WHS	white sucker

STATION CODES

AGL	Androscoggin R at Gilead above MeadWestvaco
ARP	Androscoggin R at Rumford Point above MeadWestvaco
ARF	Androscoggin R below Rumford below MeadWestvaco
ARY	Androscoggin R at Riley above International Paper
ALV	Androscoggin R at Livermore Falls below International Paper
AGI	Androscoggin R at GIP, Auburn below International Paper
ALS	Androscoggin R at Lisbon Falls below International Paper
ALW	Androscoggin Lake at Wayne below International Paper
KRM	Kennebec R at Madison above SAPPI Somerset, Skowhegan
KNW	Kennebec R at Norridgewock above SAPPI Somerset, Skowhegan
KFF	Kennebec R at Shawmut, Fairfield below SAPPI Somerset, Skowhegan
KRS	Kennebec R at Sidney below SAPPI-Somerset & KSTD in Waterville
PBW	Penobscot R at Woodville above Lincoln Pulp and Paper
PBM	Penobscot R at Winn above Lincoln Pulp and Paper in Lincoln
PBL	Penobscot R at S Lincoln below Lincoln Pulp and Paper in Lincoln
PBC	Penobscot R at Costigan, Milford above Georgia Pacific in Old Town
PBV	Penobscot R at Veazie below Georgia Pacific in Old Town
PBO	Penobscot R at Orrington below Georgia Pacific in Old Town
PWD	Presumpscot R at Windham above SAPPI Westbrook
PWB	Presumpscot R at Westbrook below SAPPI Westbrook
SFS	Salmon Falls R at S. Berwick below Berwick POTW and Prime Tanning
SEN	E Br Sebasticook at Newport below Corinna and former Eastland Woolen mill
SED	E Br Sebasticook at Detroit below Corinna and former Eastland Woolen mill
SWP	W Br Sebasticook at Palmyra below Hartland POTW and Irving Tanning

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARP-SMB 01	ARP-SMB 02	ARP-SMB 03	ARP-SMB 04	ARP-SMB 05	ARP-SMB 06	ARP-SMB 07
EXT ID		104884804	104884812	104884820	104884838	104884846	104884853	104884861
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	4.27	4.39	0.854	3.55	4.92	5.31	5.16
1,2,3,7,8-PeCDF	0.1	0.606	<DL	0.284	0.961	1.21	0.81	0.505
2,3,4,7,8-PeCDF	0.1	1.31	1.05	<DL	1.39	1.79	1.44	1.57
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.104	0.141	<DL	<DL	0.17	0.146	0.143
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	0.134
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	0.577	<DL
OCDD	1	<DL	<DL	<DL	<DL	1.09	6.34	<DL
Total TEQ (ND=0)		1.217	1.105	0.09961	1.098	1.618	1.442	1.601
Total TEQ (ND=DL)		1.5	1.397	0.5303	1.485	1.902	1.724	1.788
% Lipids		1.93	2.25	1.04	2	1.69	1.26	2.06
Sample weight (g)		30.8	30.3	30.7	30.3	30.6	30.3	30.6

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARP-SMB 08	ARP-SMB 09	ARP-SMB 10	ARP-WHS25	ARP-WHS29	ARP-WHS36	ARP-WHS50
EXT ID		104884879	104884887	104884895	104884481	104884499	104884507	104884515
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	3.9	2.57	2.27	1.17	10.3	4.62	9.21
1,2,3,7,8-PeCDF	0.1	0.832	0.412	0.462	0.283	<DL	<DL	<DL
2,3,4,7,8-PeCDF	0.1	1.44	0.84	0.823	0.317	1.06	0.673	1.17
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.124	0.101	<DL	<DL	0.157	<DL	0.138
1,2,3,7,8-PeCDD	0.1	0.101	<DL	<DL	<DL	0.148	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	1.36	<DL	<DL
Total TEQ (ND=0)		1.374	0.7983	0.6612	0.2892	1.868	0.7983	1.645
Total TEQ (ND=DL)		1.56	1.086	1.044	0.6777	2.061	1.192	1.936
% Lipids		1.94	1.17	0.97	1.31	2.47	1.17	2.28
Sample weight (g)		30.6	30.2	30.6	30.1	30.3	30.1	30.4

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARP-WHS51	ARP-WHS52	ARP-WHS53	ARP-WHS54	ARP-WHS55	ARP-WHS56	ARF SMB 01
EXT ID		104884523	104884531	104884549	104884556	104884564	104884572	104884689
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	7.82	5.38	6.45	5.36	8.29	8.42	0.378
1,2,3,7,8-PeCDF	0.1	0.75	0.54	<DL	0.452	0.765	0.893	<DL
2,3,4,7,8-PeCDF	0.1	0.967	0.627	1.01	0.68	0.969	0.994	0.155
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	0.297	<DL
1,2,3,6,7,8-HxCDF	0.25	0.445	<DL	<DL	<DL	0.25	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	0.116	0.104	<DL	0.134	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		1.348	0.879	1.267	1.002	1.377	1.548	0.1155
Total TEQ (ND=DL)		1.712	1.267	1.561	1.284	1.74	1.809	0.5086
% Lipids		2.69	1.53	1.58	1.06	2.28	1.59	0.405
Sample weight (g)		30.1	30.2	30.1	30.9	30.2	30.5	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARF SMB 02	ARF SMB 03	ARF SMB 04	ARF SMB 05	ARF SMB 06	ARF SMB 07	ARF SMB 08
EXT ID		104884705	104884713	104884739	104884747	104884754	104884762	104884770
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	1.25	4.16	0.757	1.22	3.68	1.29	1.01
1,2,3,7,8-PeCDF	0.1	0.323	<DL	0.164	0.271	0.766	0.311	0.342
2,3,4,7,8-PeCDF	0.1	0.697	1.13	0.294	0.504	1.59	0.802	0.481
1,2,3,4,7,8-HxCDF	0.25	<DL	0.252	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	0.257	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.115	0.12	<DL	<DL	0.163	0.102	<DL
1,2,3,7,8-PeCDD	0.1	<DL	0.11	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.6041	1.262	0.2309	0.3879	1.366	0.6471	0.3589
Total TEQ (ND=DL)		0.8861	1.405	0.6189	0.7773	1.655	0.9332	0.7459
% Lipids		0.137	1.61	0.67	0.95	2.07	0.0934	1.1
Sample weight (g)		30.9	30.5	30.2	30.1	30.2	30.4	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARF SMB 09	ARF SMB 10	ARF WHS 1	ARF WHS 2	ARF WHS 3	ARF WHS 10	ARF WHS 11
EXT ID		104884788	104884796	104869367	104869375	104869383	104869391	104869409
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	0.875	1.7	3.6	4.55	6.7	2.88	7.23
1,2,3,7,8-PeCDF	0.1	0.235	0.0979	0.521	0.414	0.83	0.406	0.669
2,3,4,7,8-PeCDF	0.1	0.532	0.216	0.577	0.624	1.08	0.519	1.13
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	0.118	0.135	0.15	0.11	0.205
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	0.133	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	1.26	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.3652	0.2832	0.7929	0.9233	1.537	0.6782	1.525
Total TEQ (ND=DL)		0.7485	0.6623	1.081	1.212	1.725	0.9658	1.814
% Lipids		0.696	1.4	3.12	2.99	6.85	3.81	3.88
Sample weight (g)		30.5	30.9	30.2	30.1	30.3	30.3	30.1

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARF WHS 12	ARF WHS 13	ARF WHS 14	ARF WHS 15	ARF WHS 16	ARY-SMB01	ARY-SMB02
EXT ID		104869417	104869425	104869433	104869441	104869458	104910302	104910310
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	2.33	7.53	4.02	26.8	15.2	0.89	1.32
1,2,3,7,8-PeCDF	0.1	0.267	0.774	0.427	2.54	1.67	0.183	0.203
2,3,4,7,8-PeCDF	0.1	0.393	1.18	0.654	4	2.53	0.464	0.402
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	0.586	0.513	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	0.206	0.139	0.788	0.349	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	0.159	<DL	0.482	0.279	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	0.427	0.359	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.4423	1.747	0.8899	6.174	3.587	0.3299	0.3437
Total TEQ (ND=DL)		0.8303	1.935	1.18	6.313	3.725	0.7111	0.7295
% Lipids		1.94	4.24	4.38	12.7	8.94	1.5	0.987
Sample weight (g)		30.2	30.3	30	30.4	30.5	30.7	30.3

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY-SMB03	ARY-SMB04	ARY-SMB05	ARY-SMB06	ARY-SMB07	ARY-SMB08	ARY-SMB09	ARY-SMB10
EXT ID		104910328	104910344	104910351	104910369	104910377	104910385	104910393	104910401
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	<DL	0.651	0.499	0.7	0.629	0.559	0.945	0.985
1,2,3,7,8-PeCDF	0.1	<DL	0.218	<DL	<DL	0.189	<DL	0.298	0.354
2,3,4,7,8-PeCDF	0.1	0.275	0.385	0.218	0.269	0.384	0.271	0.55	0.567
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.711
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.138
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	0.85	1.54	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	5.4	19	<DL	<DL	<DL
Total TEQ (ND=0)		0.1377	0.2683	0.1591	0.2136	0.2818	0.1917	0.3842	0.5444
Total TEQ (ND=DL)		0.5405	0.6567	0.5525	0.5959	0.656	0.5849	0.7723	0.8678
% Lipids		0.74	1.49	0.759	1.38	0.676	1.41	1.18	0.815
Sample weight (g)		30.2	30.1	30.1	30.6	30.9	30.2	30.2	30.6

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY-SMB11	ARY-SMB12	ARY-SMB13	ARY-SMB14	ARY-SMB15	ARY-SMB16	ARY-SMB17	ARY-SMB18
EXT ID		104910419	104910435	104910450	104910468	104910484	104910492	104910500	104910518
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	1.17	0.517	0.702	1.38	0.496	0.627	2.17	0.896
1,2,3,7,8-PeCDF	0.1	<DL	0.15	0.219	0.412	0.111	<DL	0.67	0.217
2,3,4,7,8-PeCDF	0.1	0.353	0.274	0.407	0.72	0.192	0.229	0.884	0.437
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	0.983	<DL	<DL	1.22	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	<DL	0.124	<DL	<DL	0.203	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	1.13	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	7.67	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.3055	0.1963	0.2844	0.6529	0.1513	0.1772	0.9071	0.3189
Total TEQ (ND=DL)		0.6897	0.5819	0.6651	0.9373	0.5319	0.5837	1.19	0.7038
% Lipids		0.999	0.675	0.852	1.59	0.845	0.567	2.46	0.494
Sample weight (g)		30.7	30.4	30.8	30.1	30.8	30.7	30.2	30.4

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY-SMB19	ARY-SMB20	ARY-SMB21	ARY-SMB22	ARY-SMB23	ARY-SMB24	ARY-SMB25	ARY-SMB26
EXT ID		104910526	104910534	104910542	104910559	104910567	104910575	104910583	104910591
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	0.894	1.7	1.32	1.01	0.446	0.587	0.615	0.613
1,2,3,7,8-PeCDF	0.1	0.176	0.5	0.321	0.405	0.138	0.192	0.176	0.154
2,3,4,7,8-PeCDF	0.1	0.316	0.643	0.372	0.541	0.232	0.44	0.27	0.309
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.11	0.112	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.3661	0.6292	0.3335	0.3915	0.1676	0.2882	0.2052	0.2234
Total TEQ (ND=DL)		0.653	0.9167	0.7228	0.7766	0.5562	0.6755	0.595	0.6122
% Lipids		0.867	1.4	1.22	1.44	0.304	0.824	0.38	0.32
Sample weight (g)		30.4	30.3	30.1	30.4	30.1	30.2	30	30.1

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY-SMB27	ARY-SMB28	ARY-SMB29	ARY-SMB30	ARY WHS 1	ARY WHS 2	ARY WHS 3	ARY WHS 4
EXT ID		104910609	104910617	104910625	104910633	104970470	104970488	104970496	104970504
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	0.518	0.686	0.401	0.836	5.85	21.1	20	5.54
1,2,3,7,8-PeCDF	0.1	0.141	0.14	0.113	0.175	0.547	1.17	0.966	<DL
2,3,4,7,8-PeCDF	0.1	0.238	0.257	0.214	0.278	0.79	2.44	2.46	0.75
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	0.643	0.692	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	<DL	<DL	0.173	0.439	0.504	0.155
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	0.249	0.281	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	1.13	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.1781	0.204	0.153	0.2314	1.181	4.143	4.134	1.084
Total TEQ (ND=DL)		0.5668	0.5939	0.5352	0.6169	1.47	4.305	4.295	1.37
% Lipids		0.55	0.46	0.5	0.56	2.2	5.6	3.04	2.25
Sample weight (g)		30.1	30	30.6	30.4	30.2	30.5	30.7	30.9

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY WHS 5	ARY WHS 6	ARY WHS 7	ARY WHS 8	ARY WHS 9	ARY WHS 10	ARY WHS 11
EXT ID		104970512	104970520	104970538	104970546	104970553	104970561	104970579
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	4.52	7.92	8.85	4.22	6.86	20.5	13.7
1,2,3,7,8-PeCDF	0.1	0.361	0.638	0.57	0.337	0.755	1.11	1.41
2,3,4,7,8-PeCDF	0.1	0.589	0.948	1	0.541	1.02	2.94	2.16
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	0.251	<DL	<DL	0.452	0.298
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	1.54
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.111	0.167	0.217	<DL	0.19	0.637	0.357
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	0.291	0.194
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	0.353	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	0.618	0.941	<DL	<DL	<DL	<DL	<DL
OCDD	1	3.63	14.9	<DL	<DL	<DL	<DL	1.02
Total TEQ (ND=0)		0.8824	1.476	1.656	0.7094	1.426	4.584	3.118
Total TEQ (ND=DL)		1.164	1.76	1.92	1.098	1.707	4.723	3.278
% Lipids		2.96	2.74	4.49	0.49	1.61	6.56	5.04
Sample weight (g)		30.4	30.1	30.1	30.1	31	30.3	30.1

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY WHS 12	ARY WHS 13	ARY WHS 14	ARY WHS 15	ARY WHS 16	ARY WHS 17	ARY WHS 18
EXT ID		104970587	104970595	104970603	104970611	104970629	104970637	104970645
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	5.08	4.34	9.64	10.7	11.3	2.27	5.13
1,2,3,7,8-PeCDF	0.1	0.375	0.323	0.782	0.909	1.34	0.197	0.335
2,3,4,7,8-PeCDF	0.1	0.503	0.554	1.32	1.35	1.92	0.315	0.55
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	0.389	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	1.53	<DL	0.988	0.908	2.43	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.147	0.127	0.258	0.326	0.291	<DL	0.144
1,2,3,7,8-PeCDD	0.1	<DL	<DL	0.121	0.167	0.215	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	0.262	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	0.539	<DL	0.566	<DL	<DL	<DL
OCDD	1	<DL	6.71	<DL	7.97	<DL	<DL	<DL
Total TEQ (ND=0)		0.9411	0.8601	2.051	2.294	2.752	0.3939	0.9489
Total TEQ (ND=DL)		1.219	1.139	2.232	2.469	2.886	0.7818	1.237
% Lipids		2.55	1.94	3.94	4.5	3.62	2.08	2.33
Sample weight (g)		30.8	30.7	30.6	31	30.3	30.2	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY WHS 19	ARY WHS 20	ARY WHS 21	ARY WHS 22	ARY WHS 23	ARY WHS 24	ARY WHS 25
EXT ID		104970652	104970660	104970678	104970686	104970694	104970702	104970710
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	9.72	8.96	13.8	6.54	4.16	15.8	7.46
1,2,3,7,8-PeCDF	0.1	0.923	0.814	1.28	0.569	0.226	0.668	0.358
2,3,4,7,8-PeCDF	0.1	1.27	1.35	1.91	1.04	0.444	1.77	0.68
1,2,3,4,7,8-HxCDF	0.25	<DL	0.258	0.334	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	0.623	0.786	0.498	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.276	0.248	0.355	0.188	0.114	0.418	0.159
1,2,3,7,8-PeCDD	0.1	0.114	0.132	0.212	<DL	<DL	0.165	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	0.583	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	5.73	1.01	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		2.057	2.024	3.001	1.39	0.7627	3.086	1.263
Total TEQ (ND=DL)		2.237	2.183	3.16	1.674	1.05	3.276	1.546
% Lipids		4.16	3.43	5.78	3.18	2.14	5.79	4.19
Sample weight (g)		30.1	30.2	30.2	30.6	30.3	30	30.8

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ARY WHS 26	ARY WHS 27	ARY WHS 28	ARY WHS 29	ARY WHS 30	ALVSMB 1	ALVSMB 2	ALVSMB 3
EXT ID		104970728	104970736	104970744	104970751	104970769	104944111	104944129	104944137
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	11.5	7.73	10.2	5.59	7.67	0.545	0.451	0.213
1,2,3,7,8-PeCDF	0.1	0.604	0.463	0.59	0.312	0.475	0.135	0.115	<DL
2,3,4,7,8-PeCDF	0.1	1.31	0.892	1.19	0.544	1.05	0.272	0.193	<DL
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.285	0.164	0.245	0.149	0.191	0.102	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	0.128	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	0.551	<DL	<DL	<DL	0.502	<DL	<DL	<DL
OCDD	1	4.44	4.17	<DL	<DL	2.76	<DL	<DL	<DL
Total TEQ (ND=0)		2.133	1.407	1.896	0.9957	1.64	0.2987	0.1476	0.02128
Total TEQ (ND=DL)		2.413	1.697	2.178	1.277	1.825	0.5865	0.5344	0.4635
% Lipids		4.19	3.83	3.68	2.61	4.1	1.21	1.04	0.298
Sample weight (g)		30.6	30	30.9	30.9	30.1	30.2	30.3	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALVSMB 4	ALVSMB 5	ALVSMB 6	ALVSMB 7	ALVSMB 8	ALVSMB 9	ALVSMB 10	ALVSMB 11
EXT ID		104944145	104944152	104944160	104944178	104944186	104944194	104944202	104944210
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	0.221	0.471	1.14	0.125	0.455	0.398	0.313	0.513
1,2,3,7,8-PeCDF	0.1	<DL	0.127	0.259	<DL	<DL	0.211	<DL	0.169
2,3,4,7,8-PeCDF	0.1	<DL	<DL	0.308	0.107	0.199	0.339	0.149	0.266
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	1.01	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.02206	0.05358	0.2807	0.06615	0.1451	0.2199	0.1058	0.1926
Total TEQ (ND=DL)		0.4656	0.48	0.6681	0.4569	0.5403	0.6079	0.4911	0.581
% Lipids		1.47	0.82	1.4	0.264	0.902	0.96	0.922	0.36
Sample weight (g)		30.1	31	30.2	30.3	30	30.2	30.8	30.1

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALVSMB 12	ALVSMB 13	ALVSMB 14	ALVSMB 15	ALVSMB 16	ALVSMB 17	ALVSMB 18	ALVSMB 19
EXT ID		104944228	104944236	104944244	104944251	104944269	104944277	104944285	104944293
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	<DL	0.809	0.362	1.23	0.548	0.787	0.322	0.63
1,2,3,7,8-PeCDF	0.1	0.242	0.205	<DL	0.287	<DL	0.183	0.102	0.183
2,3,4,7,8-PeCDF	0.1	0.726	0.281	0.18	0.516	0.253	0.445	0.142	<DL
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.141	0.101	<DL	0.152	<DL	0.107	<DL	0.185
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.516	0.3324	0.126	0.5471	0.1813	0.4172	0.1081	0.2576
Total TEQ (ND=DL)		0.8155	0.6207	0.5141	0.8289	0.5671	0.7065	0.489	0.5931
% Lipids		0.16	0.87	0.45	1.39	0.772	0.596	0.656	0.805
Sample weight (g)		30.1	30.2	30.6	30.9	30.7	30.1	30.7	30.4

