



# **EPA Statistical Support Document for the Development of Round 2 Biosolids Use or Disposal Regulations**



## **Acknowledgments**

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## I. EXECUTIVE SUMMARY

In accordance with Section 405(d) of the amended Clean Water Act, the Environmental Protection Agency (EPA) proposed a limitation of 300 parts per trillion (ppt) toxic equivalents (TEQs) of dioxin, furan and dioxin-like coplanar polychlorinated biphenyls (PCBs) in biosolids. Under the proposed limitation, biosolids containing a TEQ in excess of this proposed limitation may not be land applied. Additionally, EPA also proposed that publicly owned treatment works (POTWs), privately owned treatment works, and secondary preparers producing biosolids containing dioxin and dioxin-like TEQs in the range of 30 to 300 ppt be required to monitor their TEQs annually. Covered facilities producing less than 30 ppt TEQs would monitor every 5 years.

Supporting regulation development for the use or disposal of biosolids containing dioxin and dioxin-like compounds, this document presents estimates describing the dry weight amount of biosolids used or disposed at various-sized treatment works across the country, distribution of TEQs of dioxin and dioxin-like compounds in biosolids from POTWs across the country, and the variability over time of dioxin and dioxin-like TEQs in biosolids from three POTWs.

The estimated dry weight of biosolids used and disposed by POTWs were determined from data collected in the EPA's 1988 National Sewage Sludge Survey (NSSS). Dioxin and dioxin-like TEQs in biosolids as measured during the 2001 and 1988 NSSS support distributional assessments. It should be noted that chemical analytical techniques differed between the 1988 and 2001 surveys. In 1988, dioxin-like coplanar PCBs were measured as aroclors. Since the percentage of coplanar PCBs that comprise the aroclors are not publicly available, TEQs for the dioxin-like PCBs are not provided in this report. By contrast, the individual dioxin-like PCBs were measured in the 2001 NSSS and their TEQs are reported. Also, during the 1988 NSSS, the percent solids of each biosolid sample was quantified and a standard volume of each was subjected to chemical analyses. Dry weight amounts of the dioxin and furans were then determined mathematically based on the sample's percent solids. In 2001, the sample's volume was adjusted based on percent solids and this adjusted volume was then submitted for chemical analyses. Finally, characterization of dioxin and dioxin-like TEQs in biosolids over time was determined from long term monitoring data provided voluntarily to the EPA by three POTWs.

The EPA conducted the 1988 NSSS to support the development and promulgation of "Round 1" regulations. POTWs that practiced secondary or higher treatment of waste water were sampled from flow categories according to a statistical probability design. In 1988, biosolids from 174 POTWs were measured for dioxins and furans. Dioxin-like PCBs were measured as aroclors. During the 1988 NSSS, biosolid samples were obtained after final treatment just prior to use or disposal. EPA's 2001 NSSS characterized the dioxin and dioxin-like TEQ levels in biosolids produced by POTWs during that year. The 2001 NSSS sample of 94 POTWs was drawn from EPA's 1988 NSSS. The 94 sampled POTWs that practiced secondary or higher treatment of wastewater in 2001 projects to 6,857 POTWs in the Nation.

The maximum observed total dioxin/furan and dioxin-like PCB TEQs from the 2001 NSSS is 718 ppt. Of the 94 POTWs in the sample, only two POTWs exceeded the 300 ppt limitation. One POTW is in the category that treats more than 10 million but less than 100 million gallons of wastewater per day. The other is from the category of POTWs that treats more than 1 million but less than 10 million gallons of wastewater per day. Together, these two POTWs represent 61 of the 6,857 POTWs in the Nation in 2001 that practice secondary or higher treatment of wastewater— or 0.9 percent of the POTWs in the Nation. The 99<sup>th</sup> percentile estimate of total dioxin/furan and dioxin-like PCB TEQs from the 2001 NSSS ranges from 114 to 138 ppt, depending on the method used for congeners or aroclors not measured above the

minimum level (ML) of quantitation in a sample. The percentage of POTWs that produce biosolids with less than 30 ppt of dioxin and dioxin-like TEQs ranges from 79 percent to 73 percent, depending on the method used to produce estimates when dioxins are not measured above the ML in a POTW's biosolids sample. When the value zero is substituted for dioxin congeners not measured above the ML, 79 percent of the POTWs that practice secondary or higher treatment of wastewater in 2001 are below the total dioxin and dioxin-like TEQ 30 ppt limit and therefore would be required to monitor every 5 years. If the congener's ML values is substituted for those samples from which the congener was not measured above the ML, then 73 percent of the POTWs in 2001 produce biosolids containing less than 30 ppt TEQs of dioxin.

Of the three POTWs that supplied self-monitoring data, one submitted 90 monthly dioxin and furan TEQs. These data were collected from 1991 through 2000. Although total dioxin and furan TEQs were less than 300 ppt from March 1992 through May 1993, TEQs ranged from 100 to 265 ppt during that time. After that, only three monthly TEQs exceeded 100 ppt. One of these values, 325 ppt, occurred in November 1994. The high TEQ for this month was dominated by a high OCDD measurement. The remaining POTWs reported monthly self-monitoring TEQs from 2000 and 2001. These total TEQs were rather consistent over time; however, the POTWs did report total TEQs in excess of 30 ppt and thus would be required to monitor under this "Round 2" regulation.

## **II. INTRODUCTION**

Under the authority of Section 405(d) Clean Water Act, as amended, the Environmental Protection Agency (EPA) is promulgating limitations for use or disposal of biosolids (40 CFR 503). Biosolids are treated sewage sludge, which is a byproduct of municipal wastewater treatment. Land application, surface disposal, and incineration are the regulated uses or disposal practices for biosolids.

In 1993, EPA promulgated limits for nine toxic pollutants in biosolids that are to be land applied, surface disposed, or incinerated. Regulated pollutants included metals, pathogens, and total hydrocarbons. The 1993 limitations are referred to as the "Round 1" regulation for use and disposal of biosolids. In December 1999, EPA proposed a "Round 2" limitation of 300 parts per trillion (ppt) toxic equivalents (TEQs) of dioxins. Ppt is equivalent to nanograms per kilogram (ng/kg). The term "dioxins" is used in this document to encompass dioxins and dioxin-like polychlorinated biphenyls (PCBs). This group of dioxin-like chemicals have similar chemical properties and can thus elicit common toxic responses.

Under the proposed Round 2 regulation, biosolids containing more than 300 ppt TEQs of dioxin may not be land applied. The proposed Round 2 regulation also requires that all facilities test biosolids to be land applied for dioxins. Publicly owned treatment works (POTWs) finding dioxin TEQ levels between 30 and 300 ppt in their biosolids would be required to monitor dioxin levels annually. POTWs with less than 30 ppt of TEQs of dioxin would be required to monitor the dioxin levels in their biosolids once every 5 years. Exceptions to this testing requirement would be biosolids from POTWs that treat less than one million gallons of wastewater per day and small POTWs that prepare less than 290 dry metric tons of sewage sludge annually.

EPA conducted the 1988 National Sewage Sludge Survey (NSSS) to support the development and promulgation of Round 1 regulations. This survey was conducted according to a statistical probability sample design. Biosolids from 174 POTWs were sampled and chemically analyzed. These samples projected to 7,714 POTWs in the Nation in 1988. In support of Round 2 regulation development, EPA conducted a 2001 NSSS. The Agency obtained biosolids samples from 94 POTWs that participated in



the 1988 NSSS analytical survey. The samples in the 2001 NSSS project to 6,857 POTWs in the Nation in 2001. Section III of this report describes the sampling plan for the 2001 NSSS. It also includes a discussion of sample weights and their application for projecting sample estimates to POTWs in the Nation.

This report presents three information components that are integral to risk assessment and regulation development, including: quantity of biosolids used and disposed; the amount of dioxin and dioxin-like TEQs in disposed solids, and the variability of the TEQ amounts over time. Section IV of this report presents national estimates of the dry weight amounts of biosolids disposed by POTWs for 1988. The 2001 NSSS did not collect disposal amount information. Section V provides summary statistics for 2001 dioxin and dioxin-like pollutants, including three sets of tabulated estimates of the mean, median, and upper percentiles by congener. The estimates differ by the value that enters the estimation algorithms when a congener is not measured above the minimum level (ML) in a sample. The three methods substitute the values zero, one-half the ML, and the ML of the congener, respectively, when a congener is not measured above the ML in a sample.

Application of toxic equivalent factors (TEFs) to POTW congener dry weight concentrations is the basis for estimating TEQs. The products of congener TEFs and congeners' dry weight concentrations from the POTWs sample are summed across congeners to produce the POTWs TEQ. Section V reports total TEQs for dioxins and furans; total TEQs for co-planar PCBs; and total TEQs for dioxins, furans, and co-planer PCBs from the 2001 NSSS. Again, national estimates are presented for each of three substitution methods when a congener is not measured above the ML in a POTW sample.

Section V also provides side-by-side estimates of dioxin and furan TEQs from the 2001 and 1988 NSSS. Graphical empirical cumulative distributions of TEQs from the 2001 and 1988 NSSS augment tabulated estimates. Appendices C and D list cumulative empirical distributions underlying the graphics presentations. Results of statistical tests of differences in the national average amounts of total dioxin and furan TEQs between 1988 and 2001 are presented in Section V.

Three POTWs submitted monthly self-monitoring data. Data were collected predominantly during 2000. However, one POTW provided data from 1991 through 2000. Section VI presents summary statistics for TEQs and displays graphical presentations of these data over time.

### **III. ANALYTICAL DATA AND METHODS**

This section defines the sample design and resulting weights for the 2001 NSSS. Because the 1988 NSSS is the basis from which the 2001 NSSS was drawn, Section IIIA presents a description of the 1988 NSSS. Section IIIB provides a description of the conventions and statistical methods employed to generate estimates presented in this report. Sections IIIC and IIID discuss TEFs and statistical methods.

#### **IIIA. SAMPLE DESIGN AND SURVEY WEIGHTS**

To support Round 1 regulatory development efforts, EPA's 1988 NSSS collected biosolids quantity and pollutant occurrence data from a national probability sample of POTWs practicing at least secondary treatment of wastewater. Operationally, secondary treatment was defined as a primary clarifier process followed by biological treatment and secondary clarification. In 1988, 11,407 POTWs in the 50 states, Puerto Rico, and the District of Columbia met these criteria.

A statistical probability sample of 208 POTWs in the contiguous states and the District of Columbia comprised the analytical component of the 1988 NSSS. These POTWs were randomly drawn from secondary or higher treatment POTWs that were categorized into one of four strata based on their average daily flow of influent wastewater. These strata are defined as:

- Flow greater than 100 million gallons per day (MGD)
- Flow more than 10 MGD but less than or equal to 100 MGD
- Flow more than 1 MGD but less than or equal to 10 MGD
- Flow less than or equal to 1 MGD.

EPA contract personnel collected biosolids samples from 180 POTWs in the analytical component of the NSSS. Samples were collected just prior to use or disposal of the biosolids. All sample collection and preservation was conducted according to protocol. Contract laboratories analyzed each biosolids sample for percent solids and the concentration of 412 analytes. Method 1613 measured dibenzofurans and dioxins in a standardized sample volume. Coplanar PCBs were measured as PCB aroclors. Chemical analysis methods were either developed, chosen, or adapted to allow for the most reliable and accurate measurement of the subject analytes in the biosolids matrix. The concentration of quantified chemicals in 1988 samples were converted to dry weight measures based on their percent solids so that dioxin and furan TEQs would be comparable across the range of samples.

A more detailed discussion the NSSS sampling plan, POTWs, and data are included in a November 1992 final report titled “Statistical Support Documentation for the 40 CFR, Part 503 Final Standards for the Use or Disposal of Sewage Sludge.”

A total of 208 POTWs were selected for sampling as part of the analytical component of EPA’s 1988 NSSS. However, 32 POTWs were excluded from statistical analyses because biosolid samples were not obtained after the completion of secondary treatment of wastewater.

National concentration estimates of toxic equivalence of dioxins and furans were calculated from a sample of 174 POTWs. Biosolid samples from SurveyIDs 23-07-036 (Episode=1554) and 35-05-012 (Episode=1561) were not analyzed for the dioxin and furans during the NSSS. Therefore, dioxin and furan estimates, generated from a sample of 174 POTWs, apply to a population of 7,714 POTWs.

From the 1988 NSSS, a sample 101 POTWs was statistically drawn. Of these 101 POTWs, seven were either no longer in business or did not produce biosolids. These seven POTWs—one in stratum two, three in stratum three, and three in stratum four—represent 855 POTWs in the population of 7,714 POTWs in the Nation that practiced secondary or higher treatment of wastewater in 1988. The table below presents the descriptive sampling statistics for the 2001 NSSS.

**TABLE 1: 2001 NSSS Survey Weights**

STRATUM (H)	SAMPLE SIZE(N <sub>H</sub> )	OPERATING POTWS IN SAMPLE	ADJUSTED STRATUM (N <sub>H</sub> )	SAMPLING FRACTION (N <sub>H</sub> /N <sub>H</sub> )	STRATUM WEIGHT (N <sub>H</sub> /N)
1	11	11	27	11/27	27/6,857
2	30	29	291	29/291	291/6,857
3	36	33	1,685	33/1,685	1,685/6,857
4	24	21	4,854	21/4,854	4,854/6,857
<b>3</b>	<b>101</b>	<b>94</b>	<b>6,857</b>		<b>1.000</b>

The primary assumption underlying the statistical sample design of the 2001 NSSS is that the population consists of 7,714 POTWs across the four strata. These strata categorize the POTWs according to the average daily flow of influent wastewater. The strata definitions and the strata sizes based on the 1988 population are tabulated in the table below.

**TABLE 2: Strata Definitions and Sizes**

STRATUM	STRATUM DEFINITION	NUMBER OF POTWS IN THE POPULATION STRATUM
1	FLOW GREATER THAN 100 MGD	27
2	FLOW >10 MGD BUT #100 MGD	301
3	FLOW >1 MGD BUT #10 MGD	1,838
4	FLOW #1 MGD	5,548
<b>TOTAL</b>		<b>7,714</b>

The sampling fractions for the 2001 NSSS were derived using Bayes Theorem. Define A<sub>h</sub> as the event that a POTW was randomly drawn from the N<sub>h</sub> POTWs in stratum h of the 1988 population of POTWs. Define B<sub>h</sub> as the event that a POTW was randomly drawn for the 2001 NSSS. The event B/A indicates that a POTW in the 2001 NSSS was randomly selected from the sample of n<sub>h</sub> POTWs in the 1988 NSSS to be included in the 2001 NSSS. The event AB is defined as the event that a POTW is in both the 1988 NSSS and 2001 NSSS.

Thus, using Bayes Theorem,

$P[B_h/A_h]*P[A_h]=P[AB_h]$  applied to stratum one yields a sampling fraction (  $P[AB_h]$ ) of 11/27 because  $P[B_h/A_h]*P[A_h]=11/19*19/27$ .

### IIIB. DATA CONVENTIONS

From 2001 NSSS biosolids samples, EPA quantified dioxin and furans using EPA Method 1613B. PCB concentrations were determined by EPA Method 1668A. Because the amount of biosolids differs per sample, EPA adjusted sample volume by percent solids to report quantified amounts on a dry weight basis. This allowed sample concentrations to be compared on the same basis. Units of measure are ppt (ng/kg).

Before calculating the national estimates of dioxin, furans, and dioxin-like PCBs presented in Section V of this report, pollutant concentrations were aggregated on a POTW basis to form one concentration value per POTW for each pollutant. For POTWs with multiple samples, the pollutant concentrations were averaged together. Each aggregate concentration is considered to be detected above the pollutant's ML if at least one of the samples was detected above the ML. If a pollutant was not measured above the ML, estimates were calculated using three substitution methods. These methods substituted the value zero, one-half the ML, or the ML value when a congener was not measured above the ML in a POTW's sample.

### IIIC. TOXIC EQUIVALENTS

Dioxins, used in this report to refer to dioxin-like compounds, consist of polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, and co-planar PCBs. Because dioxins are of similar chemical structure, they express similar toxicity. TEFs standardize the toxicity of dioxin congeners to 2, 3, 7, 8 tetrachlorodibenzo-p-dioxin (TCDD). The World Health Organization (WHO) provides a TEF scheme that includes TEFs for coplanar PCBs in addition to those for dioxin and furans. Van den Berg, et. al published "Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, and PCDFs for Humans and Wildlife" in the 1998, volume 106 issue of Environmental Health Perspectives. Table 3 lists the WHO-98 TEFs.

Section V of this report presents TEQs. National estimates of TEQs at the congener level are generated from POTW TEQs resulting from the product of the congener's TEF times the congener's dry weight concentration in the POTW's biosolid sample. Total TEQs for dioxin and furans, coplanar PCBs, and total dioxin and dioxin-like compounds from a POTW's sample were mathematically aggregated by summing the congener TEQs from a POTW's sample.

$$TEQ = (Congener_i \times TEF_i) + (Congener_j \times TEF_j) + \dots + (Congener_n \times TEF_n)$$

### IIID. STATISTICAL METHODS

Section V of this report presents national summary statistics for dioxins and dioxin TEQs. Estimates of the mean and standard deviations of the empirical measures were generated according to stratified random sampling procedure listed in Cohen's 1977 edition of "Sampling Techniques." The weights are those tabulated in this section.

EPA calculated percentile estimates using the nonparametric, weighted cumulative distribution function (CDF) technique described below.

Denote the dry weight, or the TEQ concentration of a given pollutant in the sampled biosolid from the  $j^{\text{th}}$  POTW in the  $i^{\text{th}}$  survey flow stratum as  $X_{ij}$ . The values of the variable  $X_{ij}$  are then sorted in order of

increasing TEQ or concentration. The values of the adjusted survey weights ( $W_i$ ) associated with the ordered values of  $X_{ij}$  are then summed until the first occurrence of  $p$ .

If  $X_p$  is defined as the concentration of the  $p^{\text{th}}$  percentile then,

$$X_p = F(X) \geq p \text{ where } F(X) = \sum_{i=1}^4 w_i F_i(X)$$

with

$$F_i = \sum_{j=1}^{n_{ij}} \frac{I(X_{ij} \leq x)}{n_{ij}} \quad \text{and}$$

$$I(X_{ij} \leq x) = 1 \text{ if } X_{ij} \leq x \text{ for } x \geq 0 \\ = 0 \text{ otherwise.}$$

To determine the TEQ or pollutant concentration associated with the  $p^{\text{th}}$  percentile, an inverse function was applied to the cumulative distribution function. Define the  $p^{\text{th}}$  percentile as  $F_X(x_p)$  such that  $P[X \leq x_p] \geq p/100$ . The inverse of this function  $F^{-1}(p)$ , is the smallest value of  $x$  satisfying  $F_X(x) \geq p$  where  $p$  is the desired percentile point ( $P$ ) divided by 100.

Because the cumulative distribution created by application of the formula is empirical, integer valued percentile points are not always realized. The convention applied to determine the TEQ concentration associated with the  $p^{\text{th}}$  integer percentile from the empirical distribution function was to determine the smallest TEQ concentration value  $x$  such that  $F_X(x) \geq p$ . This value was denoted  $x_{p+}$  and is the  $q^{\text{th}}$  ordered TEQ concentration. The next smallest TEQ concentration from  $x_{p+}$ , or the concentration associated with the  $(q-1)$ st ordered TEQ concentration was then identified. The TEQ concentration value for the  $p^{\text{th}}$  percentile was obtained using linear interpolation between the  $q^{\text{th}}$  and  $(q-1)$  values.

**TABLE 3: WHO—Toxicity Equivalency Factors\***

<b>DIOXIN/FURAN CONGENER</b>	<b>TEF</b>
OCTACHLORODIBENZO-P-DIOXIN	0.0001
OCTACHLORODIBENZOFURAN	0.0001
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.010
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.010
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.100
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.100
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.010
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.10

<b>DIOXIN/FURAN CONGENER</b>	<b>TEF</b>
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.100
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.000
1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.050
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.100
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.100
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.100
2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.500
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.000
2,3,7,8-TETRACHLORODIBENZOFURAN	0.100
<b>CO-PLANAR POLYCHLORINATED BIPHENYLS</b>	<b>TEF</b>
PCB-77	0.0001
PCB-81	0.0001
PCB-126	0.1
PCB-169	0.01
PCB-105	0.0001
PCB-118	0.0001
PCB-123	0.0001
PCB-156	0.0005
PCB-157	0.0005
PCB-167	0.00001
PBC-114	0.0005
PCB-170	0.0000
PCB-180	0.0000
PCB-189	0.0001

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

#### **IV. DRY WEIGHTS OF BIOSOLIDS DISPOSED IN 1988**

The dry weight of biosolids disposed by POTWs is recorded in the 1988 NSSS. This information is not available for the POTWs in the 2001 NSSS. As a point of reference, Table 4 records mean, maximum, and upper percentiles of dry weight biosolids disposed in 1988 by POTWs that practice secondary or greater treatment of wastewater. Estimates are presented by flow groups. Table 4 includes three sets of disposal statistics for each flow stratum. These sets include those POTWs in the stratum that reported zero tons of biosolids disposed. The second set excludes POTWs reporting zero biosolids disposed. Finally, since Round 2 applies to land application, the third set of disposal statistics record dry weights of biosolids disposed by those POTWs in 1988 that indicated that they used land application as their major disposal practice.

Table 4 indicates that in 1988, at least half of the POTWs treating less than one million gallons of wastewater per day were less than the 290 dry weight metric tons exemption. Actually, 90 percent of the POTWs in the nation in 1988 that treated less than one million gallons of wastewater per day disposed less than 290 metric tons of biosolids annually.

**TABLE 4: Dry Weights of Biosolids Disposed in 1988 (U.S. Tons)**

POTWS	MEAN	50 <sup>TH</sup> %	95 <sup>TH</sup> %	99 <sup>TH</sup> %	MAXIMUM
<b>POTWS TREATING &gt; 100 MGD</b>					
ALL REPORTED DISPOSED (ZEROS INCLUDED)	46,900	27,800	150,000	235,000	262,000
ALL REPORTED DISPOSED (ZEROS EXCLUDED)	48,700	28,300	151,000	236,000	262,000
ALL LISTING LA AS A MAJOR DISPOSAL PRACTICE	25,800	15,200	69,500	87,800	92,300
<b>POTWS TREATING &gt; 10 MGD BUT # 100 MGD</b>					
ALL REPORTED DISPOSED (ZEROS INCLUDED)	6,310	4,370	20,500	26,200	39,900
ALL REPORTED DISPOSED (ZEROS EXCLUDED)	6,410	4,400	20,700	26,200	39,900
ALL LISTING LA AS A MAJOR DISPOSAL PRACTICE	4,560	2,830	12,900	14,000	14,200
<b>POTWS TREATING &gt; 1 MGD BUT #10</b>					
ALL REPORTED DISPOSED (ZEROS INCLUDED)	670	357	1,890	5,180	13,600
ALL REPORTED DISPOSED (ZEROS EXCLUDED)	691	390	1,900	5,390	13,600
ALL LISTING LA AS A MAJOR DISPOSAL PRACTICE	581	297	1,760	2,500	13,600
<b>POTWS TREATING # 1 MGD</b>					
ALL REPORTED DISPOSED (ZEROS INCLUDED)	51.7	31.9	247	436	5,630
ALL REPORTED DISPOSED (ZEROS EXCLUDED)	85.6	31.0	351	457	5,630
ALL LISTING LA AS A MAJOR DISPOSAL PRACTICE	78	22.0	347	455	958



## **V. NSSS NATIONAL SUMMARY STATISTICS—DIOXINS, FURANS, AND DIOXIN-LIKE PCB TOXIC EQUIVALENT ESTIMATES**

This section is comprised of four subsections. Section VA describes how 2001 NSSS dioxin and dioxin like compounds were measured. It also directs the reader to appendices that list descriptive statistics across the 94 POTWs in the 2001 NSSS for each measured compound. Section VB presents tabulated national estimates of TEQs from the 2001 NSSS. Since the proposed regulation includes testing exceptions for POTWs that treat less than one million gallons of wastewater per day, Section VC reports 2001 TEQ descriptive statistics for POTWs treating less than one million gallons of wastewater and those treating more than one million gallons. Finally, Section VD presents statistical tests of differences between the national mean dioxin and furan TEQs from 1988 and 2001.

### **VA. 2001 NSSS DIOXIN AND DIOXIN-LIKE CONCENTRATION DESCRIPTIVE STATISTICS**

Exhibits 1–3 in Appendix A present national summary statistics for 2001 NSSS pollutant concentrations. All units are ppt (or ng/kg). Dioxins and furans were measured using EPA method 1613B. PCBs were quantified using EPA Method 1668A. Sample volumes were adjusted according to percent solids prior to chemical analysis.

For each pollutant and aggregated or total pollutants, the tables report pollutant type, unit of measure, sample size, an estimate of the national percent detect, the observed maximum, and the 99<sup>th</sup>, 98<sup>th</sup>, 95<sup>th</sup>, 90<sup>th</sup> and median percentiles estimated from empirical national, cumulative distributions of pollutant concentrations. The column labeled “Sample Size” records the number of POTWs in the NSSS from which data were used to generate the reported estimates.

The exhibits differ according to the method used to account for nondetected congeners. A congener is considered a nondetection if it is not measured above the ML in a POTW’s biosolids sample. Incorporating nondetected samples into national estimates is important because if they are excluded, then estimates are biased high. Exhibit 1 reports national estimates that substituted the value zero for a congener that was not measured above the ML. This set of estimates is the least conservative with respect to the environment. Exhibit 2 records national estimates with one-half the ML value incorporated for nondetected samples. Finally, the most environmentally conservative estimates are listed in Exhibit 3. These estimates incorporated a congener’s ML value for those samples from which the congener was not measured above the ML.

The maximum observed value of 2, 3, 7, 8 TCDD in the 2001 NSSS was 47.20 ng/kg. The 99<sup>th</sup> percentile estimate from the empirical cumulative distribution of 2, 3, 7, 8 TCDD is 5.09 ng/kg. Biosolids from 99 percent of the POTWs in 2001 measured 2, 3, 7, 8 TCDD above the ML. PCB-126, which is the coplanar PCB with the highest TEF of 0.1, was measured above the minimum value in 49 percent of the 2001 NSSS biosolids samples. The observed maximum ranges from is 503 ng/kg to 908 ng/kg for the nondetection substitutions of zero and the ML, respectively. The exhibits demonstrate that most of the congeners display large standard deviations. This indicates that the observed values of the congeners vary widely.

**VB. 2001 NSSS NATIONAL SUMMARY STATISTICS—DIOXINS AND DIOXIN-LIKE PCB TOXIC EQUIVALENT ESTIMATES**

Exhibits 4–6 in Appendix B present TEQ national summary statistics for 2001 NSSS pollutants. The WHO-98 TEFs were applied to generate TEQs. All units are ppt or ng/kg.

The convention applied for nondetections, as described in Section VA, were applied when estimating TEQ summary statistics. Exhibit 4 records TEQ estimates with the value zero, entering a POTW’s TEQ when a congener is not measured above the ML in a sample. Exhibits 5–6 present TEQ estimates that use the values of one-half the ML and the ML, respectively, when a congener is not measured above the ML in a sample.

Total TEQs estimates from Exhibits 4–6 are listed in the following table.

**TABLE 5: 2001 NSSS National TEQ Estimates—Total TEQs**

<b>METHOD</b>	<b>MEAN</b>	<b>STD. DEV.</b>	<b>MAX.</b>	<b>99<sup>TH</sup> %</b>	<b>98<sup>TH</sup> %</b>	<b>95<sup>TH</sup> %</b>	<b>90<sup>TH</sup> %</b>	<b>50<sup>TH</sup> %</b>
<b>TOTAL DIOXIN AND FURAN TEQs</b>								
0	21.70	47.5	682.00	100.00	54.40	33.30	31.40	15.50
½ ML	21.70	47.5	682.00	100.00	54.40	33.30	31.60	15.50
ML	21.80	47.5	682.00	100.00	54.40	33.30	31.70	15.50
<b>TOTAL COPLANAR PCB TEQs</b>								
0	5.22	10.3	58.30	50.60	44.80	13.10	9.66	2.05
½ ML	9.87	14.0	58.30	55.10	54.50	49.40	19.20	6.04
ML	14.50	22.4	103.00	97.2	91.60	78.00	35.00	8.11
<b>TOTAL DIOXIN AND DIOXIN-LIKE TEQs</b>								
0	26.90	49.6	718.00	114.00	76.60	59.30	42.80	19.70
½ ML	31.60	50.0	718.00	115.00	80.10	73.50	55.10	23.40
ML	36.30	52.7	718.00	138.00	96.00	113.00	69.10	24.00

The coplanar PCBs exhibit more nondetections than the dioxin and furans. Therefore, their estimates are more sensitive to substitution methods. The POTW with the maximum observed dioxin and furan TEQ is not the same POTW with the maximum observed coplanar PCB. Appendix C presents the empirical cumulative distributions for the 2001 TEQ estimates.

**VC. 2001 NSSS NATIONAL DIOXIN AND DIOXIN-LIKE TEQs BY FLOW GROUP**

Because Round 2 regulations provide a testing exception for those POTWs that process less than one million gallons of wastewater per day, EPA evaluated TEQ summary statistics for this group of 2001 NSSS POTWs in comparison to those POTWs that treat more than one million gallons of wastewater per day. There are 21 POTWs in the 2001 NSSS that treat less than one million gallons of wastewater per day. These 21 sampled POTWs project to 4,854 POTWs in the Nation. The remaining 73 sampled POTWs treat more than one million gallons of wastewater per day and project to 2003 POTWs in the Nation. Table 6 presents TEQ statistics for this dichotomy of POTWs.