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALVSMB 20	ALVSMB 21	ALVSMB 22	ALVSMB 23	ALVSMB 24	ALVSMB 25	ALVSMB 26	ALVSMB 27
EXT ID		104944301	104944319	104944327	104944335	104944343	104944350	104944368	104944376
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	0.299	0.408	0.301	0.524	0.721	0.152	0.532	0.25
1,2,3,7,8-PeCDF	0.1	<DL	0.127	<DL	0.13	0.128	<DL	<DL	<DL
2,3,4,7,8-PeCDF	0.1	0.151	0.296	0.338	0.201	0.354	<DL	0.195	<DL
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	<DL	0.132	0.118	<DL	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.1056	0.1952	0.1991	0.2918	0.3736	0.01524	0.1509	0.02499
Total TEQ (ND=DL)		0.4887	0.5818	0.5872	0.5806	0.6634	0.4601	0.5361	0.4659
% Lipids		0.508	0.44	0.518	0.732	0.845	0.232	0.647	0.264
Sample weight (g)		31	30.3	30.6	30.1	30	30	30.8	30.3

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALVSMB 28	ALVSMB 29	ALVSMB 30	ALV-WHS01	ALV-WHS02	ALV-WHS03	ALV-WHS04	ALV-WHS05
EXT ID		104944384	104944392	104944400	104969753	104969761	104969779	104969787	104969795
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	0.28	0.747	0.817	5.9	14.9	5.42	3.69	2.65
1,2,3,7,8-PeCDF	0.1	<DL	0.236	0.274	0.578	1.18	0.307	<DL	0.229
2,3,4,7,8-PeCDF	0.1	0.188	0.462	0.418	0.889	1.7	0.518	0.449	0.337
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	0.34	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	0.754	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	0.188	<DL	0.195	0.515	0.203	0.132	0.104
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	0.221	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	0.682	0.551	<DL	<DL	<DL	<DL
OCDD	1	<DL	1.04	8.04	6.65	1.67	1.13	<DL	<DL
Total TEQ (ND=0)		0.1222	0.5052	0.312	1.264	3.175	1.02	0.7258	0.5491
Total TEQ (ND=DL)		0.5148	0.7948	0.6919	1.546	3.333	1.303	1.02	0.8375
% Lipids		0.35	0.842	0.742	2.99	7.38	2.82	1.85	1.79
Sample weight (g)		30.2	30.1	30.4	30.4	30.6	30.8	30.1	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALV-WHS06	ALV-WHS07	ALV-WHS08	ALV-WHS09	ALV-WHS10	ALV-WHS11	ALV-WHS12	ALV-WHS13
EXT ID		104969803	104969811	104969829	104969837	104969845	104969902	104969910	104969928
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	9.11	3.31	4.97	6.89	5.08	9.01	4.66	13.1
1,2,3,7,8-PeCDF	0.1	0.573	0.215	0.361	0.369	0.49	0.617	0.288	0.777
2,3,4,7,8-PeCDF	0.1	0.818	0.345	0.585	0.644	0.716	1.19	0.594	1.68
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	0.441	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	0.104	0.196	0.221	0.161	0.431	0.193	0.518
1,2,3,7,8-PeCDD	0.1	0.109	<DL	<DL	<DL	<DL	0.202	<DL	0.213
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	1.54	<DL	<DL	<DL	0.514	<DL	<DL
OCDD	1	<DL	30.2	<DL	2.26	<DL	5.26	<DL	1.66
Total TEQ (ND=0)		1.457	0.637	1.004	1.294	1.052	2.164	0.9707	2.919
Total TEQ (ND=DL)		1.746	0.9199	1.29	1.557	1.341	2.346	1.259	3.107
% Lipids		3.16	1.55	3.75	3.55	2.35	3.67	2.5	6.22
Sample weight (g)		30.1	30.2	30.4	30.3	30.1	30.6	30.2	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALV-WHS14	ALV-WHS15	ALV-WHS16	ALV-WHS17	ALV-WHS18	ALV-WHS19	ALV-WHS20	ALV-WHS21
EXT ID		104969936	104969944	104969951	104969969	104969977	104969985	104969993	104970009
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	4.13	6.21	8.57	14.5	3.09	4.08	13.1	7.23
1,2,3,7,8-PeCDF	0.1	<DL	0.362	0.542	0.858	<DL	0.396	1.16	0.54
2,3,4,7,8-PeCDF	0.1	0.579	0.617	1.1	1.51	0.338	0.558	2.08	0.96
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.26
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.201	0.244	0.273	0.589	0.301	<DL	0.374	0.299
1,2,3,7,8-PeCDD	0.1	<DL	0.0997	0.221	0.24	<DL	<DL	<DL	0.133
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	2.56	2.19	<DL	<DL	<DL	<DL	<DL	1.16
Total TEQ (ND=0)		0.903	1.291	1.927	3.079	0.7789	0.7073	2.784	1.687
Total TEQ (ND=DL)		1.191	1.48	2.114	3.266	1.071	1.096	3.072	1.851
% Lipids		2.01	2.74	2.64	9.01	0.97	1.56	3.6	2.23
Sample weight (g)		30.7	30.2	30.4	30.4	30.3	30.1	30.2	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALV-WHS22	ALV-WHS23	ALV-WHS24	ALV-WHS25	ALV-WHS26	ALV-WHS27	ALV-WHS28	ALV-WHS29
EXT ID		104970017	104970025	104970033	104970041	104970058	104970066	104970074	104970082
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	7.83	13.1	8.95	7.33	8.03	6.42	13.6	5.51
1,2,3,7,8-PeCDF	0.1	0.561	1.62	0.609	0.54	0.49	0.482	0.771	0.417
2,3,4,7,8-PeCDF	0.1	0.888	2.16	0.972	0.917	0.761	0.71	1.56	0.669
1,2,3,4,7,8-HxCDF	0.25	<DL	0.456	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.282	0.455	0.306	0.271	0.252	0.274	0.481	0.262
1,2,3,7,8-PeCDD	0.1	0.152	0.268	0.168	0.15	0.106	<DL	0.182	0.134
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	0.34	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	0.532	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	2.9	<DL	<DL	<DL	<DL	<DL	1.13
Total TEQ (ND=0)		1.69	3.284	1.886	1.64	1.566	1.294	2.841	1.303
Total TEQ (ND=DL)		1.877	3.418	2.069	1.829	1.755	1.58	3.031	1.492
% Lipids		2.52	3.14	3.4	3.22	2.42	3.21	4.26	2.58
Sample weight (g)		30.5	30	31.1	30.1	30.1	30.4	30.1	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALV-WHS30	ALV-WHSC1	ALV-WHSC2	ALV-WHSC3	ALV-WHSC4	ALV-WHSC5	ALF SMB 1	ALF SMB 2
EXT ID		104970108	104969860	104969878	104969886	104969894	104969852	105003834	105003842
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	10.1	6.39	5.44	10.6	5.59	6.07	1.13	0.83
1,2,3,7,8-PeCDF	0.1	0.848	0.478	0.357	0.717	0.338	0.501	0.269	0.204
2,3,4,7,8-PeCDF	0.1	1.27	0.725	0.624	1.36	0.622	0.774	0.428	0.315
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.337	0.227	0.175	0.391	0.214	0.162	0.107	0.131
1,2,3,7,8-PeCDD	0.1	0.151	0.113	0.103	0.18	0.136	0.131	<DL	0.104
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	1.29	2.54	<DL	1.64	2.08	1.06	1.66	<DL
Total TEQ (ND=0)		2.178	1.365	1.152	2.35	1.236	1.312	0.4478	0.486
Total TEQ (ND=DL)		2.366	1.555	1.34	2.539	1.425	1.5	0.7345	0.6759
% Lipids		3.87	2.67	2.84	4.72	2.92	2.84	0.864	0.68
Sample weight (g)		30.4	30.1	30.3	30.2	30.2	30.4	30.4	30

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALF SMB 3	ALF SMB 4	ALF SMB 5	ALF SMB 6	ALF SMB 7	ALF SMB 8	ALF SMB 9	ALF SMB 10
EXT ID		105003859	105003867	105003875	105003883	105003891	105003909	105003917	105003925
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	0.186	1.21	1.28	0.475	0.227	1.11	0.435	0.302
1,2,3,7,8-PeCDF	0.1	<DL	0.198	0.332	<DL	<DL	0.189	<DL	<DL
2,3,4,7,8-PeCDF	0.1	<DL	0.309	0.473	0.155	<DL	0.326	0.14	0.146
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	0.128	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	1.04
Total TEQ (ND=0)		0.01858	0.2853	0.5088	0.1248	0.02274	0.2837	0.1136	0.1035
Total TEQ (ND=DL)		0.4624	0.6733	0.7988	0.5153	0.4668	0.6718	0.5084	0.4977
% Lipids		0.118	0.976	0.846	0.37	0.157	0.929	0.406	0.243
Sample weight (g)		30.1	30.2	30	30.4	30.1	30.2	30	30.1

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALF WHS 1	ALF WHS 5	ALF WHS 6	ALF WHS 7	ALF WHS 8	ALF WHS 9	ALF WHS 10	ALF WHS 11
EXT ID		104869466	104869474	104869482	104869490	104869508	104869516	104869524	104869532
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	3.46	1.5	2.3	4	3.5	3.2	2.85	1.54
1,2,3,7,8-PeCDF	0.1	<DL	<DL	0.495	0.325	<DL	<DL	<DL	<DL
2,3,4,7,8-PeCDF	0.1	0.485	0.316	0.219	0.361	0.415	0.399	0.229	0.2
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.138	<DL	0.118	0.158	0.174	0.142	0.138	<DL
1,2,3,7,8-PeCDD	0.1	0.109	<DL	<DL	<DL	0.102	0.113	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.8359	0.3084	0.483	0.7543	0.8339	0.7748	0.5378	0.2541
Total TEQ (ND=DL)		1.028	0.7022	0.7646	1.04	1.02	0.9688	0.8214	0.6402
% Lipids		1.92	1.59	2.2	2.06	2.14	2.34	2.01	0.877
Sample weight (g)		30.5	30.1	30.9	30.5	31.5	30.2	31.2	30.7

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALF WHS 12	ALF WHS 13	ALW SMB C1	ALW SMB C2	ALW WHP 1	ALW WHP 2	ALW WHP 3
EXT ID		104869540	104869557	105033187	105033195	105004055	105004063	105004071
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	4.13	2.19	1.49	1	0.474	0.794	1.76
1,2,3,7,8-PeCDF	0.1	<DL	<DL	0.354	0.267	<DL	<DL	0.434
2,3,4,7,8-PeCDF	0.1	0.466	0.26	0.82	0.711	0.279	0.692	1.21
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	0.701	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	1.59
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.171	<DL	0.164	0.21	<DL	<DL	<DL
1,2,3,7,8-PeCDD	0.1	0.128	<DL	<DL	0.156	<DL	<DL	0.209
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	1.88	<DL	<DL	1.77	1.27	1.24
Total TEQ (ND=0)		0.9448	0.3492	0.7406	0.8357	0.187	0.4956	1.026
Total TEQ (ND=DL)		1.139	0.7424	1.025	1.025	0.5712	0.8642	1.31
% Lipids		2.35	1.46	2.87	1.84	0.55	1.1	2.48
Sample weight (g)		30.2	30.2	30.6	30.2	30.9	30.1	30

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		ALW WHP 4	ALW WHP 8	ALW WHP 9	ALW WHP 10	ALW WHP C1	ALW WHP C2	PLW SMB 1
EXT ID		105004089	105004121	105004139	105004147	105004154	105004162	105003933
Compound	DL (ng/Kg)							
2,3,7,8-TCDF	0.1	1.14	1.1	0.564	1.02	0.878	1.1	0.173
1,2,3,7,8-PeCDF	0.1	0.204	0.218	0.162	0.286	<DL	0.2	<DL
2,3,4,7,8-PeCDF	0.1	0.776	0.727	0.422	1.04	0.64	0.843	<DL
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	1.18	1.37	2.62	1.64	0.701	1.55	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	0.143	0.148	0.109	0.133	0.114	0.126	<DL
1,2,3,7,8-PeCDD	0.1	0.124	0.127	<DL	0.125	0.117	0.143	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	0.883	<DL	<DL
OCDD	1	<DL	<DL	1.04	1.07	15.1	1.83	<DL
Total TEQ (ND=0)		0.7909	0.7735	0.4104	0.9108	0.6559	0.8257	0.01727
Total TEQ (ND=DL)		0.9743	0.9561	0.6941	1.095	0.8392	1.008	0.4588
% Lipids		1.99	1.71	0.73	1.17	1.84	2	1.03
Sample weight (g)		30.3	30.4	30.1	30.1	30.3	30.4	30.2

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		PLW SMB 2	PLW SMB 3	PLW SMB 4	PLW SMB 5	PLW SMB 6	PLW SMB 7	PLW SMB 8	PLW SMB 9
EXT ID		105003941	105003958	105003966	105003974	105003982	105003990	105004006	105004014
Compound	DL (ng/Kg)								
2,3,7,8-TCDF	0.1	0.124	0.131	<DL	0.143	<DL	<DL	0.161	0.112
1,2,3,7,8-PeCDF	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,4,7,8-PeCDF	0.1	0.12	<DL	<DL	0.167	<DL	0.38	<DL	<DL
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	0.279	0.71	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	0.458	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	0.281	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	0.413	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	0.384	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL	0.462	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
OCDD	1	<DL	<DL	<DL	<DL	2.5	1.8	<DL	<DL
Total TEQ (ND=0)		0.07231	0.01312	0	0.09769	0.02812	0.4612	0.01614	0.01116
Total TEQ (ND=DL)		0.4569	0.4475	0.4695	0.4913	0.5707	0.7144	0.4587	0.4427
% Lipids		0.46	0.54	0.244	0.65	0.52	0.42	0.48	0.5
Sample weight (g)		30.8	30.8	30.7	30.1	30.6	30.2	30.2	31

APPENDIX 2. DIOXINS AND FURANS IN 2003 FISH SAMPLES

DEP ID		PLW SMB 10	PLW SMB C1	PLW SMB C2	PLW-WHPC1	PLW-WHPC2
EXT ID		105004022	105004030	105004048	105014567	105014575
Compound	DL (ng/Kg)					
2,3,7,8-TCDF	0.1	<DL	0.26	0.151	0.402	0.482
1,2,3,7,8-PeCDF	0.1	<DL	0.135	<DL	<DL	0.13
2,3,4,7,8-PeCDF	0.1	<DL	<DL	0.101	0.262	0.336
1,2,3,4,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL
2,3,4,6,7,8-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDF	0.25	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDF	0.5	<DL	0.737	<DL	<DL	<DL
1,2,3,4,7,8,9-HpCDF	0.5	<DL	<DL	<DL	<DL	<DL
OCDF	1	<DL	<DL	<DL	<DL	<DL
2,3,7,8-TCDD	0.1	<DL	<DL	0.113	<DL	<DL
1,2,3,7,8-PeCDD	0.1	<DL	<DL	0.112	0.101	0.0992
1,2,3,4,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL
1,2,3,6,7,8-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL
1,2,3,7,8,9-HxCDD	0.25	<DL	<DL	<DL	<DL	<DL
1,2,3,4,6,7,8-HpCDD	0.5	<DL	<DL	<DL	<DL	<DL
OCDD	1	1.3	<DL	<DL	<DL	<DL
Total TEQ (ND=0)		0.00013	0.04013	0.2901	0.2723	0.322
Total TEQ (ND=DL)		0.4411	0.4722	0.4817	0.5663	0.6098
% Lipids		0.15	1.7	1.2	1.68	2.18
Sample weight (g)		31	30.2	30.6	30.1	30.2

APPENDIX 3. TCDD and TCDF IN SLUDGE FROM MAINE WASTEWATER TREATMENT PLANTS

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
AMERICAN TISSUE	880930	62.6	36.9	414.0
AUGUSTA	881223	61.4	37.6	326.0
	890403	61.6	34.6	242.0
	890628	65.5	17.7	414.0
	971125		0.5	4.3
AMERICAN PULP AND I	88		104.0	2930.0
BERLIN NH				
AUBURN VPS	951005		1.3	17.9
AUBURN FIBER	970806		<0.9	9.9
AUGUSTA SANITARY	900409		<1.2	1.3
DISTRICT	900608		<3.9	2.5
	900608		E2.1	10.2
	900914		<20.0	E20.0
	900809		<20	
	910108		<5	5.0
	910220		<1.9	0.8
	910301		<1.9	4.8
	920416		1.9	1.9
	920427		<1.0	1.9
	930223		<1.3	<1.3
	940215		<1.0	<1.0
			<0.02	0.0
			<0.23	1.8
	950227		1.9	<1
	960228		<1	<1
	970408		0.9	<0.9
	980514		<1	<1
ANSON-MADISON SANIT	910408		<1.3	2.2
DISTRICT	911001		1.7	4.6
BANGOR	950104		<19.9	<26.4
BERWICK SEWER DISTR	861111		<2.5	<4.0
	890301	76.4	14.0	19.9
	890927	75.3	<12.1	<12.1
	891208	87.5	1152.0	872.0
BIDDEFORD	900208		7.2	30.0
	900208		39.0	310.0
	910501		<0.86	3.7
	910703		<0.57	<0.95
	920204		<1.5	2.9
	930121		<2.4	<3.2
	940209		<0.19	<0.48
	940913		<1.0	<2.9
	950815		<.22	1.6
	970218		<0.8	<1.7
BREWER	920520		<2.1	36.0
	920901		<6.0	110.0
	921116		3.8	19.0
	930202		<3.7	11.0
	930511		1.2	9.8
	930810		4.1	24.0
	931118		3.8	26.0
	940201		[illegible]	24.0

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	970212		3.4	22.0
	980622		<1	<1
	990730		<1	1.3
	000718		1.1	1.0
	010725		<1	<1
	010807		<1	1.8
	020723	75.7	<1	2.0
	030717		<1.0	2.3
BOOTHBAY HARBOR SD	011228		<1	2.6
BOWATER				
MILLINOCKET	850618		<0.4	
	880602		<1.9	7.3
	940414		<7.4	<8.9
	940506		<.9	6.7
	950316		<.6	4.0
	960711		<1, <1	<1
	960914		<0.4, <0.3	4.4
	960917		<1	<1
CORINNA SEWER DISTF	850506			
	871117		<11.9	<28.8
	880301		<3.0	8.5
	890222		<13.0	
	890510		<5.0	
	900131		2.3	127.0
	900606		<4.0	85.4
	900606		<4.9	82.2
	900919		<10.0	50.0
	901009		<1.5	<.8
	901024		<8.0	
	910313		<5.0	
	910514			
	920304		<3.9	<8.4
	930405		<4.8	19.9
	930811		<9.9	68.6
	940308		<13.1	46.0
	940810		<5.6	7.8
	950321		<2.1	13.3
	960206		<1.8	12.7
DOMTAR	890113	75.8	<6.2	<3.55
BAILEYVILLE	890424	74.7	<0.63	<4.74
	890718	66.0	<1.76	12.9
	891217		0.9	3.2
	910630		<1	2.0
	910630		<1	1.0
	910630		<1	<1
	910630		1.0	4.0
	910630		<1	<1
	910630		<1	2.0
	911231		<1	2.0
	911231		2.0	5.0
	911231		<1	3.0
	911231		<1	2.0
	930108		<1	<1
	940530		<5.0	<5.0
	941222		<5.0	11.9
	950331		<5.0	14.3
	950630		<5.0	<5.0
	950930		<5.0	24.5
	951231		<1.0	3.4
	020315		<0.2	J0.53
	030211		J0.3	2.3
FRASER PAPER LTD	880903	68.3	13.9	233.0
MADAWASKA	890106	79.1	E23.4	204.0