**TABLE 6: 2001 NSSS Total Dioxin and Furan and Dioxin-Like PCB National TEQ Estimates—  
POTWs By Flow Groups**

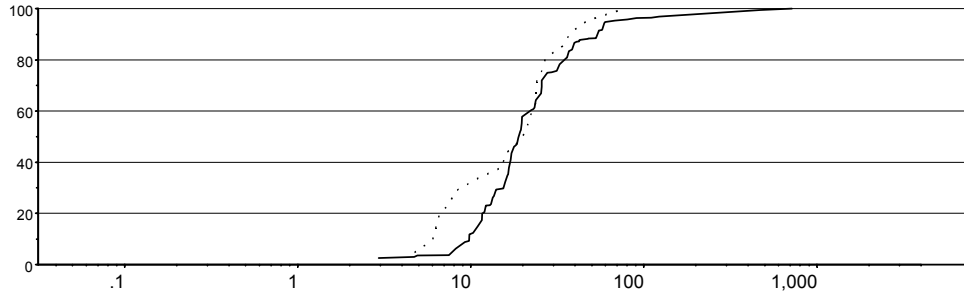
METHOD	ZERO FOR NONDETECTS		½ ML FOR NONDETECTS		ML FOR NONDETECTS	
	#1MGD	> 1 MGD	#1MGD	> 1 MGD	#1MGD	> 1 MGD
MEAN	22.10	38.50	26.50	44.10	30.80	49.60
STD. DEV.	16.8	86.7	18.3	86.8	24.6	88.2
MAXIMUM	78.60	718.00	78.6	718.00	118.00	718.00
99 <sup>TH</sup> %	71.80	401.00	76.40	403.00	109.00	406.00
98 <sup>TH</sup> %	65.10	265.00	74.20	269.00	101.00	276.00
95 <sup>TH</sup> %	46.00	62.60	67.10	94.80	77.00	134.00
90 <sup>TH</sup> %	37.20	54.00	46.10	64.20	46.60	86.90
50 <sup>TH</sup> %	19.90	18.90	22.90	22.60	23.80	25.80

These descriptive statistics illustrate the skewness of the empirical distribution of TEQs between POTWs treating less than one million gallons of wastewater per day and those treating more than one million gallons of wastewater per day. This is evidenced by the fact that the medians (50<sup>th</sup> percentiles) of the two distributions of total TEQs are very similar. However, the mean and upper percentile TEQ estimates from POTWs treating more than one million gallons of wastewater per day are higher than those that treat less than one million gallons of wastewater per day. As anticipated, values in excess of 300 ppt are from the POTWs that treat more than one million gallons of wastewater per day.

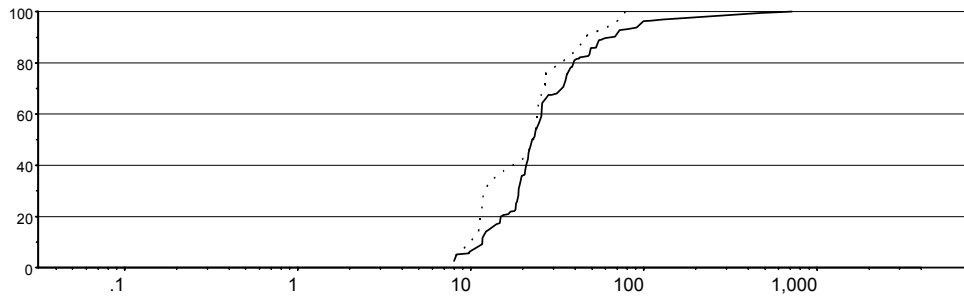
The skewness of the empirical distributions of total dioxin, furan and dioxin-like TEQs for the POTWs in the two flow categories is illustrated graphically on the next page. Appendix D presents the empirical cumulative distributions.

# Empirical Cumulative Distributions 2001 National Sewage Sludge Survey Total Dioxins/Furans/PCB TEQs

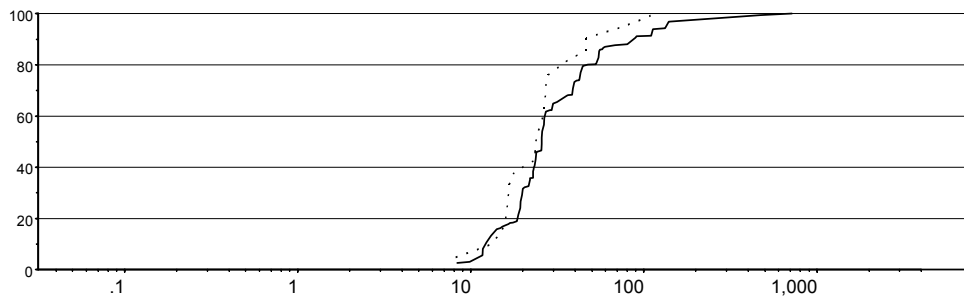
Non detects substituted by Zero



Non detects substituted by half the Minimum Level



Non detects substituted by the Minimum Level



POTWs > 1mgd ———

POTWs < 1 mgd ·····

**VD. 1988 AND 2001 NSSS NATIONAL SUMMARY STATISTICS—DIOXINS AND DIOXIN-LIKE PCB TOXIC EQUIVALENT ESTIMATES**

This section lists TEQ estimates from the 2001 NSSS next to those from 1988. Overlaid cumulative distributions of the TEQs from the two NSSS surveys augment the tabulated national estimates. We also present statistical tests of differences. Because coplanar PCBs were measured as aroclors in 1988, TEQ estimates and statistical tests of differences are with respect to total dioxin and furan TEQs. That is, coplanar PCB TEQs are not included in the estimates.

Before comparing results from the 1988 NSSS and the 2001 NSSS, the reader should notice that differences do exist between the surveys. First of all, 13 years have elapsed between the studies. Given that the treatment in a POTW is not expected to influence the amount of dioxins in biosolids, the amount of dioxins could differ in the influent between the two studies because of the effective reduction of pollutant loads facilitated by EPA’s effluent guidelines for industrial categories. Also, the samples for the 1988 NSSS were taken just prior to disposal. The biosolids samples from the 2001 NSSS were obtained after secondary treatment. Chemical analytical methods between the two studies were the same. However, in the 1988 NSSS, congeners and aroclors were measured in samples of the same size. Recorded measures were then adjusted to dry weight using the sample’s percent solids. In the 2001 NSSS, percent solids in the sample were measured first and then the sample aliquot was adjusted prior to measurement. Graphical presentations included in this section suggest that dioxin TEQs from the 1988 and 2001 NSSS are not identically distributed.

Side-by-side TEQ estimates using the WHO-98 TEQ factors are presented for total dioxin and furans. Additionally, the graphics stack overlaid cumulative distribution functions for each method of incorporating nondetected values. The abscissa has been standardized across all graphics.

**TABLE 7: Total Dioxin and Furan National TEQ Estimates**

METHOD	ZERO FOR NONDETECTS		½ ML FOR NONDETECTS		ML FOR NONDETECTS	
	2001	1988	2001	1988	2001	1988
MEAN	21.70	46.50	21.70	67.30	21.80	88.20
STD. DEV.	47.5	153.0	47.5	153.0	47.5	157.00
MAXIMUM	682.00	1870.00	682.00	1870.00	682.00	1870.00
99 <sup>TH</sup> %	100.00	450.00	100.00	453.00	100.00	466.00
98 <sup>TH</sup> %	54.40	402.00	54.40	404.00	54.40	455.00
95 <sup>TH</sup> %	33.30	301.00	33.30	303.00	33.30	340.00
90 <sup>TH</sup> %	31.40	56.70	31.60	152.00	31.70	226.00
50 <sup>TH</sup> %	15.50	5.68	15.50	34.20	15.50	52.40

Both the tabulated estimates and the graphical presentation of the empirical cumulative distribution functions of total dioxin and furan TEQs suggest that the 1988 estimates are much more sensitive to the

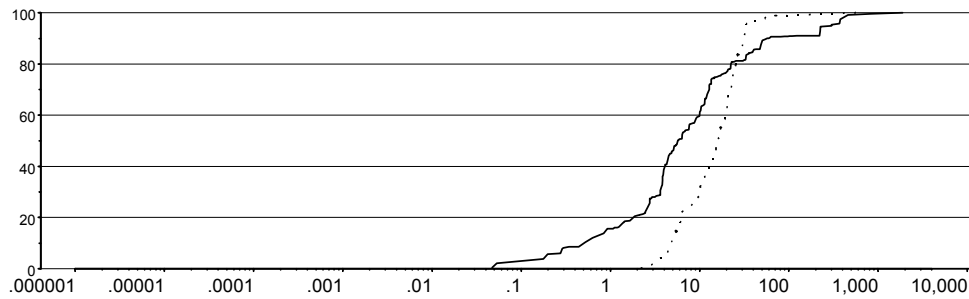
method for incorporating nondetected values. This implies that there are more nondetections in the 1988 study than in the 2001 NSSS. The mean value of the 2001 NSSS is fairly consistent across substitution methods while the mean from 1988 changes with each method. The graphics and estimates also indicate that the 1988 NSSS is more variable than the 2001 NSSS. The greater variability in 1988 is illustrated by both the sensitivity to handling nondetections which are on the low end of the distribution and the higher extreme values at the upper part of the distributions.

Two POTWs in the 2001 NSSS exceed the Round 2 limitation of 300 ppt. Approximately 5 percent of the 7,714 POTWs in 1988 would have exceeded the proposed Round 2 limitation of 300 ppt TEQs just based on total dioxin and furan TEQ without the coplanar PCBs.

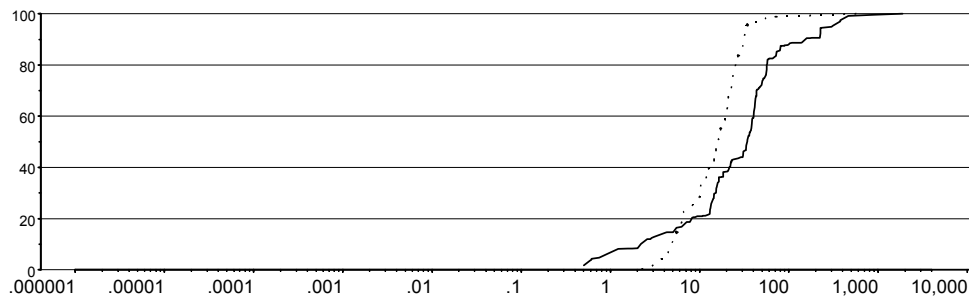
To apply statistical tests of differences, EPA created a variable to record for each POTW in both NSSS surveys—the difference between 1988 and 2001 TEQs. Paired statistical tests of differences indicate that total dioxin and furan TEQs are statistically different. The total mean TEQ from 1988 is statistically higher than that from 2001. The attained significance value for these tests are  $p=(0.0203, 0.0002, <0.0001)$  when zero,  $\frac{1}{2}$  ML, and the ML are substituted for congeners or aroclors not measured above the ML in the sample. If tests of differences are viewed at the flow rate stratum level, it is usually the POTWs treating one million gallons of wastewater per day or less that display statistically significant differences, with the 2001 mean TEQ being statistically less than the TEQ mean from the 1988 NSSS.

# Empirical Cumulative Distributions for 1988 and 2001 National Sewage Sludge Surveys Total Dioxins/Furans TEQs

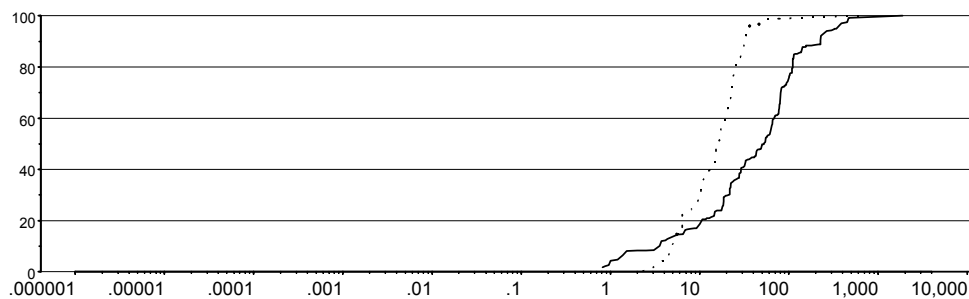
Non detects substituted by Zero



Non detects substituted by half the Minimum Level



Non detects substituted by the Minimum Level



1988 —  
2001 ·····

Using WHO set of TEQs

## VI. SELF-MONITORING DATA OVER TIME

Three POTWs submitted monthly dioxin, furan and dioxin-like PCB self-monitoring TEQs to the EPA. Data from two POTWs span from 1999 through 2001. One of these POTWS reported TEQs for two of their products. The third POTW reported self-monitoring TEQs from December, 1991 through October, 2000. At monthly intervals, the POTWs recorded the TEQ by congener or aroclor and total TEQs. Along with the congener/aroclor TEQ, the TEFs were reported. This section presents data conventions and statistical results across time from each of these three POTWs.

Section VIA of this report characterizes the submitted self-monitoring data. Data conventions and standardizations were applied to the self-monitoring data to ensure comparability across facilities and to EPA's NSSS. Section VIB details these conventions. TEQ estimates, using each of the three substitution methods for aroclors or congeners that were not measured above the ML in a sample, are presented in Section VIC. We tabulate estimates first for total dioxin and furan TEQs, then for total dioxin-like PCB TEQs, and finally for total dioxin, furan, and dioxin-like PCB TEQs. These tabulated estimates are augmented by graphical presentations of TEQs over time. Section VIC also provides a discussion of the results.

### VIA. SELF-MONITORING DATA

EPA received self-monitoring data in spreadsheets. Included in the spreadsheets were the monthly indicators and TEQs at the congener/aroclor level. Also provided in the spreadsheets were listings of the TEQ values used to generate TEQs. Table 8 provides a characterization of the submitted self-monitoring data.

**TABLE 8: Number and Type of Self-monitoring Data**

SOURCE	PERIOD OF TIME MONTH/YEAR	MONTHS	TEF SOURCE*	TREATMENT OF NONDETECTIONS	TOTAL TEQs INCLUDE
POTW_1	12/91-10/00	90	WHO-94	½*MDL	DIOXIN AND FURANS ONLY
POTW_2	7/99 -5/01	24	WHO-98	0	D/F 7/99-1/00 D/F/PCB -2/00
MILORGANITE	4/99-6/01	17	WHO-98^	0	D/F/PCBs
AGRI-LIFE	10/99-7/01	14	WHO-98^	0	D/F/PCBs

\* Please notice that the difference between the WHO-94 and WHO-98 TEQ factors occurs for 1,2,3,7,8-PeCDD. The WHO-94 factor is 0.5 while the WHO-98 factor is 1.0.

^ Milorganite and Agri-Life TEQs were calculated with modified WHO-98 TEFs. The difference is that OCDD and OCDF are weighted as 0.001—which is the WHO-94 weight not the WHO-98 factor which is 0.0001.



## VIB. DATA CONVENTIONS APPLIED TO SELF-MONITORING DATA

To facilitate comparability of these self monitoring data to each other and to EPA's NSSS, EPA standardized TEQs to use the WHO-98 TEQs reported by Van den Berg et. al. These TEFs are recorded on Table 3 of this report.

Across self-monitoring data submitted to EPA, the convention for incorporated congeners or aroclors that were not measured about the ML was inconsistent. Congeners or aroclor that are not measured about the ML in a sample are referred to as "censored or nondetects." The following paragraphs delineate how each POTW recorded censored data and EPA's technical approach to determining the MLs for each set of self-monitoring data.

POTW\_1 reported monthly TEQs by congener or aroclor. The spreadsheets also listed TEFs. Cell entries recorded in red indicated that the TEQ was censored and that one-half the ML was used to derive the congener's TEQ. Cell entries recorded in blue indicated that the TEQ was derived from a congener measurement that was above the ML. These blue TEQs are "non-censored." Thus, for the red cell entries indicating censored TEQs, the EPA applied the following relationship to determine the ML.

$$\text{If } TEQ_i = 1 / 2 ML_i * TEF_i \text{ then}$$
$$ML_i = TEQ_i * 2 / TEF_i.$$

These MLs were determined electronically and added to the POTW\_1 database.

POTW\_2 recorded the ML, the measured concentration, and the TEQ by congener for each month.

Milorganite and Agri-Life are products produced by the third POTW. Spreadsheets for these products indicated that the value zero was used for monthly censored congener TEQs. To determine MLs in these instances, EPA obtained their contract analytical laboratory sheets for each monthly analysis. ML values from the laboratory sheets were entered into an electronic database for censored data.

Once TEFs had been standardized and MLs were electronically available for the three POTWs, EPA created three sets of TEQs by congener/aroclor for each POTW. The sets differed only by the values used when data were censored. Congeners or aroclors measured above the ML in a sample are treated identically in all three sets of data. That is, the measured concentration of the congener is multiplied by the congener's TEF to yield the monthly congener TEQ. In the first set, the value of the censored congener's ML was multiplied by the congener's TEF to determine a TEQ. Estimates using this method are labeled as "Nondetects set to ML". The second method set nondetected congener values to one-half the ML. These estimates are labeled "½ ML." The final set of TEQs set nondetected congeners/aroclor to zero. Total monthly TEQs for each facility were then determined by summing the congener/aroclor TEQs for that month. This method is described in Section IIIB of this report.

## VIC. SELF-MONITORING SUMMARY STATISTICS—DIOXINS, FURANS, AND DIOXIN-LIKE PCB TOXIC EQUIVALENT ESTIMATES

In order to evaluate performance across the three POTWs, in this section of the report we present total TEQ estimates first for total dioxins and furans, then for total dioxin-like PCBs, and finally for total dioxin/furan and dioxin-like PCBs TEQs. Within each set of total estimates, we tabulate mean, median,

maximum, and upper percentile estimates of TEQs for the three POTWs. The tables presenting the data are grouped by the method designating the values used for nondetected or censored data. These statistics were generated arithmetically. Graphical presentations augment each table.

#### *Total Dioxin and Furan TEQs*

Tables 9 through 11 present summary statistics for total dioxin and furan TEQs for each of the three POTWs. Table 9 reports TEQ statistics when nondetected data have been set to zero. In that instance, the nondetected or censored congener/aroclor does not add to the TEQ. Table 10 presents estimates that incorporate one-half the ML value for those congeners not measured in a sample. Finally, estimates that use the ML value for censored data are tabulated in Table 11.

Consistently, POTW\_1's statistics exceed those of the other two POTWs. In particular, Table 9 shows a maximum value for POTW\_1 approximately four-fold higher than that of the other POTWs. In Table 9, only detected congeners or aroclors contribute to the TEQ as the value zero is used for censored data. The maximum value for the scenario where zero is substituted for the concentration when a congener or aroclor is not measured above the ML occurred in November 1992. That maximum value was predominantly caused by a high measured value for OCDD. For POTW\_1, all values from March 1992 through May 1993 report total dioxin and furan TEQs of 100 ppt or greater. Four exceed 200 ppt. POTW\_1 reported total dioxin and furan TEQs of 100 or more in only in 3 months out of 75 months (4 percent) after May 1993. These occurred in July 1993 (133 ppt), November 1994 (107ppt), and May 1995 (174 ppt). After May 1995, the highest total dioxin and furan TEQ observed for the scenario of entering zero for censored values is 77 ppt. This is more in range with the maximum TEQs observed by the other POTWs.

Tables 10 and 11 illustrate the same pattern as Table 9. When the ML is used for those congeners that are not measured above the ML, the maximum TEQ recorded by POTW\_1 is 325 ppt. This TEQ occurred in November 1994, and was caused by a high measured value of OCDD. The November 1994 POTW\_1 record is the only occurrence of total dioxin and furan TEQs exceeding the proposed limit of 300 ppt.

#### *Total Dioxin-Like PCB TEQs*

POTW\_1 did not report dioxin-like PCBs. Tables 12, 13, and 14 record descriptive statistics for two POTWs. The highest observed TEQ when nondetected aroclors are set to zero occurs in Agri-Life. This value was measured in April 2000. A majority of the aroclors were measured above the ML in this sample. When the ML values are substituted for aroclors not measured above the ML, the maximum TEQ occurs at 45 ppt. This measurement was reported by Agri-Life in October 2001. The TEQ value for this sample, when zero was substituted from those aroclors not measured above the ML, is 2.5. This difference in TEQs from the same sample indicates that the majority of aroclors were not measured above the ML.

As Tables 12 through 14 suggest and the accompanying graphics illustrate, dioxin-like PCB TEQs are fairly consistent over time. Milorganite displayed the least variation in TEQs while Agri-Life's variation in TEQs was the highest among the three POTWs.

*Total Dioxin, Furan and Dioxin-Like PCB TEQs*

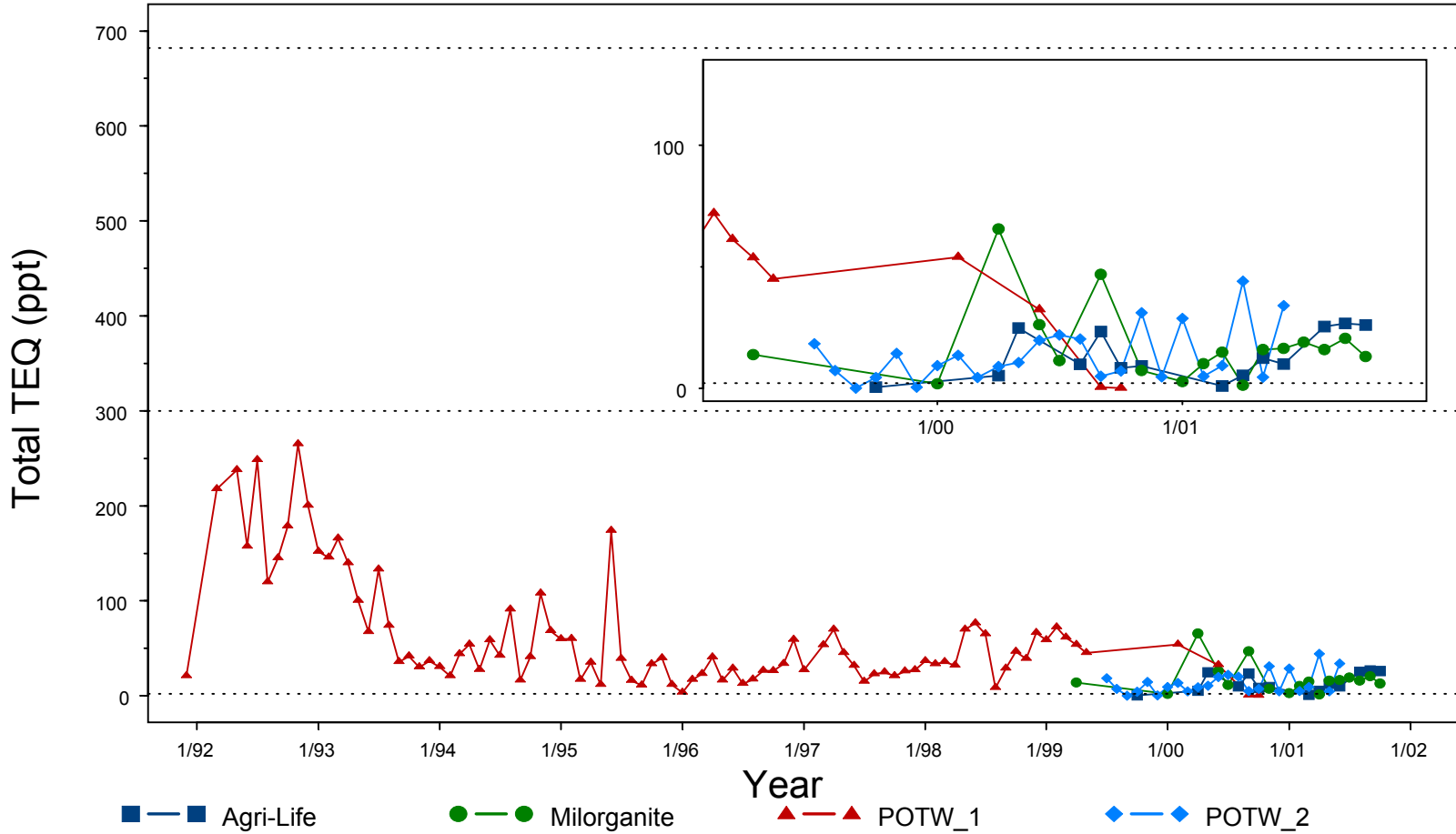
The maximum observed total TEQ occurs in November 1994. This value of 325 ppt is based on only dioxin and furan TEQs, since POTW\_1 did not report dioxin-like PCBs. For the other two POTWs, most other total TEQ descriptive statistics are less than 100 ppt. After 1995, POTW\_1's total TEQs are similar to those reported by the other three POTWs. All three POTWs reported total TEQs that would require them to monitor.

**TABLE 9: Total Dioxin and Furan TEQs  
Nondetected Values Set to Zero**

<b>METHOD</b>	<b>POTW_1</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>				
<b>MEAN</b>	62.2	13.7	17.9	13.5
<b>STD. DEV.</b>	59.1	11.5	16.3	9.73
<b>MAXIMUM</b>	265.0	44.1	65.6	26.7
<b>99<sup>TH</sup> %</b>	250.00	41.7	62.4	26.6
<b>98<sup>TH</sup> %</b>	240.0	39.3	59.3	26.5
<b>95<sup>TH</sup> %</b>	189.0	33.5	49.8	26.3
<b>90<sup>TH</sup> %</b>	152.0	30.2	32.4	25.9
<b>50<sup>TH</sup> %</b>	39.5	9.39	14.4	9.88

# TOTAL DIOXIN and FURAN TEQs Over Time

## NonDetected Values set to ZERO



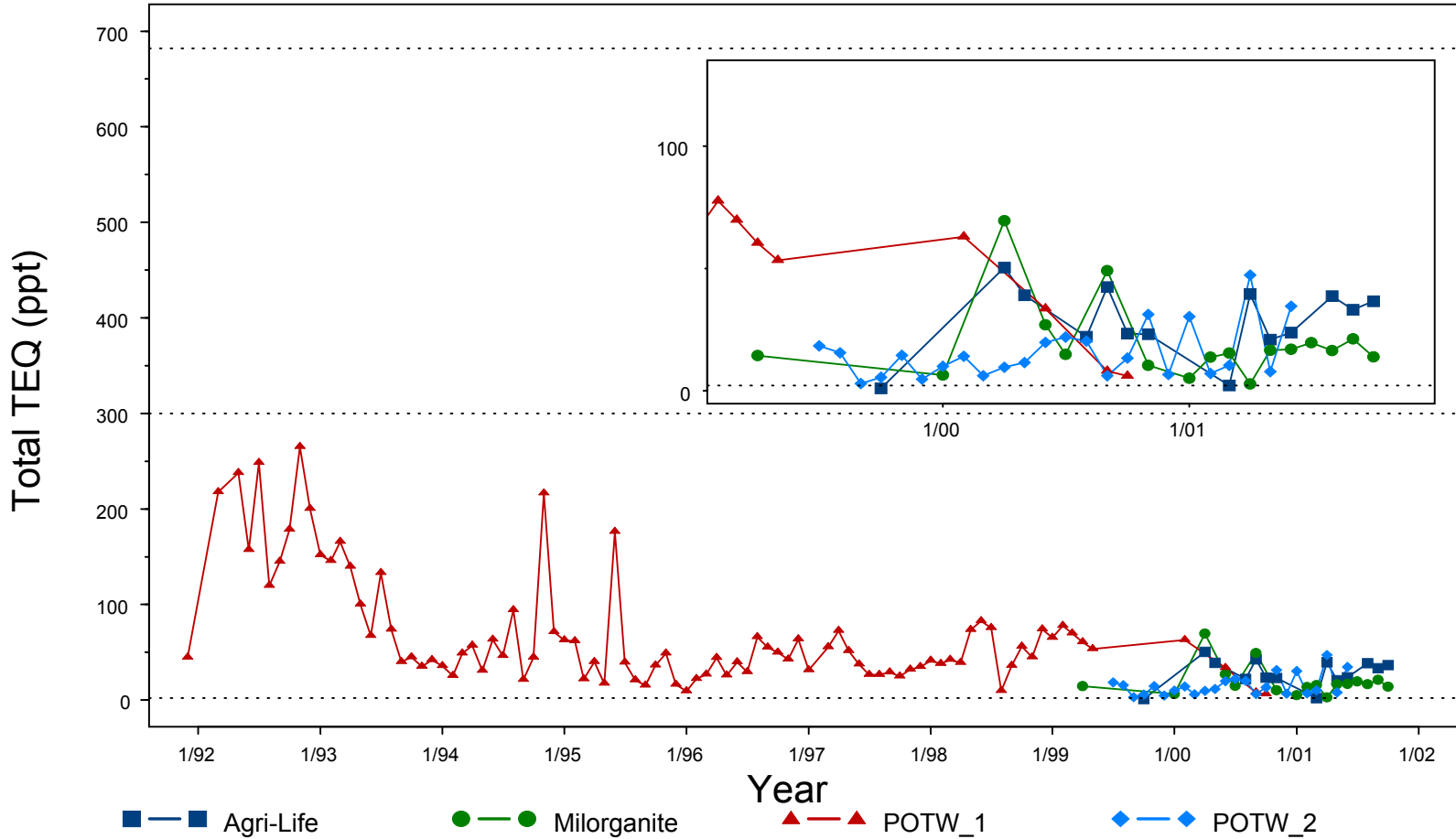
Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

**TABLE 10: Total Dioxin and Furan TEQs  
Nondetected Values Set to ½ ML**

<b>METHOD</b>	<b>POTW_1</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>				
<b>MEAN</b>	69.0	15.4	19.6	28.3
<b>STD. DEV.</b>	58.6	11.0	16.5	14.5
<b>MAXIMUM</b>	265.0	47.3	69.6	50.5
<b>99<sup>TH</sup> %</b>	250.0	44.2	66.1	49.4
<b>98<sup>TH</sup> %</b>	240.0	41.2	62.7	48.2
<b>95<sup>TH</sup> %</b>	208.0	33.9	52.2	44.9
<b>90<sup>TH</sup> %</b>	157.0	30.9	33.6	41.3
<b>50<sup>TH</sup> %</b>	46.1	11.6	15.2	23.8