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	890406	71.3	E3.83	12.9
	890930	80.1	5.0	E26.6
	940426		<.1	0.8
GARDINER WATER DIST	900918		<0.87	4.6
	910401		1.4	4.4
	911002		<0.54	5.1
	920504		<3.5	9.4
	921116		<.93	<6.4
	930407		<0.13	0.9
	931115		<1.6	<18
	931115			
	931115		<0.9	
	940329		<0.2	<1.1
	941018		<1.2	<4.3
	950221		<2.8	5.2
	951003		<1.7	
	960326		4.1	27.0
	961015		0.8	11.0
	970331		<1.1	<5.8
FORT JAMES	880801		12.0	34.0
OLD TOWN	881225	78.6	301.0	963.0
	890423	78.7	380.0	1197.0
	890718	68.8	50.6	478.0
	950103		8.8	65.0
HARTLAND WASTEWATEF	881007	65.0	<2.86	<1.71
TREATMENT PLANT	881221	65.5	<7.25	E6.09
	890312	64.3	<0.28	5.6
	890627	63.3	<1.36	6.5
	000127		<0.4	E1.4
	000426		<0.5	<0.4
	000922		<2.1 <3.1	<1.9 <2.2
	001205		<0.8	<0.9
HAWK RIDGE COMPOST	1989-90	ean n=	6.6	15.9
UNITY	1991	(1.6-13		mean n=4
(compost)	900420		2.9	15.0
	900507		3.4	6.0
	900628		3.4	31.0
	900712		5.0	40.0
	900817		3.4	31.0
	900820		3.0	30.0
	900820		5.0	40.0
	901010		<5	30.0
	910115		0.6	6.4
	910207		4.0	59.5
	910806		1.6	15.0
	920123		2.6	18.0
	920318		<1	
	920715		<2.0	34.0
	920818		<1.0	18.0
	921007		2.2	23.0
	930111		<2.2	12.0
	930406		1.7	16.0
	930629		1.7	22.0
	931213		3.4	28.0
	940101		2.6	27.0
	940422		<1.0	12.0
	940422		<1	9.1
	940725		1.6	13.0
	941024		<2.4, 4.9	13.0, 33.0
HAWK RIDGE COMPOST	950724		<1	12.0
UNITY	951012		1.1	12.0
(compost)	960131		<1	8.8

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	960501		<1	6.6
	960709		<1	7.6
	961007		1.4	10.0
	970110		<1	1.5
	970305		<1	3.6
	970725		<1	3.8
	971014		<1	3.8
INTERNATIONAL PAPEF	850621		51.3W	
JAY	870115		190.0	760.0
	880218		24.0	130.0
	880219		23.0	121.0
	880223		14.0	75.0
	880225		57.0	250.0
	880226		15.0	79.0
	880227		13.0	79.0
	881231		16.6W	143W
	890124		15W	77W
	890126		28.0	112.0
	890323		7.7W	42.6W
	890417		24.0	150.0
	950712		7.2	39.0
	960125		2.6	16.0
	960126		2.8	16.0
	960227		<1.0	14.0
	960228		2.3	14.0
	961015		<1	4.0
	961016		<1	5.4
	961126		4.6	22.0
	961127		2.7	12.0
KENNEBEC SANITARY	870713			
TREATMENT DISTRICT	871105			
WATERVILLE	880118			
	880322			
	880518			
	880921			
	890711			
	891011			
	900410		E7.9	121.0
	900824		3.3	54.0
	901101		3.6	12.0
	901221		3.5	6.7
	901221		3.5	19.0
	910408		<2.3	<3.3
	910606		<2.9	<5.0
	910808		2.3	53.0
	910911		3.1	4.1
	920226		2.6	20.0
	920708		<1.0	11.0
	930914		1.1	6.3
	941021		<1.0	8.2
	951113		<1	1.3
	960924		<1	<1
	971010		<1	12.0
	990120		<1	<1
	990915		<1	<1
	000927		0.4, <4.8, <0.75, <3.1, 2.9,3	
	010108		<.10	<.10
	11017		<0.007	1.4
KENNEBUNK SD	011105		EMPC	1.8
KIMBERLY-CLARK	871008		36.0	
WINSLOW	871201		13.5	
	880331		25.0	219.0
	880630		19.0	177.0

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	880930		22.0	189.0
	881231		17.0	181.0
	890331		18.0	177.0
	890628		14.0	89.0
	890927		11.0	67.0
	891231		13.0	115.0
	900201		12.0	86.0
	900628		12.0	94.0
	900928		9.4	76.0
	901231		7.2	63.0
	910214		12.0	86.0
	910411		8.3	100.0
	910630		4.6	62.0
	910930		6.5	69.0
	911101		6.5	63.2
	911203		6.3	68.1
	920225		6.5	72.1
	920623		5.2	55.0
	921006		5.1	60.0
	921228		7.2	59.0
	930317		4.7	47.0
	930629		4.2	37.0
	930917		3.9	42.0
	931231		5.2	44.0
	940101		3.5	31.0
	940401		3.7	27.0
	940909		4.9	33.0
	941231			30.0
	950331		4.4	42.0
	950608		<1	24.0
	950930		2.2	25.0
	951231		3.0	34.0
	960122	RWT	3.0	34.0
	960410		3.1	29.0
	960702		4.4	36.0
	960702D		1.6	17.0
	961030		2.4	18.0
	961030D		<1	17.0
	970318	RWT	2.4	16.0
	970616	RWT	1.4	16.0
	971104	RWT	1.3	23.0
KITTERY WWTP	990319		<0.4	5.2
LEWISTON-AUBURN TREATMENT PLANT	871231		<1.0	an for year (n=
	881031		0.0	
	900809		E10	9.0
	910306		<7.3	<7.3
	920610		<0.8	4.5
	930625		<1	4.4
	930922		<2.7	<2.5
	950405		<2.2	0.8
	960625		<1	<1
	961202		<1	21.0
	990730		1.0	6.9
	000201	limed	<0.6	8.5
LINCOLN PULP & PAPE LINCOLN	881119		48W	223W
	890123	80.9	44.0	203.0
	890123		44.0	173.0
	890407	85.1	49.0	298.0
	890407		41.0	219.0

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	890831	83.5	182.0	640.0
	890831		156.0	625.0
	890831		41.0	220.0
	890831		59.0	294.0
	921231		20.4	91.6
	931014		9.1	187.5
	940331	PRI SL	14.9	154.0
	940331	SEC SL	97.1	734.0
	960302		<0.4	<0.3
	960419		4.2	21.7
	960431		4.2	25.1
	970831		3.7	20.0
	971130		<1.5	3.7
	980930		<0.7	1.2
	990531		0.3	1.5
	990930		0.4	1.0
	000130		1.3	1.5
MEADWESTVACO	850621		32.0	
RUMFORD	880602		105.0	674.0
	890108	77.1	114.0	569.0
	890407	73.1	46.5	184.0
	890628	76.8	E9.91	134.0
NORRIDGEWOCK WWTP	011116		0.1	0.8
NORTH JAY WWTP	011127		0.8	<1.6
OAKLAND TREATMENT I	910304		<2.5	10.0
	910329		<5	10.0
	920415		<1.0	<1.0
	920415		<1	<1
	930408		<1.0	<1.0
	930501		<1.0	11.0
	940426		<1.0	<1.0
OGUNQUIT SD	010912		<1.4	1.4
OLD TOWN	880525		<3.0	<3.0
	900212		<2.2	16.7
	910918		<2.9	6.6
	910918		<2.2	
ORONO TREATMENT PLA	900316		2.1	
	900412		8.5	
	901001		3.5	9.2
	901021		3.9	
	910324		<2.1	9.5
	910918		<2.9	6.6
	920323		<0.6	7.6
	920328		9.4	
	920915		<0.5	5.4
	921015		1.1	
	930427		1.3	
	930427		<0.5	3.4
	940502		<0.6	2.5
PERC	910417		<2.0	9.9
PORTLAND WATER DIST	861205			
PORTLAND	870402			
	871124			
	880913			
	891206		E1.2	11.3
	891206		1.6	14.5

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	901002		<3	10.0
	901002		<3	20.0
	910826		<64	<32
	910828		<66	<140
	920715		<1.1	6.4
	920715		0.9	7.6
	930719		<1	2.3
	930719		<1.1	<3.2
	940718		<1.0	0.8
	950727		0.5	1.0
	960807		<0.7	<0.1
	980811		<0.4	3.4
	980514		<1	<1
	990602		<1	5.6
	000913		<0.1	8.0
	010806		<1	3.2
PORTLAND WATER DIST	861205			
WESTBROOK WWTF	870402			
	871119			
	891205		E1.6	14.5
	901001		<3.0	9.0
	910826		<64	<32
	920714		<1.1	7.6
	930719		<1.0	3.2
	980811		<0.2	4.1
	001011		<0.6	3.5
	001121			3.6
	001228		1.2	3.4
	010329		0.6	EMPC
	010525		<1	<.1
	010803		1.4	2.1
REGIONAL WASTE SYST	890111	ash	5.5	28.0
PORTLAND	890112	ash	6.0	24.0
	890113	ash	10.0	50.0
	890114	ash	10.0	20.0
	890121	ash	6.0	90.0
	900211	ash	E20	210.0
ROBINSON MANUFACTUF	870113		10.1	17.5
OXFORD	880419		<0.4	<0.2
	881004		<7.3	<9.6
	890119		<0.39	<1.2
	890119D		<2.1	<1.1
	910226		<3.0	<3.0
	910305		<3	<0.3
	910308		<3	<3
	910323		<5	<5
	910323		<3	<3
	920610		<1.2	<1.0
	960216		<1	0.1
	960315		<1	4.2
	970220		<1	<1
	980218		<1	<1
SABATTUS WWTP	010412		<2	<2
SAPPI -SOMERSET	861217		<2	47.0
	870519		13.0	21.0
	870930			
	871215		60.0	
	880325		27.0	88.0
	880630	EPA	67.0	33.0
	881014		40.0	98.0
	881220		54.0	177.0

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	890303		54.0	92.0
	890629		23.0	53.0
	890926		<.8	16.0
	891205		18.0	52.0
	900314		<18	23.0
	900620		35.0	73.0
	900916		45.0	86.0
	901215		39.5	115.0
	910324		23.1	51.0
	910626		39.4	146.0
	910910		69.9	260.0
	920624		33.0	856.0
	920923		20.0	39.0
	921218		15.0	45.0
	930107		11.0	31.0
	930616		23.0	73.0
	930916		56.0	170.0
	931229		42.0	110.0
	940108		31.0	95.0
	940627		33.0	89.0
	940926		12.0	36.0
	941212		11.0	20.0
	950313		3.6	15.0
	950510		3.3	11.0
	950914		9.6	25.0
	951120	comb	1.2	4.2
	960327		2.0	9.6
	960624		5.1	18.0
	960910		5.2	11.0
	961014		5.2	15.0
	970319		5.5	26.0
	970624		8.5,4.9	36.0
	970917		<.71	2.0
	971216		<.28	0.7
	980316		<.79	<6.2
	980527		1.0	2.5
	980928	dredgin	6.6	18.0
	981208		<.4	0.7
	990330		<.26	<4.2
	990607		<.4	0.8
	990921		<.48	<5.4
	991215		<.4	1.2
	000131		<.65	1.8
	000607		<.729	2.9
	000926	dredgin	1.86	6.8
	001213		<.207	1.4
	010314		0.3	0.2
	010524		0.7	0.3
	010910		<0.561	0.2
	011217		0.2	0.1
	020318		0.3	0.1
	020509		<0.319	0.1
	020917		3.1	1.5
	021217		0.5	0.2
	030310		<0.181	0.1
	030609		0.5	0.2
	030909		<0.121	0.0
	031217		0.2	0.1
SAPPI - WESTBROOK	850620		17.2	
	870929		31.0	
	871231		21.0	135.0
	880331		5.6	21.0
	880401		8.7	3.9
	880630		13.0	55.0
	881207		19.0	127.0
			19.0	69.0
	890106		<1.8	31.0
	890600		<1.2	13.0

APPENDIX 3. TCDD AND TCDF IN SLUDGE FROM WASTEWATER TREATMEN

LOCATION	DATE	%MOIST	TCDD	TCDF
	890600		5.3	35.0
	890600		<.2	0.2
	890600		<.4	8.8
	890600		69.9	60.0
	891031		5.0	30.0
	891130		3.0	30.0
	891231		7.0	50.0
	900131		6.0	20.0
	900228		2.7	24.6
	900331		5.1	33.6
	900430		5.9	34.6
	900531		5.3	25.8
	900630		19.0	26.0
	900730		5.2	20.6
	900831		2.9	12.1
	900930		2.5	10.0
	901231		7.7	35.7
	910917		70.0	275.0
	910331		3.4	21.5
	910630		2.9	19.6
	910930		3.8	14.2
	911231		2.4	25.1
	920331		1.2	19.4
	920505		1.6	10.8
	920821			24.5
	940131		0.9	11.6
	940324			12.3
	940728		2.1	17.3
	941213		5.3	29.2
	950329		1.2	20.0
	950602		1.0	10.1
	950911			18.3
	951120		1.1	23.3
	960327		2.0	9.6
	990113		4.0	61.0
	990407		2.9	36.0
	990728		1.0	14.0
	990830		<0.9	4.0
	990928		<1.0	2.8
S PORTLAND STP	880000		<8.65	<48
	900314		<5.3	<3.5
	900314		<2.7	<5.4
	910508			<10
	910531		<5	
	920401		<1.0	<0.8
	920428		<0.8	1.4
	920714		0.9	6.4
	930324		<2.8	<2.8
	940315		<1.0	3.9
	941005		8.7	48.0
	950405		<1	3.3
	960610		<1	5.3
	970616		<1	15.0
	000912		<1	2.6
	010918		<1	1.8
WELLS SANITARY DIST	011109		<0.4	0.9
YORK SD	010806		<1	<1
VAN BUREN WWTP	000918		0.6	4.0

D=duplicate analysis

APPENDIX 4. TCDD and TCDF IN WASTEWATER FROM MAINE PULP AND PAPER MILLS

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE	TCDD (pg/l)	TCDF (pg/l)
ANSON MADISON	920408	<3	<3
	921001	<3	20
BREWER	920624	<5.9	
	930429	<3.9	
	941129	7.4	
	950503	<3.6	
	960416	<10	
	000501	<10	
GEORGIA PACIFIC	880630	39	
OLD TOWN	890131	27	120
	890222	210	340
	890223	92	290
	890224	77	340
	890320		34
	890324		24
	890325	36	73
	890405	30	110
	890410	17	52
	890411	32	89
	890824	32	94
	890831	13	150
	890911	<4.1	14
	890915	<3.3	<8.1
	890921	<5.7	13
	890927	<5.3	9.7
	891011	<3	11
	891019	<5.2	14
	891102	<6	18
	891106	6.7	22
	891114	<9.5	<7.1
	891127	<6.4	20
	891206	<8.4	13
	891213	<8.3	20
	891221	<4.7	23
	900105	<6.8	<8.3
	900111	<9	<8.5
	900118	<5.9	6.1
	900125	<6.7	10
	900207	<4.6	17
	900214	<6.6	23
	900222	<7.3	15
	900301	<6	11
	900308	<3	12
	900315	<4	16
	900329	<7.4	14
	900407	<7.2	24
	900502	<7	19
	900729	<9.9	49

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)	TCDF (pg/l)
GEORGIA PACIFIC	910330		17	70
OLD TOWN	910430		19	65
	910530		9.5	41
	910630		6.8	43
	910830		11	66
	911030			7.9
	911130		<7.7	<16
	920330		<5.7	50
	920730		16	69
	920830		<4.9	23
	921030		<3.0	
	921230		4.8	
	930130		<5.0	14
	930330		<4.9	12
	930530		<4.2	11
	930630		<2.8	15
	930830		<1.6	9.2
	930930		<3.5	7.6
	931130		<3.1	32
	931230		<3.2	19
	940230		<4.8	7.7
	940330		<4.6	12
	940530		<1.5	<4.5
	940630		<3.5	9.2
	940830		<2.0	<4.8
	940930		<4.6	<6.8
	941130		<9.5	<10
	941230		<1.1	5.8
	942730		<1.1	5.8
	950130		<2.4	8.2
	950119		<2.4	8.2
	951230		<1.1	5.8
	950430		<1.4	5.6
	950430		8	36
	950421		<1.4	5.6
	950622		<2	6.8
	950928		<3.8	8.1
	951129		<5.4	13
	951228		<1.4	6.2
	980115	BPA	<2.8	<5.8
		BPB	<11	53
	980130		<3	9.4
		BPA	<2.9	18
		BPB	<2.8	8.9
	980219	BPA	<1.7	12
		BPB	<3.9	39
	980230		<2.6	8.7
	980328	BPA	<5.8	11
		BPB	<5.2	13
	980330		<2	9.1
	980730		<3	<4

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
GEORGIA PACIFIC	980830	BP	<3.5	BP	<4.2
OLD TOWN	980930		<3.2		<4.8
		BP	5.9	BP	28
	981030		<3.2		<4.8
		BP	<3.5	BP	<4.2
	981130		<5.5		<5.4
		BP	<3.4	BP	<4.6
	981230		<1.6		8.7
		BP	<3.1	BP	6.5
	990130		<3.4		<2.6
		BP	<3	BP	<3.9
	990230		<10		<10
		BP	<10	BP	<10
	990330	BP	<2.3	BP	<1.8
	990530		<1.9<4.7		<2.9<3.3
		BP	<3.2	BP	<4.8
	990630		<1.3		<1.8
		BP	<2.3	BP	7.3
	990730		<.93		<1.4
		BP	<2.6	BP	<1.8
	990930		<.68		<2.1
		BP	<1.3	BP	<5
	991030		<2.5		<2.1
		BP	<3	BP	<3.6
	000130		<8.4		<4.9
		BP	<9.0	BP	<5.4
	000330		<3.4		<3.1
		BP	<2.9	BP	<2.3
	000430		<7.4		<7.6
		BP	<5.0	BP	<5.5
	000630		<2.2		<1.5
		BP	<4.0	BP	<3.0
	000830		<1.2		<1.1
		BP	<3.0	BP	<3.2
	001030		<2.3		<2.6
		BP	<3.4	BP	<3.4
	001130		<2.7		<1.4
		BP	<2.7	BP	<3.2
	010130		<3.3		<2.1
		BP	<3.9	BP	<3.1
	010330		<4.7		<3.2
		BP	<2.4	BP	<4.5
	010530		<2.9		<2.5
		BP	<6.7	BP	<5.4
	010630		<1.7		<1.5
		BP	<3.2	BP	<3.2
	010730		<2.0		<1.5
		BP	<2.7	BP	<2.2
	010930		<3.2		<2.5
		BP	<2.3	BP	<1.7

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
GEORGIA PACIFIC	011130		<4.7		<3.9
OLD TOWN		BP	<3.4	BP	<2.6
	020115		<2.7		<1.9
	020115	BP	<2.5	BP	<1.8
	020225		<4.2		<3.0
	020227	BP	<3.9	BP	<4.2
	020416		<1.4		<1.5
	020416	BP	<2.4	BP	<2.3
	020625		<4.1		<4.4
	020730		ND		ND
	020723	BP	<4.1	BP	<2.5
	020830		ND		ND
	021010	BP	<3.2	BP	<3.1
	020930		<4.7		<3.1
	021030		<3.2		<3.1
	021130		<10		<10
	021106	BP	<10	BP	<10
	021230		<0.69		<1.6
	021203	BP	<0.69	BP	<1.6
	030130		<0.49		<0.93
	030230		<1.4		<1.6
	030330		<1.8		<1.5
	030430		<1.4		<2.4
	030530		<6.8		<8.9
	030630		<5.0		<3.6
	030730		<2.2		<1.4
	030830		<3.4		<3.2
	030930		<7.0		<5.1
	031030		NS		NS
	031130		<10		<10
	031230		<2.9		<1.7
DOMTAR	880101		6.8		25
Baileyville	900316		<5		4
	900423		<3		<6
	900531		<8		<5
	900619		<3		<1
	900716		<1		<3
	900807		<2		<5
	910630		<10		<10
	910630		<10		<10
	910630		<11		<11
	910630		<11		<11
	910630		<11		<11
	910630		<11		<11
	910630		<10		<10
	910630		<11		<11
	910630		<11		<11
	911231		<10		<10
	911231		<10		<10
	911231		<11		<11

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
DOMTAR	911231		<11		<11
Baileyville	911231		<10		<10
	911231		<11		<11
	911231		<10		<10
	911231		<11		<11
	911231		<11		<11
	930408		<10		<10
	930506		<10		<10
	930713		<10		<10
	940530		<10		<10
	941222		<10		<10
	950331		<10		<10
	950630		<10		<10
	950930		<10		<10
	951231		<10		<10
	980330				60
	980421		<10		60
	980825		<10		40
		BP	<10	BP	10
	981230		<10		<10
		BP	<10	BP	<10
	990430		<10		<10
		BP	<10	BP	<10
	990930		<4		<3
			<2		<6
		BP	C<2 A<4	BP	C<2 A<7
		BP	C<5 A<3	BP	C<4 A<3
	991030		<5		<3
		BP	C<7 A<5	BP	C<8 A<3
	991130		<1		<6
		BP	C<1 A<2	BP	C<5 A<3A
	000130		<4.2		<3.4
		BP	C<2.0 A<2.0	BP	C<4.0 A<3.0
			<5.0		<4.0
		BP	C<3.0 A<3.0	BP	C<3.0 A<2.0
	000930	BP	C<7.1 A<3.4	BP	C<5.6 A<2.4
		BP	C<2.3 A<2.5	BP	C<1.6 A<1.7
	001200	BP	C<5.9 A<3.8	BP	C<5.3 A<2.1
		BP	C<5.1 A<4.0	BP	C<4.0 A<3.0
	020319	BP	C<4.7 A<5.1	BP	C<4.0 A<4.2
	020610		<2.4		<3.1
	020615	BP	C<2.6	BP	C<2.1
	020918	BP	C<1.9 A<1.3	BP	C<4.7 A<1.3
	030211		<4.7		J7.3
	030312	BP	C<4.0 A<2.6	BP	C<4.3 2.6
	031023	BP	C<5.8 A<3.5	BP	C<4.3 A<2.5

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)	TCDF (pg/l)
INTERNATIONAL PAPER	880101		88	420
Jay	880715		30	150
	890307		30, E6	100, E20
	890310		16	74
	890616		<8	980
	890621		17	140
	890713		<16	50
	890720	DEP	30	150
	890818		20	110
	900413		<10	90
	910924		<10	60
	910926		<10	60
	911129		50	210
	911219		<20	<80
	920125		20	110
	920126		20	110
	920127		30	100
	920128		30	100
	920129		13.7	49.9
	920312		19.3	65.6
	920320		14.8	73.9
	920423		<13.9	59.1
	920610		<5.7	29.5
	920617		<6.3	30.8
	920723		<8.4	33.6
	920819		6.6	29.7
	920923		<2.6	<2.0
	921111		<6.1	22.4
	921202		<2.6	<14.4
	930125		5.4	19.6
	930222		<5.3	25.5
	930420		<2.0	16.7
	930527		4.3	10.3
	930716		<5.2	28.9
	930826		<5.3, <6.5	21.5, 19.2
	930910		<8.6	9.4
	931022			19.5
	931119		<3.6	19.5
	931224		10.9	31.1
	940125		<4.1	21.6
	940226		7.3	38
	940422		7.7	41.1
	940520		4.1	25.6
	940722		<3.4	16.7
	940829		<7.9	31.8
	941027		<3.4	25.3
	941125		<6.8	24.4
	950126		<5.0	20.9
	950222		<3.6	21.4
	950420		<2.5	25.6
	950527		<1.8	24.1

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
INTERNATIONAL PAPER	950724		<3.2		16.1
Jay	950826		<4.9		7.5
	950929		<6.0		15.4
	951020		<8.5		12.9
	951122		<3.8		10.5
	960228		<10		6.5
	960430		<10		12.8
	960530		<10		15.7
	961030		<10		7.7
	961130		<10		<10
	970130		<10		<10
	970228		<10		11.5
	970330		<10		<10
	970330	BPA	<6.2	BPA	<6.3
		BPB	<5.1	BPB	<3.7
	970430		<10		14.4
	970522	BPA	4.9	BPA	5.6
		BPB	10.9	BPB	9.6
	970406	BPA	<4.9	BPA	10.9
		BPB	<5.6	BPB	9.6
	970630		<10		6.8
	970730		<10		<10
	970728	BPA	<5.2	BPA	11.5
		BPB	<5.4	BPB	6.3
	970830		<10		<10
	971030		<10		
	971013	BPA	<4.3	BPA	<5
		BPB	<7.2	BPB	<8.3
	971130		<10		
	980117		<2.1		7.1
	980126	BPA	<3.5		<3.2
		BPB	<1.2		<1.7
	980221		<3.7		<3.7
	980406	BPA	<0.6		<2.3
		BPB	<1.4		<1.3
	980516		<3		8
	980613		<1.4		<2.2
	980706	BPA	<2.8		19
		BPB	<1.2		4.8
	980711		<2.3		4.9
	980814		<2.2		<1.1
	981012	BPA	<2.0		45
		BPB	<2.9		<1.6
	981016		<2		5.1
	981116	BPA	<6.8		9.9
	981119		<7		<8.6
	981130	BPB	<3.3		<5.2
	990117		<2.8		3.6
	990112	BPA	<.99		54
		BPB	<.97		4
	990312		<3		7.4

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)	TCDF (pg/l)
INTERNATIONAL PAPER	990304	BPA	<2.1	9.7
Jay		BPB	<2.7	<5.9
	990412		<5.9	18
	990408	BPA	<2.6	7.4
		BPB	<5.5	<5
	990618		<5.1	<4.2
	990622	BPA	<8.6	<9
		BPB	<3.3	<4.1
	990723		<2.2	<1.6
	990720	BPA	<2.9	130
		BPB	<2.5	<2.3
	990917		<6.2	<6.5
	990913	BPA	<3.8	<1.6
		BPB	<3.4	<1.4
	991008		<5.6	6.6
	991005	BPA	<2	<1.6
		BPB	<3	<1.3
	991112		<2.7	<6.5
	991110	BPA	<2.7	<4
		BPB	<2.1	<2.1
	000104	BPA	<2.5	<1.8
		BPB	<3.0	<2.8
	000306	BPA	<1.6	<5.0
		BPB	<1.1	<2.6
	000419	BPA	<2.9	<1.6
		BPB	<2.7	<1.8
	000612	BPA	<3.7	<2.6
		BPB	<1.51	<0.59
	000705	BPA	<2.43	<4.57
		BPB	<2.07	<1.8
	000829	BPA	<2.28	<3.57
		BPB	<1.69	<2.20
	001019	BPA	<0.573	<1.91
		BPB	<0.698	<1.61
	001207	BPA	<1.80	<1.89
		BPB	<0.825	<1.19
	020130		ND	ND
	020230		ND	ND
	020430		ND	ND
	020530		ND	ND
	020730		ND	ND
	020830		ND	ND
	021030		ND	ND
	021130		ND	ND
	030130		ND	ND
	030230		ND	ND
	030330		ND	ND
	030430		ND	ND
	030630		ND	ND
	031030		ND	ND
	031130		ND	ND

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
HARTLAND	960530		<0.06		
KIMBERLY-CLARK	930308		<10		<12
	930623		<4.6		<3.9
LINCOLN PULP AND PAPER	881130		32		130
	920817		11.2		69.8
	920908		<11		27.3
	921117		7.7		39.1
	921216		<1.9		9.5
	931230		<5.5		<17.3
	940417		1.9		7.5
	950824		1.3		8.5
	960409		1.3		8.5
	970116	BP	25.4	BP	103
	970212	BP	11	BP	43.1
	970522	BP	11.4	BP	27.6
	970813	BP	6.4	BP	14.4
	971001	BP	1.6	BP	1.9
	971231	BP	<2.4	BP	<3.83
	980330	BP	<3.4	BP	<3.7
	980430	BP	<10	BP	13.2
	980630	BP	<8.9	BP	<4
	980830	BP	<7.1	BP	<7.6
	980930	BP	<2.3<4.1	BP	<2.3<3.2
	981130	BP	<2.6<4.9	BP	<2.7<3.6
	981230	BP	<1.5	BP	<1.3
	990230	BP	<1.1	BP	<2.1
	990330	BP	<2.5	BP	<3.8
	990430	BP	<2.8	BP	<3.2
	990630	BP	<4.4	BP	<4.5
	990830	BP	<4.3	BP	<2.8
	990930	BP	<1.3	BP	<.44
	991030	BP	<2.3	BP	<2.2
	991130	BP	<3	BP	<2.9
	000130	BP	<1.4	BP	<1.4
	000330	BP	<3.0	BP	<1.2
	000430	BP	<1.6	BP	<1.3
	000630	BP	<7.14	BP	<3.63
	000730	BP	<2.07	BP	<1.25
	000830	BP	<2.14	BP	<3.17
	001030	BP	<3.39	BP	<2.17
	001130	BP	<2.08	BP	<4.43
	010228	BP	<2.11	BP	<2.39
	010330	BP	<0.56	BP	<0.618
	010530	BP	<3.28	BP	<7.31
	010630	BP	<2.05	BP	<1.97
	010830	BP	<1.25	BP	<3.56

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
LINCOLN PULP AND PAPER	010930	BP	<4.01	BP	<3.37
	011130	BP	<2.18	BP	<6.19
	011230	BP	<4.97	BP	<4.79
	020230	BP	<1.68	BP	<1.22
	020330	BP	<2.27	BP	<1.31
	020530	BP	<1.34	BP	<1.08
	020630	BP	<.841	BP	<1.03
	021030	BP	<.381	BP	<.548
	021130	BP	<.612	BP	<.340
	030230	BP	<1.16	BP	<.630
	030330	BP	<.995	BP	<.590
	030530	BP	<1.63	BP	<1.17
	030630	BP	<2.15	BP	<.447
	030730	BP	<2.82	BP	<2.67
	030830	BP	<3.76	BP	<3.02
MEADWESTVACO CORP	880518		120		570
	890301		25		80
	890807		<6		20
	890810		<13		20
	890814		<5		13
	890817		<5		18
	890821		<8		21
	890824		<5		10
	890829		<5		18
	890831		<11		20
	890905		<11		20
	890907		<9		18
	891023		<3		7
	891026		<5		6
	891222		<5		20
	900216		<2		6
	900216		<1		7
	900515		<10		<8
	900515		<1		5
	900627		<3		8
	900627		<3		9
	920217		<4.6		14
	920221		<4.6		13
	920311		<4.6		9.9
	920316		3.2		8.7
			3.5		12
			4.6		17
	920326		4.5		8.5
	920412		6.3		24
	920613		<4.6		6.8
	920708		<4.6		<5.8
	920831		<4.6		3.5
	920904		<3.8		
	921104		<3.7		

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
MEADWESTVACO CORP	921201		<2.4		
	930105		<2.4		
	930201		<2.4		<10
	930401		<2.8		<10
	930501		<2.4		<10
	930701		<3.9		12
	930801		<2.8		<3.4
	931001		<3.2		<10
	931101		<3.9		<3.6
	940130		<2.8		<5.2
	940219		<1.9		<1.3
	940417		<3.3		<2.4
	940509		<3.6		<1.2
	940728		<3.7		<1.7
	940829		<2.7		<2.0
	941024		<2.1		<1.1
	941205		<2.7		<1.8
	950131		<10		<10
	950229		<10		<10
	950430		<10		<10
	950531		<10		<10
	950731		<10		<10
	950831		<10		<10
	951031		<10		<10
	951130		<10		<10
	960130		<10		<10
	960330		<10		<10
	960430		<10		<10
	960530		<10		<10
	960730		<10		<10
	960830		<10		<10
	961030		<10		<10
	961130		<10		<10
	970317		<10		<10
	980130		<10		<10
	980230		<10		<10
	980430		<10		<10
	980530		<10		<10
	980609	BP	<10		<10
	980730		<10		<10
	980830	BP	<10		<10
	981030	BP	<10		<10
	981130	BP	<10		<10
	990130		<10		<10
		BP	<10	BP	<10
	990230		<10		<10
		BP	<10	BP	<10
	990430		<10		<10
		BP	<10	BP	<10
	990530		<10		<10

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
MEADWESTVACO CORP		BP	<10	BP	<10
	990730		<10		<10
		BP	<10	BP	<10
	990830		<10		<10
		BP	<10	BP	<10
	991030		<10		<10
		BP	<10	BP	<10
	991130		<10		<10
		BP	<10	BP	<10
	000113	BP	<10	BP	<10
	000224	BP	<10	BP	<10
	000410	BP	<10	BP	<10
	000505	BP	<10	BP	<10
	000718	BP	<10	BP	<10
	001003	BP	<10	BP	<10
	001106	BP	<10	BP	<10
	010112	BP	<10	BP	<10
	010201	BP	<10	BP	<10
	010408	BP	<10	BP	<10
	010502	BP	<10	BP	<10
	010711	BP	<10	BP	<10
	010808	BP	<10	BP	<10
	011009	BP	<10	BP	<10
	011102	BP	<10	BP	<10
	020105	BP	<10	BP	<10
	020202	BP	<10	BP	<10
	020408	BP	<10	BP	<10
	020503	BP	<10	BP	<10
	020712	BP	<10	BP	<10
	020817	BP	<10	BP	<10
	021001	BP	<10	BP	<10
	021106	BP	<10	BP	<10
	030102	BP	<10	BP	<10
	030201	BP	<10	BP	<10
	030406	BP	<10	BP	<10
	030512	BP	<10	BP	<10
	030706	BP	<10	BP	<10
	030811	BP	<10	BP	<10
	031020	BP	<10	BP	<10
	031110	BP	<10	BP	<10
SAPPI - SOMERSET	880630		16,19		63,100
	900710		<7.1		8.4
	900716		<6.1		5.9
	dup		<5.5		<7.3
	900724		<3.6		<3.9
	930105		<3.4		9.2
	930224		<4.7		15
	930311		<4.0		10
	930409		6.8		18

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)	TCDF (pg/l)
SAPPI - SOMERSET	930616		6.3	14
	930917		7	17
	931203		7.6	19
	940107		<3.8	9.2
	940624		<10	13
	940923		<11	8.7
	941209		<4.6	6.6
	950310		9	11.6
	950505		<10.3	6.6
	950616		<3.9	<9.4
	950807		5.8	14.5
	950911		2.8	15.3
	951124		<4.2	38.7
	951208		<7.4	29
	960112		<1.6	<2.3
	960209		<3.2	<4.8
	960405		<2.7	<2.7
	960610		<3.6	6.5
	960712		<3.0	4.2
	960809		5.8	15
	961108		<4.9	11
	961206		<4.1	9.7
	970103		<4.3	6.2
	970207		<2.0	7.5
	970411		<2.2	5.7
	970509		8.2	12
	970708	BP	<3.0	
	970711		<3.2	<2.9
	970805	BP	<2.9	
	970807	BP	<3.5	
	970815		<3	<3.3
	970820	BP	<3.7	
	980825	BP	<2.3	
	970916	BP	<2.6	
	971017		<9.1	<6.3
	971114		<3.8	<0.51
	980109		<3.5	<1.9
	980112	BP	<3.2	
	980206		<4.3	<2
	980410		<1.6	<1.6
	980608		<5.7	<1.7
	980810		<1.6	<2.5
	980911		<1.9	<2
	981009		<1.9	<1.9
	981106		<2.2	<1
	990210		<1.5	<1.2
	990310		<2.6	<2
	990410		<4.6	<3.3
	990510		<3.4	<4.5
	990710		<3.5	<3.9
	990910		<7.3	<6

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
SAPPI - SOMERSET	991010		<4.1		<6.1
	991110		<2.2		<1.1
	000204		<3.4		<4.7
	000310		<3.1		<3.1
	000407		<3.3		<3.3
	000505		<5.7		<4.5
	000728		<2.24		<1.22
	000908		<4.34		<4.67
	001110		<0.556		<1.13
	001208		<3.61		<3.09
	020130	BP	<0.993	BP	<0.696
	020230	BP	<3.29	BP	<2.16
	020330	BP	<2.64	BP	<1.09
	020430	BP	<0.328	BP	<0.475
	020530	BP	<0.471	BP	<0.473
	020630	BP	<0.926	BP	<0.982
	020730	BP	<0.903	BP	<0.708
	020830	BP	<0.955	BP	<1.19
	020930	BP	<2.41	BP	<2.25
	021030	BP	<0.661	BP	1.73
	021130	BP	<1.77	BP	<1.66
	021230	BP	ND	BP	<1.68
	030130	BP	<0.933	BP	<0.435
	030230	BP	<1.91	BP	<2.36
	030330	BP	<1.18	BP	<1.20
	030430	BP	<1.82	BP	<1.21
	030530	BP	<0.878	BP	<0.874
	030630	BP	<0.841	BP	<0.847
	030730	BP	<1.18	BP	<0.985
	030830	BP	<2.04	BP	<1.42
	030930	BP	<0.672	BP	<0.573
	031030		<1.28		<1.20
	031130		<1.41		<1.49
SAPPI - WESTBROOK	880101		6.3		
	1989		1		
	901118		<3		8
	910425		<5		<5
	910716		<8		<5
	911203		<8		<5
	920218		<2.8		7
	920507		<1.2		4.6
	920715		<5.8		<4.9
	921114		<1.8		3.9
	930303		<7.8		16
	930617		<1.5		<6.4
	930915		<2.4		5.7
	931208		<3.4		<7.3
	940130		<6.5		<9.8
	940324				<5.9

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN EFFLUENT FROM WASTEWATER TREATMENT PLANTS

SOURCE	DATE		TCDD (pg/l)		TCDF (pg/l)
SAPPI - WESTBROOK	940727		3.6		7.8
	941212		<6.0		<15.8
	950730		<5.4		9.8
	950615		<2.8		<9.9
	950815		<4.3		<21.9
	970519	BP	<7.9	BP	<10
	970808	BP	5.05	BP	<8.2
	971002	BP	<	BP	13.46
	980324		<1.6		5.9
	980914	BP	13.4	BP	130
	980915		<1.0		11
	980921		<1.9		<1.9
		BP	<10	BP	110
	981118		<10		<10
		BP	<10	BP	130
	981208	BP	<10	BP	140
	981209		<11		<11
	990113		<10		<10
	990131				<11
		BP	10	BP	140
	990209		<10		<10
	990318		<10		<10
	990331				<10
		BP	<11	BP	150
	990407		<10		<10
	990526		<11		15
	990617		<10		<10
	990630				15
		BP	<11	BP	130
	990728		<9.5		<9.5
	990731	BP	<10	BP	54
	990830		<10		<10
	990830		<10		<10

APPENDIX 5. TCDD, TCDF, MSD, AND P-VALUES FOR 2003 A/B TEST

Appendix 5. TCDD, TCDF, MSD, and p-values for the 2003 A/B test

ID	A/B	TCDDw pg/g	TCDFw pg/g	TCDDL pg/g	TCDFL pg/g
FISH					
ARPSMB	A	[redacted]		6.77	229.37
ARFSMB	B			24.88	340.34
MSD % A				411	142
p				0.326	0.290
ARPWHS	A	[redacted]	6.70	5.34	[redacted]
ARFWHS	B		8.08	3.94	
MSD % A			87	40	
p			0.450	0.257	
ARYSMB	A	[redacted]		7.95	98.08
ALVSMB	B			14.11	71.36
MSD % A				82	22
p				**0.011**	**0.010**
ARYWHS	A	0.24	9.22	[redacted]	
ALVWHS	B	0.28	7.68		
MSD % A		34	28		
p		0.165	**0.088**		
KNWSMB	A	[redacted]		9.99	11.53
KFFSMB	B			5.92	9.08
MSD % A				94	81
p				1.000	0.762
KNWWHS	A	[redacted]	0.32	2.33	[redacted]
KFFWHS	B		0.92	4.79	
MSD % A			99	69	
p			**0.001**	**0.005**	
PBWSMB	A	[redacted]		17.23	28.45
PBLSMB	B			13.48	24.27
MSD % A				39	40
p				**0.064**	0.203
PBWWHS	A	[redacted]		3.27	56.33
PBLWHS	B			3.90	54.36
MSD % A				55	41
p				0.597	0.424
PBCSMB	A	[redacted]		29.72	44.49
PBVSMB	B			11.27	34.51
MSD % A				114	78
p				**0.059**	0.705
PBCWHS	A	[redacted]		2.79	38.54
PBVWHS	B			2.42	41.64
MSD % A				37	35