## TOTAL DIOXIN and FURAN TEQs Over Time

NonDetected Values set to 1/2 ML



Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

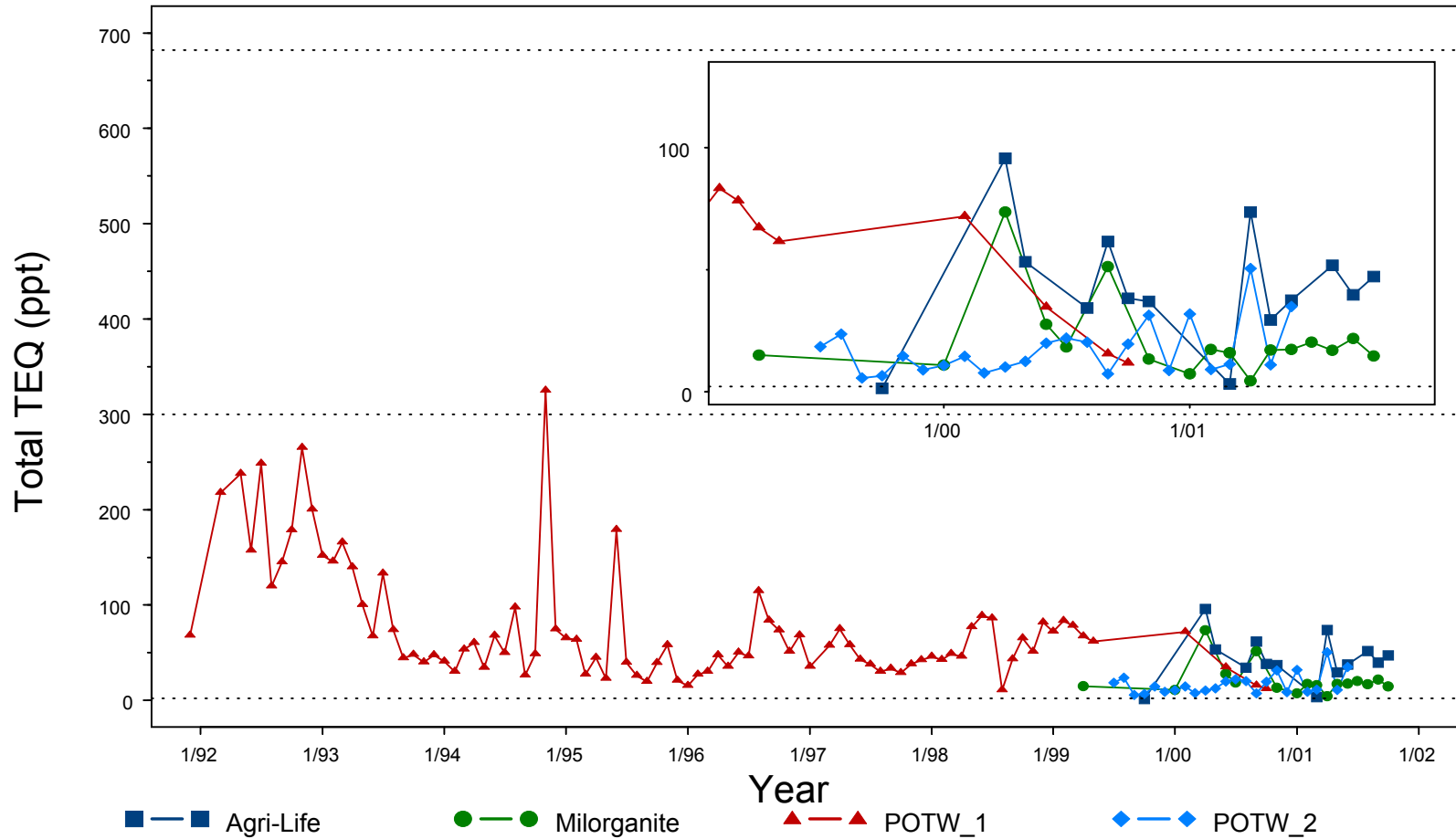
**TABLE 11: Total Dioxin and Furan TEQs  
Nondetected Values Set to ML**

<b>METHOD</b>	<b>POTW_1</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>				
<b>MEAN</b>	75.7	17.2	21.4	43.2
<b>STD. DEV.</b>	60.9	11.0	16.8	24.7
<b>MAXIMUM</b>	325.0	50.5	73.6	95.7
<b>99<sup>TH</sup> %</b>	271.0	46.8	69.8	92.6
<b>98<sup>TH</sup> %</b>	252.0	43.1	66.0	89.5
<b>95<sup>TH</sup> %</b>	209.0	34.4	54.7	80.3
<b>90<sup>TH</sup> %</b>	157.0	31.7	34.8	68.8
<b>50<sup>TH</sup> %</b>	53.3	12.4	17.1	38.3



## TOTAL DIOXIN and FURAN TEQs Over Time

NonDetected Values set to ML



Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

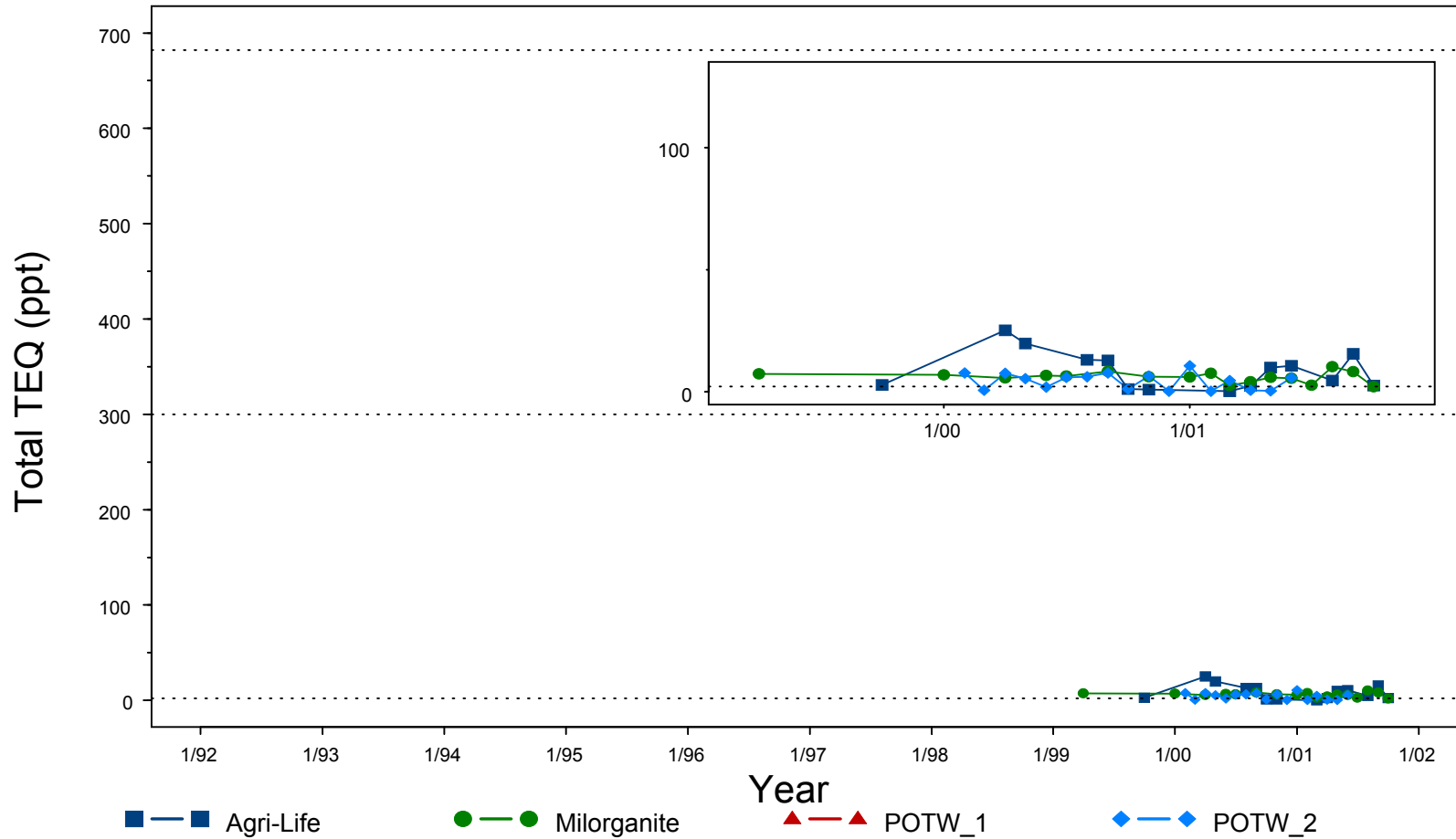
**TABLE 12: Total Dioxin-like PCB TEQs  
Nondetected Values Set to Zero**

<b>METHOD</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>			
<b>MEAN</b>	4.34	6.04	8.7
<b>STD. DEV.</b>	3.35	2.19	7.85
<b>MAXIMUM</b>	10.7	10.3	25.3
<b>99<sup>TH</sup> %</b>	10.2	9.98	24.5
<b>98<sup>TH</sup> %</b>	9.72	9.65	23.7
<b>95<sup>TH</sup> %</b>	8.18	8.67	21.4
<b>90<sup>TH</sup> %</b>	7.71	8.29	18.1
<b>50<sup>TH</sup> %</b>	5.03	6.15	4.62

No PCB data exists for POTW\_1

# TOTAL DIOXIN-LIKE PCB TEQs Over Time

NonDetected Values set to ZERO



Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

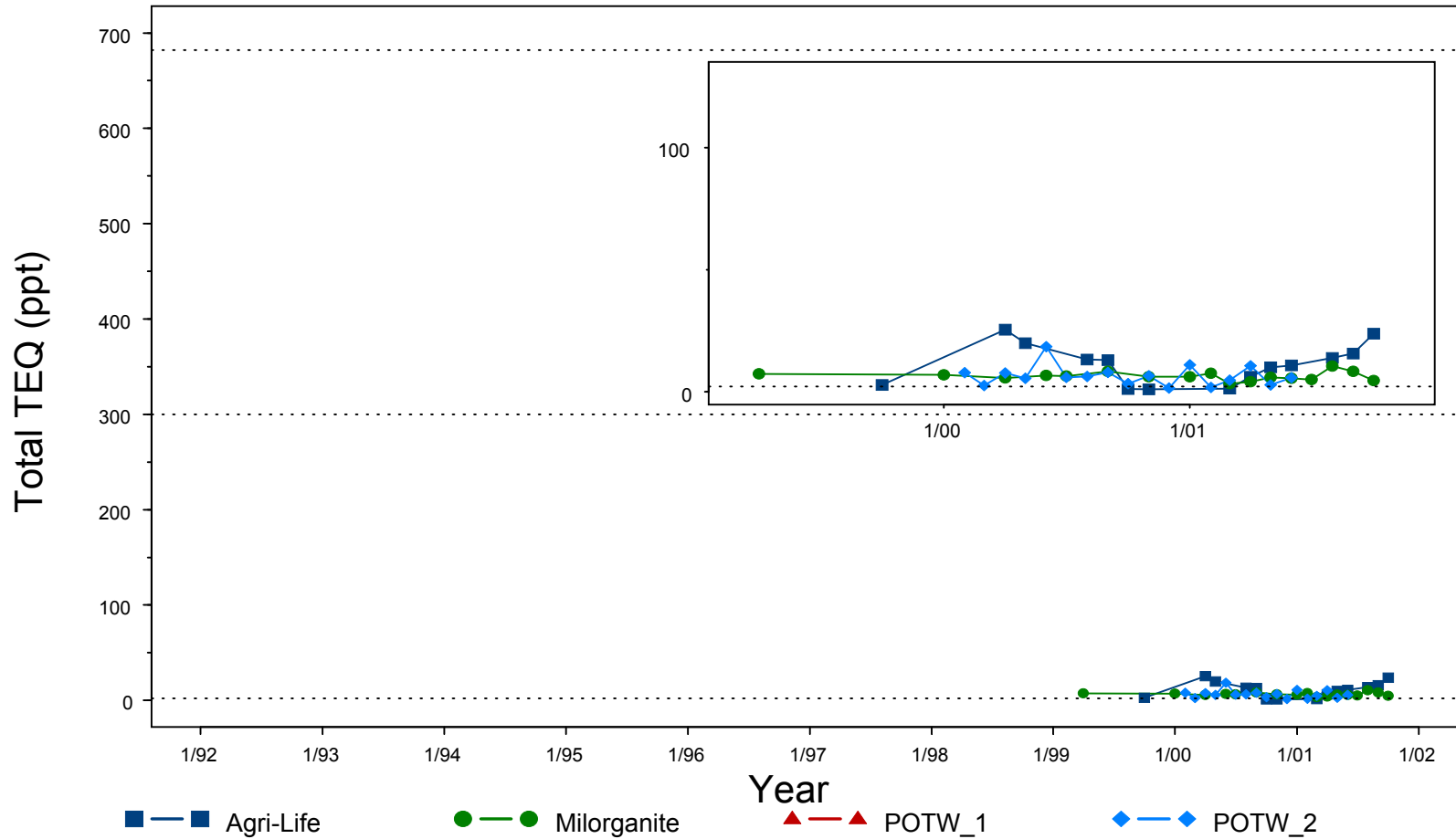
**TABLE 13: Total Dioxin-like PCB TEQs**  
**Nondetected Values Set to ½ ML**

<b>METHOD</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>			
<b>MEAN</b>	6.53	6.42	11.3
<b>STD. DEV.</b>	4.18	1.74	8.19
<b>MAXIMUM</b>	18.6	10.5	25.5
<b>99<sup>TH</sup> %</b>	17.3	10.2	25.2
<b>98<sup>TH</sup> %</b>	16.0	9.82	25.0
<b>95<sup>TH</sup> %</b>	12.2	8.73	24.3
<b>90<sup>TH</sup> %</b>	10.8	8.36	22.2
<b>50<sup>TH</sup> %</b>	5.91	6.18	10.9

No PCB data exists for POTW\_1

# TOTAL DIOXIN-LIKE PCB TEQs Over Time

NonDetected Values set to 1/2 ML



Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

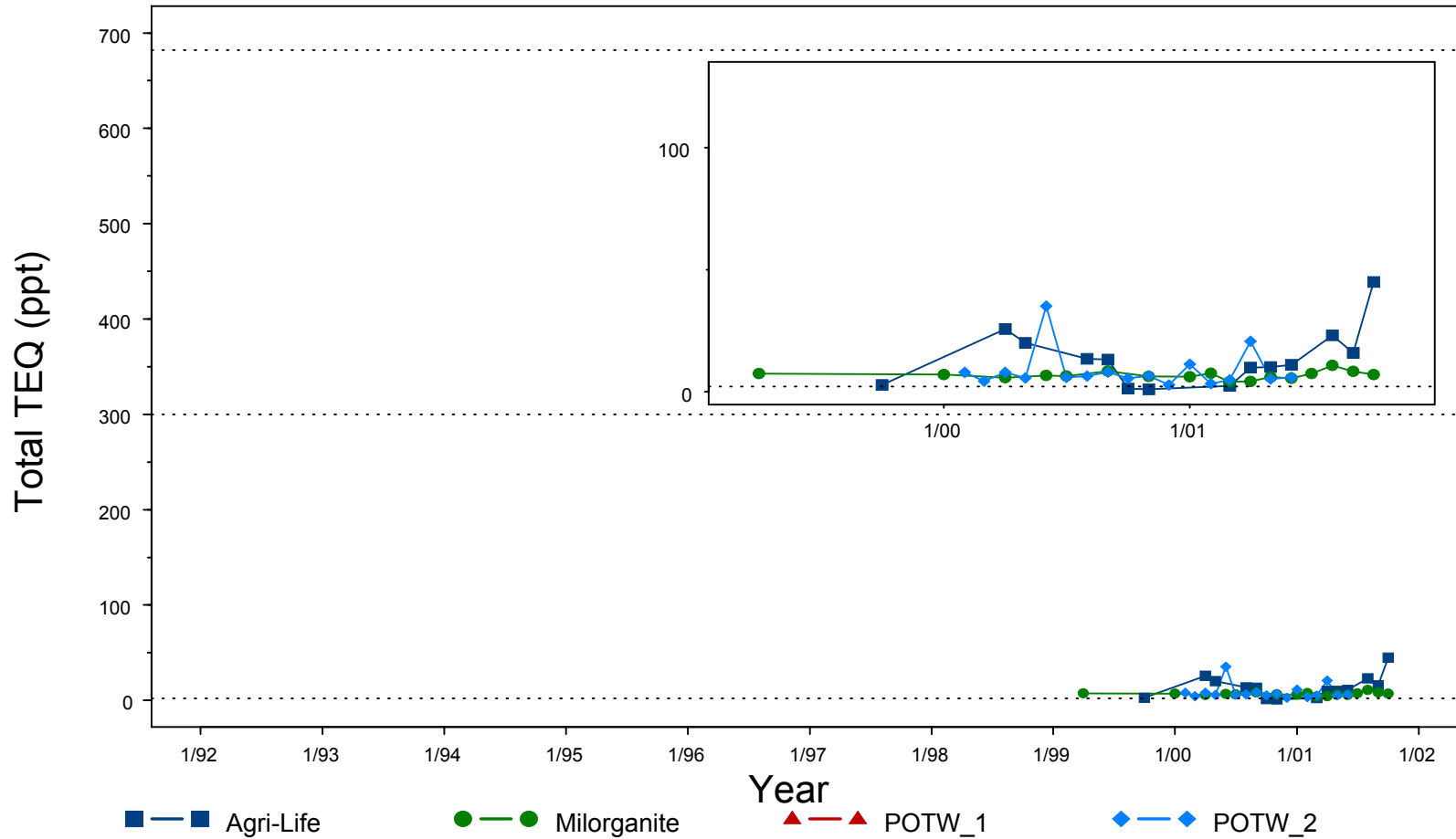
**TABLE 14: Total Dioxin-like PCB TEQs  
Nondetected Values Set to ML**

<b>METHOD</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>			
<b>MEAN</b>	8.73	6.8	13.9
<b>STD. DEV.</b>	7.93	1.6	11.9
<b>MAXIMUM</b>	35.2	10.8	45.0
<b>99<sup>TH</sup> %</b>	32.7	10.4	42.3
<b>98<sup>TH</sup> %</b>	30.3	9.99	39.6
<b>95<sup>TH</sup> %</b>	22.9	8.8	31.5
<b>90<sup>TH</sup> %</b>	14.2	8.43	24.7
<b>50<sup>TH</sup> %</b>	5.95	6.56	11.0

No PCB data exists for POTW\_1

# TOTAL DIOXIN-LIKE PCB TEQs Over Time

NonDetected Values set to ML



Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

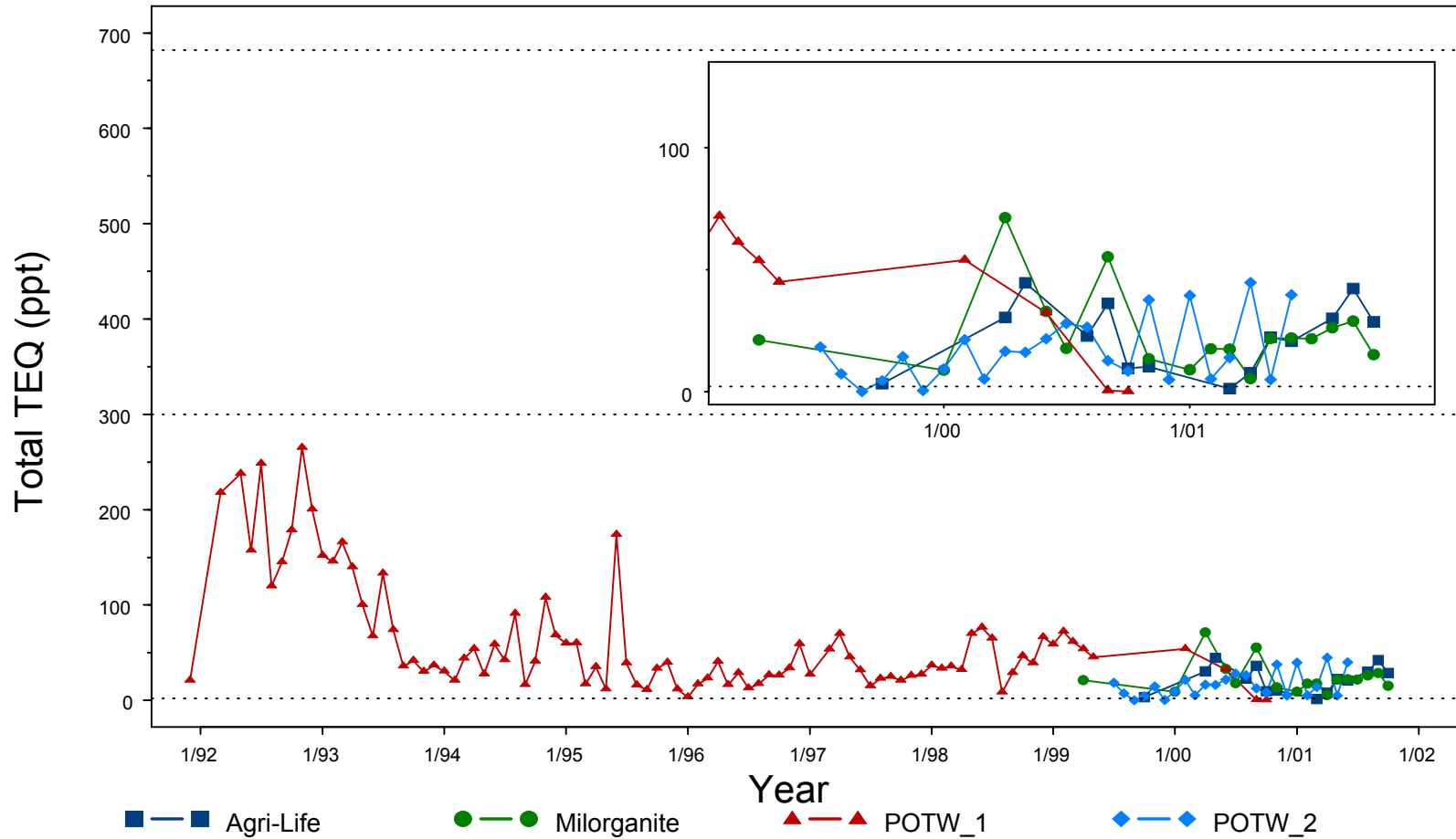
**TABLE 15: Total Dioxin, Furan and Dioxin-like PCB TEQs  
Nondetected Values Set to Zero**

<b>METHOD</b>	<b>POTW_1</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>				
<b>MEAN</b>	62.2	16.8	23.9	22.2
<b>STD. DEV.</b>	59.1	13.2	16.7	14.1
<b>MAXIMUM</b>	265.0	44.8	71.3	44.6
<b>99<sup>TH</sup> %</b>	250.0	43.6	68.6	44.2
<b>98<sup>TH</sup> %</b>	240.0	42.4	65.9	43.9
<b>95<sup>TH</sup> %</b>	189.0	39.7	57.7	42.9
<b>90<sup>TH</sup> %</b>	152.0	38.8	39.6	39.8
<b>50<sup>TH</sup> %</b>	39.5	14.0	19.5	22.4



# TOTAL DIOXIN, FURAN and DIOXIN-LIKE PCB TEQs Over Time

NonDetected Values set to ZERO



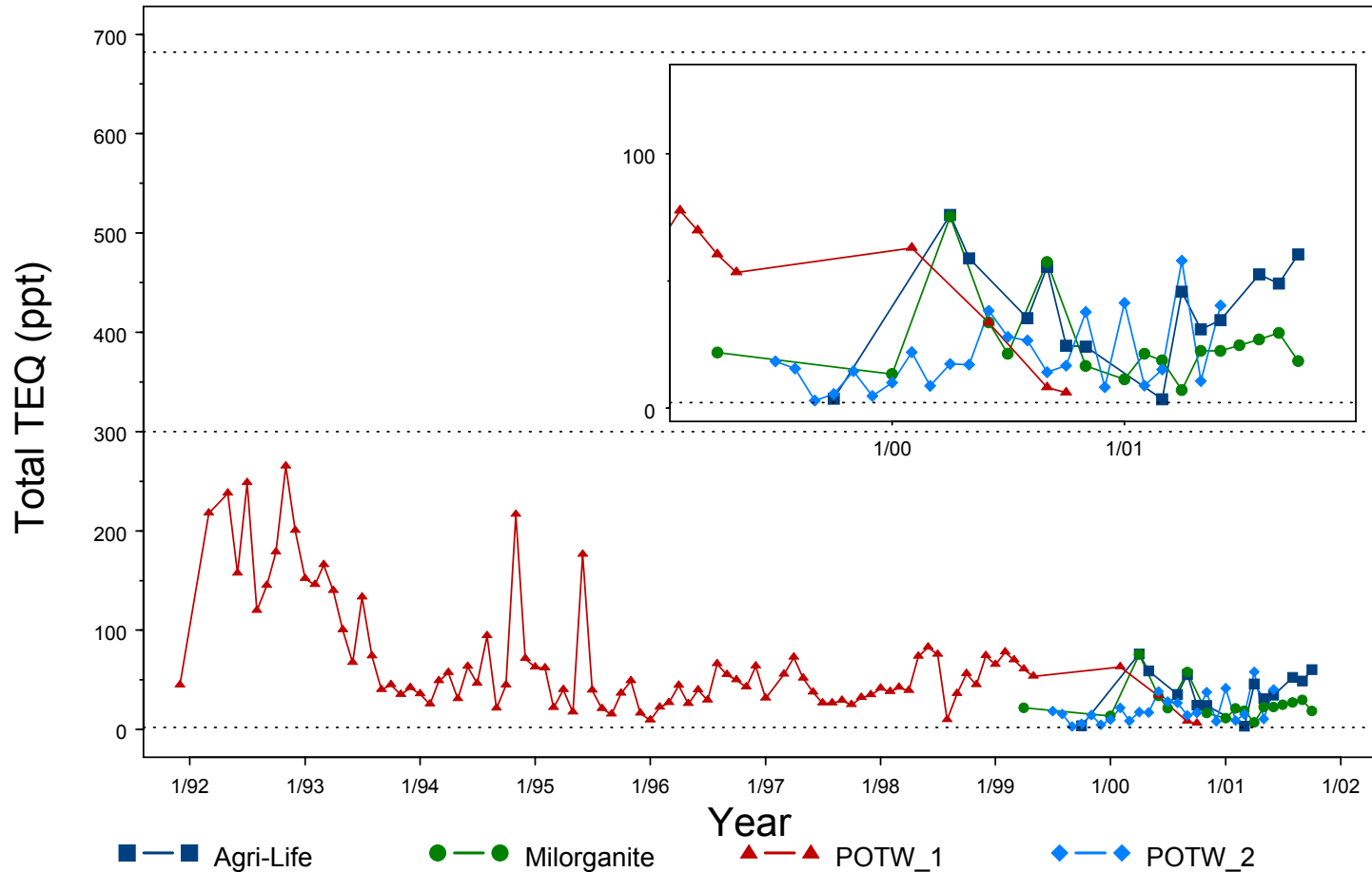
Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

**TABLE 16: Total Dioxin, Furan and Dioxin-like PCB TEQs  
Nondetected Values Set to ½ ML**

<b>METHOD</b>	<b>POTW_1</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>				
<b>MEAN</b>	69.0	20.1	26.1	39.7
<b>STD. DEV.</b>	58.6	14.0	16.8	21.2
<b>MAXIMUM</b>	265.0	58.0	75.4	76.0
<b>99<sup>TH</sup> %</b>	250.0	54.0	72.3	73.8
<b>98<sup>TH</sup> %</b>	240.0	50.1	69.3	71.6
<b>95<sup>TH</sup> %</b>	208.0	41.2	60.2	65.1
<b>90<sup>TH</sup> %</b>	157.0	39.6	40.8	59.8
<b>50<sup>TH</sup> %</b>	46.1	15.5	21.6	35.4

# TOTAL DIOXIN, FURAN and DIOXIN-LIKE PCB TEQs Over Time

NonDetected Values set to 1/2 ML



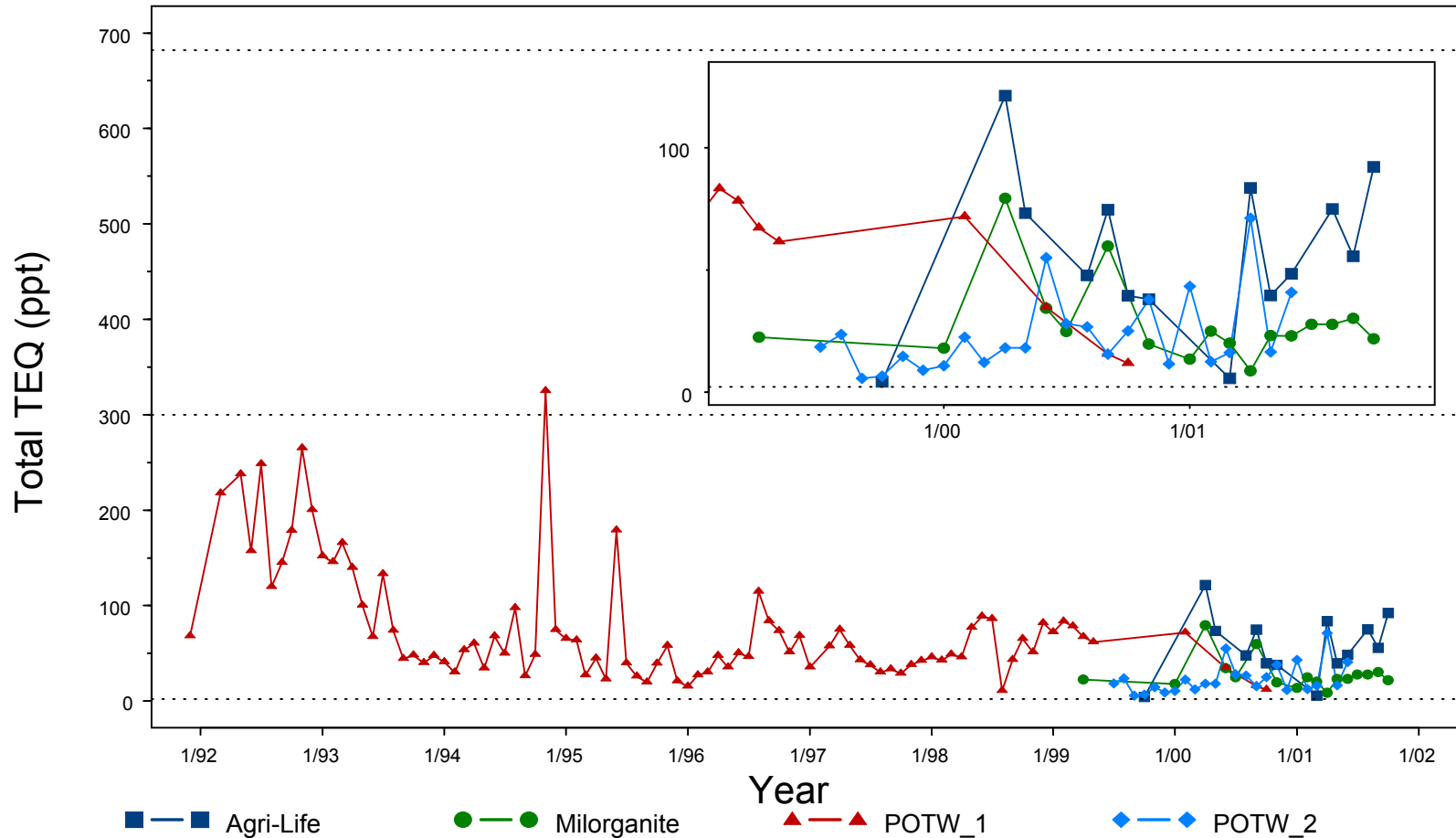
Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000, POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.

**TABLE 17: Total Dioxin, Furan and Dioxin-like PCB TEQs  
Nondetected Values Set to ML**

<b>METHOD</b>	<b>POTW_1</b>	<b>POTW_2</b>	<b>MILORGANITE</b>	<b>AGRI-LIFE</b>
<b>ESTIMATE</b>				
<b>MEAN</b>	75.7	23.4	28.2	57.1
<b>STD. DEV.</b>	60.9	16.0	17.0	32.3
<b>MAXIMUM</b>	325.0	71.3	79.4	121.0
<b>99<sup>TH</sup> %</b>	271.0	67.4	76.0	117.0
<b>98<sup>TH</sup> %</b>	252.0	63.5	72.7	113.0
<b>95<sup>TH</sup> %</b>	209.0	52.7	62.7	101.0
<b>90<sup>TH</sup> %</b>	157.0	42.4	42.0	88.8
<b>50<sup>TH</sup> %</b>	53.3	18.1	23.1	48.5

# TOTAL DIOXIN, FURAN and DIOXIN-LIKE PCB TEQs Over Time

NonDetected Values set to ML



Notes: TEQs incorporate WHO-98 Toxic Equivalent Factors.  
 Total TEQs for POTW\_1 are TOTAL Dioxin and Furan TEQs only. Beginning February 2000,  
 POTW\_2's TEQs include Dioxin-like PCBs in addition to Dioxin and Furan TEQs.