Appendix 5. TCDD, TCDF, MSD, and p-values for the 2003 A/B test

ID	A/B	TCDDw pg/g	TCDFw pg/g	TCDDL pg/g	TCDFL pg/g
p		[redacted]		0.910	0.303
MUSSELS					
Androscoggin River above and below IP					
ARMS01	A	0.05	0.10		
ARMS02	A	0.05	0.12		
ARMS03	A	0.05	0.14		
ARMS04	[redacted]				
ARMS05					
MSD % A					
p					
ARMS06	B	0.05	0.08		
ARMS07	B	0.05	0.12		
ARMS08	B	0.05	0.14		
ARMS09	B	0.05	0.13		
ARMS10	B	0.05	0.19		
ARMS11	B	0.05	0.20		
ARMS12	B	0.05	0.16		
Kennebec River above and below SAPPI					
KRMS01	A	0.05	0.11	6.67	14.40
KRMS02	A	[redacted]		60.73	20.33
KRMS03	B			10.27	14.78
MSD % A				58	91
p				**0.119**	0.234
KRMS04	B	0.05	0.10	7.94	15.31
KRMS05	B	0.05	0.11	8.22	17.33
KRMS06	B	0.05	0.13	8.68	22.68
SPMD				ng/spmd	ng/spmd
Androscoggin R					
ARY	A			[redacted]	
ASN	B				
MSD % ref					
p					
ALV	B			<0.1	0.044
ALF	B			<0.1	1.829
Kennebec R					
SU 1	A			<2.91,<2.76	<6.35,<5.13
SU 2	A			<3.35,<3.91	<6.86,<4.88
SU 3	A			<2.88,<2.88	<4.95,<4.61
SU 4	A			<4.05,<3.85	<7.70,<5.30
FD 1	B			<2.10,<3.15	<5.99,<5.62
FD 2	B			<2.08,<2.23	<5.92,<7.93
FD 3	B			<2.82<2.30	<7.29,<7.29

FD 4	B	<2.31,<2.38	<5.33,<5.90

Bold p-values are significant at p<0.135   Shaded blocks show whether wet wt or lipid wt used

APPENDIX 6. LENGTHS AND WEIGHTS FOR 2002 and 2003 FISH SAMPLES

APPENDIX 6. Lengths and weights of 2003 fish samples

Field ID	Date	Length mm	Weight gm.
ANDROSCOGGIN RUMFORD POINT			
ARP-SMB01	9/9/2003	366	723
ARP-SMB02	9/9/2003	367	767
ARP-SMB03	9/9/2003	365	755
ARP-SMB04	9/9/2003	360	710
ARP-SMB05	9/9/2003	362	701
ARP-SMB06	9/9/2003	366	793
ARP-SMB07	9/9/2003	358	658
ARP-SMB08	9/9/2003	370	717
ARP-SMB09	9/9/2003	356	630
ARP-SMB10	9/9/2003	352	685
ARP-WHS25	9/10/2003	480	1128
ARP-WHS29	9/10/2003	480	998
ARP-WHS36	9/11/2003	485	1134
ARP-WHS50	9/10/2003	460	938
ARP-WHS51	9/10/2003	462	955
ARP-WHS52	9/10/2003	481	1075
ARP-WHS53	9/11/2003	480	1202
ARP-WHS54	9/11/2003	465	1091
ARP-WHS55	9/11/2003	476	1175
ARP-WHS56	9/11/2003	482	1084
ANDROSCOGGIN RUMFORD			
ARF-SMB-01	8/12/2003	405	930
ARF-SMB-02	8/12/2003	408	1000
ARF-SMB-03	8/12/2003	385	800
ARF-SMB-04	8/12/2003	380	790
ARF-SMB-05	8/12/2003	382	880
ARF-SMB-06	8/12/2003	395	980
ARF-SMB-07	8/12/2003	407	990
ARF-SMB-08	8/12/2003	384	790
ARF-SMB-09	8/12/2003	410	1040
ARF-SMB-10	8/12/2003	405	965
ARF-WHS-01	8/12/2003	450	1310
ARF-WHS-02	8/12/2003	445	1170
ARF-WHS-03	8/12/2003	432	1025
ARF-WHS-10	8/12/2003	450	1180
ARF-WHS-11	8/12/2003	458	1280
ARF-WHS-12	8/12/2003	445	1180
ARF-WHS-13	8/12/2003	440	1020
ARF-WHS-14	8/12/2003	440	1100
ARF-WHS-15	8/12/2003	445	1090
ARF-WHS-16	8/12/2003	440	1200
ANDROSCOGGIN RILEY			
ARY-SMB01	8/20/03	371	670

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm.
ARY-SMB02	8/20/03	365	600
ARY-SMB03	8/20/03	379	705
ARY-SMB04	8/20/03	381	740
ARY-SMB05	8/20/03	380	760
ARY-SMB06	8/20/03	364	550
ARY-SMB07	8/20/03	363	650
ARY-SMB08	8/20/03	365	645
ARY-SMB09	8/20/03	373	710
ARY-SMB10	8/21/03	373	680
ARY-SMB11	8/21/03	375	690
ARY-SMB12	8/21/03	365	610
ARY-SMB13	8/21/03	390	800
ARY-SMB14	8/21/03	365	620
ARY-SMB15	8/21/03	366	685
ARY-SMB16	8/21/03	380	805
ARY-SMB17	8/21/03	362	740
ARY-SMB18	8/21/03	376	720
ARY-SMB19	8/21/03	380	710
ARY-SMB20	8/21/03	356	580
ARY-SMB21	8/21/03	356	610
ARY-SMB22	8/21/03	381	735
ARY-SMB23	8/22/03	373	710
ARY-SMB24	8/22/03	385	810
ARY-SMB25	8/22/03	366	600
ARY-SMB26	8/22/03	366	680
ARY-SMB27	8/22/03	379	730
ARY-SMB28	8/22/03	355	600
ARY-SMB29	8/22/03	367	650
ARY-SMB30	8/22/03	379	780
ARY-WHS-01	9/16/2003	482	1290
ARY-WHS-2	9/16/2003	480	1380
ARY-WHS-3	9/16/2003	466	1310
ARY-WHS-4	9/16/2003	477	1170
ARY-WHS-5	9/16/2003	460	1165

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm
ARY-WHS-6	9/16/2003	481	1485
ARY-WHS-7	9/16/2003	470	1215
ARY-WHS-8	9/16/2003	478	1330
ARY-WHS-9	9/16/2003	457	1165
ARY-WHS-10	9/16/2003	468	1235
ARY-WHS-11	9/16/2003	465	1360
ARY-WHS-12	9/16/2003	473	1210
ARY-WHS-13	9/16/2003	462	1185
ARY-WHS-14	9/16/2003	475	1250
ARY-WHS-15	9/16/2003	455	1170
ARY-WHS-16	9/16/2003	478	1400
ARY-WHS-17	9/16/2003	456	1245
ARY-WHS-18	9/16/2003	470	1225
ARY-WHS-19	9/16/2003	480	1250
ARY-WHS-20	9/16/2003	457	1080
ARY-WHS-21	9/16/2003	458	1310
ARY-WHS-22	9/16/2003	475	1210
ARY-WHS-23	9/16/2003	455	1090
ARY-WHS-24	9/16/2003	460	1280
ARY-WHS-25	9/16/2003	464	1265
ARY-WHS-26	9/16/2003	454	1205
ARY-WHS-27	9/16/2003	460	1150
ARY-WHS-28	9/16/2003	451	1425
ARY-WHS-29	9/16/2003	460	1140
ARY-WHS-30	9/16/2003	451	1100
ANDROSCOGGIN LIVERMORE			
ALV-SMB01	08/26/03	360	680
ALV-SMB02	08/26/03	375	670
ALV-SMB03	08/26/03	372	630
ALV-SMB04	08/26/03	360	560
ALV-SMB05	08/26/03	380	700
ALV-SMB06	08/26/03	380	720
ALV-SMB07	08/26/03	385	670

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm.
ALV-SMB08	08/26/03	366	680
ALV-SMB09	08/26/03	362	620
ALV-SMB10	08/26/03	375	670
ALV-SMB11	08/26/03	358	610
ALV-SMB12	08/26/03	368	550
ALV-SMB13	08/26/03	370	660
ALV-SMB14	08/26/03	385	740
ALV-SMB15	08/26/03	360	660
ALV-SMB16	08/26/03	361	600
ALV-SMB17	08/26/03	353	600
ALV-SMB18	08/26/03	374	650
ALV-SMB19	08/26/03	370	700
ALV-SMB20	08/26/03	380	650
ALV-SMB21	08/27/03	360	650
ALV-SMB22	08/27/03	373	620
ALV-SMB23	08/27/03	378	680
ALV-SMB24	08/27/03	360	620
ALV-SMB25	08/27/03	358	580
ALV-SMB26	08/27/03	367	660
ALV-SMB27	08/27/03	380	620
ALV-SMB28	08/27/03	382	700
ALV-SMB29	08/27/03	376	690
ALV-SMB30	08/27/03	382	810
ALV-WHS-1	9/17/2003	457	1100
ALV-WHS-2	9/17/2003	462	1140
ALV-WHS-3	9/17/2003	480	1235
ALV-WHS-4	9/17/2003	462	1090
ALV-WHS-5	9/18/2003	457	1030
ALV-WHS-6	9/18/2003	484	1390
ALV-WHS-7	9/18/2003	482	1190
ALV-WHS-8	9/18/2003	474	1425
ALV-WHS-9	9/18/2003	473	1305
ALV-WHS-10	9/18/2003	470	1125
ALV-WHS-11	9/18/2003	484	1440

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm.
ALV-WHS-12	9/18/2003	478	1390
ALV-WHS-13	9/18/2003	485	1430
ALV-WHS-14	9/18/2003	463	1200
ALV-WHS-15	9/18/2003	466	1295
ALV-WHS-16	9/18/2003	461	1300
ALV-WHS-17	9/18/2003	472	1335
ALV-WHS-18	9/18/2003	475	1290
ALV-WHS-19	9/18/2003	466	1240
ALV-WHS-20	9/18/2003	476	1300
ALV-WHS-21	9/18/2003	458	1210
ALV-WHS-22	9/18/2003	473	1340
ALV-WHS-23	9/18/2003	478	1465
ALV-WHS-24	9/18/2003	480	1500
ALV-WHS-25	9/18/2003	478	1195
ALV-WHS-26	9/18/2003	464	1200
ALV-WHS-27	9/18/2003	464	1155
ALV-WHS-28	9/18/2003	457	1080
ALV-WHS-29	9/18/2003	470	1270
ALV-WHS-30	9/18/2003	464	1225
ANDROSCOGGIN LIVERMORE FALLS			
ALF-SMB-01	8/18/2003	369	710
ALF-SMB-02	8/18/2003	370	845
ALF-SMB-03	8/18/2003	360	600
ALF-SMB-04	8/18/2003	365	860
ALF-SMB-05	8/18/2003	380	840
ALF-SMB-06	8/18/2003	365	680
ALF-SMB-07	8/18/2003	373	680
ALF-SMB-08	8/18/2003	381	900
ALF-SMB-09	8/18/2003	358	625
ALF-SMB-10	8/18/2003	365	630
ALF-WHS-01	8/19/2003	480	1175
ALF-WHS-05	8/19/2003	480	1130

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm.
ALF-WHS-06	8/19/2003	455	980
ALF-WHS-07	8/20/2003	470	980
ALF-WHS-08	8/20/2003	470	1010
ALF-WHS-09	8/20/2003	480	1100
ALF-WHS-10	8/20/2003	458	970
ALF-WHS-11	8/20/2003	458	910
ALF-WHS-12	8/20/2003	465	1090
ALF-WHS-13	8/20/2003	460	950
ANDROSCOGGIN LAKE			
ALW-WHP-1	10/7/2003	280	290
ALW-WHP-2	10/9/2003	315	480
ALW-WHP-3	10/16/2003	302	415
ALW-WHP-4	10/16/2003	266	240
ALW-WHP-5	10/16/2003	300	390
ALW-WHP-6	10/16/2003	301	420
ALW-WHP-7	10/16/2003	280	275
ALW-WHP-8	10/16/2003	266	245
ALW-WHP-9	10/16/2003	289	350
ALW-WHP-10	10/16/2003	306	385
ALW-SMB-1	9/29/2003	367	720
ALW-SMB-2	9/28/2003	450	1000
ALW-SMB-3	9/28/2003	340	540
ALW-SMB-4	9/28/2003	345	550
ALW-SMB-5	9/28/2003	350	600
ALW-SMB-6	9/28/2003	342	550
ALW-SMB-7	10/28/2003	361	660
ALW-SMB-10	9/26/2003	420	1255
ALW-SMB-12	10/16/2003	455	1260
POCASSET LAKE			
PLW-WHP-1	10/7/2003	336	510
PLW-WHP-2	10/7/2003	324	470
PLW-WHP-3	10/7/2003	305	370
PLW-WHP-4	10/7/2003	320	495
PLW-WHP-5	10/7/2003	308	400
PLW-WHP-6	10/7/2003	318	460
PLW-WHP-7	10/7/2003	354	700
PLW-WHP-8	10/7/2003	265	270
PLW-WHP-9	10/7/2003	345	640
PLW-WHP-10	10/8/2003	353	660
PLW-SMB-1	10/7/2003	390	920
PLW-SMB-2	10/7/2003	370	710
PLW-SMB-3	10/7/2003	433	1100
PLW-SMB-4	10/7/2003	345	520
PLW-SMB-5	10/7/2003	400	980
PLW-SMB-6	10/7/2003	405	1000

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm.
PLW-SMB-7	10/7/2003	360	610
PLW-SMB-8	10/8/2003	378	670
PLW-SMB-9	10/8/2003	326	500
PLW-SMB-10	10/8/2003	347	620
KENNEBEC R NORRIDGEWOCK			
KNW-SMB-01	7/21/2003	375	680
KNW-SMB-02	7/21/2003	366	638
KNW-SMB-03	7/21/2003	376	740
KNW-SMB-04	7/21/2003	363	565
KNW-SMB-05	7/21/2003	380	750
KNW-SMB-06	7/21/2003	361	620
KNW-SMB-07	7/22/2003	388	675
KNW-SMB-08	7/22/2003	350	560
KNW-SMB-09	7/22/2003	368	605
KNW-SMB-10	7/22/2003	363	580
KNW-WHS-01	7/21/2003	454	1205
KNW-WHS-02	7/21/2003	440	1280
KNW-WHS-03	7/21/2003	446	1220
KNW-WHS-04	7/21/2003	448	1090
KNW-WHS-05	7/21/2003	440	1110
KNW-WHS-06	7/21/2003	461	1187
KNW-WHS-07	7/21/2003	440	975
KNW-WHS-08	7/21/2003	447	1110
KNW-WHS-09	7/21/2003	435	1150
KNW-WHS-10	7/21/2003	445	965
KENNEBEC R -FAIRFIELD			
KFF-SMB-01	7/24/2003	388	805
KFF-SMB-02	7/24/2003	390	790
KFF-SMB-03	7/24/2003	359	630
KFF-SMB-04	7/24/2003	380	735
KFF-SMB-05	7/24/2003	374	645
KFF-SMB-06	8/1/2003	355	530
KFF-SMB-07	8/1/2003	357	560
KFF-SMB-08	8/1/2003	385	740
KFF-SMB-09	8/1/2003	383	725
KFF-SMB-10	8/1/2003	368	680
KFF-WHS-01	7/24/2003	463	1390
KFF-WHS-02	7/24/2003	453	1010
KFF-WHS-03	7/24/2003	453	1125
KFF-WHS-04	7/24/2003	460	1190
KFF-WHS-05	7/24/2003	461	1265
KFF-WHS-06	7/24/2003	430	950
KFF-WHS-07	7/24/2003	455	1140
KFF-WHS-08	7/24/2003	430	1075
KFF-WHS-09	7/24/2003	452	1020

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm
KFF-WHS-10	7/24/2003	438	980
PENOBSCOT WOODVILLE			
PBW-SMB-1	8/11/2003	382	750
PBW-SMB-2	8/11/2003	364	570
PBW-SMB-3	8/11/2003	395	820
PBW-SMB-4	8/11/2003	375	600
PBW-SMB-5	8/11/2003	375	630
PBW-SMB-6	8/11/2003	390	750
PBW-SMB-7	8/12/2003	384	700
PBW-SMB-8	8/12/2003	369	640
PBW-SMB-9	8/12/2003	383	720
PBW-SMB-10	8/12/2003	384	730
PBW-WHS-1	8/11/2003	460	900
PBW-WHS-2	8/11/2003	445	890
PBW-WHS-3	8/11/2003	464	990
PBW-WHS-4	8/11/2003	425	860
PBW-WHS-5	8/12/2003	455	1050
PBW-WHS-6	8/12/2003	446	990
PBW-WHS-7	8/12/2003	447	940
PBW-WHS-8	8/12/2003	444	950
PBW-WHS-9	8/12/2003	434	780
PBW-WHS-10	8/12/2003	435	950
PENOBSCOT MATTAWAMKEAG			
PBM-SMB-1	8/13/2003	367	700
PBM-SMB-2	8/13/2003	364	590
PBM-SMB-11	8/13/2003	388	832
PBM-SMB-4	8/13/2003	363	600
PBM-SMB-12	8/13/2003	415	990
PBM-SMB-13	8/13/2003	369	708
PBM-SMB-7	8/13/2003	357	560
PBM-SMB-8	8/13/2003	381	720
PBM-SMB-9	8/13/2003	375	620
PBM-SMB-10	8/13/2003	359	590
PBM-WHS-1	8/27/2003	435	920
PBM-WHS-2	8/27/2003	449	1080
PBM-WHS-3	8/27/2003	454	880
PBM-WHS-4	8/27/2003	458	1130
PBM-WHS-5	8/27/2003	457	1020
PBM-WHS-6	8/27/2003	460	1130
PBM-WHS-7	8/28/2003	444	1050
PBM-WHS-8	8/28/2003	459	1160
PBM-WHS-9	8/28/2003	460	1230
PBM-WHS-10	8/28/2003	435	920
PENOBSCOT LINCOLN			

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm
PBL-SMB-1	8/12/2003	385	700
PBL-SMB-2	8/12/2003	382	790
PBL-SMB-3	8/12/2003	380	670
PBL-SMB-4	8/12/2003	386	750
PBL-SMB-5	8/12/2003	365	700
PBL-SMB-6	8/12/2003	361	750
PBL-SMB-7	8/13/2003	380	810
PBL-SMB-8	8/13/2003	375	720
PBL-SMB-9	8/14/2003	378	740
PBL-SMB-10	8/14/2003	362	600
PBL-WHS-1	8/26/2003	455	1000
PBL-WHS-2	8/26/2003	457	990
PBL-WHS-3	8/26/2003	454	1020
PBL-WHS-4	8/26/2003	440	950
PBL-WHS-5	8/26/2003	459	1190
PBL-WHS-6	8/26/2003	455	950
PBL-WHS-7	8/26/2003	446	1100
PBL-WHS-8	8/26/2003	440	1050
PBL-WHS-9	8/26/2003	428	890
PBL-WHS-10	8/26/2003	422	840
PENOBSCOT R -COSTIGAN			
PBC-SMB-1	8/4/2003	391	785
PBC-SMB-2	8/4/2003	386	685
PBC-SMB-3	8/4/2003	389	835
PBC-SMB-4	8/4/2003	367	660
PBC-SMB-5	8/4/2003	380	660
PBC-SMB-6	8/4/2003	394	765
PBC-SMB-7	8/5/2003	398	800
PBC-SMB-8	8/5/2003	398	815
PBC-SMB-9	8/5/2003	381	780
PBC-SMB-10	8/5/2003	396	880
PBC-WHS-1	8/4/2003	455	1080
PBC-WHS-2	8/5/2003	441	1080
PBC-WHS-3	8/5/2003	455	1160
PBC-WHS-4	8/5/2003	451	1225
PBC-WHS-5	8/5/2003	439	1040
PBC-WHS-6	8/5/2003	449	1040
PBC-WHS-7	8/5/2003	435	910
PBC-WHS-8	8/5/2003	441	1125
PBC-WHS-9	8/5/2003	462	1205
PBC-WHS-10	8/5/2003	449	1120
PENOBSCOT R -VEAZIE			
PBV-SMB-1	5/6/2003	390	740
PBV-SMB-2	5/6/2003	381	675

APPENDIX 6. Lengths and weights of 2003 fish samples

field ID	Date	Length mm	Weight gm.
PBV-SMB-3	5/6/2003	373	558
PBV-SMB-4	5/6/2003	391	673
PBV-SMB-5	5/6/2003	366	562
PBV-SMB-6	5/6/2003	393	688
PBV-SMB-7	5/7/2003	385	710
PBV-SMB-8	5/7/2003	379	563
PBV-SMB-9	5/7/2003	379	660
PBV-SMB-10	5/8/2003	349	600
PBV-WHS-01	5/19/2003	470	1220
PBV-WHS-02	5/19/2003	470	1200
PBV-WHS-03	5/19/2003	455	1000
PBV-WHS-04	5/19/2003	460	990
PBV-WHS-05	5/19/2003	475	1060
PBV-WHS-06	5/19/2003	475	1120
PBV-WHS-07	5/19/2003	455	900
PBV-WHS-08	5/19/2003	460	1040
PBV-WHS-09	5/19/2003	440	900
PBV-WHS-10	5/19/2003	450	880
SEBASTICOOK PALMYRA			
SWP-SMB-01	8/15/2003	453	1120
SWP-SMB-02	8/15/2003	376	725
SWP-SMB-03	8/15/2003	464	1210
SWP-SMB-04		310	405
SWP-SMB-05		404	890

APPENDIX 7. SUMMARY OF DIOXINS AND FURANS IN FISH AND SHELLFISH SAMPLES, 1984-2001

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

			NDS/NBS 1984-86	MAINE 1988-1990		1991		1992	
WATER/STATION	SPECIES	TISSUE	TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE
ANDROSCOGGIN LAKE									
Wayne	bn trout	f							
	bass	f							
	w perch								
	sucker	w							
Pocasset LAKE									
Wayne	bass								
	SMB COMP								
	WHP COMP								
ANDROSCOGGIN R									
Gilead	rb trout								
	bn trout								
	juv bass								
	bass								
	sucker	w	1.8f/6.5w						
Rumford	bass	f				1.4	2.3-2.8	0.6	1.0-1.2
	juv bass								
	sucker	w						3.0	7.4-8.0
Riley	bass								
	sucker	w	<2.1f/13w						
Jay	bass	f		17.6	24.0-29.1			1.2	1.9-2.3
	sucker	w						5.4	12.9-13.9
Livermore Falls	bass	f				2.4	3.1-3.3	1.1	1.4-1.5
	sucker	w						3.8	7.4-8.0
	sucker comp								
Livermore ALF	bass								
	sucker								
N Turner	sucker	w	6.2f/30w						
Auburn-GIP	bass	f	3.7f/24w					1.7	2.6-2.8
	lm bass	f						1.1	1.6-1.8
	sucker	w	8.3f/29w					5.6	14.3-15.4
	bullhead	w	7.8f/29.6w						
Lisbon Falls	bn trout	f		5.3	6.5-6.9				
	bass	f		4.5	5.5-5.8			0.7	1.0
	sucker	w	5.1f/12w					3.4	8.1-8.7
Brunswick	sucker	w	19.0						
	carp	f	11.0						
BEARCE LAKE									
Baring	pickerel	f	<0.1						
BRAVE BOAT HARBOR									
Kittery	lobster	m							
	lobster	t							
BROOKLYN	lobster	m							
	lobster	t							
COREA	lobster	t							
JONES CREEK									
Scarborough	clam	m						<0.1	0.02-0.3

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

WATER/STATION	SPECIES	TISSUE	NDS/NBS 1984-86 TCDD	MAINE 1988- 1990 TCDD	MAINE 1988- 1990 DTE	19 91 TCDD	19 91 DTE	19 92 TCDD	19 92 DTE
KENNEBEC R									
Madison	bn trout	f							
	bass	f						<0.1	0.02-0.1
	sucker	w						0.1	0.3
Norridgewock	bass								
	bn trout								
	sucker								
Fairfield	trout	f		6.2	6.9-8.0			1.4	1.6-1.8
	bass	f				1.4	1.6-1.7	0.6	0.6-0.7
	sucker	w	6.4	10.3	16.8-18.1			2.0	3.1-3.3
Sidney	bass	f	20.3w			1.0	1.4-2.4	0.4	0.6-1.0
	bn trout								
	sucker	w	1.2f/11.4w					2.7	4.4-4.8
Augusta	bn trout	f		2.2	2.9-4.9			1.9	2.5-4.3
	bass	f						0.4	0.6-1.0
	sucker	w		5.0	7.3-8.4			1.5	2.6-2.8
Hallowell	smelt	c						0.2	0.5-0.8
Richmond	eel	f							
Phippsburg	clam	m						0.3	0.6-0.9
	lobster	m							
	lobster	t							
MESSALONSKEE LAKE									
Belgrade	bass					<0.09	0.04-0.3		
NARRAGUAGUS R									
Cherryfield	fallfish	w	<1.0						
NORTH POND									
Chesterfield	sucker	w	0.4						
	pickerel	f	<0.1						
PENOBSCOT R									
E Br Grindstone	bass	f		<0.1	0.09-0.2				
	sucker	w		<0.4	0.02-0.6				
E Millinocket	bass	f		<0.2	0.4-0.8				
	sucker	w		0.7	3.6-4.2				
Woodville	bass								
	sucker								
Winn	bass								
	sucker								
N Lincoln	bass	f		<0.4	0.2-0.8				
	sucker	w		<0.5-20.8	2.0-41.6				
S Lincoln	bass	f	5.0	1.7	2.3-2.7	0.9	1.2-1.3	0.7	1.0-1.2
	sucker	w		37.0	66.4-67.2			3.3	6.8
Passadumkeag	bass	f		1.8	2.9				
	sucker	w		2.8	7.6-7.7				
Milford	bass	f		0.9	1.4-1.7			0.3	0.4-0.5
	sucker	w		9.7	19.9-20.1			2.2	4.6
Veazie	bass	f	4.6w	1.9	2.4-2.6	1.2	1.5-1.7	0.4	0.6
	sucker	w	2.6f/7.6w	5.9	9.8-9.9	2.5	4.9-5.0	2.2	4.8-4.9
Bangor	eel	f							

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

WATER/STATION	SPECIES	TISSUE	NDS/NBS 1984-86 TCDD	MAINE 1988-1990 TCDD	MAINE 1988-1990 DTE	1991 TCDD	1991 DTE	1992 TCDD	1992 DTE
Bucksport	clam	m						0.1	0.8-0.9
Stockton Springs	lobster	m							
	lobster	t							
OWLS HEAD	mussel	m	<0.8						
PISCATAQUIS R									
Sangerville	bass	f				<0.2	0.03-0.3		
	bn trout	f				<0.4	0.03-0.4		
	sucker	w				0.26	0.6-0.7		
Howland	bass	f		<0.2	0.02-0.6				
PRESUMPSCOT R									
Windham	bass	f							
	sucker	w							
Westbrook	bass	f		1.8	2.4-4.5	0.2	0.2-0.4	0.1	0.2-0.4
	pickerel	f		<2.6	0.06-5.9				
	w perch	f		1.2	2.5-3.1	0.4	0.9-1.0		
	sucker	w	5.2	5.1	8.2-9.6	0.6	1.6-1.7	0.3	0.8-0.9
Falmouth	clam	m						<0.1	0.2-0.4
Portland	lobster	m							
	lobster	t							
ST CROIX R									
Woodland	bass	f							
	sucker								
Baring	bass			0.3	0.5-1.0	<0.1	0.04-0.3		
	sucker	w	<0.7	0.6	1.0-1.1				
Robbinston	lobster	t							
ST JOHN R									
Frenchville	sucker	w							
Madawaska	y perch	f		<0.5	0.08-0.8				
	bk trout	f							
	sucker	w							
SACO R									
Dayton	sucker	w	<0.3						
SACO BAY									
Scarborough	lobster	m							
	lobster	t							
SALMON FALLS R									
Acton	lm bass								
	sucker								
S Berwick	bass	f		0.4	0.5-0.6				
	lm bass								
	pickerel	f		0.2	0.3				
	sucker	w		1.5	2.1-2.2			2.4	3.4-3.6
SANDY P									
	bass	f	<1.0						
SEBAGO L									
Naples	bass	w	<0.6						

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

			NDS/NBS 1984-86	MAINE 1988-1990		1991		1992	
WATER/STATION	SPECIES	TISSUE	TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE
SEBASTICOOK R									
E Br Corinna	lm bass								
	bass								
	sucker								
Newport	bass	f						0.1	0.3-0.4
	lm bass	f	<0.2					<0.2	0.2-0.4
	w perch	f		1.0	1.6-2.1				
Sebastcook L	bass	f							
	w perch	f							
Detroit	bass	f							
W Br Harmony	bass								
	sucker								
W Br Palmyra	bass	f		1.2	1.4-1.8			0.4	0.5-0.6
	pickerel	f	<0.1					0.2	0.2
	sucker	w	1.6	3.3	4.3-4.6			1.1	1.4-1.6
WEBBER POND									
Vassalboro	bass	f				<0.08	0.04-0.4		

f=fillet
m=meat
t=tomalley
w=whole

DTE= dioxin toxic equivalents using WHO 98 toxic equivalency factors (TEF).
Range shown at nd=0 and nd=mdl, ie DTEo-DTEd

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

WATER/STATION	SPECIES	TISSUE	1993 TCDD	1993 DTE	1994 TCDD	1994 DTE	1995 TCDD	1995 DTE	1996 TCDD	1996 DTE
ANDROSCOGGIN LAKE										
Wayne	bn trout	f							0.7	1.1-2.3
	bass	f							0.6	1.2-2.2
	w perch									
	sucker	w							0.4	1.4-2.5
Pocasset LAKE										
Wayne	bass					<0.1 .1-1	<0.1	<0.1-0.5		
	SMB COMP						<0.1	0.2-0.5		
	WHP COMP						<0.1	0.3-0.6		
ANDROSCOGGIN R										
Gilead	rb trout						1.2	2.4-2.9	0.9	2.0-2.6
	bn trout								0.4	1.0-1.5
	juv bass									
	bass						0.9	3.8-4.1		
	sucker	w					1.7	6.1-6.7	0.7	4.4-5.3
Rumford	bass	f	2.9	4.5-5.4	3.8	5.7-6.2	2.2	3.5-4.1		
	juv bass									
	sucker	w	5.8	13.6-14.6	4.0	11.4-11.9			0.8	4.1-5.2
Riley	bass									
	sucker	w								
Jay	bass	f	1.4	1.8-2.2	1.6	2.2-2.8			0.5	1.3-1.4
	sucker	w	4.5	10.9-11.8	4.7	11.5-12.3	2.3	6.9-7.6		
Livermore Falls	bass	f	1.4	1.6-1.8	1.4	1.6-2.3	0.5	0.8-1.3		
	sucker	w	3.6	6.8-7.3	2.2	4.8-5.3			0.6	3.4-3.9
	sucker comp									
Livermore ALF	bass									
	sucker									
N Turner	sucker	w								
Auburn-GIP	bass	f	1.2	1.8-1.9	1.3	2.0-2.7			0.6	2.1-2.5
	lm bass	f								
	sucker	w	3.7	9.0-9.8	1.6	4.4-5.4	1.4	3.8-5.0		
	bullhead	w	2.1	3.0-3.3	1.3	2.3-2.8				
Lisbon Falls	bn trout	f								
	bass	f	1.2	1.7-1.8	0.6	0.8-1.7	0.9	1.4-2.4		
	sucker	w	2.7	6.1-6.6	2.4	5.8-6.2			0.7	1.6-2.8
Brunswick	sucker	w								
	carp	f								
BEARCE LAKE										
Baring	pickerel	f								
BRAVE BOAT HARBOR										
Kittery	lobster	m			<0.1	<0.1-1.2			1.7	13.8-15.5
	lobster	t			1.3	9.7-11.5	1.6	6.7-9.9		
BROOKLYN	lobster	m					0.8	4.9-8.2		
	lobster	t								
COREA	lobster	t							0.6	6.6-7.3
JONES CREEK										
Scarborough	clam	m								

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

			1993		1994		1995		1996	
WATER/STATION	SPECIES	TISSUE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
KENNEBEC R										
Madison	bn trout	f					<0.1	0.1-0.7		
	bass	f							<0.1	0.1-0.8
	sucker	w					0.1	0.3-1.0	<0.1	0.3-1.0
Norridgewock	bass									
	bn trout									
	sucker									
Fairfield	trout	f	1.4	1.6-1.9	2.2	2.5-3.8	1.6	1.7-2.5		
	bass	f	1.5	1.7-2.0	0.9	1.1-1.8				
	sucker	w	1.6	2.2-2.6	2.2	2.9-3.8			1.6	2.1-2.7
Sidney	bass	f	0.6	0.8-1.4	0.3	0.4-1.3			0.2	0.4-1.0
	bn trout									
	sucker	w	1.5	2.5-2.7	2.3	3.0-4.0	1.2	1.7-2.5		
Augusta	bn trout	f					1.0	1.3-3.5		
	bass	f	0.6	0.9-1.5	1.0	1.3-3.7				
	sucker	w	1.9	3.3-3.6	2.3	4.0-5.8			2.2	2.6-3.3
Hallowell	smelt	c								
Richmond	eel	f	0.6	0.8-1.4						
Phippsburg	clam	m								
	lobster	m	0.2	0.3-1.2	<0.1	<0.1-1.6				
	lobster	t	7.9	27.5-27.6	6.5	23.4-26.6	4.6	13.5-17.1	3.6	16.7-18.6
MESSALONSKEE LAKE										
Belgrade	bass									
NARRAGUAGUS R										
Cherryfield	fallfish	w								
NORTH POND										
Chesterfield	sucker	w								
	pickerel	f								
PENOBSCOT R										
E Br Grindstone	bass	f					<0.1	0.1-0.7	<0.1	0.1-0.8
	sucker	w					<0.1	0.1-0.6	<0.1	0.1-0.8
E Millinocket	bass	f								
	sucker	w								
Woodville	bass									
	sucker									
Winn	bass									
	sucker									
N Lincoln	bass	f								
	sucker	w								
S Lincoln	bass	f	1.2	1.6-1.8	0.4	0.4-1.7	0.5	0.7-1.3	0.3	0.5-1.2
	sucker	w	1.7	3.5-3.6	2.2	5.8-6.1			1.6	2.2-3.2
Passadumkeag	bass	f								
	sucker	w								
Milford	bass	f								
	sucker	w								
Veazie	bass	f	0.6	0.8-1.0	0.2	0.2-1.3	0.3	0.4-1.9	0.3	0.3-1.5
	sucker	w	1.1	2.7-3.0	0.6	1.6-2.8	0.5	1.4-2.5	0.4	0.9-2.0
Bangor	eel	f	1.0	1.1-1.2					0.3	0.4-1.5

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

			1993		1994		1995		1996	
WATER/STATION	SPECIES	TISSUE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
Bucksport	clam	m								
Stockton Springs	lobster	m	0.1	0.3-1.1	<0.1	0.1-1.0			0.9	12.5-13.2
	lobster	t	4.0	28.0	2.3	18.1-27.9	1.3	7.2-14.6		
OWLS HEAD	mussel	m								
PISCATAQUIS R										
Sangerville	bass	f								
	bn trout	f								
	sucker	w								
Howland	bass	f								
PRESUMPSCOT R										
Windham	bass	f	<0.1	<0.1-0.3	<0.1	<0.1-1.1			<0.1	0.5-1.5
	sucker	w	0.3	0.7-0.8	0.2	1.4-2.4	0.3	2.4-7.7		
Westbrook	bass	f	<0.2	0.1-0.5	0.2	0.3-1.2			0.2	0.4-0.9
	pickerel	f								
	w perch	f								
	sucker	w	1.1	1.8-2.3	0.9	2.1-3.7	0.8	1.6-2.6		
Falmouth	clam	m								
Portland	lobster	m	<0.1	0.1-0.8	<0.1	0.2-1.0			2.7	18.9-21.6
	lobster	t	3.4	18.5-18.7	2.5	17.2-21.3	2.2	9.5-12.8		
ST CROIX R										
Woodland	bass	f								
	sucker									
Baring	bass									
	sucker	w								
Robbinston	lobster	t							1.0	10.2-11.2
ST JOHN R										
Frenchville	sucker	w			0.1	0.2-1.0				
Madawaska	y perch	f								
	bk trout	f			<0.3	<0.1-2.3				
	sucker	w			<0.1	0.2-0.8				
SACO R										
Dayton	sucker	w								
SACO BAY										
Scarborough	lobster	m	<0.1	0.1-0.8	<0.1	<0.1-0.8				
	lobster	t	2.0	11.3-14.6	1.3	9.7-12.0				
SALMON FALLS R										
Acton	lm bass						<0.1	<0.1-0.7	<0.1	0.1-1.0
	sucker									
S Berwick	bass	f	0.2	0.2-0.9	0.5	0.7-3.3	0.4	0.4-4.0		
	lm bass									
	pickerel	f								
	sucker	w	1.9	3.6-3.8	2.1	4.7-6.1			2.0	3.2-4.5
SANDY P										
	bass	f								
SEBAGO L										
Naples	bass	w								

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

WATER/STATION	SPECIES	TISSUE	1993 TCDD	1993 DTE	1994 TCDD	1994 DTE	1995 TCDD	1995 DTE	1996 TCDD	1996 DTE
SEBASTICOOK R										
E Br Corinna	lm bass						0.1	0.2-1.1		
	bass									
	sucker									
Newport	bass	f								
	lm bass	f					0.3	1.1-2.0		
	w perch	f							0.3	1.6-2.3
Sebastcook L	bass	f								
	w perch	f								
Detroit	bass	f								
W Br Harmony	bass						<0.1	0.1-0.8		
	sucker								0.1	0.1-1.2
W Br Palmyra	bass	f	0.9	1.2-1.6	0.4	0.4-1.3	0.8	1.7-2.2		
	pickerel	f								
	sucker	w	1.0	2.6-2.7	1.2	4.0-4.3			1.2	2.2-3.6
WEBBER POND										
Vassalboro	bass	f								

f=fillet
m=meat
t=tomalley
w=whole

DTE= dioxin toxic equivalents using
Range shown at nd=0 and nd=mdl, ie D[illegible]