**APPENDIX A: NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES  
FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**

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Exhibit 1—Nondetects Set to Zero

Dioxin and Furans .....	A-1
PCBs .....	A-2
Totals .....	A-9

Exhibit 2—Nondetects Set to One-half ML

Dioxin and Furans .....	A-10
PCBs .....	A-11
Totals .....	A-18

Exhibit 3—Nondetects set to ML

Dioxin and Furans .....	A-19
PCBs .....	A-20
Totals .....	A-27

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure-Nondetects Set to zero**  
**group=Dioxins and Furans**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	492.00	2060.00	24100.00	1520.00	1030.00	743.00	656.00	273.00
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	99	167.00	551.00	5150.00	3410.00	351.00	231.00	170.00	88.20
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	100	9.13	58.30	655.00	54.90	19.20	8.73	6.94	2.80
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	3.60	6.87	124.00	16.20	9.80	8.02	6.46	2.22
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	96	5.50	20.70	500.00	36.60	15.30	10.10	8.73	3.36
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	21.30	35.00	369.00	131.00	66.00	43.90	41.30	15.10
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	5.21	25.20	618.00	24.10	13.90	8.37	8.07	2.60
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	11.80	19.80	332.00	52.80	35.70	22.80	21.20	7.49
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	20	0.27	2.50	54.40	2.63	-0.05	0.60	0.20	0.00
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	5.76	5.69	92.00	14.60	13.10	12.00	11.10	4.57
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	93	1.37	7.28	189.00	6.71	4.05	2.65	2.43	1.00
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	6.03	38.70	974.00	31.10	12.60	8.19	7.81	2.80
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	100	2.61	17.70	463.00	7.61	7.26	5.91	3.97	1.50
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	1.41	1.50	47.20	5.09	4.86	3.37	2.38	1.10
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	94	6857	100	3.11	3.93	79.70	10.60	10.50	7.87	5.70	2.30
OCTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	6780.00	39100.00	457000.00	14300.00	12800.00	7790.00	7510.00	2730.00
OCTACHLORODIBENZOFURAN	NG/KG	94	6857	100	802.00	3890.00	37800.00	19000.00	1910.00	753.00	554.00	279.00



**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=PCBs**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
DECACHLORO BIPHENYL	NG/KG	94	6857	100	862.00	2260.00	12800.00	10000.00	7290.00	1490.00	927.00	384.00
PCB-1	NG/KG	94	6857	95	101.00	521.00	12700.00	1150.00	376.00	208.00	174.00	34.10
PCB-10	NG/KG	94	6857	85	19.50	53.20	722.00	225.00	84.80	56.70	30.90	10.00
PCB-103	NG/KG	94	6857	98	60.10	159.00	3160.00	308.00	293.00	167.00	101.00	27.50
PCB-104	NG/KG	94	6857	9	2.97	16.40	474.00	52.20	48.80	16.30	0.00	0.00
PCB-105	NG/KG	94	6857	100	4570.00	7120.00	39200.00	33800.00	28300.00	10800.00	8210.00	2270.00
PCB-106	NG/KG	94	6857	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PCB-107+PCB-124	NG/KG	94	6857	100	411.00	532.00	2810.00	2540.00	2270.00	1040.00	750.00	223.00
PCB-109	NG/KG	94	6857	100	687.00	888.00	4700.00	4310.00	3920.00	1720.00	1270.00	388.00
PCB-11	NG/KG	94	6857	97	11400.00	337000.00	17500000.00	6910.00	6180.00	3860.00	3410.00	1060.00
PCB-110+PCB-115	NG/KG	94	6857	100	12900.00	17400.00	93600.00	81600.00	69700.00	29000.00	23800.00	7330.00
PCB-111	NG/KG	94	6857	2	0.23	4.10	106.00	3.49	1.39	0.00	0.00	0.00
PCB-112	NG/KG	94	6857	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PCB-114	NG/KG	94	6857	100	292.00	453.00	2500.00	2180.00	1870.00	677.00	536.00	154.00
PCB-118	NG/KG	94	6857	100	9870.00	12200.00	63600.00	58200.00	52800.00	24700.00	19500.00	5550.00
PCB-12+PCB-13	NG/KG	94	6857	100	147.00	200.00	1670.00	1030.00	589.00	451.00	293.00	81.40
PCB-120	NG/KG	94	6857	65	8.92	28.90	575.00	64.20	63.60	31.90	12.60	3.25
PCB-121	NG/KG	94	6857	25	1.85	8.66	166.00	35.30	9.06	5.13	4.18	0.00
PCB-122	NG/KG	94	6857	99	141.00	256.00	1430.00	1210.00	984.00	298.00	236.00	62.90
PCB-123	NG/KG	94	6857	100	313.00	386.00	2140.00	1830.00	1520.00	674.00	534.00	258.00
PCB-126	NG/KG	94	6857	49	26.90	72.10	503.00	349.00	312.00	68.20	48.20	0.00
PCB-127	NG/KG	94	6857	80	20.80	24.50	241.00	95.90	95.70	65.40	46.50	13.30
PCB-128+PCB-166	NG/KG	94	6857	100	1780.00	2100.00	10100.00	9430.00	8770.00	5460.00	3630.00	994.00
PCB-129+PCB-138+PCB-160+PCB-163	NG/KG	94	6857	100	11900.00	13800.00	93800.00	63500.00	62700.00	34200.00	30500.00	7000.00
PCB-130	NG/KG	94	6857	100	694.00	763.00	4170.00	3530.00	3410.00	1880.00	1520.00	399.00
PCB-131	NG/KG	94	6857	100	168.00	182.00	825.00	821.00	817.00	502.00	357.00	101.00

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-132	NG/KG	94	6857	100	3670.00	4020.00	31700.00	17600.00	17400.00	10100.00	9330.00	2150.00
PCB-133	NG/KG	94	6857	100	145.00	169.00	2570.00	613.00	563.00	419.00	325.00	91.60
PCB-134+PCB-143	NG/KG	94	6857	100	594.00	660.00	4850.00	2940.00	2890.00	1550.00	1470.00	354.00
PCB-135+PCB-151+PCB-154	NG/KG	94	6857	100	3590.00	4430.00	56200.00	15900.00	15400.00	13900.00	7090.00	2280.00
PCB-136	NG/KG	94	6857	100	1380.00	1620.00	19500.00	6020.00	5710.00	4770.00	3120.00	811.00
PCB-137	NG/KG	94	6857	100	584.00	583.00	2610.00	2550.00	2500.00	1780.00	1290.00	382.00
PCB-139+PCB-140	NG/KG	94	6857	100	199.00	211.00	1650.00	898.00	880.00	583.00	404.00	117.00
PCB-14	NG/KG	94	6857	84	9.12	36.10	883.00	63.80	37.80	37.90	21.00	3.88
PCB-141	NG/KG	94	6857	100	2010.00	2420.00	22200.00	10500.00	9160.00	5110.00	4720.00	1310.00
PCB-142	NG/KG	94	6857	0	0.00	0.08	2.10	0.00	0.00	0.00	0.00	0.00
PCB-144	NG/KG	94	6857	100	512.00	572.00	4320.00	2300.00	2140.00	1840.00	1170.00	310.00
PCB-145	NG/KG	94	6857	75	3.85	4.74	22.30	20.20	19.70	12.20	10.40	2.19
PCB-146	NG/KG	94	6857	100	1440.00	1610.00	20300.00	6140.00	5640.00	4430.00	3350.00	904.00
PCB-147+PCB-149	NG/KG	94	6857	100	8400.00	9950.00	107000.00	39100.00	35700.00	29100.00	18100.00	5270.00
PCB-148	NG/KG	94	6857	89	9.64	33.10	823.00	33.60	30.10	29.70	20.00	6.40
PCB-15	NG/KG	94	6857	100	1130.00	1460.00	12800.00	5460.00	3740.00	3570.00	2880.00	769.00
PCB-150	NG/KG	94	6857	98	12.30	25.10	591.00	42.80	42.70	37.60	26.70	7.92
PCB-152	NG/KG	94	6857	89	9.73	16.50	310.00	52.40	52.10	27.80	20.20	4.73
PCB-153+PCB-168	NG/KG	94	6857	100	9540.00	11100.00	109000.00	45700.00	41300.00	31900.00	20200.00	5840.00
PCB-155	NG/KG	94	6857	95	26.60	83.20	2010.00	184.00	58.20	51.30	39.20	20.30
PCB-156+PCB-157	NG/KG	94	6857	100	1540.00	1690.00	8200.00	7750.00	7460.00	4620.00	3200.00	917.00
PCB-158	NG/KG	94	6857	100	1150.00	1280.00	7760.00	5770.00	5250.00	3060.00	2570.00	664.00
PCB-159	NG/KG	94	6857	95	102.00	143.00	1540.00	600.00	559.00	341.00	166.00	62.90
PCB-16	NG/KG	94	6857	100	941.00	1750.00	17200.00	6590.00	3910.00	2880.00	1710.00	456.00
PCB-161	NG/KG	94	6857	0	0.10	2.73	71.40	0.00	0.00	0.00	0.00	0.00

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-162	NG/KG	94	6857	100	32.20	34.00	217.00	151.00	146.00	104.00	59.80	19.80
PCB-164	NG/KG	94	6857	100	754.00	925.00	6690.00	4310.00	4250.00	2240.00	1780.00	428.00
PCB-165	NG/KG	94	6857	4	0.18	1.09	33.20	3.36	2.11	0.00	0.00	0.00
PCB-167	NG/KG	94	6857	100	455.00	506.00	2740.00	2390.00	2380.00	1340.00	960.00	266.00
PCB-169	NG/KG	94	6857	44	2.43	18.30	466.00	12.60	10.80	5.85	4.63	0.00
PCB-17	NG/KG	94	6857	100	1040.00	1820.00	16700.00	7270.00	3870.00	3850.00	2770.00	470.00
PCB-170	NG/KG	94	6857	100	2090.00	3080.00	36100.00	13100.00	11900.00	6050.00	4250.00	1230.00
PCB-171+PCB-173	NG/KG	94	6857	100	677.00	988.00	12700.00	3780.00	3450.00	2490.00	1330.00	407.00
PCB-172	NG/KG	94	6857	100	372.00	543.00	7240.00	2180.00	2010.00	1180.00	667.00	228.00
PCB-174	NG/KG	94	6857	100	2350.00	3330.00	42800.00	13100.00	12200.00	8310.00	4110.00	1470.00
PCB-175	NG/KG	94	6857	99	101.00	135.00	1890.00	474.00	449.00	402.00	186.00	71.70
PCB-176	NG/KG	94	6857	100	338.00	482.00	7000.00	1640.00	1610.00	1480.00	575.00	225.00
PCB-177	NG/KG	94	6857	100	1340.00	2010.00	27100.00	7290.00	6860.00	6040.00	2260.00	799.00
PCB-178	NG/KG	94	6857	99	539.00	745.00	11000.00	2530.00	2510.00	2310.00	874.00	354.00
PCB-179	NG/KG	94	6857	100	1170.00	1590.00	22400.00	5490.00	5390.00	4930.00	1890.00	737.00
PCB-18+PCB-30	NG/KG	94	6857	100	2040.00	3760.00	36100.00	14900.00	8140.00	6730.00	4170.00	913.00
PCB-180+PCB-193	NG/KG	94	6857	100	5330.00	7970.00	109000.00	32400.00	31100.00	14300.00	9330.00	3160.00
PCB-181	NG/KG	94	6857	90	21.80	26.10	195.00	113.00	112.00	70.10	57.10	13.20
PCB-182	NG/KG	94	6857	78	9.21	15.30	317.00	39.90	38.90	30.90	18.00	6.42
PCB-183+PCB-185	NG/KG	94	6857	94	1680.00	2350.00	31100.00	8280.00	7880.00	7090.00	3010.00	1070.00
PCB-184	NG/KG	94	6857	100	64.30	166.00	3960.00	189.00	147.00	145.00	113.00	48.50
PCB-186	NG/KG	94	6857	1	0.03	0.31	5.10	1.39	0.00	0.00	0.00	0.00
PCB-187	NG/KG	94	6857	100	3290.00	4240.00	55800.00	14900.00	14800.00	13900.00	5560.00	2190.00
PCB-188	NG/KG	94	6857	7	0.55	4.61	111.00	8.55	5.67	3.99	0.00	0.00
PCB-189	NG/KG	94	6857	99	76.90	117.00	1440.00	502.00	455.00	212.00	167.00	43.10

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-19	NG/KG	94	6857	100	307.00	581.00	14800.00	3210.00	646.00	1170.00	917.00	143.00
PCB-190	NG/KG	94	6857	100	451.00	675.00	7980.00	2720.00	2490.00	1630.00	803.00	258.00
PCB-191	NG/KG	94	6857	100	84.80	123.00	1630.00	494.00	461.00	265.00	161.00	50.90
PCB-192	NG/KG	94	6857	1	0.09	1.90	49.60	1.16	0.00	0.00	0.00	0.00
PCB-194	NG/KG	94	6857	100	1110.00	1560.00	19700.00	6570.00	6320.00	3220.00	2490.00	645.00
PCB-195	NG/KG	94	6857	99	422.00	650.00	8240.00	2660.00	2540.00	1470.00	793.00	213.00
PCB-196	NG/KG	94	6857	100	649.00	874.00	12600.00	3320.00	3210.00	1850.00	1500.00	392.00
PCB-197+PCB-200	NG/KG	94	6857	100	262.00	302.00	4220.00	1090.00	1090.00	832.00	572.00	187.00
PCB-198+PCB-199	NG/KG	94	6857	100	1770.00	2030.00	24400.00	7930.00	7730.00	5090.00	4970.00	1130.00
PCB-2	NG/KG	94	6857	97	55.80	610.00	27100.00	169.00	142.00	102.00	78.50	15.40
PCB-20+PCB-28	NG/KG	94	6857	100	5300.00	8320.00	48500.00	32600.00	30300.00	24600.00	14700.00	2640.00
PCB-201	NG/KG	94	6857	99	221.00	249.00	3430.00	811.00	807.00	786.00	534.00	156.00
PCB-202	NG/KG	94	6857	100	490.00	455.00	4570.00	1590.00	1570.00	1520.00	1300.00	380.00
PCB-203	NG/KG	94	6857	100	1070.00	1220.00	14400.00	4560.00	4440.00	3500.00	2880.00	687.00
PCB-204	NG/KG	94	6857	25	0.74	3.27	73.40	4.82	4.64	3.29	2.42	0.00
PCB-205	NG/KG	94	6857	99	57.60	91.70	1310.00	366.00	342.00	188.00	110.00	30.90
PCB-206	NG/KG	94	6857	100	1050.00	1440.00	7690.00	7220.00	6750.00	3000.00	1850.00	583.00
PCB-207	NG/KG	94	6857	100	127.00	141.00	943.00	653.00	614.00	356.00	274.00	83.20
PCB-208	NG/KG	94	6857	100	412.00	620.00	3450.00	2980.00	2510.00	985.00	663.00	233.00
PCB-209	NG/KG	94	6857	100	862.00	2260.00	12800.00	10000.00	7290.00	1490.00	927.00	384.00
PCB-21+PCB-33	NG/KG	94	6857	100	999.00	2230.00	22700.00	9080.00	3350.00	2540.00	2330.00	384.00
PCB-22	NG/KG	94	6857	100	1520.00	2350.00	17800.00	8640.00	8390.00	4830.00	4040.00	719.00
PCB-23	NG/KG	94	6857	50	4.52	32.80	844.00	42.10	16.80	14.00	7.70	0.16
PCB-24	NG/KG	94	6857	93	28.00	57.60	962.00	221.00	96.10	80.30	58.60	14.50
PCB-25	NG/KG	94	6857	100	299.00	462.00	2930.00	1890.00	1880.00	896.00	836.00	126.00

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-26+PCB-29	NG/KG	94	6857	100	641.00	1010.00	8170.00	3770.00	3060.00	2210.00	1670.00	303.00
PCB-27	NG/KG	94	6857	100	202.00	304.00	2140.00	1630.00	915.00	902.00	564.00	117.00
PCB-3	NG/KG	94	6857	99	118.00	227.00	3670.00	643.00	616.00	502.00	383.00	28.90
PCB-31	NG/KG	94	6857	100	3840.00	5720.00	46100.00	17900.00	16100.00	13400.00	12800.00	1900.00
PCB-32	NG/KG	94	6857	100	882.00	1420.00	10400.00	4710.00	4640.00	3880.00	2530.00	458.00
PCB-34	NG/KG	94	6857	74	12.40	23.00	196.00	95.40	90.70	47.90	24.70	5.72
PCB-35	NG/KG	94	6857	100	242.00	1200.00	44500.00	727.00	532.00	434.00	396.00	179.00
PCB-36	NG/KG	94	6857	100	66.00	52.00	523.00	176.00	173.00	155.00	144.00	49.80
PCB-37	NG/KG	94	6857	100	1430.00	2430.00	12200.00	11500.00	10800.00	4900.00	3520.00	699.00
PCB-38	NG/KG	94	6857	36	3.93	13.00	124.00	57.30	48.60	21.70	5.40	0.00
PCB-39	NG/KG	94	6857	99	30.10	48.80	255.00	234.00	230.00	103.00	53.80	15.20
PCB-4	NG/KG	94	6857	96	447.00	1230.00	13700.00	5030.00	2300.00	1530.00	1020.00	149.00
PCB-40+PCB-41+PCB-71	NG/KG	94	6857	100	3560.00	7690.00	41400.00	35200.00	29100.00	12500.00	6640.00	1390.00
PCB-42	NG/KG	94	6857	100	1870.00	4210.00	22700.00	19200.00	15600.00	7100.00	2960.00	680.00
PCB-43	NG/KG	94	6857	96	223.00	392.00	1860.00	1850.00	1830.00	1080.00	419.00	92.60
PCB-44+PCB-47+PCB-65	NG/KG	94	6857	100	7180.00	14300.00	76300.00	65100.00	53900.00	26300.00	11200.00	2890.00
PCB-45+PCB-51	NG/KG	94	6857	100	998.00	1760.00	9960.00	8290.00	8280.00	3870.00	2420.00	391.00
PCB-46	NG/KG	94	6857	100	349.00	641.00	3180.00	3140.00	3090.00	1440.00	782.00	143.00
PCB-48	NG/KG	94	6857	100	1060.00	1870.00	9110.00	9010.00	8910.00	3920.00	2540.00	450.00
PCB-49+PCB-69	NG/KG	94	6857	100	4270.00	8670.00	46200.00	39500.00	32800.00	15900.00	6110.00	1780.00
PCB-5	NG/KG	94	6857	66	18.00	48.70	492.00	216.00	75.10	67.00	44.50	2.77
PCB-50+PCB-53	NG/KG	94	6857	100	786.00	1480.00	7240.00	7010.00	6770.00	3720.00	1320.00	304.00
PCB-52	NG/KG	94	6857	100	9640.00	15700.00	81200.00	71900.00	62600.00	33700.00	16200.00	4750.00
PCB-54	NG/KG	94	6857	91	14.40	71.30	2980.00	86.90	83.50	62.60	27.30	4.49
PCB-55	NG/KG	94	6857	77	50.90	67.60	387.00	232.00	225.00	195.00	136.00	22.00

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-56	NG/KG	94	6857	100	3440.00	9470.00	52800.00	41900.00	30900.00	9330.00	4640.00	1170.00
PCB-57	NG/KG	94	6857	71	16.70	32.20	175.00	140.00	134.00	92.80	39.80	4.48
PCB-58	NG/KG	94	6857	45	9.21	25.20	128.00	108.00	88.20	52.20	15.60	0.00
PCB-59+PCB-62+PCB-75	NG/KG	94	6857	100	548.00	1100.00	5860.00	5100.00	4340.00	2160.00	945.00	223.00
PCB-6	NG/KG	94	6857	92	182.00	473.00	4910.00	1970.00	689.00	644.00	371.00	54.20
PCB-60	NG/KG	94	6857	100	1720.00	4310.00	24000.00	19400.00	14800.00	4600.00	2820.00	577.00
PCB-61+PCB-70+PCB-74+PCB-76	NG/KG	94	6857	100	12700.00	23800.00	129000.00	111000.00	93800.00	41700.00	19100.00	5580.00
PCB-63	NG/KG	94	6857	100	268.00	549.00	2960.00	2530.00	2090.00	1060.00	397.00	110.00
PCB-64	NG/KG	94	6857	99	3280.00	6890.00	37400.00	31400.00	25500.00	12100.00	5020.00	1350.00
PCB-66	NG/KG	94	6857	100	7610.00	20400.00	113000.00	89500.00	65900.00	25300.00	8620.00	2390.00
PCB-67	NG/KG	94	6857	100	146.00	241.00	1220.00	1160.00	1100.00	526.00	316.00	64.50
PCB-68	NG/KG	94	6857	100	50.80	404.00	10600.00	164.00	159.00	108.00	71.70	25.80
PCB-7	NG/KG	94	6857	97	59.20	359.00	9120.00	441.00	113.00	161.00	87.00	19.50
PCB-72	NG/KG	94	6857	86	35.70	71.30	363.00	357.00	351.00	157.00	54.40	10.30
PCB-73	NG/KG	94	6857	4	0.65	11.20	371.00	1.64	1.05	0.00	0.00	0.00
PCB-77	NG/KG	94	6857	100	824.00	2480.00	23200.00	10700.00	7790.00	1910.00	828.00	228.00
PCB-78	NG/KG	94	6857	32	3.33	7.05	117.00	16.00	15.40	14.00	11.70	0.00
PCB-79	NG/KG	94	6857	100	131.00	183.00	981.00	880.00	778.00	322.00	243.00	69.50
PCB-8	NG/KG	94	6857	93	696.00	2260.00	24600.00	8750.00	2660.00	1960.00	1630.00	185.00
PCB-80	NG/KG	94	6857	18	1.39	5.16	63.10	10.50	7.42	6.10	5.24	0.00
PCB-81	NG/KG	94	6857	100	199.00	354.00	1980.00	1620.00	1260.00	399.00	375.00	100.00
PCB-82	NG/KG	94	6857	100	1420.00	2310.00	12800.00	10800.00	8820.00	3220.00	2590.00	722.00
PCB-83+PCB-99	NG/KG	94	6857	100	6270.00	8630.00	46500.00	41700.00	36900.00	13800.00	11500.00	3370.00
PCB-84	NG/KG	94	6857	100	2920.00	3610.00	18900.00	16800.00	14600.00	7440.00	5280.00	1700.00
PCB-85+PCB-116+PCB-117	NG/KG	94	6857	100	2020.00	3120.00	17100.00	14500.00	12000.00	4480.00	3490.00	1020.00

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-86+PCB-87+PCB-97+PCB-108+PCB-119+PCB-125	NG/KG	94	6857	100	8200.00	11200.00	60300.00	52500.00	44800.00	19500.00	15300.00	4580.00
PCB-88+PCB-91	NG/KG	94	6857	100	1440.00	1960.00	10500.00	9650.00	8800.00	3350.00	2870.00	774.00
PCB-89	NG/KG	94	6857	99	130.00	259.00	1450.00	1220.00	982.00	303.00	202.00	64.10
PCB-9	NG/KG	94	6857	96	60.00	156.00	1600.00	594.00	275.00	255.00	105.00	17.20
PCB-90+PCB-101+PCB-113	NG/KG	94	6857	100	11300.00	14100.00	71600.00	69300.00	67000.00	27900.00	25700.00	6590.00
PCB-92	NG/KG	94	6857	100	1980.00	2270.00	13700.00	10300.00	9330.00	4930.00	4450.00	1230.00
PCB-93+PCB-95+PCB-98+PCB-100+PCB-102	NG/KG	94	6857	100	8940.00	10700.00	53600.00	52900.00	52200.00	21800.00	18900.00	5290.00
PCB-94	NG/KG	94	6857	93	53.30	90.90	1370.00	381.00	359.00	131.00	87.20	29.70
PCB-96	NG/KG	94	6857	99	72.10	107.00	643.00	544.00	520.00	167.00	133.00	39.60

**EXHIBIT 1 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to zero**  
**group=TOTALS**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCBA	NG/KG	94	6857	0	249000.00	478000.00	18400000.00	1660000.00	1630000.00	520000.00	498000.00	131000.00
PCBB	NG/KG	94	6857	100	249000.00	478000.00	18400000.00	1660000.00	1630000.00	520000.00	498000.00	131000.00
TOTAL DICHLORO BIPHENYLS	NG/KG	94	6857	100	14200.00	338000.00	17500000.00	61500.00	26500.00	12400.00	7040.00	2860.00
TOTAL HEPTACHLORO BIPHENYLS	NG/KG	94	6857	100	20000.00	28000.00	376000.00	108000.00	102000.00	69400.00	35000.00	13000.00
TOTAL HEXACHLORO BIPHENYLS	NG/KG	94	6857	100	50700.00	58000.00	516000.00	243000.00	217000.00	153000.00	122000.00	30500.00
TOTAL MONOCHLORO BIPHENYLS	NG/KG	94	6857	100	275.00	1190.00	32500.00	2010.00	938.00	903.00	672.00	81.70
TOTAL NONACHLORO BIPHENYLS	NG/KG	94	6857	100	1590.00	2190.00	11800.00	10900.00	9910.00	4330.00	2720.00	888.00
TOTAL OCTACHLORO BIPHENYLS	NG/KG	94	6857	100	6040.00	7340.00	92900.00	28900.00	28000.00	18200.00	15000.00	3820.00
TOTAL PCBS	NG/KG	94	6857	100	249000.00	478000.00	18400000.00	1660000.00	1630000.00	520000.00	498000.00	131000.00
TOTAL PENTACHLORO BIPHENYLS	NG/KG	94	6857	100	74100.00	97100.00	516000.00	457000.00	399000.00	174000.00	146000.00	42100.00
TOTAL TETRACHLORO BIPHENYLS	NG/KG	94	6857	100	61000.00	125000.00	681000.00	576000.00	472000.00	213000.00	92300.00	24800.00
TOTAL TRICHLORO BIPHENYLS	NG/KG	94	6857	100	19800.00	30400.00	244000.00	100000.00	84800.00	76900.00	61100.00	9530.00
DIOXINSA	NG/KG	94	6857	0	8320.00	45000.00	525000.00	37200.00	15300.00	9100.00	8890.00	3350.00
DIOXINSB	NG/KG	94	6857	100	8320.00	45000.00	525000.00	37200.00	15300.00	9100.00	8890.00	3350.00



**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=Dioxins and Furans**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	492.00	2060.00	24100.00	1520.00	1030.00	743.00	656.00	273.00
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	99	167.00	551.00	5150.00	3410.00	351.00	231.00	170.00	88.20
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	100	9.13	58.30	655.00	54.90	19.20	8.73	6.94	2.80
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	3.61	6.87	124.00	16.20	9.80	8.02	6.46	2.22
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	96	5.53	20.70	500.00	36.60	15.30	10.10	8.73	3.36
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	21.30	35.00	369.00	131.00	66.00	43.90	41.30	15.10
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	5.21	25.20	618.00	24.10	13.90	8.37	8.07	2.60
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	11.80	19.80	332.00	52.80	35.70	22.80	21.20	7.49
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	20	0.84	2.51	54.40	4.12	2.73	1.72	1.10	0.50
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	5.76	5.69	92.00	14.60	13.10	12.00	11.10	4.57
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	93	1.51	7.28	189.00	6.71	4.05	3.04	2.61	1.00
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	6.03	38.70	974.00	31.10	12.60	8.19	7.81	2.80
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	100	2.61	17.70	463.00	7.61	7.26	5.91	3.97	1.50
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	1.42	1.50	47.20	5.09	4.86	3.37	2.38	1.10
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	94	6857	100	3.11	3.93	79.70	10.60	10.50	7.87	5.70	2.30
OCTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	6780.00	39100.00	457000.00	14300.00	12800.00	7790.00	7510.00	2730.00
OCTACHLORODIBENZOFURAN	NG/KG	94	6857	100	802.00	3890.00	37800.00	19000.00	1910.00	753.00	554.00	279.00

**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=PCBs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
DECACHLORO BIPHENYL	NG/KG	94	6857	100	862.00	2260.00	12800.00	10000.00	7290.00	1490.00	927.00	384.00
PCB-1	NG/KG	94	6857	95	101.00	521.00	12700.00	1150.00	376.00	208.00	174.00	34.20
PCB-10	NG/KG	94	6857	85	21.60	53.20	722.00	225.00	84.80	56.70	40.60	11.60
PCB-103	NG/KG	94	6857	98	60.10	159.00	3160.00	308.00	293.00	167.00	101.00	27.50
PCB-104	NG/KG	94	6857	9	31.50	46.60	474.00	236.00	228.00	84.90	41.50	25.00
PCB-105	NG/KG	94	6857	100	4570.00	7120.00	39200.00	33800.00	28300.00	10800.00	8210.00	2270.00
PCB-106	NG/KG	94	6857	0	3.28	4.94	24.50	23.20	21.80	18.20	3.87	2.50
PCB-107+PCB-124	NG/KG	94	6857	100	411.00	532.00	2810.00	2540.00	2270.00	1040.00	750.00	223.00
PCB-109	NG/KG	94	6857	100	687.00	888.00	4700.00	4310.00	3920.00	1720.00	1270.00	388.00
PCB-11	NG/KG	94	6857	97	11400.00	337000.00	17500000.00	6910.00	6180.00	3860.00	3410.00	1060.00
PCB-110+PCB-115	NG/KG	94	6857	100	12900.00	17400.00	93600.00	81600.00	69700.00	29000.00	23800.00	7330.00
PCB-111	NG/KG	94	6857	2	3.78	6.50	106.00	24.40	24.30	20.00	8.29	2.50
PCB-112	NG/KG	94	6857	0	7.20	10.40	49.00	46.30	43.70	40.00	15.20	5.00
PCB-114	NG/KG	94	6857	100	292.00	453.00	2500.00	2180.00	1870.00	677.00	536.00	154.00
PCB-118	NG/KG	94	6857	100	9870.00	12200.00	63600.00	58200.00	52800.00	24700.00	19500.00	5550.00
PCB-12+PCB-13	NG/KG	94	6857	100	149.00	220.00	5000.00	1070.00	589.00	452.00	293.00	81.90
PCB-120	NG/KG	94	6857	65	13.40	29.50	575.00	64.20	63.60	48.70	31.90	5.01
PCB-121	NG/KG	94	6857	25	7.73	12.70	166.00	47.70	45.00	40.00	20.30	5.00
PCB-122	NG/KG	94	6857	99	141.00	256.00	1430.00	1210.00	984.00	298.00	236.00	62.90
PCB-123	NG/KG	94	6857	100	313.00	386.00	2140.00	1830.00	1520.00	674.00	534.00	258.00
PCB-126	NG/KG	94	6857	49	73.30	117.00	503.00	467.00	441.00	400.00	164.00	46.90
PCB-127	NG/KG	94	6857	80	22.40	23.60	241.00	95.90	95.70	65.40	46.50	14.20
PCB-128+PCB-166	NG/KG	94	6857	100	1780.00	2100.00	10100.00	9430.00	8770.00	5460.00	3630.00	994.00
PCB-129+PCB-138+PCB-160+PCB-163	NG/KG	94	6857	100	11900.00	13800.00	93800.00	63500.00	62700.00	34200.00	30500.00	7000.00
PCB-130	NG/KG	94	6857	100	694.00	763.00	4170.00	3530.00	3410.00	1880.00	1520.00	399.00
PCB-131	NG/KG	94	6857	100	168.00	182.00	825.00	821.00	817.00	502.00	357.00	101.00