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

WATER/STATION	SPECIES	TISSUE	1997 TCDD	1997 DTE	1998 TCDD	1998 DTE	1999 TCDD	1999 DTE	2000 TCDD	2000 DTE	2001 TCDD	2001 DTE
ANDROSCOGGIN LAKE												
Wayne	bn trout	f										
	bass	f			0.2	0.4-1.0	0.1	0.2-0.8	<0.1	0.02-1.3	<0.1	0.1-0.8
	w perch				0.5	0.6-1.2	0.2	0.3-0.9	0.2	0.2-0.8	0.1	0.2-0.7
	sucker	w			0.4	0.9-1.1			<0.1	0.1-1.1	<0.1	0.1-0.7
Pocasset LAKE												
Wayne	bass											
	SMB COMP											
	WHP COMP											
ANDROSCOGGIN R												
Gilead	rb trout		0.5	1.6-2.1	0.4	1.5-2.0	0.7	1.7-2.3	0.4	0.9-1.4	0.8	2.1-2.5
	bn trout						0.4	1.0-1.5	0.1	0.4-1.0	0.8	2.5-2.7
	juv bass											
	bass						0.4	1.4-1.5	0.2	0.8-1.2	0.3	1.0-1.4
	sucker	w	0.5	3.4-3.8	0.9	3.1-3.5	0.8	2.9-3.3	0.3	1.8-2.2	0.1	0.7-1.1
Rumford	bass	f	0.5	1.2-1.8	0.4	1.1-1.5	0.6	1.5-1.9	0.2	0.6-1.1	0.2	0.5-1.0
	juv bass											
	sucker	w	0.5	3.6-4.9	0.4	3.0-3.4	0.4	2.8-3.2	0.3	1.9-2.3	0.3	2.0-2.4
Riley	bass		0.3	1.1-2.2	0.2	0.8-1.0	<0.1	0.6-0.9	<0.1	0.2-0.6	0.2	0.8-1.0
	sucker	w	0.5	3.8-4.8	0.3	2.5-2.8	0.3	2.6-2.8			0.3	1.9-2.1
Jay	bass	f										
	sucker	w										
Livermore Falls	bass	f	0.3	1.2-1.4	0.2	1.1-1.2	0.2	0.9-1.2	0.2	0.6-1.0	0.3	0.9-1.4
	sucker	w	0.5	2.8-2.9	0.5	2.8-2.9	0.4	2.4			0.3	1.6-1.7
	sucker comp											
Livermore ALF	bass											
	sucker											
N Turner	sucker	w										
Auburn-GIP	bass	f	0.4	2.0-2.2	0.4	1.6-1.8	0.4	1.6-1.8	0.1	0.4-0.9	0.2	0.4-0.9
	lm bass	f										
	sucker	w									0.2	0.6-0.9
	bullhead	w										
Lisbon Falls	bn trout	f										
	bass	f	0.6	1.3-1.8	0.5	1.1-1.5	0.7	1.7-2.1	0.2	0.5-1.0	0.4	0.9-1.3
	sucker	w										
Brunswick	sucker	w										
	carp	f										
BEARCE LAKE												
Baring	pickerel	f										
BRAVE BOAT HARBOR												
Kittery	lobster	m										
	lobster	t										
BROOKLYN	lobster	m										
	lobster	t										
COREA	lobster	t										
JONES CREEK												
Scarborough	clam	m										

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

			1997		1998		1999		2000		2001	
WATER/STATION	SPECIES	TISSUE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
KENNEBEC R												
Madison	bn trout	f									<0.1	<0.1-0.7
	bass	f	<0.2	0.03-1.6								
	sucker	w	<0.1	0.2-0.8								
Norridgewock	bass				<0.1	0.03-0.6	<0.1	0.03-0.7	<0.1	0.05-0.7	<0.1	0.1-0.8
	bn trout								<0.1	0.04-0.7		
	sucker				<0.1	0.2-0.7	<0.1	0.03-0.7	<0.1	0.05-0.7	<0.1	<0.1-0.7
Fairfield	trout	f	1.2	1.3-1.9							1.0	1.2-1.8
	bass	f	0.6	0.6-1.2	0.3	0.4-1.0	0.4	0.4-1.0	0.4	0.5-1.1	0.2	0.4-0.9
	sucker	w	1.2	1.7-2.1	0.9	1.4-1.8	0.3	0.4-1.0	0.4	0.5-1.0	0.3	0.5-1.1
Sidney	bass	f	0.2	0.3-0.9					0.2	0.2-0.8	0.2	0.4-0.9
	bn trout								0.3	0.3-0.8	0.4	0.5-1.1
	sucker	w										
Augusta	bn trout	f	0.6	1.0-1.3								
	bass	f	0.5	0.8-1.6	0.3	0.6-0.9	0.3	0.6-0.9				
	sucker	w										
Hallowell	smelt	c										
Richmond	eel	f										
Phippsburg	clam	m										
	lobster	m										
	lobster	t										
MESSALONSKEE LAKE												
Belgrade	bass											
NARRAGUAGUS R												
Cherryfield	fallfish	w										
NORTH POND												
Chesterfield	sucker	w										
	pickerel	f										
PENOBSCOT R												
E Br Grindstone	bass	f	<0.1	0.04-0.7	<0.1	0.04-0.7						
	sucker	w	<0.1	0.07-0.7	<0.1	0.07-0.7						
E Millinocket	bass	f	<0.1	0.04-0.7	<0.1	0.04-0.7						
	sucker	w	<0.1	0.09-0.7	<0.1	0.09-0.7						
Woodville	bass		<0.1	0.07-0.7	<0.1	0.06-0.7	<0.1	0.08-0.7	<0.1	0.1-0.7	<0.1	0.1-0.7
	sucker		<0.1	0.09-0.7	<0.1	0.08-0.7	<0.1	0.1-0.7	<0.1	0.1-0.7	<0.1	0.1-0.7
Winn	bass						<0.1	0.2-0.8	<0.1	0.1-0.7	<0.1	<0.1-0.7
	sucker						<0.1	0.2-0.9	<0.1	0.1-0.8	<0.1	<0.1-0.7
N Lincoln	bass	f										
	sucker	w										
S Lincoln	bass	f	0.2	0.4-1.0	0.2	0.4-0.9	0.4	0.6-1.0	0.2	0.3-0.9	0.4	0.5-1.1
	sucker	w	1.2	1.6-2.2	1.0	1.4-2.0	1.0	1.4-1.6	0.7	1.0-1.5	0.3	0.5-1.1
Passadumkeag	bass	f										
	sucker	w										
Milford	bass	f	0.2	0.4-0.9	0.2	0.2-0.8	0.1	0.4-0.7	0.2	0.3-0.9	0.3	0.5-1.1
	sucker	w	1.0	1.6-2.0	1.0	1.5-2.0	1.0	1.5-1.6	0.8	1.1-1.6	0.4	0.5-1.0
Veazie	bass	f	0.3	0.4-0.9	0.2	0.3-0.9	0.3	0.4-0.9	0.4	0.5-1.1	0.2	0.3-0.8
	sucker	w	1.1	1.3-1.9	1.0	1.2-1.8	1.1	1.3-1.7	0.9	1.2-1.7	1.3	1.7-2.2
Bangor	eel	f							1.6	2.0-2.5	1.1	1.5-2.0

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

WATER/STATION	SPECIES	TISSUE	1997 TCDD	1997 DTE	1998 TCDD	1998 DTE	1999 TCDD	1999 DTE	2000 TCDD	2000 DTE	2001 TCDD	2001 DTE
Bucksport	clam	m										
Stockton Springs	lobster	m										
	lobster	t										
OWLS HEAD	mussel	m										
PISCATAQUIS R												
Sangerville	bass	f										
	bn trout	f										
	sucker	w										
Howland	bass	f										
PRESUMPSCOT R												
Windham	bass	f	<0.1	0.5-0.7	<0.1	0.4-0.8			<0.1	0.1-0.7	<0.1	0.1-0.7
	sucker	w	0.2	1.2-1.4	0.2	1.2-1.4					0.2	1.4-1.5
Westbrook	bass	f	0.1	0.4-0.9	<0.1	0.3-0.8			<0.1	0.2-0.8	<0.1	<0.1-0.7
	pickerel	f	0.2	1.6-2.0	0.2	1.6-2.0					0.2	1.3-1.7
	w perch	f										
	sucker	w										
Falmouth	clam	m										
Portland	lobster	m										
	lobster	t										
ST CROIX R												
Woodland	bass	f	<0.1	0.02-0.7	<0.1	0.06-0.7	<0.1	0.06-0.7				
	sucker		<0.1	0.09-0.7	<0.1	0.08-0.7	<0.1	0.07-0.7				
Baring	bass		<0.1	0.03-0.7	<0.1	0.05-0.7	<0.1	0.05-0.7				
	sucker	w	<0.1	0.07-0.8	<0.1	0.08-0.8	<0.1	0.08-0.7				
Robbinston	lobster	t										
ST JOHN R												
Frenchville	sucker	w										
Madawaska	y perch	f										
	bk trout	f										
	sucker	w										
SACO R												
Dayton	sucker	w										
SACO BAY												
Scarborough	lobster	m										
	lobster	t										
SALMON FALLS R												
Acton	lm bass											
	sucker											
S Berwick	bass	f	0.2	0.3-0.6			0.1	0.3-0.6	0.1	0.2-0.8	0.2	0.4-0.8
	lm bass						0.2	0.5-0.8				
	pickerel	f	0.6	0.8-1.0								
	sucker	w										
SANDY P												
	bass	f										
SEBAGO L												
Naples	bass	w										

APPENDIX 7. DIOXIN AND FURAN CONCENTRATIONS IN MAINE FISH AND SHELLFISH 1984-2001 (pg/g)

WATER/STATION	SPECIES	TISSUE	1997 TCDD	1997 DTE	1998 TCDD	1998 DTE	1999 TCDD	1999 DTE	2000 TCDD	2000 DTE	2001 TCDD	2001 DTE
SEBASTICOOK R												
E Br Corinna	lm bass		<0.1	0.1-0.7								
	bass											
	sucker											
Newport	bass	f	0.2	1.2-1.4							0.1	0.6-0.9
	lm bass	f										
	w perch	f										
Sebastcook L	bass	f							0.1	0.5-0.8		
	w perch	f							0.2	0.8-0.9		
Detroit	bass	f									0.1	0.2-0.8
W Br Harmony	bass		<0.1	0.06-0.7								
	sucker											
W Br Palmyra	bass	f	0.3	0.6-0.9	0.2	0.5-0.8	0.2	0.6-0.8	0.1	0.4-2.7	0.2	0.5-0.8
	pickerel	f										
	sucker	w										
WEBBER POND												
Vassalboro	bass	f										

f=fillet
m=meat
t=tomalley
w=whole

DTE= dioxin toxic equivalents using
Range shown at nd=0 and nd=mdl, ie D:

APPENDIX 8. DIOXIN AND FURAN CONCENTRATIONS IN 2002 FISH SAMPLES

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID		ARP-SMB-1	ARP-SMB-2	ARP-SMB-3	ARP-SMB-4	ARP-SMB-05	ARP-SMB	ARP-SMB	ARP-SMB	ARP-SMB	ARP-SMB
SWAT ID		02-286	02-287	02-288	02-289	02-290	02-291	02-292	02-293	02-294	02-295
ECL ID		2926	2928	2929	2930	2931	2934	2935	2936	2937	2938
GCMS File		030921-12	030922-6	030922-7	030922-8	030922-9	030605-6	030605-7	030605-8	030605-9	030605-10
Ext_wt (g)		25.0	25.1	25.1	25.0	25.1	25.0	25.0	25.1	25.1	25.1
% Lipid	DL	1.84	1.54	1.37	2.58	1.42	2.01	2.01	2.19	1.70	1.24
2,3,7,8-TCDF	< 0.100	5.49	5.62	3.97	7.80	4.99	5.80	5.88	6.02	6.06	4.69
1,2,3,7,8-PeCDF	< 0.500	0.888	1.13	0.593	0.908	1.17	1.32	0.766	1.10	0.890	1.49
2,3,4,7,8-PeCDF	< 0.500	1.26	1.49	0.937	1.57	1.55	1.85	1.20	1.44	1.61	1.74
1,2,3,4,7,8-HxCDF	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	< 0.500	<0.498	< 0.498	< 0.498
1,2,3,6,7,8-HxCDF	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	< 0.500	<0.498	< 0.498	< 0.498
2,3,4,6,7,8-HxCDF	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	< 0.500	<0.498	< 0.498	< 0.498
1,2,3,7,8,9-HxCDF	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	< 0.500	<0.498	< 0.498	< 0.498
1,2,3,4,6,7,8-HpCDF	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	< 0.500	<0.498	< 0.498	< 0.498
1,2,3,4,7,8,9-HpCDF	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	< 0.500	<0.498	< 0.498	< 0.498
OCDF	< 1.00	< 1.00	< 0.996	< 0.996	< 1.00	< 0.996	< 1.00	< 1.00	<0.996	<0.996	<0.996
2,3,7,8-TCDD	< 0.100	< 0.100	<0.119 E	< 0.0996	0.108	0.114	0.110	<0.100	0.135	0.109	0.220
1,2,3,7,8-PeCDD	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	<0.500	<0.498	< 0.498	< 0.498
1,2,3,4,7,8-HxCDD	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	<0.500	<0.498	< 0.498	< 0.498
1,2,3,6,7,8-HxCDD	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	<0.500	<0.498	< 0.498	< 0.498
1,2,3,7,8,9-HxCDD	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	<0.500	<0.498	< 0.498	< 0.498
1,2,3,4,6,7,8-HpCDD	< 0.500	< 0.500	< 0.498	< 0.498	< 0.500	< 0.498	< 0.500	<0.500	<0.498	< 0.498	< 0.498
OCDD	<1.00	< 1.00	< 0.996	1.56	1.77	2.27	<1.00	<1.00	<0.996	1.51	<0.996
DTEo		1.22	1.36	0.895	1.72	1.45	1.68	1.23	1.51	1.56	1.63
DTEd		2.19	2.34	1.86	2.58	2.31	2.50	2.15	2.33	2.38	2.45
DTEh		1.71	1.85	1.38	2.15	1.88	2.09	1.69	1.92	1.97	2.04

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ARP-sSMB-01	ARP-sSMB-02	ARP-sSMB-03	ARP-sSMB-04	ARP-sSMB-05	ARP-sSMB-06	ARP-sSMB-07	ARP-sSMB-08
SWAT ID	02-276	02-277	02-278	02-279	02-280	02-281	02-282	02-283
ECL ID	2916	2917	2918	2919	2920	2921	2922	2923
GCMS File	03916B-12	03916B-13	030921-4	030921-5	030921-6	030921-7	030921-8	030921-9
Ext_wt (g)	25.1	25.0	25.0	25.2	25.1	25.0	25.1	25.0
% Lipid	6.33	5.46	4.92	4.78	4.16	4.56	4.59	2.45
2,3,7,8-TCDF	7.61	6.40	7.41	5.85	8.78	8.06	11.0	6.10
1,2,3,7,8-PeCDF	1.18	0.958	1.15	0.774	1.07	1.35	1.46	0.811
2,3,4,7,8-PeCDF	1.75	1.53	1.82	1.41	2.15	1.99	2.53	1.91
1,2,3,4,7,8-HxCDF	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,6,7,8-HxCDF	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
2,3,4,6,7,8-HxCDF	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,7,8,9-HxCDF	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,4,6,7,8-HpCDF	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,4,7,8,9-HpCDF	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
OCDF	< 0.996	< 1.00	< 1.00	< 0.992	< 0.996	< 1.00	< 0.996	< 1.00
2,3,7,8-TCDD	0.152	0.156	0.160	<0.132 E	0.221	0.171	0.197	0.147
1,2,3,7,8-PeCDD	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,4,7,8-HxCDD	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,6,7,8-HxCDD	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,7,8,9-HxCDD	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
1,2,3,4,6,7,8-HpCDD	< 0.498	< 0.500	< 0.500	< 0.496	< 0.498	< 0.500	< 0.498	< 0.500
OCDD	1.30	1.67	4.41	2.19	3.83	< 1.00	< 0.996	4.96
DTEo	1.85	1.61	1.87	1.33	2.23	2.04	2.64	1.75
DTEd	2.71	2.47	2.73	2.32	3.09	2.90	3.50	2.62
DTEh	2.28	2.04	2.3	1.825	2.66	2.47	3.07	2.185

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ARP-sSMB-09	ARP-sSMB-10	ARP-WHS	ARP-WHS	ARP-WHS	ARP-WHS	ARP-WHS	ARP-WHS	ARP-WHS	ARP-WHS
SWAT ID	02-284	02-285	02-298	02-298 dup	02-298AVG	02-296	02-297	02-299	02-300	02-301
ECL ID	2924	2925	2943	2944		2939	2942	2945	2946	2947
GCMS File	030921-10	030921-11	030605A-2	030605A-3		030605-11	030605-12	030605A-4	030605A-5	030605A-6
Ext_wt (g)	21.2	25.0	25.0	25.0	25.0	25.1	25.0	25.1	25.1	25.0
% Lipid	4.85	4.76	2.02	1.97	1.99	3.14	2.02	2.65	3.18	1.61
2,3,7,8-TCDF	6.60	8.98	8.32	8.02	8.17	10.4	5.84	9.04	10.7	5.52
1,2,3,7,8-PeCDF	0.967	1.53	0.627	0.582	0.605	0.793	0.571	0.853	1.05	0.762
2,3,4,7,8-PeCDF	1.64	1.99	1.12	1.03	1.08	1.19	0.853	1.19	1.58	1.04
1,2,3,4,7,8-HxCDF	< 0.590	< 0.500	< 0.500	<0.500	<0.500	< 0.498	< 0.500	<0.498	<0.498	< 0.500
1,2,3,6,7,8-HxCDF	< 0.590	< 0.500	< 0.500	<0.500	<0.500	< 0.498	< 0.500	<0.498	<0.498	< 0.500
2,3,4,6,7,8-HxCDF	< 0.590	< 0.500	< 0.500	< 0.500	< 0.500	< 0.498	< 0.500	<0.498	<0.498	< 0.500
1,2,3,7,8,9-HxCDF	< 0.590	< 0.500	< 0.500	< 0.500	< 0.500	< 0.498	< 0.500	<0.498	<0.498	< 0.500
1,2,3,4,6,7,8-HpCDF	< 0.590	< 0.500	< 0.500	< 0.500	< 0.500	< 0.498	< 0.500	<0.498	<0.498	< 0.500
1,2,3,4,7,8,9-HpCDF	< 0.590	< 0.500	< 0.500	< 0.500	< 0.500	< 0.498	< 0.500	<0.498	<0.498	< 0.500
OCDF	< 1.18	< 1.00	< 1.00	< 1.00	< 1.00	<0.996	< 1.00	<0.996	<0.996	< 1.00
2,3,7,8-TCDD	0.153	0.192	0.108	0.105	0.107	0.173	< 0.100	0.114	0.141	0.127
1,2,3,7,8-PeCDD	< 0.590	< 0.500	< 0.500	<0.500	<0.500	< 0.498	< 0.500	< 0.498	<0.498	< 0.500
1,2,3,4,7,8-HxCDD	< 0.590	< 0.500	< 0.500	< 0.500	< 0.500	< 0.498	< 0.500	< 0.498	<0.498	< 0.500
1,2,3,6,7,8-HxCDD	< 0.590	< 0.500	< 0.500	< 0.500	< 0.500	< 0.498	< 0.500	< 0.498	<0.498	< 0.500
1,2,3,7,8,9-HxCDD	< 0.590	< 0.500	< 0.500	< 0.500	< 0.500	< 0.498	< 0.500	< 0.498	<0.498	< 0.500
1,2,3,4,6,7,8-HpCDD	< 0.590	< 0.500	< 0.500	0.5	0.5	0.5	< 0.500	< 0.498	<0.498	< 0.500
OCDD	33.0	4.92	<1.00	< 1.00	< 1.00	<0.996	2.05	<0.996	<0.996	<1.00
DTEo	1.68	2.16	1.53	1.45	1.49	1.85	1.04	1.66	2.06	1.24
DTEd	2.71	3.03	2.35	2.27	2.31	2.66	1.96	2.47	2.87	2.06
DTEh	2.195	2.595	1.94	1.86	1.90	2.25	1.50	2.06	2.46	1.65