**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-132	NG/KG	94	6857	100	3670.00	4020.00	31700.00	17600.00	17400.00	10100.00	9330.00	2150.00
PCB-133	NG/KG	94	6857	100	145.00	169.00	2570.00	613.00	563.00	419.00	325.00	91.60
PCB-134+PCB-143	NG/KG	94	6857	100	594.00	660.00	4850.00	2940.00	2890.00	1550.00	1470.00	354.00
PCB-135+PCB-151+PCB-154	NG/KG	94	6857	100	3590.00	4430.00	56200.00	15900.00	15400.00	13900.00	7090.00	2280.00
PCB-136	NG/KG	94	6857	100	1380.00	1620.00	19500.00	6020.00	5710.00	4770.00	3120.00	811.00
PCB-137	NG/KG	94	6857	100	584.00	583.00	2610.00	2550.00	2500.00	1780.00	1290.00	382.00
PCB-139+PCB-140	NG/KG	94	6857	100	199.00	211.00	1650.00	898.00	880.00	583.00	404.00	117.00
PCB-14	NG/KG	94	6857	84	12.60	37.00	883.00	74.90	52.50	43.10	40.00	5.63
PCB-141	NG/KG	94	6857	100	2010.00	2420.00	22200.00	10500.00	9160.00	5110.00	4720.00	1310.00
PCB-142	NG/KG	94	6857	0	6.30	9.44	49.00	46.30	43.70	19.80	7.31	5.00
PCB-144	NG/KG	94	6857	100	512.00	572.00	4320.00	2300.00	2140.00	1840.00	1170.00	310.00
PCB-145	NG/KG	94	6857	75	7.69	10.30	49.00	46.30	43.70	21.80	20.20	5.00
PCB-146	NG/KG	94	6857	100	1440.00	1610.00	20300.00	6140.00	5640.00	4430.00	3350.00	904.00
PCB-147+PCB-149	NG/KG	94	6857	100	8400.00	9950.00	107000.00	39100.00	35700.00	29100.00	18100.00	5270.00
PCB-148	NG/KG	94	6857	89	13.10	33.90	823.00	48.30	47.10	39.70	29.70	7.39
PCB-15	NG/KG	94	6857	100	1130.00	1460.00	12800.00	5460.00	3740.00	3570.00	2880.00	769.00
PCB-150	NG/KG	94	6857	98	13.00	25.00	591.00	42.80	42.70	37.60	26.70	8.37
PCB-152	NG/KG	94	6857	89	11.30	16.50	310.00	52.40	52.10	27.80	23.90	6.21
PCB-153+PCB-168	NG/KG	94	6857	100	9540.00	11100.00	109000.00	45700.00	41300.00	31900.00	20200.00	5840.00
PCB-155	NG/KG	94	6857	95	26.70	83.10	2010.00	184.00	58.20	51.30	39.20	20.30
PCB-156+PCB-157	NG/KG	94	6857	100	1540.00	1690.00	8200.00	7750.00	7460.00	4620.00	3200.00	917.00
PCB-158	NG/KG	94	6857	100	1150.00	1280.00	7760.00	5770.00	5250.00	3060.00	2570.00	664.00
PCB-159	NG/KG	94	6857	95	103.00	143.00	1540.00	600.00	559.00	341.00	166.00	62.90
PCB-16	NG/KG	94	6857	100	941.00	1750.00	17200.00	6590.00	3910.00	2880.00	1710.00	456.00
PCB-161	NG/KG	94	6857	0	6.39	9.76	71.40	46.70	44.10	20.80	7.60	5.00

**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-162	NG/KG	94	6857	100	32.20	33.90	217.00	151.00	146.00	104.00	59.80	19.80
PCB-164	NG/KG	94	6857	100	754.00	925.00	6690.00	4310.00	4250.00	2240.00	1780.00	428.00
PCB-165	NG/KG	94	6857	4	3.23	4.77	33.20	23.20	21.90	10.40	4.18	2.50
PCB-167	NG/KG	94	6857	100	455.00	506.00	2740.00	2390.00	2380.00	1340.00	960.00	266.00
PCB-169	NG/KG	94	6857	44	3.67	18.30	466.00	12.60	11.30	8.97	5.76	2.50
PCB-17	NG/KG	94	6857	100	1040.00	1820.00	16700.00	7270.00	3870.00	3850.00	2770.00	470.00
PCB-170	NG/KG	94	6857	100	2090.00	3080.00	36100.00	13100.00	11900.00	6050.00	4250.00	1230.00
PCB-171+PCB-173	NG/KG	94	6857	100	677.00	988.00	12700.00	3780.00	3450.00	2490.00	1330.00	407.00
PCB-172	NG/KG	94	6857	100	372.00	543.00	7240.00	2180.00	2010.00	1180.00	667.00	228.00
PCB-174	NG/KG	94	6857	100	2350.00	3330.00	42800.00	13100.00	12200.00	8310.00	4110.00	1470.00
PCB-175	NG/KG	94	6857	99	101.00	135.00	1890.00	474.00	449.00	402.00	186.00	71.70
PCB-176	NG/KG	94	6857	100	338.00	482.00	7000.00	1640.00	1610.00	1480.00	575.00	225.00
PCB-177	NG/KG	94	6857	100	1340.00	2010.00	27100.00	7290.00	6860.00	6040.00	2260.00	799.00
PCB-178	NG/KG	94	6857	99	539.00	745.00	11000.00	2530.00	2510.00	2310.00	874.00	354.00
PCB-179	NG/KG	94	6857	100	1170.00	1590.00	22400.00	5490.00	5390.00	4930.00	1890.00	737.00
PCB-18+PCB-30	NG/KG	94	6857	100	2040.00	3760.00	36100.00	14900.00	8140.00	6730.00	4170.00	913.00
PCB-180+PCB-193	NG/KG	94	6857	100	5330.00	7970.00	109000.00	32400.00	31100.00	14300.00	9330.00	3160.00
PCB-181	NG/KG	94	6857	90	22.30	25.90	195.00	113.00	112.00	70.10	57.10	13.30
PCB-182	NG/KG	94	6857	78	12.20	16.80	317.00	49.00	49.00	40.30	30.80	7.60
PCB-183+PCB-185	NG/KG	94	6857	94	1690.00	2350.00	31100.00	8280.00	7880.00	7090.00	3010.00	1070.00
PCB-184	NG/KG	94	6857	100	64.30	166.00	3960.00	189.00	147.00	145.00	113.00	48.50
PCB-186	NG/KG	94	6857	1	6.30	9.44	49.00	46.30	43.70	19.80	7.15	5.00
PCB-187	NG/KG	94	6857	100	3290.00	4240.00	55800.00	14900.00	14800.00	13900.00	5560.00	2190.00
PCB-188	NG/KG	94	6857	7	29.30	45.30	245.00	232.00	218.00	81.70	25.90	25.00
PCB-189	NG/KG	94	6857	99	76.90	117.00	1440.00	502.00	455.00	212.00	167.00	43.10

**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-19	NG/KG	94	6857	100	307.00	581.00	14800.00	3210.00	646.00	1170.00	917.00	143.00
PCB-190	NG/KG	94	6857	100	451.00	675.00	7980.00	2720.00	2490.00	1630.00	803.00	258.00
PCB-191	NG/KG	94	6857	100	84.80	123.00	1630.00	494.00	461.00	265.00	161.00	50.90
PCB-192	NG/KG	94	6857	1	3.22	5.04	49.60	23.40	22.00	10.40	3.80	2.50
PCB-194	NG/KG	94	6857	100	1110.00	1560.00	19700.00	6570.00	6320.00	3220.00	2490.00	645.00
PCB-195	NG/KG	94	6857	99	422.00	650.00	8240.00	2660.00	2540.00	1470.00	793.00	213.00
PCB-196	NG/KG	94	6857	100	649.00	874.00	12600.00	3320.00	3210.00	1850.00	1500.00	392.00
PCB-197+PCB-200	NG/KG	94	6857	100	262.00	302.00	4220.00	1090.00	1090.00	832.00	572.00	187.00
PCB-198+PCB-199	NG/KG	94	6857	100	1770.00	2030.00	24400.00	7930.00	7730.00	5090.00	4970.00	1130.00
PCB-2	NG/KG	94	6857	97	55.80	610.00	27100.00	169.00	142.00	102.00	78.50	15.40
PCB-20+PCB-28	NG/KG	94	6857	100	5300.00	8320.00	48500.00	32600.00	30300.00	24600.00	14700.00	2640.00
PCB-201	NG/KG	94	6857	99	225.00	249.00	3430.00	811.00	807.00	786.00	534.00	156.00
PCB-202	NG/KG	94	6857	100	490.00	455.00	4570.00	1590.00	1570.00	1520.00	1300.00	380.00
PCB-203	NG/KG	94	6857	100	1070.00	1220.00	14400.00	4560.00	4440.00	3500.00	2880.00	687.00
PCB-204	NG/KG	94	6857	25	5.80	9.48	73.40	46.80	44.10	16.60	7.21	4.90
PCB-205	NG/KG	94	6857	99	57.60	91.70	1310.00	366.00	342.00	188.00	110.00	30.90
PCB-206	NG/KG	94	6857	100	1050.00	1440.00	7690.00	7220.00	6750.00	3000.00	1850.00	583.00
PCB-207	NG/KG	94	6857	100	127.00	141.00	943.00	653.00	614.00	356.00	274.00	83.20
PCB-208	NG/KG	94	6857	100	412.00	620.00	3450.00	2980.00	2510.00	985.00	663.00	233.00
PCB-209	NG/KG	94	6857	100	862.00	2260.00	12800.00	10000.00	7290.00	1490.00	927.00	384.00
PCB-21+PCB-33	NG/KG	94	6857	100	999.00	2230.00	22700.00	9080.00	3350.00	2540.00	2330.00	384.00
PCB-22	NG/KG	94	6857	100	1520.00	2350.00	17800.00	8640.00	8390.00	4830.00	4040.00	719.00
PCB-23	NG/KG	94	6857	50	9.17	33.70	844.00	48.90	47.00	40.00	18.30	5.00
PCB-24	NG/KG	94	6857	93	31.10	110.00	5000.00	233.00	40.20	80.90	58.60	17.50
PCB-25	NG/KG	94	6857	100	299.00	462.00	2930.00	1890.00	1880.00	896.00	836.00	126.00

**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-26+PCB-29	NG/KG	94	6857	100	641.00	1010.00	8170.00	3770.00	3060.00	2210.00	1670.00	303.00
PCB-27	NG/KG	94	6857	100	202.00	304.00	2140.00	1630.00	915.00	902.00	564.00	117.00
PCB-3	NG/KG	94	6857	99	119.00	227.00	3670.00	643.00	616.00	502.00	383.00	30.80
PCB-31	NG/KG	94	6857	100	3840.00	5720.00	46100.00	17900.00	16100.00	13400.00	12800.00	1900.00
PCB-32	NG/KG	94	6857	100	882.00	1420.00	10400.00	4710.00	4640.00	3880.00	2530.00	458.00
PCB-34	NG/KG	94	6857	74	15.90	23.40	196.00	95.40	90.70	49.20	37.20	6.69
PCB-35	NG/KG	94	6857	100	242.00	1200.00	44500.00	727.00	532.00	434.00	396.00	179.00
PCB-36	NG/KG	94	6857	100	66.00	52.00	523.00	176.00	173.00	155.00	144.00	49.80
PCB-37	NG/KG	94	6857	100	1430.00	2430.00	12200.00	11500.00	10800.00	4900.00	3520.00	699.00
PCB-38	NG/KG	94	6857	36	6.47	13.30	124.00	57.30	48.60	24.50	11.20	2.50
PCB-39	NG/KG	94	6857	99	30.80	48.60	255.00	234.00	230.00	103.00	53.80	15.50
PCB-4	NG/KG	94	6857	96	447.00	1230.00	13700.00	5030.00	2300.00	1530.00	1020.00	149.00
PCB-40+PCB-41+PCB-71	NG/KG	94	6857	100	3560.00	7690.00	41400.00	35200.00	29100.00	12500.00	6640.00	1390.00
PCB-42	NG/KG	94	6857	100	1870.00	4210.00	22700.00	19200.00	15600.00	7100.00	2960.00	680.00
PCB-43	NG/KG	94	6857	96	224.00	391.00	1860.00	1850.00	1830.00	1080.00	419.00	92.60
PCB-44+PCB-47+PCB-65	NG/KG	94	6857	100	7180.00	14300.00	76300.00	65100.00	53900.00	26300.00	11200.00	2890.00
PCB-45+PCB-51	NG/KG	94	6857	100	998.00	1760.00	9960.00	8290.00	8280.00	3870.00	2420.00	391.00
PCB-46	NG/KG	94	6857	100	349.00	641.00	3180.00	3140.00	3090.00	1440.00	782.00	143.00
PCB-48	NG/KG	94	6857	100	1060.00	1870.00	9110.00	9010.00	8910.00	3920.00	2540.00	450.00
PCB-49+PCB-69	NG/KG	94	6857	100	4270.00	8670.00	46200.00	39500.00	32800.00	15900.00	6110.00	1780.00
PCB-5	NG/KG	94	6857	66	21.80	48.60	492.00	216.00	75.20	69.40	47.90	5.00
PCB-50+PCB-53	NG/KG	94	6857	100	786.00	1480.00	7240.00	7010.00	6770.00	3720.00	1320.00	304.00
PCB-52	NG/KG	94	6857	100	9640.00	15700.00	81200.00	71900.00	62600.00	33700.00	16200.00	4750.00
PCB-54	NG/KG	94	6857	91	15.40	71.20	2980.00	86.90	83.50	62.60	27.30	4.56
PCB-55	NG/KG	94	6857	77	52.90	66.30	387.00	232.00	225.00	195.00	136.00	29.70

**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-56	NG/KG	94	6857	100	3440.00	9470.00	52800.00	41900.00	30900.00	9330.00	4640.00	1170.00
PCB-57	NG/KG	94	6857	71	20.70	31.90	175.00	140.00	134.00	92.80	46.30	8.21
PCB-58	NG/KG	94	6857	45	14.20	25.60	128.00	108.00	88.20	55.20	43.00	5.00
PCB-59+PCB-62+PCB-75	NG/KG	94	6857	100	548.00	1100.00	5860.00	5100.00	4340.00	2160.00	945.00	223.00
PCB-6	NG/KG	94	6857	92	182.00	473.00	4910.00	1970.00	689.00	644.00	371.00	54.20
PCB-60	NG/KG	94	6857	100	1720.00	4310.00	24000.00	19400.00	14800.00	4600.00	2820.00	577.00
PCB-61+PCB-70+PCB-74+PCB-76	NG/KG	94	6857	100	12700.00	23800.00	129000.00	111000.00	93800.00	41700.00	19100.00	5580.00
PCB-63	NG/KG	94	6857	100	268.00	549.00	2960.00	2530.00	2090.00	1060.00	397.00	110.00
PCB-64	NG/KG	94	6857	99	3280.00	6890.00	37400.00	31400.00	25500.00	12100.00	5020.00	1350.00
PCB-66	NG/KG	94	6857	100	7610.00	20400.00	113000.00	89500.00	65900.00	25300.00	8620.00	2390.00
PCB-67	NG/KG	94	6857	100	146.00	241.00	1220.00	1160.00	1100.00	526.00	316.00	64.50
PCB-68	NG/KG	94	6857	100	50.90	404.00	10600.00	164.00	159.00	108.00	71.70	25.80
PCB-7	NG/KG	94	6857	97	59.30	359.00	9120.00	441.00	113.00	161.00	87.00	19.50
PCB-72	NG/KG	94	6857	86	37.00	70.80	363.00	357.00	351.00	157.00	54.40	10.60
PCB-73	NG/KG	94	6857	4	6.55	14.20	371.00	47.30	44.60	18.70	6.88	5.00
PCB-77	NG/KG	94	6857	100	824.00	2480.00	23200.00	10700.00	7790.00	1910.00	828.00	228.00
PCB-78	NG/KG	94	6857	32	8.77	11.10	120.00	47.10	44.40	40.00	15.40	5.00
PCB-79	NG/KG	94	6857	100	131.00	183.00	981.00	880.00	778.00	322.00	243.00	69.50
PCB-8	NG/KG	94	6857	93	697.00	2260.00	24600.00	8750.00	2660.00	1960.00	1630.00	185.00
PCB-80	NG/KG	94	6857	18	7.27	10.70	63.10	48.70	48.30	40.00	8.18	5.00
PCB-81	NG/KG	94	6857	100	199.00	354.00	1980.00	1620.00	1260.00	399.00	375.00	100.00
PCB-82	NG/KG	94	6857	100	1420.00	2310.00	12800.00	10800.00	8820.00	3220.00	2590.00	722.00
PCB-83+PCB-99	NG/KG	94	6857	100	6270.00	8630.00	46500.00	41700.00	36900.00	13800.00	11500.00	3370.00
PCB-84	NG/KG	94	6857	100	2920.00	3610.00	18900.00	16800.00	14600.00	7440.00	5280.00	1700.00
PCB-85+PCB-116+PCB-117	NG/KG	94	6857	100	2020.00	3120.00	17100.00	14500.00	12000.00	4480.00	3490.00	1020.00

**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-86+PCB-87+PCB-97+PCB-108+PCB-119+PCB-125	NG/KG	94	6857	100	8200.00	11200.00	60300.00	52500.00	44800.00	19500.00	15300.00	4580.00
PCB-88+PCB-91	NG/KG	94	6857	100	1440.00	1960.00	10500.00	9650.00	8800.00	3350.00	2870.00	774.00
PCB-89	NG/KG	94	6857	99	131.00	259.00	1450.00	1220.00	982.00	303.00	202.00	64.10
PCB-9	NG/KG	94	6857	96	60.10	156.00	1600.00	594.00	275.00	255.00	105.00	17.20
PCB-90+PCB-101+PCB-113	NG/KG	94	6857	100	11300.00	14100.00	71600.00	69300.00	67000.00	27900.00	25700.00	6590.00
PCB-92	NG/KG	94	6857	100	1980.00	2270.00	13700.00	10300.00	9330.00	4930.00	4450.00	1230.00
PCB-93+PCB-95+PCB-98+PCB-100+PCB-102	NG/KG	94	6857	100	8940.00	10700.00	53600.00	52900.00	52200.00	21800.00	18900.00	5290.00
PCB-94	NG/KG	94	6857	93	53.90	90.60	1370.00	381.00	359.00	131.00	87.20	29.80
PCB-96	NG/KG	94	6857	99	72.10	107.00	643.00	544.00	520.00	167.00	133.00	39.60



**EXHIBIT 2 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ½ ML**  
**group=TOTALS**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCBA	NG/KG	94	6857	0	249000.00	478000.00	18400000.00	1660000.00	1630000.00	520000.00	500000.00	132000.00
PCBB	NG/KG	94	6857	100	249000.00	478000.00	18400000.00	1660000.00	1630000.00	520000.00	500000.00	132000.00
TOTAL DICHLORO BIPHENYLS	NG/KG	94	6857	100	14200.00	338000.00	17500000.00	61500.00	26500.00	12400.00	7040.00	2860.00
TOTAL HEPTACHLORO BIPHENYLS	NG/KG	94	6857	100	20000.00	28000.00	376000.00	108000.00	102000.00	69400.00	35000.00	13000.00
TOTAL HEXACHLORO BIPHENYLS	NG/KG	94	6857	100	50700.00	58000.00	516000.00	243000.00	217000.00	153000.00	122000.00	30500.00
TOTAL MONOCHLORO BIPHENYLS	NG/KG	94	6857	100	275.00	1190.00	32500.00	2010.00	938.00	903.00	672.00	81.70
TOTAL NONACHLORO BIPHENYLS	NG/KG	94	6857	100	1590.00	2190.00	11800.00	10900.00	9910.00	4330.00	2720.00	888.00
TOTAL OCTACHLORO BIPHENYLS	NG/KG	94	6857	100	6040.00	7340.00	92900.00	28900.00	28000.00	18200.00	15000.00	3820.00
TOTAL PCBS	NG/KG	94	6857	100	249000.00	478000.00	18400000.00	1660000.00	1630000.00	520000.00	498000.00	131000.00
TOTAL PENTACHLORO BIPHENYLS	NG/KG	94	6857	100	74100.00	97100.00	516000.00	457000.00	399000.00	174000.00	146000.00	42100.00
TOTAL TETRACHLORO BIPHENYLS	NG/KG	94	6857	100	61000.00	125000.00	681000.00	576000.00	472000.00	213000.00	92300.00	24800.00
TOTAL TRICHLORO BIPHENYLS	NG/KG	94	6857	100	19800.00	30400.00	244000.00	100000.00	84800.00	76900.00	61100.00	9530.00
DIOXINSA	NG/KG	94	6857	0	8320.00	45000.00	525000.00	37200.00	15300.00	9110.00	8890.00	3350.00
DIOXINSB	NG/KG	94	6857	100	8320.00	45000.00	525000.00	37200.00	15300.00	9110.00	8890.00	3350.00

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=Dioxins and Furans**

POLLUTANT	UNIT	SAMPLE SIZE	POTWs	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	492.00	2060.00	24100.00	1520.00	1030.00	743.00	656.00	273.00
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	99	167.00	551.00	5150.00	3410.00	351.00	231.00	170.00	88.20
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	100	9.13	58.30	655.00	54.90	19.20	8.73	6.94	2.80
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	3.62	6.87	124.00	16.20	9.80	8.02	6.46	2.22
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	96	5.56	20.70	500.00	36.60	15.30	10.10	8.73	3.36
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	21.30	35.00	369.00	131.00	66.00	43.90	41.30	15.10
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	5.21	25.20	618.00	24.10	13.90	8.37	8.07	2.60
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	11.80	19.80	332.00	52.80	35.70	22.80	21.20	7.49
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	20	1.41	2.66	54.40	6.43	5.46	3.44	1.76	1.00
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	5.76	5.69	92.00	14.60	13.10	12.00	11.10	4.57
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	93	1.66	7.32	189.00	6.71	6.08	4.15	2.63	1.00
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	6.03	38.70	974.00	31.10	12.60	8.19	7.81	2.80
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	100	2.61	17.70	463.00	7.61	7.26	5.91	3.97	1.50
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	1.42	1.50	47.20	5.09	4.86	3.37	2.38	1.10
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	94	6857	100	3.11	3.93	79.70	10.60	10.50	7.87	5.70	2.30
OCTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	6780.00	39100.00	457000.00	14300.00	12800.00	7790.00	7510.00	2730.00
OCTACHLORODIBENZOFURAN	NG/KG	94	6857	100	802.00	3890.00	37800.00	19000.00	1910.00	753.00	554.00	279.00

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=PCBs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
DECACHLORO BIPHENYL	NG/KG	94	6857	100	862.00	2260.00	12800.00	10000.00	7290.00	1490.00	927.00	384.00
PCB-1	NG/KG	94	6857	95	102.00	521.00	12700.00	1150.00	376.00	208.00	174.00	34.30
PCB-10	NG/KG	94	6857	85	23.70	54.70	722.00	225.00	97.60	87.70	42.20	11.60
PCB-103	NG/KG	94	6857	98	60.10	159.00	3160.00	308.00	293.00	167.00	101.00	27.50
PCB-104	NG/KG	94	6857	9	60.10	90.60	490.00	485.00	481.00	179.00	62.40	50.00
PCB-105	NG/KG	94	6857	100	4570.00	7120.00	39200.00	33800.00	28300.00	10800.00	8210.00	2270.00
PCB-106	NG/KG	94	6857	0	6.56	9.88	49.00	46.30	43.70	36.40	7.74	5.00
PCB-107+PCB-124	NG/KG	94	6857	100	411.00	532.00	2810.00	2540.00	2270.00	1040.00	750.00	223.00
PCB-109	NG/KG	94	6857	100	687.00	888.00	4700.00	4310.00	3920.00	1720.00	1270.00	388.00
PCB-11	NG/KG	94	6857	97	11400.00	337000.00	17500000.00	6910.00	6180.00	3860.00	3410.00	1060.00
PCB-110+PCB-115	NG/KG	94	6857	100	12900.00	17400.00	93600.00	81600.00	69700.00	29000.00	23800.00	7330.00
PCB-111	NG/KG	94	6857	2	7.33	11.00	106.00	46.70	44.10	40.00	16.60	5.00
PCB-112	NG/KG	94	6857	0	14.40	20.70	98.00	92.70	87.30	80.00	30.40	10.00
PCB-114	NG/KG	94	6857	100	292.00	453.00	2500.00	2180.00	1870.00	677.00	536.00	154.00
PCB-118	NG/KG	94	6857	100	9870.00	12200.00	63600.00	58200.00	52800.00	24700.00	19500.00	5550.00
PCB-12+PCB-13	NG/KG	94	6857	100	151.00	273.00	10000.00	1070.00	589.00	452.00	293.00	81.90
PCB-120	NG/KG	94	6857	65	17.80	33.80	575.00	95.60	92.20	80.00	44.90	9.76
PCB-121	NG/KG	94	6857	25	13.60	21.50	166.00	94.40	89.10	80.00	35.40	10.00
PCB-122	NG/KG	94	6857	99	141.00	256.00	1430.00	1210.00	984.00	298.00	236.00	62.90
PCB-123	NG/KG	94	6857	100	313.00	386.00	2140.00	1830.00	1520.00	674.00	534.00	258.00
PCB-126	NG/KG	94	6857	49	120.00	209.00	980.00	927.00	873.00	744.00	314.00	58.80
PCB-127	NG/KG	94	6857	80	23.90	23.60	241.00	95.90	95.70	72.10	54.50	14.50
PCB-128+PCB-166	NG/KG	94	6857	100	1780.00	2100.00	10100.00	9430.00	8770.00	5460.00	3630.00	994.00
PCB-129+PCB-138+PCB-160+PCB-163	NG/KG	94	6857	100	11900.00	13800.00	93800.00	63500.00	62700.00	34200.00	30500.00	7000.00
PCB-130	NG/KG	94	6857	100	694.00	763.00	4170.00	3530.00	3410.00	1880.00	1520.00	399.00
PCB-131	NG/KG	94	6857	100	168.00	182.00	825.00	821.00	817.00	502.00	357.00	101.00

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-132	NG/KG	94	6857	100	3670.00	4020.00	31700.00	17600.00	17400.00	10100.00	9330.00	2150.00
PCB-133	NG/KG	94	6857	100	145.00	169.00	2570.00	613.00	563.00	419.00	325.00	91.60
PCB-134+PCB-143	NG/KG	94	6857	100	594.00	660.00	4850.00	2940.00	2890.00	1550.00	1470.00	354.00
PCB-135+PCB-151+PCB-154	NG/KG	94	6857	100	3590.00	4430.00	56200.00	15900.00	15400.00	13900.00	7090.00	2280.00
PCB-136	NG/KG	94	6857	100	1380.00	1620.00	19500.00	6020.00	5710.00	4770.00	3120.00	811.00
PCB-137	NG/KG	94	6857	100	584.00	583.00	2610.00	2550.00	2500.00	1780.00	1290.00	382.00
PCB-139+PCB-140	NG/KG	94	6857	100	199.00	211.00	1650.00	898.00	880.00	583.00	404.00	117.00
PCB-14	NG/KG	94	6857	84	16.10	41.30	883.00	104.00	94.90	80.20	38.20	6.23
PCB-141	NG/KG	94	6857	100	2010.00	2420.00	22200.00	10500.00	9160.00	5110.00	4720.00	1310.00
PCB-142	NG/KG	94	6857	0	12.60	18.90	98.00	92.70	87.30	39.70	14.60	10.00
PCB-144	NG/KG	94	6857	100	512.00	572.00	4320.00	2300.00	2140.00	1840.00	1170.00	310.00
PCB-145	NG/KG	94	6857	75	11.50	20.40	98.00	92.70	87.30	41.70	20.50	5.20
PCB-146	NG/KG	94	6857	100	1440.00	1610.00	20300.00	6140.00	5640.00	4430.00	3350.00	904.00
PCB-147+PCB-149	NG/KG	94	6857	100	8400.00	9950.00	107000.00	39100.00	35700.00	29100.00	18100.00	5270.00
PCB-148	NG/KG	94	6857	89	16.50	37.80	823.00	94.60	89.30	65.30	33.30	7.39
PCB-15	NG/KG	94	6857	100	1130.00	1460.00	12800.00	5460.00	3740.00	3570.00	2880.00	769.00
PCB-150	NG/KG	94	6857	98	13.70	25.30	591.00	42.80	42.70	40.10	30.10	8.37
PCB-152	NG/KG	94	6857	89	12.90	18.10	310.00	52.40	52.10	47.90	27.70	6.28
PCB-153+PCB-168	NG/KG	94	6857	100	9540.00	11100.00	109000.00	45700.00	41300.00	31900.00	20200.00	5840.00
PCB-155	NG/KG	94	6857	95	26.90	83.10	2010.00	184.00	58.20	51.30	40.40	20.40
PCB-156+PCB-157	NG/KG	94	6857	100	1540.00	1690.00	8200.00	7750.00	7460.00	4620.00	3200.00	917.00
PCB-158	NG/KG	94	6857	100	1150.00	1280.00	7760.00	5770.00	5250.00	3060.00	2570.00	664.00
PCB-159	NG/KG	94	6857	95	103.00	143.00	1540.00	600.00	559.00	341.00	166.00	62.90
PCB-16	NG/KG	94	6857	100	941.00	1750.00	17200.00	6590.00	3910.00	2880.00	1710.00	456.00
PCB-161	NG/KG	94	6857	0	12.70	19.00	98.00	92.70	87.30	42.60	15.20	10.00