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ARP-WHS	ARP-WHS	ARP-WHS	ARP-WHS	ARF-SMB	ARF-SMB	ARF-SMB	ARF-SMB	ARF-SMB	ARF-SMB	ARF-SMB
SWAT ID	02-302	02-303	02-304	02-305	02-206	02-207	02-208	02-209	02-210	02-211	02-212
ECL ID	2948	2949	2950	2951	2892	2893	2894	2895	2896	2897	2898
GCMS File	030605A-7	030605A-8	030605A-9	030606-4	030513A-11	030603A-2	030603A-3	030603A-4	030603A-5	030603A-6	030603A-7
Ext_wt (g)	25.1	25.1	25.1	25.0	25	25.1	25	25.1	25	25	25.1
% Lipid	1.90	2.29	2.21	1.51	1.112	0.72	1.529	1.422	0.802	1.548	1.196
2,3,7,8-TCDF	5.97	7.96	4.46	4.18	1.396	1.084	2.701	2.348	1.393	2.395	1.664
1,2,3,7,8-PeCDF	0.547	0.769	<0.498	0.516	< 0.500	0.639	< 0.500	1.053	< 0.500	< 0.500	<0.498
2,3,4,7,8-PeCDF	0.821	1.19	0.736	0.721	< 0.500	0.672	0.645	1.143	< 0.500	0.725	0.733
1,2,3,4,7,8-HxCDF	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.664	< 0.500	< 0.500	<0.498
1,2,3,6,7,8-HxCDF	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.63	< 0.500	< 0.500	<0.498
2,3,4,6,7,8-HxCDF	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.509	< 0.500	< 0.500	<0.498
1,2,3,7,8,9-HxCDF	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.535	< 0.500	< 0.500	<0.498
1,2,3,4,6,7,8-HpCDF	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.641	< 0.500	< 0.500	<0.498
1,2,3,4,7,8,9-HpCDF	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.575	< 0.500	< 0.500	<0.498
OCDF	<0.996	<0.996	<0.996	< 1.00	< 1.00	<0.996	< 1.00	1.292	< 1.00	< 1.00	<0.996
2,3,7,8-TCDD	< 0.0996	0.102	< 0.0996	< 0.0996	< 0.100	0.171	< 0.100	0.201	< 0.100	< 0.100	< 0.0996
1,2,3,7,8-PeCDD	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.668	< 0.500	< 0.500	<0.498
1,2,3,4,7,8-HxCDD	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.623	< 0.500	< 0.500	<0.498
1,2,3,6,7,8-HxCDD	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.644	< 0.500	< 0.500	<0.498
1,2,3,7,8,9-HxCDD	<0.498	<0.498	<0.498	< 0.500	< 0.500	<0.498	< 0.500	0.603	< 0.500	< 0.500	<0.498
1,2,3,4,6,7,8-HpCDD	<0.498	<0.498	<0.498	< 0.500	< 0.500	0.525	< 0.500	0.591	< 0.500	< 0.500	<0.498
OCDD	<0.996	<0.996	<0.996	<1.00	<1.00	27	<1.00	1.23	<1.00	15.7	<0.996
DTEo	1.03	1.53	0.81	0.80	0.14	0.66	0.59	2.11	0.14	0.60	0.53
DTEd	1.95	2.35	1.76	1.62	1.33	1.47	1.54	2.11	1.33	1.55	1.48
DTEh	1.49	1.94	1.28	1.21	0.74	1.06	1.07	2.11	0.74	1.08	1.01

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ARF-SMB	ARF-SMB	ARF-SMB	ARF-sSMB-1	ARF-sSMB-3	ARF-sSMB-4	ARF-sSMB-5	ARF-sSMB-6	ARF-sSMB-7
SWAT ID	02-213	02-214	02-215	02-196	02-198	02-199	02-200	02-201	02-202
ECL ID	2899	2900	2901	2725	2726	2727	2728	2714	2729
GCMS File	030603A-8	030603A-9	030603A-10	031011C-4	031011C-5	031011C-6	031011C-7	031011C-12	031011C-8
Ext_wt (g)	25	25.1	25.1	52.6	30.3	30.2	34.2	24.9	31.3
% Lipid	0.719	0.941	1.295	2.29	2.73	3.55	2.32	1.93	2.06
2,3,7,8-TCDF	1.023	1.181	1.754	2.59	3.48	4.10	2.07	1.58	2.81
1,2,3,7,8-PeCDF	< 0.500	<0.498	<0.498	0.319	< 0.413	0.453	< 0.365	< 0.502	< 0.399
2,3,4,7,8-PeCDF	< 0.500	<0.498	0.662	0.779	0.704	0.769	0.415	< 0.502	0.605
1,2,3,4,7,8-HxCDF	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,6,7,8-HxCDF	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
2,3,4,6,7,8-HxCDF	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,7,8,9-HxCDF	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,4,6,7,8-HpCDF	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,4,7,8,9-HpCDF	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
OCDF	< 1.00	<0.996	<0.996	< 0.475	< 0.825	< 0.828	< 0.731	< 1.00	< 0.799
2,3,7,8-TCDD	<0.100	< 0.0996	< 0.0996	0.157	0.111	0.125	0.109	0.113	0.0940
1,2,3,7,8-PeCDD	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,4,7,8-HxCDD	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,6,7,8-HxCDD	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,7,8,9-HxCDD	< 0.500	<0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
1,2,3,4,6,7,8-HpCDD	< 0.500	0.498	<0.498	< 0.238	< 0.413	< 0.414	< 0.365	< 0.502	< 0.399
OCDD	3.12	36.3	<0.996	2.93	4.27	6.70	3.46	14.4	4.38
DTEo	0.10	0.13	0.51	0.822	0.811	0.943	0.524	0.272	0.678
DTEd	1.30	1.32	1.45	1.23	1.55	1.66	1.17	1.42	1.39
DTEh	0.70	0.72	0.98	1.03	1.18	1.30	0.85	0.85	1.03

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ARF-sSMB-9	ARF-sSMB-10	ARF-WHS	ARF-WHS	ARF-WHS	ARF-WHS	ARF-WHS-05	ARF-WHS-06	ARF-WHS-07	ARF-WHS-08
SWAT ID	02-204	02-205	02-261	02-262	02-263	02-264	02-265	02-266	02-267	02-268
ECL ID	2748	2749	2902	2903	2904	2905	2908	2909	2910	2911
GCMS File	031011C-9	031011C-10	030515-4	030515-5	030515-6	030515-7	03916B-6	03916B-7	03916B-8	03916B-9
Ext_wt (g)	60.1	67.4	25.1	25	25	25.1	25.0	25.1	25.0	25.1
% Lipid	2.64	2.21	2.409	3.234	2.108	1.829	3.29	2.25	2.09	2.73
2,3,7,8-TCDF	3.97	3.23	4.183	3.23	3.119	2.498	3.51	2.55	2.15	2.80
1,2,3,7,8-PeCDF	0.490	0.373	0.605	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
2,3,4,7,8-PeCDF	1.04	0.829	0.638	< 0.500	< 0.500	<0.498	0.511	< 0.498	< 0.500	< 0.498
1,2,3,4,7,8-HxCDF	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,6,7,8-HxCDF	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
2,3,4,6,7,8-HxCDF	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,7,8,9-HxCDF	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,4,6,7,8-HpCDF	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,4,7,8,9-HpCDF	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
OCDF	< 0.416	< 0.371	<0.996	< 1.00	< 1.00	<0.996	< 1.00	< 0.996	< 1.00	< 0.996
2,3,7,8-TCDD	0.155	0.126	0.146	<0.100	<0.100	< 0.0996	< 0.100	< 0.0996	< 0.100	< 0.0996
1,2,3,7,8-PeCDD	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,4,7,8-HxCDD	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,6,7,8-HxCDD	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,7,8,9-HxCDD	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
1,2,3,4,6,7,8-HpCDD	< 0.208	< 0.185	<0.498	< 0.500	< 0.500	<0.498	< 0.500	< 0.498	< 0.500	< 0.498
OCDD	4.08	3.37	2.47 B	<1.00	<1.00	2.04 B	< 1.00	18.5	22.4	2.72
DTEo	1.10	0.882	0.91	0.32	0.31	0.25	0.607	0.257	0.217	0.280
DTEd	1.46	1.20	1.73	1.52	1.51	1.45	1.60	1.49	1.46	1.52
DTEh	1.28	1.04	1.32	0.92	0.91	0.85	1.10	0.87	0.84	0.90

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ARF-WHS-09	ARF-WHS-10	ARY-SMB	ARY-SMB	ARY-SMB	ARY-SMB	ARY-SMB	ARY-SMB	ARY-SMB	ARY-SMB	ARY-SMB
SWAT ID	02-269	02-270	02-306	02-307	02-309	02-310	02-311	02-312	02-313	02-314	02-315
ECL ID	2912	2913	2952	2953	2955	2958	2959	2960	2961	2962	2963
GCMS File	03916B-10	03916B-11	030606-5	030606-6	030606-8	030606-11	030606-12	030606-13	030607A-1	030607A-2	030607A-3
Ext_wt (g)	25.0	25.2	25.0	25.0	25.1	25.0	25.2	25.0	25.0	25.1	25.0
% Lipid	1.90	2.97	1.00	1.28	1.65	0.800	0.980	0.942	0.703	0.857	1.15
2,3,7,8-TCDF	1.84	2.88	0.956	1.94	2.06	0.826	0.698	0.982	0.429	0.673	1.23
1,2,3,7,8-PeCDF	< 0.500	< 0.496	<0.500	0.518	0.545	< 0.500	< 0.496	< 0.500	< 0.500	< 0.498	0.507
2,3,4,7,8-PeCDF	< 0.500	< 0.496	<0.500	0.616	0.602	< 0.500	< 0.496	<0.500	<0.500	< 0.498	0.724
1,2,3,4,7,8-HxCDF	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,6,7,8-HxCDF	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
2,3,4,6,7,8-HxCDF	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,7,8,9-HxCDF	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,4,6,7,8-HpCDF	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,4,7,8,9-HpCDF	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
OCDF	< 1.00	< 0.992	< 1.00	< 1.00	<0.996	< 1.00	<0.992	<1.000	<1.000	<0.996	< 1.00
2,3,7,8-TCDD	< 0.100	< 0.0992	<0.100	0.100	< 0.0996	< 0.100	<0.0992	<0.100	<0.100	< 0.0996	0.128
1,2,3,7,8-PeCDD	< 0.500	< 0.496	<0.500	<0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,4,7,8-HxCDD	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,6,7,8-HxCDD	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,7,8,9-HxCDD	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
1,2,3,4,6,7,8-HpCDD	< 0.500	< 0.496	< 0.500	< 0.500	<0.498	< 0.500	< 0.496	<0.500	<0.500	< 0.498	< 0.500
OCDD	< 1.00	1.20	1.58	1.33	<0.996	1.67	3.79	<1.00	2.69	<0.996	1.06
DTEo	0.184	0.288	0.10	0.63	0.63	0.08	0.07	0.10	0.04	0.07	0.51
DTEd	1.42	1.52	1.29	1.45	1.45	1.28	1.26	1.29	1.24	1.26	1.33
DTEh	0.80	0.90	0.69	1.04	1.04	0.68	0.66	0.70	0.64	0.66	0.92

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ARY-SMB-05	ARY-WHS	ARY-WHS	ARY-WHS	ARY-WHS	ALV-SMB	[redacted]	ALV-SMB	ALV-SMB
SWAT ID	02-308Redo	02-316-C1	02-316-C1 DUP	02-316-C1 AVG	02-319-C2	02-328	[redacted]	02-326	02-329
ECL ID	3251	2964	2965		2981	2984	[redacted]	2982	2985
GCMS File	030923-6	030607A-4	030607A-5		030607A-6	030607A-8	[redacted]	030607A-7	030607A-9
Ext_wt (g)	25.1	25.0	25.0	25.0	25.0	25.1	[redacted]	25.1	25.1
% Lipid	0.972	3.44	3.39	3.41	4.37	0.847	[redacted]	0.724	0.582
2,3,7,8-TCDF	1.03	9.38	9.29	9.34	0.493	0.619	[redacted]	11.1	0.251
1,2,3,7,8-PeCDF	< 0.498	0.699	0.675	0.687	<0.500	<0.498	[redacted]	0.942	<0.498
2,3,4,7,8-PeCDF	< 0.498	1.10	1.12	1.109	<0.500	<0.498	[redacted]	1.46	<0.498
1,2,3,4,7,8-HxCDF	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,6,7,8-HxCDF	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
2,3,4,6,7,8-HxCDF	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,7,8,9-HxCDF	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,4,6,7,8-HpCDF	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,4,7,8,9-HpCDF	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
OCDF	< 0.996	< 1.00	< 1.00	< 1.00	< 1.00	<0.996	[redacted]	<0.996	<0.996
					<0.100		[redacted]		
2,3,7,8-TCDD	< 0.0996	0.228	0.221	0.225	<0.101	<0.0996	[redacted]	0.261	<0.0996
1,2,3,7,8-PeCDD	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,4,7,8-HxCDD	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,6,7,8-HxCDD	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,7,8,9-HxCDD	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
1,2,3,4,6,7,8-HpCDD	< 0.498	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	[redacted]	<0.498	<0.498
OCDD	< 0.996	<1.00	2.29	1.40	< 1.00	3.24B	[redacted]	<0.996	2.21B
DTEo	0.103	1.75	1.74	1.75	0.05	0.06	[redacted]	2.15	0.03
DTEd	1.34	2.57	2.56	2.57	1.24	1.25	[redacted]	2.96	1.22
DTEh	0.72	2.16	2.15	2.16	0.65	0.66	0.68	2.55	0.62

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ALV-SMB	ALV-SMB	ALV-SMB	ALV-SMB	ALV-SMB	ALV-SMB	ALV-SMB	ALV-WHS	ALV-WHS	AGI-SMB	AGI-SMB
SWAT ID	02-330	02-331	02-327	02-332	02-333	02-334	02-335	02-336-C1	02-337-C2	02-452	02-452
ECL ID	2986	2987	3144	3133	3134	3135	3136	2992	2995	3142	3001
GCMS File	030607A-12	030607A-13	030604a-6	030531B-8	030531B-9	030531B-10	030601-4	030607A-14	030607A-15	030604a-4	030609-8
Ext_wt (g)	25.1	25.1	25.0	25	25	25	25	25.1	25.1	25.1	25
% Lipid	0.840	0.540	0.464	0.561	0.583	0.589	0.589	3.08	2.91	0.620	0.59
2,3,7,8-TCDF	0.506	0.368	0.200	0.278	0.191	0.29	0.922	4.75	6.73	0.970	0.922
1,2,3,7,8-PeCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
2,3,4,7,8-PeCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	0.654	<0.498	< 0.500
1,2,3,4,7,8-HxCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,6,7,8-HxCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
2,3,4,6,7,8-HxCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,7,8,9-HxCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,4,6,7,8-HpCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,4,7,8,9-HpCDF	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
OCDF	<0.996	<0.996	<1.000	< 1.00	< 1.00	< 1.00	< 1.00	<0.996	<0.996	<0.996	< 1.00
2,3,7,8-TCDD	0.112	<0.0996	<0.100	< 0.100	< 0.100	< 0.100	0.106	0.116	0.189	0.129	0.11
1,2,3,7,8-PeCDD	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,4,7,8-HxCDD	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,6,7,8-HxCDD	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,7,8,9-HxCDD	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
1,2,3,4,6,7,8-HpCDD	<0.498	<0.498	<0.500	< 0.500	< 0.500	< 0.500	< 0.500	<0.498	<0.498	<0.498	< 0.500
OCDD	3.20B	<0.996	3.38 B	<1.00	<1.00	1.93 B	2.01 B	2.86B	3.87B	2.53 B	55.2
DTEo	0.16	0.04	0.02	0.03	0.02	0.03	0.20	0.61	1.19	0.23	0.21
DTEd	1.25	1.23	1.22	1.22	1.21	1.22	1.29	1.70	2.03	1.32	1.30
DTEh	0.71	0.63	0.62	0.63	0.62	0.63	0.75	1.15	1.61	0.77	0.76

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	AGI-SMB	AGI-SMB	AGI-SMB	AGI-SMB	AGI-SMB	AGI-WHS	AGI-WHS-C1	ALW-SMB	ALW-SMB-C2	ALW-WHP
SWAT ID	02-452	02-453	02-449	02-450	02-451	02-454-C2	02-456-C1	02-479-C1	02-480-C2	02-464-C1
ECL ID	ave	3143	3137	3138	3139	3005	3147	3008	3148	3006
GCMS File		030604a-5	030601-5	030601-6	030601-7	030609-9	030604a-7	030609-11	030604a-8	030609-10
Ext_wt (g)		25.0	25	25.1	25.1	25	25.1	25.1	25.1	25.2
% Lipid	0.61	0.610	0.792	0.554	0.884	1.92	1.66	1.317	0.975	1.665
2,3,7,8-TCDF	0.95	0.670	0.554	0.445	0.551	7.7	5.81	0.817	0.355	1.22
1,2,3,7,8-PeCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	0.628	< 0.498	<0.498	< 0.498	<0.496
2,3,4,7,8-PeCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	0.972	0.681	0.693	< 0.498	0.774
1,2,3,4,7,8-HxCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	<0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,6,7,8-HxCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
2,3,4,6,7,8-HxCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,7,8,9-HxCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,4,6,7,8-HpCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,4,7,8,9-HpCDF	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
OCDF	#DIV/0!	<1.000	< 1.00	<0.996	<0.996	< 1.00	<0.996	<0.996	<0.996	<0.992
2,3,7,8-TCDD	0.12	0.124	0.156	0.111	< 0.0996	0.281	0.223	0.131	< 0.0996	0.102
1,2,3,7,8-PeCDD	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,4,7,8-HxCDD	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,6,7,8-HxCDD	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,7,8,9-HxCDD	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	< 0.500	< 0.498	< 0.498	< 0.498	<0.496
1,2,3,4,6,7,8-HpCDD	#DIV/0!	<0.500	< 0.500	<0.498	<0.498	1.43	< 0.498	< 0.498	< 0.498	0.73
OCDD	55.20	2.24 B	<1.00	<0.996	1.07 B	78.8	2.87 B	2.48	1.37 B	44.4
DTEo	0.22	0.19	0.21	0.16	0.06	1.59	0.00	0.56	0.04	0.24
DTEd	1.31	1.29	1.31	1.25	1.25	2.41	0.00	1.40	1.23	1.32
DTEh	0.76	0.74	0.76	0.70	0.65	2.00	0.00	0.98	0.63	0.78

Appendix 8. Dioxin and furan concentrations in 2002 fish samples.

DEP ID	ALW-WHP-C2	Pocasset-SMB	Pocasset-SMB	Pocasset-SMB
SWAT ID	02-465-C2	02-489-C1	02-489-C1 DUP	02-489-C1 AVG
ECL ID	3179	3125	3126	
GCMS File	030602A-3	030531B-3	030531B-4	
Ext_wt (g)	25.1	25	25.1	25.1
% Lipid	1.095	0.977	1.844	1.411
2,3,7,8-TCDF	1.244	0.101	0.11	0.106
1,2,3,7,8-PeCDF	<0.498	< 0.500	<0.498	<0.498
2,3,4,7,8-PeCDF	0.742	< 0.500	<0.498	<0.498
1,2,3,4,7,8-HxCDF	<0.498	< 0.500	<0.498	<0.498
1,2,3,6,7,8-HxCDF	<0.498	< 0.500	<0.498	<0.498
2,3,4,6,7,8-HxCDF	<0.498	< 0.500	<0.498	<0.498
1,2,3,7,8,9-HxCDF	<0.498	< 0.500	<0.498	<0.498
1,2,3,4,6,7,8-HpCDF	<0.498	< 0.500	<0.498	<0.498
1,2,3,4,7,8,9-HpCDF	<0.498	< 0.500	<0.498	<0.498
OCDF	<0.996	< 1.00	<0.996	<0.996
2,3,7,8-TCDD	0.116	< 0.100	< 0.0996	< 0.0996
1,2,3,7,8-PeCDD	< 0.498	< 0.500	<0.498	<0.498
1,2,3,4,7,8-HxCDD	< 0.498	< 0.500	<0.498	<0.498
1,2,3,6,7,8-HxCDD	< 0.498	< 0.500	<0.498	<0.498
1,2,3,7,8,9-HxCDD	< 0.498	< 0.500	<0.498	<0.498
1,2,3,4,6,7,8-HpCDD	< 0.498	< 0.500	<0.498	<0.498
OCDD	1.452	1.38 B	6.1 B	3.74
DTEo	0.61	0.01	0.01	0.01
DTEd	1.45	1.21	1.21	1.21
DTEh	1.03	0.61	0.61	0.61