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-162	NG/KG	94	6857	100	32.20	33.90	217.00	151.00	146.00	104.00	59.80	19.80
PCB-164	NG/KG	94	6857	100	754.00	925.00	6690.00	4310.00	4250.00	2240.00	1780.00	428.00
PCB-165	NG/KG	94	6857	4	6.29	9.46	49.00	46.30	43.70	20.10	8.20	5.00
PCB-167	NG/KG	94	6857	100	455.00	506.00	2740.00	2390.00	2380.00	1340.00	960.00	266.00
PCB-169	NG/KG	94	6857	44	4.91	18.30	466.00	20.70	15.20	10.30	8.34	3.52
PCB-17	NG/KG	94	6857	100	1040.00	1820.00	16700.00	7270.00	3870.00	3850.00	2770.00	470.00
PCB-170	NG/KG	94	6857	100	2090.00	3080.00	36100.00	13100.00	11900.00	6050.00	4250.00	1230.00
PCB-171+PCB-173	NG/KG	94	6857	100	677.00	988.00	12700.00	3780.00	3450.00	2490.00	1330.00	407.00
PCB-172	NG/KG	94	6857	100	372.00	543.00	7240.00	2180.00	2010.00	1180.00	667.00	228.00
PCB-174	NG/KG	94	6857	100	2350.00	3330.00	42800.00	13100.00	12200.00	8310.00	4110.00	1470.00
PCB-175	NG/KG	94	6857	99	101.00	135.00	1890.00	474.00	449.00	402.00	186.00	71.70
PCB-176	NG/KG	94	6857	100	338.00	482.00	7000.00	1640.00	1610.00	1480.00	575.00	225.00
PCB-177	NG/KG	94	6857	100	1340.00	2010.00	27100.00	7290.00	6860.00	6040.00	2260.00	799.00
PCB-178	NG/KG	94	6857	99	539.00	745.00	11000.00	2530.00	2510.00	2310.00	874.00	354.00
PCB-179	NG/KG	94	6857	100	1170.00	1590.00	22400.00	5490.00	5390.00	4930.00	1890.00	737.00
PCB-18+PCB-30	NG/KG	94	6857	100	2040.00	3760.00	36100.00	14900.00	8140.00	6730.00	4170.00	913.00
PCB-180+PCB-193	NG/KG	94	6857	100	5330.00	7970.00	109000.00	32400.00	31100.00	14300.00	9330.00	3160.00
PCB-181	NG/KG	94	6857	90	22.70	25.80	195.00	113.00	112.00	70.10	57.10	13.30
PCB-182	NG/KG	94	6857	78	15.20	23.20	317.00	97.90	97.90	65.80	32.50	8.86
PCB-183+PCB-185	NG/KG	94	6857	94	1690.00	2350.00	31100.00	8280.00	7880.00	7090.00	3010.00	1070.00
PCB-184	NG/KG	94	6857	100	64.30	166.00	3960.00	189.00	147.00	145.00	113.00	48.50
PCB-186	NG/KG	94	6857	1	12.60	18.90	98.00	92.70	87.30	39.70	14.30	10.00
PCB-187	NG/KG	94	6857	100	3290.00	4240.00	55800.00	14900.00	14800.00	13900.00	5560.00	2190.00
PCB-188	NG/KG	94	6857	7	58.10	90.60	490.00	463.00	437.00	153.00	57.10	50.00
PCB-189	NG/KG	94	6857	99	76.90	117.00	1440.00	502.00	455.00	212.00	167.00	43.10

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-19	NG/KG	94	6857	100	307.00	581.00	14800.00	3210.00	646.00	1170.00	917.00	143.00
PCB-190	NG/KG	94	6857	100	451.00	675.00	7980.00	2720.00	2490.00	1630.00	803.00	258.00
PCB-191	NG/KG	94	6857	100	84.80	123.00	1630.00	494.00	461.00	265.00	161.00	50.90
PCB-192	NG/KG	94	6857	1	6.35	9.59	49.60	46.70	44.10	20.90	7.60	5.00
PCB-194	NG/KG	94	6857	100	1110.00	1560.00	19700.00	6570.00	6320.00	3220.00	2490.00	645.00
PCB-195	NG/KG	94	6857	99	422.00	650.00	8240.00	2660.00	2540.00	1470.00	793.00	213.00
PCB-196	NG/KG	94	6857	100	649.00	874.00	12600.00	3320.00	3210.00	1850.00	1500.00	392.00
PCB-197+PCB-200	NG/KG	94	6857	100	262.00	302.00	4220.00	1090.00	1090.00	832.00	572.00	187.00
PCB-198+PCB-199	NG/KG	94	6857	100	1770.00	2030.00	24400.00	7930.00	7730.00	5090.00	4970.00	1130.00
PCB-2	NG/KG	94	6857	97	55.90	610.00	27100.00	169.00	142.00	102.00	78.50	15.40
PCB-20+PCB-28	NG/KG	94	6857	100	5300.00	8320.00	48500.00	32600.00	30300.00	24600.00	14700.00	2640.00
PCB-201	NG/KG	94	6857	99	228.00	253.00	3430.00	811.00	807.00	800.00	536.00	156.00
PCB-202	NG/KG	94	6857	100	490.00	455.00	4570.00	1590.00	1570.00	1520.00	1300.00	380.00
PCB-203	NG/KG	94	6857	100	1070.00	1220.00	14400.00	4560.00	4440.00	3500.00	2880.00	687.00
PCB-204	NG/KG	94	6857	25	10.90	18.50	98.00	92.70	87.30	33.20	13.20	6.68
PCB-205	NG/KG	94	6857	99	57.60	91.70	1310.00	366.00	342.00	188.00	110.00	30.90
PCB-206	NG/KG	94	6857	100	1050.00	1440.00	7690.00	7220.00	6750.00	3000.00	1850.00	583.00
PCB-207	NG/KG	94	6857	100	127.00	141.00	943.00	653.00	614.00	356.00	274.00	83.20
PCB-208	NG/KG	94	6857	100	412.00	620.00	3450.00	2980.00	2510.00	985.00	663.00	233.00
PCB-209	NG/KG	94	6857	100	862.00	2260.00	12800.00	10000.00	7290.00	1490.00	927.00	384.00
PCB-21+PCB-33	NG/KG	94	6857	100	999.00	2230.00	22700.00	9080.00	3350.00	2540.00	2330.00	384.00
PCB-22	NG/KG	94	6857	100	1520.00	2350.00	17800.00	8640.00	8390.00	4830.00	4040.00	719.00
PCB-23	NG/KG	94	6857	50	13.80	37.50	844.00	93.60	88.30	46.40	29.00	6.00
PCB-24	NG/KG	94	6857	93	34.20	197.00	10000.00	233.00	40.20	80.90	59.10	17.50
PCB-25	NG/KG	94	6857	100	299.00	462.00	2930.00	1890.00	1880.00	896.00	836.00	126.00

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=PCBs**  
**(continued)**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-26+PCB-29	NG/KG	94	6857	100	641.00	1010.00	8170.00	3770.00	3060.00	2210.00	1670.00	303.00
PCB-27	NG/KG	94	6857	100	202.00	304.00	2140.00	1630.00	915.00	902.00	564.00	117.00
PCB-3	NG/KG	94	6857	99	119.00	227.00	3670.00	643.00	616.00	502.00	383.00	30.80
PCB-31	NG/KG	94	6857	100	3840.00	5720.00	46100.00	17900.00	16100.00	13400.00	12800.00	1900.00
PCB-32	NG/KG	94	6857	100	882.00	1420.00	10400.00	4710.00	4640.00	3880.00	2530.00	458.00
PCB-34	NG/KG	94	6857	74	19.40	27.70	196.00	98.00	97.30	92.50	42.90	10.00
PCB-35	NG/KG	94	6857	100	242.00	1200.00	44500.00	727.00	532.00	434.00	396.00	179.00
PCB-36	NG/KG	94	6857	100	66.00	52.00	523.00	176.00	173.00	155.00	144.00	49.80
PCB-37	NG/KG	94	6857	100	1430.00	2430.00	12200.00	11500.00	10800.00	4900.00	3520.00	699.00
PCB-38	NG/KG	94	6857	36	9.02	15.20	124.00	60.50	56.20	45.40	22.50	5.00
PCB-39	NG/KG	94	6857	99	31.50	48.70	255.00	234.00	230.00	103.00	53.80	15.50
PCB-4	NG/KG	94	6857	96	448.00	1230.00	13700.00	5030.00	2300.00	1530.00	1020.00	149.00
PCB-40+PCB-41+PCB-71	NG/KG	94	6857	100	3560.00	7690.00	41400.00	35200.00	29100.00	12500.00	6640.00	1390.00
PCB-42	NG/KG	94	6857	100	1870.00	4210.00	22700.00	19200.00	15600.00	7100.00	2960.00	680.00
PCB-43	NG/KG	94	6857	96	224.00	391.00	1860.00	1850.00	1830.00	1080.00	419.00	92.60
PCB-44+PCB-47+PCB-65	NG/KG	94	6857	100	7180.00	14300.00	76300.00	65100.00	53900.00	26300.00	11200.00	2890.00
PCB-45+PCB-51	NG/KG	94	6857	100	998.00	1760.00	9960.00	8290.00	8280.00	3870.00	2420.00	391.00
PCB-46	NG/KG	94	6857	100	349.00	641.00	3180.00	3140.00	3090.00	1440.00	782.00	143.00
PCB-48	NG/KG	94	6857	100	1060.00	1870.00	9110.00	9010.00	8910.00	3920.00	2540.00	450.00
PCB-49+PCB-69	NG/KG	94	6857	100	4270.00	8670.00	46200.00	39500.00	32800.00	15900.00	6110.00	1780.00
PCB-5	NG/KG	94	6857	66	25.60	50.90	492.00	216.00	147.00	86.30	64.60	10.00
PCB-50+PCB-53	NG/KG	94	6857	100	786.00	1480.00	7240.00	7010.00	6770.00	3720.00	1320.00	304.00
PCB-52	NG/KG	94	6857	100	9640.00	15700.00	81200.00	71900.00	62600.00	33700.00	16200.00	4750.00
PCB-54	NG/KG	94	6857	91	16.50	71.50	2980.00	86.90	83.50	62.60	46.80	4.60
PCB-55	NG/KG	94	6857	77	54.90	65.50	387.00	232.00	225.00	195.00	136.00	29.80

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-56	NG/KG	94	6857	100	3440.00	9470.00	52800.00	41900.00	30900.00	9330.00	4640.00	1170.00
PCB-57	NG/KG	94	6857	71	24.70	35.00	175.00	140.00	134.00	97.40	86.10	10.00
PCB-58	NG/KG	94	6857	45	19.10	29.90	128.00	119.00	110.00	89.30	56.30	10.00
PCB-59+PCB-62+PCB-75	NG/KG	94	6857	100	548.00	1100.00	5860.00	5100.00	4340.00	2160.00	945.00	223.00
PCB-6	NG/KG	94	6857	92	182.00	473.00	4910.00	1970.00	689.00	644.00	371.00	54.20
PCB-60	NG/KG	94	6857	100	1720.00	4310.00	24000.00	19400.00	14800.00	4600.00	2820.00	577.00
PCB-61+PCB-70+PCB-74+PCB-76	NG/KG	94	6857	100	12700.00	23800.00	129000.00	111000.00	93800.00	41700.00	19100.00	5580.00
PCB-63	NG/KG	94	6857	100	268.00	549.00	2960.00	2530.00	2090.00	1060.00	397.00	110.00
PCB-64	NG/KG	94	6857	99	3280.00	6890.00	37400.00	31400.00	25500.00	12100.00	5020.00	1350.00
PCB-66	NG/KG	94	6857	100	7610.00	20400.00	113000.00	89500.00	65900.00	25300.00	8620.00	2390.00
PCB-67	NG/KG	94	6857	100	146.00	241.00	1220.00	1160.00	1100.00	526.00	316.00	64.50
PCB-68	NG/KG	94	6857	100	50.90	404.00	10600.00	164.00	159.00	108.00	71.70	25.80
PCB-7	NG/KG	94	6857	97	59.30	359.00	9120.00	441.00	113.00	161.00	87.00	19.50
PCB-72	NG/KG	94	6857	86	38.30	70.80	363.00	357.00	351.00	157.00	80.00	10.50
PCB-73	NG/KG	94	6857	4	12.50	21.10	371.00	93.80	88.50	37.00	13.80	10.00
PCB-77	NG/KG	94	6857	100	824.00	2480.00	23200.00	10700.00	7790.00	1910.00	828.00	228.00
PCB-78	NG/KG	94	6857	32	14.20	20.30	122.00	93.40	88.10	80.00	16.10	10.00
PCB-79	NG/KG	94	6857	100	132.00	183.00	981.00	880.00	778.00	322.00	243.00	69.50
PCB-8	NG/KG	94	6857	93	697.00	2260.00	24600.00	8750.00	2660.00	1960.00	1630.00	185.00
PCB-80	NG/KG	94	6857	18	13.20	20.30	98.00	92.70	87.30	80.00	16.00	10.00
PCB-81	NG/KG	94	6857	100	199.00	354.00	1980.00	1620.00	1260.00	399.00	375.00	100.00
PCB-82	NG/KG	94	6857	100	1420.00	2310.00	12800.00	10800.00	8820.00	3220.00	2590.00	722.00
PCB-83+PCB-99	NG/KG	94	6857	100	6270.00	8630.00	46500.00	41700.00	36900.00	13800.00	11500.00	3370.00
PCB-84	NG/KG	94	6857	100	2920.00	3610.00	18900.00	16800.00	14600.00	7440.00	5280.00	1700.00
PCB-85+PCB-116+PCB-117	NG/KG	94	6857	100	2020.00	3120.00	17100.00	14500.00	12000.00	4480.00	3490.00	1020.00



**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=PCBs**  
**(continued)**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCB-86+PCB-87+PCB-97+PCB-108+PCB-119+PCB-125	NG/KG	94	6857	100	8200.00	11200.00	60300.00	52500.00	44800.00	19500.00	15300.00	4580.00
PCB-88+PCB-91	NG/KG	94	6857	100	1440.00	1960.00	10500.00	9650.00	8800.00	3350.00	2870.00	774.00
PCB-89	NG/KG	94	6857	99	131.00	259.00	1450.00	1220.00	982.00	303.00	202.00	64.10
PCB-9	NG/KG	94	6857	96	60.10	155.00	1600.00	594.00	275.00	255.00	105.00	17.20
PCB-90+PCB-101+PCB-113	NG/KG	94	6857	100	11300.00	14100.00	71600.00	69300.00	67000.00	27900.00	25700.00	6590.00
PCB-92	NG/KG	94	6857	100	1980.00	2270.00	13700.00	10300.00	9330.00	4930.00	4450.00	1230.00
PCB-93+PCB-95+PCB-98+PCB-100+PCB-102	NG/KG	94	6857	100	8940.00	10700.00	53600.00	52900.00	52200.00	21800.00	18900.00	5290.00
PCB-94	NG/KG	94	6857	93	54.50	90.50	1370.00	381.00	359.00	131.00	87.20	29.90
PCB-96	NG/KG	94	6857	99	72.20	107.00	643.00	544.00	520.00	167.00	133.00	39.60

**EXHIBIT 3 : NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure -Nondetects Set to ML**  
**group=TOTALS**

Pollutant	Unit	Sample Size	POTWs	Percent Detect	Mean	Standard Deviation	Observed Maximum	99th Percentile	98th Percentile	95th Percentile	90th Percentile	Median
PCBa	NG/KG	94	6857	0	249000.00	478000.00	18400000.00	1660000.00	1630000.00	521000.00	501000.00	132000.00
PCBb	NG/KG	94	6857	100	249000.00	478000.00	18400000.00	1660000.00	1630000.00	521000.00	501000.00	132000.00
TOTAL DICHLORO BIPHENYLS	NG/KG	94	6857	100	14200.00	338000.00	17500000.00	61500.00	26500.00	12400.00	7040.00	2860.00
TOTAL HEPTACHLORO BIPHENYLS	NG/KG	94	6857	100	20000.00	28000.00	376000.00	108000.00	102000.00	69400.00	35000.00	13000.00
TOTAL HEXACHLORO BIPHENYLS	NG/KG	94	6857	100	50700.00	58000.00	516000.00	243000.00	217000.00	153000.00	122000.00	30500.00
TOTAL MONOCHLORO BIPHENYLS	NG/KG	94	6857	100	275.00	1190.00	32500.00	2010.00	938.00	903.00	672.00	81.70
TOTAL NONACHLORO BIPHENYLS	NG/KG	94	6857	100	1590.00	2190.00	11800.00	10900.00	9910.00	4330.00	2720.00	888.00
TOTAL OCTACHLORO BIPHENYLS	NG/KG	94	6857	100	6040.00	7340.00	92900.00	28900.00	28000.00	18200.00	15000.00	3820.00
TOTAL PCBs	NG/KG	94	6857	100	249000.00	478000.00	18400000.00	1660000.00	1630000.00	520000.00	498000.00	131000.00
TOTAL PENTACHLORO BIPHENYLS	NG/KG	94	6857	100	74100.00	97100.00	516000.00	457000.00	399000.00	174000.00	146000.00	42100.00
TOTAL TETRACHLORO BIPHENYLS	NG/KG	94	6857	100	61000.00	125000.00	681000.00	576000.00	472000.00	213000.00	92300.00	24800.00
TOTAL TRICHLORO BIPHENYLS	NG/KG	94	6857	100	19800.00	30400.00	244000.00	100000.00	84800.00	76900.00	61100.00	9530.00
dioxinsa	NG/KG	94	6857	0	8320.00	45000.00	525000.00	37200.00	15300.00	9110.00	8890.00	3350.00
dioxinsb	NG/KG	94	6857	100	8320.00	45000.00	525000.00	37200.00	15300.00	9110.00	8890.00	3350.00

**APPENDIX B: NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001  
NATIONAL SEWAGE SLUDGE SURVEY**

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Exhibit 4—Nondetects Set to Zero

Dioxin and Furans . . . . .	B-1
PCBs . . . . .	B-2
Totals . . . . .	B-3

Exhibit 5—Nondetects Set to One-half ML

Dioxin and Furans . . . . .	B-4
PCBs . . . . .	B-5
Totals . . . . .	B-6

Exhibit 6—Nondetects set to ML

Dioxin and Furans . . . . .	B-7
PCBs . . . . .	B-8
Totals . . . . .	B-9

**EXHIBIT 4 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure - Nondetects Set to zero**

**Dioxins and Furan TEQs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	4.92	20.60	241.00	15.20	10.30	7.43	6.56	2.73
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	99	1.67	5.51	51.50	34.10	3.51	2.31	1.70	0.88
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.09	0.58	6.55	0.55	0.19	0.09	0.07	0.03
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	0.36	0.69	12.40	1.62	0.98	0.80	0.65	0.22
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	96	0.55	2.07	50.00	3.66	1.53	1.01	0.87	0.34
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	2.13	3.50	36.90	13.10	6.60	4.39	4.13	1.51
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.52	2.52	61.80	2.41	1.39	0.84	0.81	0.26
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	1.18	1.98	33.20	5.28	3.57	2.28	2.12	0.75
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	20	0.03	0.25	5.44	0.26	0.06	0.06	0.02	0.00
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	5.76	5.69	92.00	14.60	13.10	12.00	11.10	4.57
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	93	0.07	0.36	9.45	0.34	0.20	0.13	0.12	0.05
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.60	3.87	97.40	3.11	1.26	0.82	0.78	0.28
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	100	1.31	8.86	232.00	3.81	3.63	2.96	1.98	0.75
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	1.41	1.50	47.20	5.09	4.86	3.37	2.38	1.10
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.31	0.39	7.97	1.06	1.05	0.79	0.57	0.23
OCTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	0.68	3.91	45.70	1.43	1.28	0.78	0.75	0.27
OCTACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.08	0.39	3.78	1.90	0.19	0.08	0.06	0.03

Note : Three significant figures are reported  
TEQs calculated with WHO-98 toxic equivalent factors

**EXHIBIT 4: NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY  
Nonparametric Substitution Method Estimation Procedure - Nondetects Set to zero**

**Dioxin-Like PCB TEQs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-105	NG/KG	94	6857	100	0.46	0.71	3.92	3.38	2.83	1.08	0.82	0.23
PCB-114	NG/KG	94	6857	100	0.15	0.23	1.25	1.09	0.93	0.34	0.27	0.08
PCB-118	NG/KG	94	6857	100	0.99	1.22	6.36	5.82	5.28	2.47	1.95	0.56
PCB-123	NG/KG	94	6857	100	0.03	0.04	0.21	0.18	0.15	0.07	0.05	0.03
PCB-126	NG/KG	94	6857	49	2.69	7.21	50.30	34.90	3.57	6.82	4.82	0.00
PCB-156+PCB-157	NG/KG	94	6857	100	0.77	0.85	4.10	3.88	3.73	2.31	1.60	0.46
PCB-167	NG/KG	94	6857	100	0.00	0.01	0.03	0.02	0.02	0.01	0.01	0.00
PCB-169	NG/KG	94	6857	44	0.02	0.18	4.66	0.13	0.11	0.06	0.05	0.00
PCB-189	NG/KG	94	6857	99	0.01	0.01	0.14	0.05	0.05	0.02	0.02	0.00
PCB-77	NG/KG	94	6857	100	0.08	0.25	2.32	1.07	0.78	0.19	0.08	0.02
PCB-81	NG/KG	94	6857	100	0.02	0.04	0.20	0.16	0.13	0.04	0.04	0.01

Note: Three significant figures are reported using WHO set of TEFs

**EXHIBIT 4 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure - Nondetects Set to zero**

**Totals**

POLLUTANT	UNIT	SAMPLE SIZE	POTWs	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCBa	NG/KG	94	6857	0	5.22	10.30	58.30	50.60	44.80	13.10	9.66	2.05
PCBb	NG/KG	94	6857	100	5.22	10.30	58.30	50.60	44.80	13.10	9.66	2.05
DIOXINSA	NG/KG	94	6857	0	21.70	47.50	682.00	100.00	54.40	33.30	31.40	15.50
DIOXINSB	NG/KG	94	6857	100	21.70	47.50	682.00	100.00	54.40	33.30	31.40	15.50
TOTAL DIOXINS/FURANS/PCBS	NG/KG	94	6857	0	26.90	49.50	718.00	113.00	76.60	59.30	42.90	19.70

a Composites considered a detect if all individual congeners or PCBs are measured above the minimum level.

b Composites considered a detect if at least one congener is measured above the minimum level.

Note: Three significant figures are reported using WHO set of TEFs

**EXHIBIT 5 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure - Nondetects Set to ½ Minimum Level (½ ML)**

**Dioxins and Furan TEQs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	4.92	20.60	241.00	15.20	10.30	7.43	6.56	2.73
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	99	1.67	5.51	51.50	34.10	3.51	2.31	1.70	0.88
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.09	0.58	6.55	0.55	3.57	0.09	0.07	0.03
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	0.36	0.69	12.40	1.62	0.98	0.80	0.65	0.22
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	96	0.55	2.07	50.00	3.66	1.53	1.01	0.87	0.34
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	2.13	3.50	36.90	13.10	6.60	4.39	4.13	1.51
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.52	2.52	61.80	2.41	1.39	0.84	0.81	0.26
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	1.18	1.98	33.20	5.28	3.57	2.28	2.12	0.75
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	20	0.08	0.25	5.44	0.41	0.27	0.17	0.11	0.05
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	5.76	5.69	92.00	14.60	13.10	12.00	11.10	4.57
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	93	0.08	0.36	9.45	0.34	0.20	0.15	0.13	0.05
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.60	3.87	97.40	3.11	1.26	0.82	0.78	0.28
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	100	1.31	8.86	232.00	3.81	3.63	2.96	1.98	0.75
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	1.42	1.50	47.20	5.09	4.86	3.37	2.38	1.10
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.31	0.39	7.97	1.06	1.05	0.79	0.57	0.23
OCTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	0.68	3.91	45.70	1.43	1.28	0.78	0.75	0.27
OCTACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.08	0.39	3.78	1.90	3.57	0.08	0.06	0.03

Note : Three significant figures are reported  
TEQs calculated with WHO-98 toxic equivalent factors

**EXHIBIT 5 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY  
 Nonparametric Substitution Method Estimation Procedure - Nondetects Set to ½ Minimum Level (½ ML)**

**Dioxin-Like PCB TEQs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-105	NG/KG	94	6857	100	0.46	0.71	3.92	3.38	2.83	1.08	0.82	0.23
PCB-114	NG/KG	94	6857	100	0.15	0.23	1.25	1.09	0.93	0.34	0.27	0.08
PCB-118	NG/KG	94	6857	100	0.99	1.22	6.36	5.82	5.28	2.47	1.95	0.56
PCB-123	NG/KG	94	6857	100	0.03	0.04	0.21	0.18	0.15	0.07	0.05	0.03
PCB-126	NG/KG	94	6857	49	7.33	11.70	50.30	46.70	44.10	40.00	16.40	4.69
PCB-156+PCB-157	NG/KG	94	6857	100	0.77	0.85	4.10	3.88	3.73	2.31	1.60	0.46
PCB-167	NG/KG	94	6857	100	0.00	0.01	0.03	0.02	0.02	0.01	0.01	0.00
PCB-169	NG/KG	94	6857	44	0.04	0.18	4.66	0.13	0.11	0.09	0.06	0.03
PCB-189	NG/KG	94	6857	99	0.01	0.01	0.14	0.05	0.05	0.02	0.02	0.00
PCB-77	NG/KG	94	6857	100	0.08	0.25	2.32	1.07	0.78	0.19	0.08	0.02
PCB-81	NG/KG	94	6857	100	0.02	0.04	0.20	0.16	0.13	0.04	0.04	0.01

Note: Three significant figures are reported using WHO set of TEFs



**EXHIBIT 5 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**  
**Nonparametric Substitution Method Estimation Procedure - Nondetects Set to ½ Minimum Level (½ ML)**

**Totals**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCBa	NG/KG	94	6857	0	9.87	14.00	58.30	55.10	54.50	49.40	19.20	6.04
PCBb	NG/KG	94	6857	100	9.87	14.00	58.30	55.10	54.50	49.40	19.20	6.04
DIOXINSA	NG/KG	94	6857	0	21.70	47.50	682.00	100.00	54.40	33.30	31.60	15.50
DIOXINSB	NG/KG	94	6857	100	21.70	47.50	682.00	100.00	13.10	12.00	31.60	15.50
TOTAL DIOXINS/FURANS/PCBS	NG/KG	94	6857	0	31.60	50.00	718.00	115.00	80.00	73.50	55.20	23.40

a Composites considered a detect if all individual congeners or PCBs are measured above the minimum level.

b Composites considered a detect if at least one congener is measured above the minimum level.

Note: Three significant figures are reported using WHO set of TEFs

**EXHIBIT 6 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY  
Nonparametric Substitution Method Estimation Procedure - Nondetects Set to Minimum Level (ML)**

**Dioxins and Furan TEQs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	4.92	20.60	241.00	15.20	10.30	7.43	6.56	2.73
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	99	1.67	5.51	51.50	34.10	3.51	2.31	1.70	0.88
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.09	0.58	6.55	0.55	0.19	0.09	0.07	0.03
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	0.36	0.69	12.40	1.62	0.98	0.80	0.65	0.22
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	96	0.56	2.07	50.00	3.66	1.53	1.01	0.87	0.34
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	2.13	3.50	36.90	13.10	6.60	4.39	4.13	1.51
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.52	2.52	61.80	2.41	1.39	0.84	0.81	0.26
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	1.18	1.98	33.20	5.28	3.57	2.28	2.12	0.75
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	20	0.14	0.27	5.44	0.64	0.55	0.34	0.18	0.10
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	5.76	5.69	92.00	14.60	13.10	12.00	11.10	4.57
1,2,3,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	93	0.08	0.37	9.45	0.34	0.30	0.21	0.13	0.05
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.60	3.87	97.40	3.11	3.57	0.82	0.78	0.28
2,3,4,7,8-PENTACHLORODIBENZOFURAN	NG/KG	94	6857	100	1.31	8.86	232.00	3.81	3.63	2.96	1.98	0.75
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	99	1.42	1.50	47.20	5.09	4.86	3.37	2.38	1.10
2,3,7,8-TETRACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.31	0.39	7.97	1.06	1.05	0.79	0.57	0.23
OCTACHLORODIBENZO-P-DIOXIN	NG/KG	94	6857	100	0.68	3.91	45.70	1.43	1.28	0.78	0.75	0.27
OCTACHLORODIBENZOFURAN	NG/KG	94	6857	100	0.08	0.39	3.78	1.90	0.19	0.08	0.06	0.03

Note: Three significant figures are reported using WHO set of TEFs

**EXHIBIT 6 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY  
Nonparametric Substitution Method Estimation Procedure - Nondetects Set to Minimum Level (ML)**

**Dioxin-Like PCB TEQs**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCB-105	NG/KG	94	6857	100	0.46	0.71	3.92	3.38	2.83	1.08	0.82	0.23
PCB-114	NG/KG	94	6857	100	0.15	0.23	1.25	1.09	0.93	0.34	0.27	0.08
PCB-118	NG/KG	94	6857	100	0.99	1.22	6.36	5.82	5.28	2.47	1.95	0.56
PCB-123	NG/KG	94	6857	100	0.03	0.04	0.21	0.18	0.15	0.07	0.05	0.03
PCB-126	NG/KG	94	6857	49	12.00	20.90	98.00	92.70	87.30	74.40	31.40	5.88
PCB-156+PCB-157	NG/KG	94	6857	100	0.77	0.85	4.10	3.88	3.73	2.31	1.60	0.46
PCB-167	NG/KG	94	6857	100	0.00	0.01	0.03	0.02	0.02	0.01	0.01	0.00
PCB-169	NG/KG	94	6857	44	0.05	0.18	4.66	0.21	0.15	0.10	0.08	0.04
PCB-189	NG/KG	94	6857	99	0.01	0.01	0.14	0.05	3.57	0.02	0.02	0.00
PCB-77	NG/KG	94	6857	100	0.08	0.25	2.32	1.07	0.78	0.19	0.08	0.02
PCB-81	NG/KG	94	6857	100	0.02	0.04	0.20	0.16	0.13	0.04	0.04	0.01

Note: Three significant figures are reported using WHO set of TEFs

**EXHIBIT 6 : NATIONAL TOXIC EQUIVALENT ESTIMATES FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY  
Nonparametric Substitution Method Estimation Procedure - Nondetects Set to Minimum Level (ML)**

**Totals**

POLLUTANT	UNIT	SAMPLE SIZE	POTWS	PERCENT DETECT	MEAN	STANDARD DEVIATION	OBSERVED MAXIMUM	99TH PERCENTILE	98TH PERCENTILE	95TH PERCENTILE	90TH PERCENTILE	MEDIAN
PCBA	NG/KG	94	6857	0	14.50	22.40	103.00	97.20	91.60	78.00	35.00	8.11
PCBB	NG/KG	94	6857	100	14.50	22.40	103.00	97.20	91.60	78.00	35.00	8.11
DIOXINSA	NG/KG	94	6857	0	21.80	47.50	682.00	100.00	54.40	33.30	31.70	15.50
DIOXINSB	NG/KG	94	6857	100	21.80	47.50	682.00	100.00	54.40	33.30	31.70	15.50
TOTAL DIOXINS/FURANS/PCBS	NG/KG	94	6857	0	36.30	52.60	718.00	138.00	117.00	113.00	69.10	24.00

a Composites considered a detect if all individual congeners or PCBs are measured above the minimum level.

b Composites considered a detect if at least one congener is measured above the minimum level.

Note: Three significant figures are reported using WHO set of TEFs

**APPENDIX C: EMPIRICAL CUMULATIVE DISTRIBUTIONS OF NATIONAL TOXIC EQUIVALENTS FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY**

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Exhibit 1—Dioxin and Furan TEQs

Nondetects Set to Zero . . . . .	C-1
Nondetects Set to ML . . . . .	C-4
Nondetects Set to One-half ML . . . . .	C-7

Exhibit 2—Coplanar PCB TEQs

Nondetects Set to Zero . . . . .	C-10
Nondetects Set to ML . . . . .	C-13
Nondetects Set to One-half ML . . . . .	C-16

Exhibit 3—Total Dioxin/Furan/Coplanar PCB TEQ

Nondetects Set to Zero . . . . .	C-19
Nondetects Set to ML . . . . .	C-22
Nondetects Set to One-half ML . . . . .	C-25

EPA / NSSS 15:55 19SEP01 M:\PW\SLUDGE\REQ165\R165AK10.SAS 1  
 NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
 Nonparametric Substitution Method Estimation Procedure - Nondetects Set to zero  
 Cumulative Distribution for Dioxins/Furans/PCBs

ANALYTE	EPISODE	QTY_LOW	P
dioxinsb	6345	682.295	1.00000
	6377	466.154	0.99854
	6437	121.347	0.99109
	6346	93.147	0.98963
	6407	63.323	0.98927
	6389	56.211	0.98781
	6429	56.021	0.98634
	6385	55.213	0.98488
	6434	53.927	0.97743
	6421	49.325	0.97707
	6350	46.046	0.96963
	6347	45.426	0.96927
	6435	36.335	0.96781
	6353	36.151	0.96036
	6352	34.828	0.96000
	6431	34.776	0.95964
	6361	34.764	0.95818
	6340	34.342	0.95782
	6355	33.308	0.95636
	6418	33.068	0.92265
	6424	32.124	0.92119
	6393	31.005	0.88748
	6411	29.418	0.85377
	6369	28.828	0.84632
	6420	28.580	0.83888
	6402	28.172	0.83741
	6349	27.781	0.83705
	6357	26.661	0.83670
	6395	25.977	0.83634
	6351	25.533	0.82889
	6382	25.401	0.79518
	6433	25.007	0.79372
	6430	23.669	0.76001

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTY_LOW	P
dioxinsb	6358	23.046	0.72630
	6423	22.416	0.69259
	6397	22.321	0.68515
	6341	22.147	0.67770
	6428	20.863	0.67624
	6354	20.691	0.64253
	6415	20.451	0.63508
	6400	20.207	0.62763
	6427	19.961	0.62019
	6387	19.652	0.61872
	6365	19.239	0.58501
	6368	18.894	0.58355
	6409	18.458	0.57611
	6390	18.205	0.56866
	6378	17.721	0.56720
	6356	17.187	0.55975
	6363	17.175	0.55230
	6376	17.123	0.51859
	6386	16.326	0.51115
	6344	15.502	0.50370
	6436	15.445	0.49625
	6406	15.380	0.49479
	6426	15.250	0.49333
	6392	15.180	0.45962
	6375	15.083	0.45217
	6394	14.985	0.44472
	6370	14.548	0.44326
	6374	14.425	0.44180
	6364	14.039	0.44033
	6348	14.018	0.40663
	6414	13.335	0.39918
	6381	13.304	0.39772
	6416	12.598	0.39625

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTY_LOW	P
dioxinsb	6404	12.487	0.36254
	6413	10.863	0.35510
	6380	10.684	0.35474
	6338	10.196	0.32103
	6342	10.167	0.31957
	6373	10.100	0.28586
	6405	10.074	0.28439
	6410	9.832	0.28293
	6401	9.399	0.27548
	6360	9.033	0.27402
	6339	8.929	0.26657
	6379	8.421	0.25913
	6419	8.339	0.25168
	6396	8.007	0.24423
	6372	7.515	0.23679
	6359	6.742	0.22934
	6383	6.302	0.22190
	6384	6.267	0.18819
	6425	6.093	0.18074
	6371	5.708	0.14703
	6391	5.429	0.14667
	6367	5.000	0.11296
	6366	4.449	0.07925
	6412	4.237	0.04555
	6399	4.060	0.04408
	6403	3.628	0.04262
	6343	2.713	0.00891
	6438	2.171	0.00146

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs



ANALYTE	EPISODE	QUANTITY	P
dioxinsb	6345	682.295	1.00000
	6377	466.154	0.99854
	6437	121.347	0.99109
	6346	93.147	0.98963
	6407	63.323	0.98927
	6389	56.211	0.98781
	6429	56.021	0.98634
	6385	55.313	0.98488
	6434	53.927	0.97743
	6421	49.325	0.97707
	6347	46.226	0.96963
	6350	46.146	0.96816
	6435	36.335	0.96781
	6353	36.151	0.96036
	6352	34.828	0.96000
	6431	34.776	0.95964
	6361	34.764	0.95818
	6340	34.442	0.95782
	6355	33.408	0.95636
	6418	33.068	0.92265
	6424	32.299	0.92119
	6393	31.345	0.88748
	6411	29.418	0.85377
	6369	28.928	0.84632
	6420	28.680	0.83888
	6402	28.172	0.83741
	6349	27.781	0.83705
	6357	27.161	0.83670
	6382	26.311	0.83634
	6395	26.292	0.83487
	6351	25.633	0.82743
	6433	25.007	0.79372
	6430	23.669	0.76001

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QUANTITY	P
dioxinsb	6358	23.046	0.72630
	6397	22.651	0.69259
	6423	22.416	0.68515
	6341	22.197	0.67770
	6354	21.291	0.67624
	6428	20.993	0.66879
	6415	20.551	0.63508
	6400	20.307	0.62763
	6427	20.061	0.62019
	6387	19.752	0.61872
	6365	19.339	0.58501
	6368	18.994	0.58355
	6409	18.558	0.57611
	6390	18.305	0.56866
	6378	17.821	0.56720
	6356	17.287	0.55975
	6363	17.275	0.55230
	6376	17.223	0.51859
	6386	16.326	0.51115
	6344	15.602	0.50370
	6436	15.445	0.49625
	6406	15.430	0.49479
	6392	15.280	0.49333
	6426	15.250	0.48588
	6375	15.208	0.45217
	6394	15.085	0.44472
	6364	14.969	0.44326
	6370	14.598	0.40955
	6374	14.525	0.40809
	6348	14.118	0.40663
	6414	13.435	0.39918
	6381	13.304	0.39772
	6404	12.707	0.39625

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QUANTITY	P
dioxinsb	6416	12.698	0.38881
	6413	10.863	0.35510
	6380	10.784	0.35474
	6342	10.317	0.32103
	6338	10.296	0.28732
	6373	10.100	0.28586
	6405	10.074	0.28439
	6410	9.932	0.28293
	6401	9.499	0.27548
	6339	9.469	0.27402
	6360	9.133	0.26657
	6379	8.521	0.25913
	6419	8.439	0.25168
	6396	8.107	0.24423
	6372	7.615	0.23679
	6359	6.842	0.22934
	6383	6.402	0.22190
	6425	6.368	0.18819
	6384	6.367	0.15448
	6371	5.708	0.14703
	6391	5.529	0.14667
	6367	5.100	0.11296
	6366	4.549	0.07925
	6412	4.447	0.04555
	6399	4.160	0.04408
	6403	3.828	0.04262
	6343	2.813	0.00891
	6438	2.271	0.00146

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
dioxinsb	6345	682.295	1.00000
	6377	466.154	0.99854
	6437	121.347	0.99109
	6346	93.147	0.98963
	6407	63.323	0.98927
	6389	56.211	0.98781
	6429	56.021	0.98634
	6385	55.263	0.98488
	6434	53.927	0.97743
	6421	49.325	0.97707
	6350	46.096	0.96963
	6347	45.826	0.96927
	6435	36.335	0.96781
	6353	36.151	0.96036
	6352	34.828	0.96000
	6431	34.776	0.95964
	6361	34.764	0.95818
	6340	34.392	0.95782
	6355	33.358	0.95636
	6418	33.068	0.92265
	6424	32.211	0.92119
	6393	31.175	0.88748
	6411	29.418	0.85377
	6369	28.878	0.84632
	6420	28.630	0.83888
	6402	28.172	0.83741
	6349	27.781	0.83705
	6357	26.911	0.83670
	6395	26.135	0.83634
	6382	25.856	0.82889
	6351	25.583	0.82743
	6433	25.007	0.79372
	6430	23.669	0.76001

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
dioxinsb	6358	23.046	0.72630
	6397	22.486	0.69259
	6423	22.416	0.68515
	6341	22.172	0.67770
	6354	20.991	0.67624
	6428	20.928	0.66879
	6415	20.501	0.63508
	6400	20.257	0.62763
	6427	20.011	0.62019
	6387	19.702	0.61872
	6365	19.289	0.58501
	6368	18.944	0.58355
	6409	18.508	0.57611
	6390	18.255	0.56866
	6378	17.771	0.56720
	6356	17.237	0.55975
	6363	17.225	0.55230
	6376	17.173	0.51859
	6386	16.326	0.51115
	6344	15.552	0.50370
	6436	15.445	0.49625
	6406	15.405	0.49479
	6426	15.250	0.49333
	6392	15.230	0.45962
	6375	15.146	0.45217
	6394	15.035	0.44472
	6370	14.573	0.44326
	6364	14.504	0.44180
	6374	14.475	0.40809
	6348	14.068	0.40663
	6414	13.385	0.39918
	6381	13.304	0.39772
	6416	12.648	0.39625

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
dioxinsb	6404	12.597	0.36254
	6413	10.863	0.35510
	6380	10.734	0.35474
	6338	10.246	0.32103
	6342	10.242	0.31957
	6373	10.100	0.28586
	6405	10.074	0.28439
	6410	9.882	0.28293
	6401	9.449	0.27548
	6339	9.199	0.27402
	6360	9.083	0.26657
	6379	8.471	0.25913
	6419	8.389	0.25168
	6396	8.057	0.24423
	6372	7.565	0.23679
	6359	6.792	0.22934
	6383	6.352	0.22190
	6384	6.317	0.18819
	6425	6.230	0.18074
	6371	5.708	0.14703
	6391	5.479	0.14667
	6367	5.050	0.11296
	6366	4.499	0.07925
	6412	4.342	0.04555
	6399	4.110	0.04408
	6403	3.728	0.04262
	6343	2.763	0.00891
	6438	2.221	0.00146

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTY_LOW	P
PCBb	6341	58.2748	1.00000
	6358	55.5356	0.99854
	6345	35.9509	0.96483
	6407	27.3497	0.96336
	6352	17.9937	0.96190
	6346	17.1738	0.96154
	6415	15.3819	0.96118
	6355	13.1778	0.95374
	6431	12.7402	0.92003
	6420	12.1636	0.91857
	6429	11.9929	0.91710
	6353	11.6132	0.91564
	6427	11.4289	0.91528
	6350	11.0908	0.91382
	6379	10.8286	0.91346
	6349	10.7600	0.90601
	6411	10.2258	0.90566
	6347	9.4764	0.89821
	6418	9.4080	0.89675
	6357	9.2857	0.89528
	6356	8.4721	0.89492
	6426	8.2844	0.88748
	6436	7.8358	0.85377
	6438	7.5962	0.85231
	6406	7.5883	0.85084
	6361	7.4087	0.84938
	6363	6.6916	0.84902
	6338	6.2420	0.81531
	6390	5.6103	0.81385
	6400	5.5178	0.81238
6421	5.4393	0.80494	
6342	5.4338	0.79749	
6424	5.4020	0.76378	

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTY_LOW	P
PCBb	6381	5.1200	0.73007
	6364	4.6183	0.72861
	6396	4.2000	0.69490
	6410	4.1669	0.68745
	6372	4.0763	0.68001
	6385	3.9998	0.67256
	6340	3.9313	0.66512
	6369	3.7741	0.66365
	6434	3.5951	0.65621
	6370	3.5212	0.65585
	6393	3.4290	0.65438
	6389	3.3979	0.62067
	6397	3.1042	0.61921
	6348	2.9963	0.61177
	6373	2.9424	0.60432
	6377	2.8151	0.60286
	6416	2.7198	0.59541
	6360	2.6203	0.56170
	6359	2.4876	0.55425
	6386	2.4690	0.54681
	6382	2.2176	0.53936
	6387	2.0846	0.53790
	6433	2.0547	0.50419
	6339	2.0465	0.47048
	6413	2.0184	0.46303
	6384	1.9198	0.46267
	6405	1.8972	0.45523
	6383	1.8074	0.45376
	6371	1.7598	0.42006
	6394	1.7252	0.41970
	6354	1.6298	0.41823
	6366	1.5647	0.41079
6367	1.5436	0.37708	

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs



ANALYTE	EPISODE	QTY_LOW	P
PCBb	6419	1.4653	0.34337
	6395	1.4571	0.33592
	6425	1.4513	0.32848
	6437	1.3857	0.29477
	6392	1.3756	0.29330
	6409	1.3094	0.28586
	6423	1.2799	0.27841
	6402	1.1356	0.27096
	6403	1.0939	0.27061
	6374	1.0041	0.23690
	6404	0.9365	0.23543
	6401	0.9144	0.22799
	6391	0.8375	0.22652
	6344	0.7866	0.19282
	6368	0.7716	0.18537
	6375	0.7508	0.17792
	6412	0.6892	0.17048
	6399	0.6381	0.16901
	6435	0.4606	0.16755
	6351	0.4311	0.16010
	6430	0.3940	0.12639
	6414	0.2870	0.09268
	6365	0.2761	0.09122
	6343	0.2174	0.08976
	6428	0.2133	0.08231
	6376	0.0732	0.04860
	6380	0.0569	0.04116
	6378	0.0515	0.00745

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QUANTITY	P
PCBb	6364	102.716	1.00000
	6385	84.000	0.96629
	6369	83.774	0.95884
	6359	82.568	0.95140
	6341	58.275	0.94395
	6358	55.536	0.94249
	6404	42.444	0.90878
	6345	35.951	0.90133
	6339	34.910	0.89987
	6407	27.375	0.89242
	6340	23.941	0.89096
	6352	17.994	0.88950
	6346	17.174	0.88914
	6395	16.733	0.88878
	6415	15.432	0.88133
	6424	14.036	0.87389
	6355	13.178	0.84018
	6348	12.996	0.80647
	6373	12.992	0.79902
	6431	12.740	0.79756
	6416	12.730	0.79610
	6420	12.164	0.76239
	6413	12.018	0.76092
	6429	11.993	0.76057
	6405	11.897	0.75910
	6371	11.760	0.75764
	6366	11.615	0.75728
	6353	11.613	0.72357
	6367	11.594	0.72321
	6419	11.515	0.68950
	6425	11.451	0.68206
	6427	11.429	0.64835
6437	11.396	0.64689	

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QUANTITY	P
PCBb	6392	11.376	0.64542
	6409	11.309	0.63798
	6403	11.144	0.63053
	6350	11.091	0.59682
	6374	11.054	0.59646
	6401	10.964	0.59500
	6391	10.888	0.59354
	6344	10.837	0.55983
	6379	10.829	0.55238
	6349	10.760	0.54493
	6412	10.739	0.54458
	6399	10.688	0.54311
	6343	10.267	0.54165
	6411	10.226	0.53420
	6347	9.476	0.52676
	6418	9.433	0.52529
	6357	9.336	0.52383
	6370	8.521	0.52347
	6356	8.472	0.52201
	6426	8.284	0.51456
	6436	7.886	0.48085
	6438	7.596	0.47939
	6406	7.588	0.47793
	6361	7.409	0.47646
	6387	7.110	0.47610
	6375	6.761	0.44239
	6363	6.702	0.43495
	6338	6.242	0.40124
	6378	6.062	0.39978
	6390	5.660	0.39233
6400	5.518	0.39087	
6342	5.484	0.38342	
6421	5.439	0.34971	

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QUANTITY	P
PCBb	6377	5.365	0.34226
	6381	5.170	0.33482
	6396	4.200	0.33335
	6410	4.167	0.32591
	6372	4.076	0.31846
	6434	3.595	0.31101
	6393	3.429	0.31066
	6389	3.398	0.27695
	6397	3.104	0.27548
	6430	2.806	0.26804
	6360	2.620	0.23433
	6428	2.524	0.22688
	6386	2.469	0.19317
	6435	2.461	0.18573
	6351	2.441	0.17828
	6414	2.297	0.14457
	6365	2.286	0.14311
	6382	2.268	0.14164
	6376	2.083	0.14018
	6380	2.067	0.13273
	6433	2.055	0.09903
	6384	1.970	0.06532
	6383	1.807	0.05787
	6394	1.725	0.02416
	6354	1.630	0.02270
	6423	1.290	0.01525
	6402	1.136	0.00780
	6368	0.772	0.00745

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
PCBb	6341	58.2748	1.00000
	6358	55.5356	0.99854
	6364	53.6673	0.96483
	6385	43.9998	0.93112
	6369	43.7741	0.92367
	6359	42.5276	0.91623
	6345	35.9509	0.90878
	6407	27.3622	0.90732
	6404	21.6900	0.90585
	6339	18.4780	0.89841
	6352	17.9937	0.89096
	6346	17.1738	0.89060
	6415	15.4069	0.89024
	6340	13.9363	0.88280
	6355	13.1778	0.88133
	6431	12.7402	0.84762
	6420	12.1636	0.84616
	6429	11.9929	0.84470
	6353	11.6132	0.84323
	6427	11.4289	0.84288
	6350	11.0908	0.84141
	6379	10.8286	0.84105
	6349	10.7600	0.83361
	6411	10.2258	0.83325
	6424	9.7188	0.82580
	6347	9.4764	0.79209
	6418	9.4205	0.79063
	6357	9.3107	0.78917
	6395	9.0951	0.78881
	6356	8.4721	0.78136
	6426	8.2844	0.77392
	6348	7.9963	0.74021
	6373	7.9674	0.73276

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
PCBb	6436	7.8608	0.73130
	6416	7.7248	0.72983
	6438	7.5962	0.69613
	6406	7.5883	0.69466
	6361	7.4087	0.69320
	6413	7.0184	0.69284
	6405	6.8972	0.69248
	6371	6.7598	0.69102
	6363	6.6966	0.69066
	6366	6.5897	0.65695
	6367	6.5686	0.62324
	6419	6.4903	0.58953
	6425	6.4513	0.58209
	6437	6.3907	0.54838
	6392	6.3756	0.54692
	6409	6.3094	0.53947
	6338	6.2420	0.53202
	6403	6.1189	0.53056
	6374	6.0291	0.49685
	6370	6.0212	0.49539
	6401	5.9394	0.49392
	6391	5.8625	0.49246
	6344	5.8116	0.45875
	6412	5.7142	0.45130
	6399	5.6631	0.44984
	6390	5.6353	0.44838
	6400	5.5178	0.44691
	6342	5.4588	0.43947
	6421	5.4393	0.40576
	6343	5.2424	0.39831
	6381	5.1450	0.39087
	6387	4.5971	0.38940
6396	4.2000	0.35569	

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
 Nonparametric Substitution Method Estimation Procedure - Nondetects Set to 1/2 ML  
 Cumulative Distribution for Dioxins/Furans/PCBs

ANALYTE	EPISODE	QTYHALF	P
PCBb	6410	4.1669	0.34825
	6377	4.0901	0.34080
	6372	4.0763	0.33335
	6375	3.7558	0.32591
	6434	3.5951	0.31846
	6393	3.4290	0.31810
	6389	3.3979	0.28439
	6397	3.1042	0.28293
	6378	3.0567	0.27548
	6360	2.6203	0.26804
	6386	2.4690	0.26059
	6382	2.2426	0.25314
	6433	2.0547	0.25168
	6384	1.9448	0.21797
	6383	1.8074	0.21053
	6394	1.7252	0.17682
	6354	1.6298	0.17535
	6430	1.6000	0.16791
	6435	1.4606	0.13420
	6351	1.4361	0.12675
	6428	1.3688	0.09304
	6414	1.2920	0.05933
	6423	1.2849	0.05787
	6365	1.2811	0.05042
	6402	1.1356	0.04896
	6376	1.0782	0.04860
	6380	1.0619	0.04116
	6368	0.7716	0.00745

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

EPA / NSSS 15:55 19SEP01 M:\PW\SLUDGE\REQ165\R165AK10.SAS  
 NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS/PCBS  
 Nonparametric Substitution Method Estimation Procedure - Nondetects Set to zero  
 Cumulative Distribution for Dioxins/Furans/PCBs

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ANALYTE	EPISODE	QTY_LOW	P
Total Dioxins/Furans/PCBs	6345	718.246	1.00000
	6377	468.969	0.99854
	6437	122.733	0.99109
	6346	110.321	0.98963
	6407	90.672	0.98927
	6341	80.422	0.98781
	6358	78.581	0.98634
	6429	68.014	0.95263
	6389	59.609	0.95117
	6385	59.213	0.94971
	6434	57.522	0.94226
	6350	57.137	0.94190
	6347	54.902	0.94154
	6421	54.764	0.94008
	6352	52.822	0.93263
	6353	47.764	0.93228
	6431	47.516	0.93192
	6355	46.486	0.93045
	6418	42.476	0.89675
	6361	42.172	0.89528
	6420	40.743	0.89492
	6411	39.644	0.89346
	6349	38.541	0.88601
	6340	38.273	0.88566
	6424	37.526	0.88419
	6435	36.796	0.85048
	6357	35.947	0.84304
	6415	35.833	0.84268
	6393	34.434	0.83523
	6369	32.602	0.80152
	6427	31.390	0.79408
	6402	29.307	0.79261
	6382	27.618	0.79226

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs



ANALYTE	EPISODE	QTY_LOW	P
Total Dioxins/Furans/PCBs	6395	27.434	0.79079
	6433	27.061	0.78335
	6351	25.964	0.74964
	6400	25.725	0.71593
	6356	25.659	0.70848
	6397	25.425	0.70104
	6430	24.063	0.69359
	6363	23.866	0.65988
	6390	23.816	0.62617
	6423	23.696	0.62471
	6426	23.534	0.61726
	6436	23.281	0.58355
	6406	22.968	0.58209
	6354	22.321	0.58062
	6387	21.736	0.57318
	6428	21.077	0.53947
	6409	19.767	0.50576
	6368	19.665	0.49831
	6365	19.515	0.49087
	6379	19.249	0.48940
	6386	18.795	0.48196
	6364	18.657	0.47451
	6381	18.424	0.44080
	6370	18.069	0.43934
	6378	17.773	0.43788
	6376	17.196	0.43043
	6348	17.015	0.42298
	6394	16.710	0.41554
	6392	16.556	0.41407
	6338	16.438	0.40663
	6344	16.288	0.40516
	6375	15.834	0.39772
	6342	15.600	0.39027

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

EPA / NSSS 15:55 19SEP01 M:\PW\SLUDGE\REQ165\R165AK10.SAS  
 NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS/PCBS  
 Nonparametric Substitution Method Estimation Procedure - Nondetects Set to zero  
 Cumulative Distribution for Dioxins/Furans/PCBs

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ANALYTE	EPISODE	QTY_LOW	P
Total Dioxins/Furans/PCBs	6374	15.429	0.35656
	6416	15.318	0.35510
	6410	13.998	0.32139
	6414	13.622	0.31394
	6404	13.423	0.31248
	6373	13.042	0.30503
	6413	12.881	0.30357
	6396	12.207	0.30321
	6405	11.971	0.29576
	6360	11.653	0.29430
	6372	11.591	0.28685
	6339	10.976	0.27941
	6380	10.741	0.27196
	6401	10.313	0.23825
	6419	9.805	0.23679
	6438	9.767	0.22934
	6359	9.230	0.22788
	6384	8.187	0.22043
	6383	8.110	0.21299
	6425	7.544	0.17928
	6371	7.467	0.14557
	6367	6.543	0.14521
	6391	6.267	0.11150
	6366	6.014	0.07779
	6412	4.926	0.04408
	6403	4.722	0.04262
	6399	4.699	0.00891
	6343	2.930	0.00745

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QUANTITY	P
Total Dioxins/Furans/PCBs	6345	718.246	1.00000
	6377	471.519	0.99854
	6385	139.313	0.99109
	6437	132.743	0.98364
	6364	117.685	0.98218
	6369	112.702	0.94847
	6346	110.321	0.94102
	6407	90.697	0.94067
	6359	89.410	0.93920
	6341	80.472	0.93176
	6358	78.581	0.93029
	6429	68.014	0.89658
	6389	59.609	0.89512
	6340	58.383	0.89366
	6434	57.522	0.89219
	6350	57.237	0.89184
	6347	55.702	0.89148
	6404	55.150	0.89001
	6421	54.764	0.88257
	6352	52.822	0.87512
	6353	47.764	0.87476
	6431	47.516	0.87441
	6355	46.586	0.87294
	6424	46.334	0.83923
	6339	44.379	0.80552
	6395	43.025	0.79808
	6418	42.501	0.79063
	6361	42.172	0.78917
	6420	40.844	0.78881
	6411	39.644	0.78735
	6435	38.796	0.77990
	6349	38.541	0.77245
	6357	36.497	0.77210

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QUANTITY	P
Total Dioxins/Furans/PCBs	6415	35.983	0.77174
	6393	34.774	0.76429
	6427	31.490	0.73058
	6409	29.867	0.72912
	6402	29.307	0.72167
	6382	28.578	0.72131
	6351	28.074	0.71985
	6348	27.115	0.68614
	6433	27.061	0.67870
	6387	26.861	0.64499
	6392	26.656	0.61128
	6430	26.475	0.60383
	6344	26.438	0.57012
	6400	25.825	0.56268
	6356	25.759	0.55523
	6397	25.755	0.54778
	6374	25.579	0.54034
	6416	25.428	0.53887
	6363	23.976	0.50516
	6390	23.966	0.47145
	6378	23.883	0.46999
	6423	23.706	0.46254
	6426	23.534	0.45510
	6428	23.518	0.42139
	6436	23.331	0.38768
	6370	23.119	0.38622
	6373	23.092	0.38475
	6406	23.018	0.38329
	6354	22.921	0.38183
	6413	22.881	0.37438
	6405	21.971	0.37402
	6375	21.969	0.37256
	6365	21.625	0.36511

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

EPA / NSSS 15:55 19SEP01 M:\PW\SLUDGE\REQ165\R165AK10.SAS  
 NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS/PCBS  
 Nonparametric Substitution Method Estimation Procedure - Nondetects Set to ML  
 Cumulative Distribution for Dioxins/Furans/PCBs

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ANALYTE	EPISODE	QUANTITY	P
Total Dioxins/Furans/PCBs	6401	20.463	0.36365
	6419	19.955	0.36219
	6368	19.765	0.35474
	6379	19.349	0.34729
	6376	19.306	0.33985
	6386	18.795	0.33240
	6381	18.474	0.32495
	6425	17.819	0.32349
	6371	17.467	0.28978
	6394	16.810	0.28942
	6367	16.693	0.28796
	6338	16.538	0.25425
	6391	16.417	0.25279
	6366	16.164	0.21908
	6342	15.800	0.18537
	6414	15.732	0.15166
	6412	15.186	0.15020
	6403	14.972	0.14873
	6399	14.849	0.11502
	6410	14.098	0.11356
	6343	13.080	0.10611
	6380	12.851	0.09867
	6396	12.307	0.06496
	6360	11.753	0.05751
	6372	11.691	0.05007
	6438	9.867	0.04262
	6384	8.337	0.04116
	6383	8.210	0.03371

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
Total Dioxins/Furans/PCBs	6345	718.246	1.00000
	6377	470.244	0.99854
	6437	127.738	0.99109
	6346	110.321	0.98963
	6385	99.263	0.98927
	6407	90.685	0.98182
	6341	80.447	0.98036
	6358	78.581	0.97890
	6369	72.652	0.94519
	6364	68.171	0.93774
	6429	68.014	0.90403
	6389	59.609	0.90257
	6434	57.522	0.90110
	6350	57.187	0.90075
	6347	55.302	0.90039
	6421	54.764	0.89892
	6352	52.822	0.89148
	6359	49.320	0.89112
	6340	48.328	0.88367
	6353	47.764	0.88221
	6431	47.516	0.88185
	6355	46.536	0.88039
	6418	42.488	0.84668
	6361	42.172	0.84522
	6424	41.930	0.84486
	6420	40.794	0.81115
	6411	39.644	0.80969
	6349	38.541	0.80224
	6435	37.796	0.80188
	6357	36.222	0.79444
	6415	35.908	0.79408
	6395	35.230	0.78663
	6393	34.604	0.77918

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
Total Dioxins/Furans/PCBs	6404	34.287	0.74548
	6427	31.440	0.73803
	6402	29.307	0.73657
	6382	28.098	0.73621
	6339	27.677	0.73474
	6433	27.061	0.72730
	6351	27.019	0.69359
	6400	25.775	0.65988
	6356	25.709	0.65243
	6397	25.590	0.64499
	6430	25.269	0.63754
	6409	24.817	0.60383
	6387	24.299	0.59638
	6363	23.921	0.56268
	6390	23.891	0.52897
	6423	23.701	0.52750
	6426	23.534	0.52006
	6436	23.306	0.48635
	6406	22.993	0.48488
	6354	22.621	0.48342
	6428	22.297	0.47597
	6348	22.065	0.44227
	6392	21.606	0.43482
	6344	21.363	0.42737
	6378	20.828	0.41993
	6370	20.594	0.41248
	6365	20.570	0.41102
	6374	20.504	0.40955
	6416	20.373	0.40809
	6368	19.715	0.37438
	6379	19.299	0.36693
	6375	18.902	0.35949
	6386	18.795	0.35204

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs

ANALYTE	EPISODE	QTYHALF	P
Total Dioxins/Furans/PCBs	6381	18.449	0.34459
	6376	18.251	0.34313
	6373	18.067	0.33568
	6413	17.881	0.33422
	6405	16.971	0.33386
	6394	16.760	0.33240
	6338	16.488	0.33094
	6342	15.700	0.32947
	6401	15.388	0.29576
	6419	14.880	0.29430
	6414	14.677	0.28685
	6410	14.048	0.28539
	6425	12.682	0.27794
	6371	12.467	0.24423
	6396	12.257	0.24388
	6380	11.796	0.23643
	6360	11.703	0.20272
	6372	11.641	0.19527
	6367	11.618	0.18783
	6391	11.342	0.15412
	6366	11.089	0.12041
	6412	10.056	0.08670
	6403	9.847	0.08524
	6438	9.817	0.05153
	6399	9.774	0.05007
	6384	8.262	0.04860
	6383	8.160	0.04116
	6343	8.005	0.00745

b Composites considered a detect if at least one congener is measured above the minimum level.  
 Using WHO set of TEFs



**APPENDIX D: EMPIRICAL CUMULATIVE DISTRIBUTIONS OF NATIONAL TOXIC EQUIVALENTS FROM THE 2001 NATIONAL SEWAGE SLUDGE SURVEY BY FLOW GROUPS**

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Exhibit 1—Dioxin and Furan TEQs - POTWs with Flows of > 1 MGD

Nondetects Set to Zero . . . . .	D-1
Nondetects Set to One-half ML . . . . .	D-4
Nondetects Set to ML . . . . .	D-7

Exhibit 2—Coplanar PCB TEQs - POTWs with Flows of > 1 MGD

Nondetects Set to Zero . . . . .	D-10
Nondetects Set to One-half ML . . . . .	D-13
Nondetects Set to ML . . . . .	D-16

Exhibit 3—Total Dioxin/Furan/Coplanar PCB TEQ - POTWs with Flows of > 1 MGD

Nondetects Set to Zero . . . . .	D-19
Nondetects Set to One-half ML . . . . .	D-22
Nondetects Set to ML . . . . .	D-25

Exhibit 4 —Dioxin and Furan TEQs - POTWs with Flows of < 1 MGD

Nondetects Set to Zero . . . . .	D-28
Nondetects Set to One-half ML . . . . .	D-29
Nondetects Set to ML . . . . .	D-30

Exhibit 5—Coplanar PCB TEQs - POTWs with Flows of < 1 MGD

Nondetects Set to Zero . . . . .	D-31
Nondetects Set to One-half ML . . . . .	D-32
Nondetects Set to ML . . . . .	D-33

Exhibit 6—Total Dioxin/Furan/Coplanar PCB TEQ - POTWs with Flows of < 1 MGD

Nondetects Set to Zero . . . . .	D-34
Nondetects Set to One-half ML . . . . .	D-35
Nondetects Set to ML . . . . .	D-36

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
DIOXIN/FURANS	6345	682.30	1.00000
	6377	466.15	0.99499
	6437	121.35	0.96950
	6346	93.15	0.96449
	6407	63.32	0.96326
	6389	56.21	0.95825
	6429	56.02	0.95324
	6385	55.21	0.94823
	6434	53.93	0.92274
	6421	49.33	0.92152
	6350	46.05	0.89602
	6347	45.43	0.89480
	6435	36.34	0.88979
	6353	36.15	0.86430
	6352	34.83	0.86307
	6431	34.78	0.86185
	6361	34.76	0.85684
	6340	34.34	0.85561
	6418	33.07	0.85060
	6411	29.42	0.84559
	6369	28.83	0.82010
	6420	28.58	0.79461
	6402	28.17	0.78960
	6349	27.78	0.78837
	6357	26.66	0.78715
	6395	25.98	0.78592
	6382	25.40	0.76043
	6423	22.42	0.75542
	6397	22.32	0.72993
	6341	22.15	0.70444
	6354	20.69	0.69943
	6415	20.45	0.67393
	6400	20.21	0.64844
	6427	19.96	0.62295
	6365	19.24	0.61794

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
DIOXIN/FURANS	6368	18.89	0.61293
	6409	18.46	0.58744
	6390	18.21	0.56195
	6378	17.72	0.55694
	6356	17.19	0.53144
	6376	17.12	0.50595
	6386	16.33	0.48046
	6344	15.50	0.45497
	6436	15.45	0.42948
	6406	15.38	0.42447
	6392	15.18	0.41946
	6375	15.08	0.39396
	6394	14.98	0.36847
	6370	14.55	0.36346
	6374	14.42	0.35845
	6348	14.02	0.35344
	6414	13.33	0.32795
	6381	13.30	0.32294
	6404	12.49	0.31793
	6413	10.86	0.29244
	6338	10.20	0.29121
	6373	10.10	0.28620
	6405	10.07	0.28119
	6410	9.83	0.27618
	6401	9.40	0.25069
	6360	9.03	0.24568
	6339	8.93	0.22019
	6379	8.42	0.19470
	6419	8.34	0.16921
	6396	8.01	0.14371
	6372	7.51	0.11822
	6359	6.74	0.09273
	6384	6.27	0.06724
	6371	5.71	0.04175
	6412	4.24	0.04052

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
DIOXIN/FURANS	6399	4.06	0.03551
	6343	2.71	0.03050
	6438	2.17	0.00501

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ½ ML  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
DIOXIN/FURANS	6345	682.30	1.00000
	6377	466.15	0.99499
	6437	121.35	0.96950
	6346	93.15	0.96449
	6407	63.32	0.96326
	6389	56.21	0.95825
	6429	56.02	0.95324
	6385	55.26	0.94823
	6434	53.93	0.92274
	6421	49.33	0.92152
	6350	46.10	0.89602
	6347	45.83	0.89480
	6435	36.34	0.88979
	6353	36.15	0.86430
	6352	34.83	0.86307
	6431	34.78	0.86185
	6361	34.76	0.85684
	6340	34.39	0.85561
	6418	33.07	0.85060
	6411	29.42	0.84559
	6369	28.88	0.82010
	6420	28.63	0.79461
	6402	28.17	0.78960
	6349	27.78	0.78837
	6357	26.91	0.78715
	6395	26.13	0.78592
	6382	25.86	0.76043
	6397	22.49	0.75542
	6423	22.42	0.72993
	6341	22.17	0.70444
	6354	20.99	0.69943
	6415	20.50	0.67393
	6400	20.26	0.64844
	6427	20.01	0.62295
	6365	19.29	0.61794

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
DIOXIN/FURANS	6368	18.94	0.61293
	6409	18.51	0.58744
	6390	18.26	0.56195
	6378	17.77	0.55694
	6356	17.24	0.53144
	6376	17.17	0.50595
	6386	16.33	0.48046
	6344	15.55	0.45497
	6436	15.45	0.42948
	6406	15.40	0.42447
	6392	15.23	0.41946
	6375	15.15	0.39396
	6394	15.03	0.36847
	6370	14.57	0.36346
	6374	14.47	0.35845
	6348	14.07	0.35344
	6414	13.38	0.32795
	6381	13.30	0.32294
	6404	12.60	0.31793
	6413	10.86	0.29244
	6338	10.25	0.29121
	6373	10.10	0.28620
	6405	10.07	0.28119
	6410	9.88	0.27618
	6401	9.45	0.25069
	6339	9.20	0.24568
	6360	9.08	0.22019
	6379	8.47	0.19470
	6419	8.39	0.16921
	6396	8.06	0.14371
	6372	7.56	0.11822
	6359	6.79	0.09273
	6384	6.32	0.06724
	6371	5.71	0.04175
	6412	4.34	0.04052

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
DIOXIN/FURANS	6399	4.11	0.03551
	6343	2.76	0.03050
	6438	2.22	0.00501

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
DIOXIN/FURANS	6345	682.30	1.00000
	6377	466.15	0.99499
	6437	121.35	0.96950
	6346	93.15	0.96449
	6407	63.32	0.96326
	6389	56.21	0.95825
	6429	56.02	0.95324
	6385	55.31	0.94823
	6434	53.93	0.92274
	6421	49.33	0.92152
	6347	46.23	0.89602
	6350	46.15	0.89101
	6435	36.34	0.88979
	6353	36.15	0.86430
	6352	34.83	0.86307
	6431	34.78	0.86185
	6361	34.76	0.85684
	6340	34.44	0.85561
	6418	33.07	0.85060
	6411	29.42	0.84559
	6369	28.93	0.82010
	6420	28.68	0.79461
	6402	28.17	0.78960
	6349	27.78	0.78837
	6357	27.16	0.78715
	6382	26.31	0.78592
	6395	26.29	0.78091
	6397	22.65	0.75542
	6423	22.42	0.72993
	6341	22.20	0.70444
	6354	21.29	0.69943
	6415	20.55	0.67393
	6400	20.31	0.64844
	6427	20.06	0.62295
	6365	19.34	0.61794



NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
DIOXIN/FURANS	6368	18.99	0.61293
	6409	18.56	0.58744
	6390	18.31	0.56195
	6378	17.82	0.55694
	6356	17.29	0.53144
	6376	17.22	0.50595
	6386	16.33	0.48046
	6344	15.60	0.45497
	6436	15.45	0.42948
	6406	15.43	0.42447
	6392	15.28	0.41946
	6375	15.21	0.39396
	6394	15.08	0.36847
	6370	14.60	0.36346
	6374	14.52	0.35845
	6348	14.12	0.35344
	6414	13.43	0.32795
	6381	13.30	0.32294
	6404	12.71	0.31793
	6413	10.86	0.29244
	6338	10.30	0.29121
	6373	10.10	0.28620
	6405	10.07	0.28119
	6410	9.93	0.27618
	6401	9.50	0.25069
	6339	9.47	0.24568
	6360	9.13	0.22019
	6379	8.52	0.19470
	6419	8.44	0.16921
	6396	8.11	0.14371
	6372	7.61	0.11822
	6359	6.84	0.09273
	6384	6.37	0.06724
	6371	5.71	0.04175
	6412	4.45	0.04052

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
DIOXIN/FURANS	6399	4.16	0.03551
	6343	2.81	0.03050
	6438	2.27	0.00501

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
PCBs	6341	58.27	1.00000
	6345	35.95	0.99499
	6407	27.35	0.98998
	6352	17.99	0.98497
	6346	17.17	0.98375
	6415	15.38	0.98252
	6431	12.74	0.95703
	6420	12.16	0.95202
	6429	11.99	0.94701
	6353	11.61	0.94200
	6427	11.43	0.94077
	6350	11.09	0.93576
	6379	10.83	0.93454
	6349	10.76	0.90905
	6411	10.23	0.90782
	6347	9.48	0.88233
	6418	9.41	0.87732
	6357	9.29	0.87231
	6356	8.47	0.87108
	6436	7.84	0.84559
	6438	7.60	0.84058
	6406	7.59	0.83557
	6361	7.41	0.83056
	6338	6.24	0.82934
	6390	5.61	0.82433
	6400	5.52	0.81932
	6421	5.44	0.79383
	6381	5.12	0.76833
	6396	4.20	0.76332
	6410	4.17	0.73783
	6372	4.08	0.71234
	6385	4.00	0.68685
	6340	3.93	0.66136
	6369	3.77	0.65635
	6434	3.60	0.63085

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
PCBs	6370	3.52	0.62963
	6389	3.40	0.62462
	6397	3.10	0.61961
	6348	3.00	0.59412
	6373	2.94	0.56862
	6377	2.82	0.56361
	6360	2.62	0.53812
	6359	2.49	0.51263
	6386	2.47	0.48714
	6382	2.22	0.46165
	6339	2.05	0.45664
	6413	2.02	0.43114
	6384	1.92	0.42992
	6405	1.90	0.40443
	6371	1.76	0.39942
	6394	1.73	0.39819
	6354	1.63	0.39318
	6419	1.47	0.36769
	6395	1.46	0.34220
	6437	1.39	0.31671
	6392	1.38	0.31170
	6409	1.31	0.28620
	6423	1.28	0.26071
	6402	1.14	0.23522
	6374	1.00	0.23399
	6404	0.94	0.22899
	6401	0.91	0.20349
	6344	0.79	0.19848
	6368	0.77	0.17299
	6375	0.75	0.14750
	6412	0.69	0.12201
	6399	0.64	0.11700
	6435	0.46	0.11199
	6414	0.29	0.08650
	6365	0.28	0.08149

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
PCBs	6343	0.22	0.07648
	6376	0.07	0.05098
	6378	0.05	0.02549

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ½ ML  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
PCBs	6341	58.27	1.00000
	6385	44.00	0.99499
	6369	43.77	0.96950
	6359	42.53	0.94401
	6345	35.95	0.91851
	6407	27.36	0.91350
	6404	21.69	0.90849
	6339	18.48	0.88300
	6352	17.99	0.85751
	6346	17.17	0.85629
	6415	15.41	0.85506
	6340	13.94	0.82957
	6431	12.74	0.82456
	6420	12.16	0.81955
	6429	11.99	0.81454
	6353	11.61	0.80953
	6427	11.43	0.80830
	6350	11.09	0.80329
	6379	10.83	0.80207
	6349	10.76	0.77658
	6411	10.23	0.77535
	6347	9.48	0.74986
	6418	9.42	0.74485
	6357	9.31	0.73984
	6395	9.10	0.73861
	6356	8.47	0.71312
	6348	8.00	0.68763
	6373	7.97	0.66214
	6436	7.86	0.65713
	6438	7.60	0.65212
	6406	7.59	0.64711
	6361	7.41	0.64210
	6413	7.02	0.64087
	6405	6.90	0.63965
	6371	6.76	0.63464

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
PCBs	6419	6.49	0.63341
	6437	6.39	0.60792
	6392	6.38	0.60291
	6409	6.31	0.57742
	6338	6.24	0.55193
	6374	6.03	0.54692
	6370	6.02	0.54191
	6401	5.94	0.53690
	6344	5.81	0.53189
	6412	5.71	0.50640
	6399	5.66	0.50139
	6390	5.64	0.49638
	6400	5.52	0.49137
	6421	5.44	0.46587
	6343	5.24	0.44038
	6381	5.14	0.41489
	6396	4.20	0.40988
	6410	4.17	0.38439
	6377	4.09	0.35890
	6372	4.08	0.33340
	6375	3.76	0.30791
	6434	3.60	0.28242
	6389	3.40	0.28119
	6397	3.10	0.27618
	6378	3.06	0.25069
	6360	2.62	0.22520
	6386	2.47	0.19971
	6382	2.24	0.17422
	6384	1.94	0.16921
	6394	1.73	0.14371
	6354	1.63	0.13871
	6435	1.46	0.11321
	6414	1.29	0.08772
	6423	1.28	0.08271
	6365	1.28	0.05722

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
PCBs	6402	1.14	0.05221
	6376	1.08	0.05098
	6368	0.77	0.02549



NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
PCBs	6385	84.00	1.00000
	6369	83.77	0.97451
	6359	82.57	0.94902
	6341	58.27	0.92352
	6404	42.44	0.91851
	6345	35.95	0.89302
	6339	34.91	0.88801
	6407	27.37	0.86252
	6340	23.94	0.85751
	6352	17.99	0.85250
	6346	17.17	0.85128
	6395	16.73	0.85005
	6415	15.43	0.82456
	6348	13.00	0.79907
	6373	12.99	0.77357
	6431	12.74	0.76856
	6420	12.16	0.76355
	6413	12.02	0.75854
	6429	11.99	0.75732
	6405	11.90	0.75231
	6371	11.76	0.74730
	6353	11.61	0.74607
	6419	11.52	0.74485
	6427	11.43	0.71936
	6437	11.40	0.71435
	6392	11.38	0.70934
	6409	11.31	0.68385
	6350	11.09	0.65835
	6374	11.05	0.65713
	6401	10.96	0.65212
	6344	10.84	0.64711
	6379	10.83	0.62162
	6349	10.76	0.59612
	6412	10.74	0.59490
	6399	10.69	0.58989

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
PCBs	6343	10.27	0.58488
	6411	10.23	0.55939
	6347	9.48	0.53390
	6418	9.43	0.52889
	6357	9.34	0.52388
	6370	8.52	0.52265
	6356	8.47	0.51764
	6436	7.89	0.49215
	6438	7.60	0.48714
	6406	7.59	0.48213
	6361	7.41	0.47712
	6375	6.76	0.47589
	6338	6.24	0.45040
	6378	6.06	0.44539
	6390	5.66	0.41990
	6400	5.52	0.41489
	6421	5.44	0.38940
	6377	5.37	0.36391
	6381	5.17	0.33841
	6396	4.20	0.33340
	6410	4.17	0.30791
	6372	4.08	0.28242
	6434	3.60	0.25693
	6389	3.40	0.25570
	6397	3.10	0.25069
	6360	2.62	0.22520
	6386	2.47	0.19971
	6435	2.46	0.17422
	6414	2.30	0.14872
	6365	2.29	0.14371
	6382	2.27	0.13871
	6376	2.08	0.13370
	6384	1.97	0.10820
	6394	1.73	0.08271
	6354	1.63	0.07770

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
PCBs	6423	1.29	0.05221
	6402	1.14	0.02672
	6368	0.77	0.02549

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - TOTAL DIOXINS/FURANS/PCBS  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
TOTAL DIOXINS/FURANS/PCBS	6345	718.25	1.00000
	6377	468.97	0.99499
	6437	122.73	0.96950
	6346	110.32	0.96449
	6407	90.67	0.96326
	6341	80.42	0.95825
	6429	68.01	0.95324
	6389	59.61	0.94823
	6385	59.21	0.94322
	6434	57.52	0.91773
	6350	57.14	0.91651
	6347	54.90	0.91528
	6421	54.76	0.91027
	6352	52.82	0.88478
	6353	47.76	0.88355
	6431	47.52	0.88233
	6418	42.48	0.87732
	6361	42.17	0.87231
	6420	40.74	0.87108
	6411	39.64	0.86607
	6349	38.54	0.84058
	6340	38.27	0.83936
	6435	36.80	0.83435
	6357	35.95	0.80885
	6415	35.83	0.80763
	6369	32.60	0.78214
	6427	31.39	0.75665
	6402	29.31	0.75164
	6382	27.62	0.75041
	6395	27.43	0.74540
	6400	25.72	0.71991
	6356	25.66	0.69442
	6397	25.42	0.66892
	6390	23.82	0.64343
	6423	23.70	0.63842

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - TOTAL DIOXINS/FURANS/PCBS  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
TOTAL DIOXINS/FURANS/PCBS	6436	23.28	0.61293
	6406	22.97	0.60792
	6354	22.32	0.60291
	6409	19.77	0.57742
	6368	19.67	0.55193
	6365	19.51	0.52643
	6379	19.25	0.52142
	6386	18.79	0.49593
	6381	18.42	0.47044
	6370	18.07	0.46543
	6378	17.77	0.46042
	6376	17.20	0.43493
	6348	17.01	0.40944
	6394	16.71	0.38394
	6392	16.56	0.37894
	6338	16.44	0.35344
	6344	16.29	0.34843
	6375	15.83	0.32294
	6374	15.43	0.29745
	6410	14.00	0.29244
	6414	13.62	0.26695
	6404	13.42	0.26194
	6373	13.04	0.23645
	6413	12.88	0.23144
	6396	12.21	0.23021
	6405	11.97	0.20472
	6360	11.65	0.19971
	6372	11.59	0.17422
	6339	10.98	0.14872
	6401	10.31	0.12323
	6419	9.80	0.11822
	6438	9.77	0.09273
	6359	9.23	0.08772
	6384	8.19	0.06223
	6371	7.47	0.03674

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
TOTAL DIOXINS/FURANS/PCBs	6412	4.93	0.03551
	6399	4.70	0.03050
	6343	2.93	0.02549

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ½ ML  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
TOTAL DIOXINS/FURANS/PCBs	6345	718.25	1.00000
	6377	470.24	0.99499
	6437	127.74	0.96950
	6346	110.32	0.96449
	6385	99.26	0.96326
	6407	90.68	0.93777
	6341	80.45	0.93276
	6369	72.65	0.92775
	6429	68.01	0.90226
	6389	59.61	0.89725
	6434	57.52	0.89224
	6350	57.19	0.89101
	6347	55.30	0.88979
	6421	54.76	0.88478
	6352	52.82	0.85929
	6359	49.32	0.85806
	6340	48.33	0.83257
	6353	47.76	0.82756
	6431	47.52	0.82633
	6418	42.49	0.82132
	6361	42.17	0.81632
	6420	40.79	0.81509
	6411	39.64	0.81008
	6349	38.54	0.78459
	6435	37.80	0.78336
	6357	36.22	0.75787
	6415	35.91	0.75665
	6395	35.23	0.73115
	6404	34.29	0.70566
	6427	31.44	0.68017
	6402	29.31	0.67516
	6382	28.10	0.67393
	6339	27.68	0.66892
	6400	25.77	0.64343
	6356	25.71	0.61794

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
 NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ½ ML  
 INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
TOTAL DIOXINS/FURANS/PCBs	6397	25.59	0.59245
	6409	24.82	0.56696
	6390	23.89	0.54146
	6423	23.70	0.53645
	6436	23.31	0.51096
	6406	22.99	0.50595
	6354	22.62	0.50094
	6348	22.06	0.47545
	6392	21.61	0.44996
	6344	21.36	0.42447
	6378	20.83	0.39897
	6370	20.59	0.37348
	6365	20.57	0.36847
	6374	20.50	0.36346
	6368	19.72	0.35845
	6379	19.30	0.33296
	6375	18.90	0.30747
	6386	18.79	0.28198
	6381	18.45	0.25648
	6376	18.25	0.25147
	6373	18.07	0.22598
	6413	17.88	0.22097
	6405	16.97	0.21975
	6394	16.76	0.21474
	6338	16.49	0.20973
	6401	15.39	0.20472
	6419	14.88	0.19971
	6414	14.68	0.17422
	6410	14.05	0.16921
	6371	12.47	0.14371
	6396	12.26	0.14249
	6360	11.70	0.11700
	6372	11.64	0.09151
	6412	10.06	0.06601
	6438	9.82	0.06100



NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QTYHALF	P
TOTAL DIOXINS/FURANS/PCBs	6399	9.77	0.05599
	6384	8.26	0.05098
	6343	8.01	0.02549

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
TOTAL DIOXINS/FURANS/PCBs	6345	718.25	1.00000
	6377	471.52	0.99499
	6385	139.31	0.96950
	6437	132.74	0.94401
	6369	112.70	0.93900
	6346	110.32	0.91350
	6407	90.70	0.91228
	6359	89.41	0.90727
	6341	80.47	0.88178
	6429	68.01	0.87677
	6389	59.61	0.87176
	6340	58.38	0.86675
	6434	57.52	0.86174
	6350	57.24	0.86051
	6347	55.70	0.85929
	6404	55.15	0.85428
	6421	54.76	0.82879
	6352	52.82	0.80329
	6353	47.76	0.80207
	6431	47.52	0.80084
	6339	44.38	0.79583
	6395	43.03	0.77034
	6418	42.50	0.74485
	6361	42.17	0.73984
	6420	40.84	0.73861
	6411	39.64	0.73360
	6435	38.80	0.70811
	6349	38.54	0.68262
	6357	36.50	0.68139
	6415	35.98	0.68017
	6427	31.49	0.65468
	6409	29.87	0.64967
	6402	29.31	0.62417
	6382	28.58	0.62295
	6348	27.11	0.61794

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
 Nonparametric Substitution Method Estimation Procedure - Nondetects Set to ML  
 Includes Only POTWs with Flows of > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
TOTAL DIOXINS/FURANS/PCBs	6392	26.66	0.59245
	6344	26.44	0.56696
	6400	25.82	0.54146
	6356	25.76	0.51597
	6397	25.75	0.49048
	6374	25.58	0.46499
	6390	23.97	0.45998
	6378	23.88	0.45497
	6423	23.71	0.42948
	6436	23.33	0.40398
	6370	23.12	0.39897
	6373	23.09	0.39396
	6406	23.02	0.38895
	6354	22.92	0.38394
	6413	22.88	0.35845
	6405	21.97	0.35723
	6375	21.97	0.35222
	6365	21.62	0.32673
	6401	20.46	0.32172
	6419	19.95	0.31671
	6368	19.77	0.29121
	6379	19.35	0.26572
	6376	19.31	0.24023
	6386	18.79	0.21474
	6381	18.47	0.18925
	6371	17.47	0.18424
	6394	16.81	0.18301
	6338	16.54	0.17800
	6414	15.73	0.17299
	6412	15.19	0.16798
	6399	14.85	0.16297
	6410	14.10	0.15796
	6343	13.08	0.13247
	6396	12.31	0.10698
	6360	11.75	0.08149

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF > 1 MGD

ANALYTE	EPISODE	QUANTITY	P
TOTAL DIOXINS/FURANS/PCBs	6372	11.69	0.05599
	6438	9.87	0.03050
	6384	8.34	0.02549

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
DIOXIN/FURANS	6355	33.31	1.00000
	6424	32.12	0.95238
	6393	31.00	0.90476
	6351	25.53	0.85714
	6433	25.01	0.80952
	6430	23.67	0.76190
	6358	23.05	0.71429
	6428	20.86	0.66667
	6387	19.65	0.61905
	6363	17.17	0.57143
	6426	15.25	0.52381
	6364	14.04	0.47619
	6416	12.60	0.42857
	6380	10.68	0.38095
	6342	10.17	0.33333
	6383	6.30	0.28571
	6425	6.09	0.23810
	6391	5.43	0.19048
	6367	5.00	0.14286
	6366	4.45	0.09524
	6403	3.63	0.04762

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QTYHALF	P
DIOXIN/FURANS	6355	33.36	1.00000
	6424	32.21	0.95238
	6393	31.17	0.90476
	6351	25.58	0.85714
	6433	25.01	0.80952
	6430	23.67	0.76190
	6358	23.05	0.71429
	6428	20.93	0.66667
	6387	19.70	0.61905
	6363	17.22	0.57143
	6426	15.25	0.52381
	6364	14.50	0.47619
	6416	12.65	0.42857
	6380	10.73	0.38095
	6342	10.24	0.33333
	6383	6.35	0.28571
	6425	6.23	0.23810
	6391	5.48	0.19048
	6367	5.05	0.14286
	6366	4.50	0.09524
	6403	3.73	0.04762

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - DIOXINS/FURANS  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QUANTITY	P
DIOXIN/FURANS	6355	33.41	1.00000
	6424	32.30	0.95238
	6393	31.34	0.90476
	6351	25.63	0.85714
	6433	25.01	0.80952
	6430	23.67	0.76190
	6358	23.05	0.71429
	6428	20.99	0.66667
	6387	19.75	0.61905
	6363	17.27	0.57143
	6426	15.25	0.52381
	6364	14.97	0.47619
	6416	12.70	0.42857
	6380	10.78	0.38095
	6342	10.32	0.33333
	6383	6.40	0.28571
	6425	6.37	0.23810
	6391	5.53	0.19048
	6367	5.10	0.14286
	6366	4.55	0.09524
	6403	3.83	0.04762

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
PCBs	6358	55.54	1.00000
	6355	13.18	0.95238
	6426	8.28	0.90476
	6363	6.69	0.85714
	6342	5.43	0.80952
	6424	5.40	0.76190
	6364	4.62	0.71429
	6393	3.43	0.66667
	6416	2.72	0.61905
	6387	2.08	0.57143
	6433	2.05	0.52381
	6383	1.81	0.47619
	6366	1.56	0.42857
	6367	1.54	0.38095
	6425	1.45	0.33333
	6403	1.09	0.28571
	6391	0.84	0.23810
	6351	0.43	0.19048
	6430	0.39	0.14286
	6428	0.21	0.09524
	6380	0.06	0.04762



NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QTYHALF	P
PCBs	6358	55.54	1.00000
	6364	53.67	0.95238
	6355	13.18	0.90476
	6424	9.72	0.85714
	6426	8.28	0.80952
	6416	7.72	0.76190
	6363	6.70	0.71429
	6366	6.59	0.66667
	6367	6.57	0.61905
	6425	6.45	0.57143
	6403	6.12	0.52381
	6391	5.86	0.47619
	6342	5.46	0.42857
	6387	4.60	0.38095
	6393	3.43	0.33333
	6433	2.05	0.28571
	6383	1.81	0.23810
	6430	1.60	0.19048
	6351	1.44	0.14286
	6428	1.37	0.09524
	6380	1.06	0.04762

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QUANTITY	P
PCBs	6364	102.72	1.00000
	6358	55.54	0.95238
	6424	14.04	0.90476
	6355	13.18	0.85714
	6416	12.73	0.80952
	6366	11.61	0.76190
	6367	11.59	0.71429
	6425	11.45	0.66667
	6403	11.14	0.61905
	6391	10.89	0.57143
	6426	8.28	0.52381
	6387	7.11	0.47619
	6363	6.70	0.42857
	6342	5.48	0.38095
	6393	3.43	0.33333
	6430	2.81	0.28571
	6428	2.52	0.23810
	6351	2.44	0.19048
	6380	2.07	0.14286
	6433	2.05	0.09524
	6383	1.81	0.04762

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ZERO  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QTY_LOW	P
TOTAL DIOXINS/FURANS/PCBs	6358	78.58	1.00000
	6355	46.49	0.95238
	6424	37.53	0.90476
	6393	34.43	0.85714
	6433	27.06	0.80952
	6351	25.96	0.76190
	6430	24.06	0.71429
	6363	23.87	0.66667
	6426	23.53	0.61905
	6387	21.74	0.57143
	6428	21.08	0.52381
	6364	18.66	0.47619
	6342	15.60	0.42857
	6416	15.32	0.38095
	6380	10.74	0.33333
	6383	8.11	0.28571
	6425	7.54	0.23810
	6367	6.54	0.19048
	6391	6.27	0.14286
	6366	6.01	0.09524
	6403	4.72	0.04762

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO 1/2 ML  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QTYHALF	P
TOTAL DIOXINS/FURANS/PCBs	6358	78.58	1.00000
	6364	68.17	0.95238
	6355	46.54	0.90476
	6424	41.93	0.85714
	6393	34.60	0.80952
	6433	27.06	0.76190
	6351	27.02	0.71429
	6430	25.27	0.66667
	6387	24.30	0.61905
	6363	23.92	0.57143
	6426	23.53	0.52381
	6428	22.30	0.47619
	6416	20.37	0.42857
	6342	15.70	0.38095
	6425	12.68	0.33333
	6380	11.80	0.28571
	6367	11.62	0.23810
	6391	11.34	0.19048
	6366	11.09	0.14286
	6403	9.85	0.09524
	6383	8.16	0.04762

NATIONAL POLLUTANT CONCENTRATION PERCENTILE ESTIMATES FROM THE NATIONAL SEWAGE SLUDGE 2001 SURVEY - Total Dioxins/Furans/PCBs  
NONPARAMETRIC SUBSTITUTION METHOD ESTIMATION PROCEDURE - NONDETECTS SET TO ML  
INCLUDES ONLY POTWS WITH FLOWS OF # 1 MGD

ANALYTE	EPISODE	QUANTITY	P
TOTAL DIOXINS/FURANS/PCBs	6364	117.69	1.00000
	6358	78.58	0.95238
	6355	46.59	0.90476
	6424	46.33	0.85714
	6393	34.77	0.80952
	6351	28.07	0.76190
	6433	27.06	0.71429
	6387	26.86	0.66667
	6430	26.48	0.61905
	6416	25.43	0.57143
	6363	23.98	0.52381
	6426	23.53	0.47619
	6428	23.52	0.42857
	6425	17.82	0.38095
	6367	16.69	0.33333
	6391	16.42	0.28571
	6366	16.16	0.23810
	6342	15.80	0.19048
	6403	14.97	0.14286
	6380	12.85	0.09524
	6383	8.21	0.04762