

Cumulative Frequency Plots of Species' Sensitivity to the Toxicants in the ANZECC & ARMCANZ Water Quality Guidelines'

This document contains the cumulative frequency plots of species sensitivity for the toxicants for which trigger values were derived using the statistical distribution method. The plots were generated using the BurrliOZ software (Campbell et al. 2000), included on the CD Rom, that was specifically designed for derivation of trigger values."

Each plot contains the geometric means for the most sensitive end-points for each species for which toxicity data were available. Three sample distributions are also plotted. The blue line is for the Burr Type III distribution estimated from the toxicity data by maximum likelihood. The log-logistic distribution used by Aldenberg and Slob (1993), and adopted in the Netherlands, as well as the normal distribution, are also plotted for comparative purposes. In the current version of BurrliOZ contained on the CD Rom, the normal curve is not displayed. This has been replaced by the log-normal curve as used in Denmark, and as developed by Wagner and Løkke (1991)."

Each plot also contains a purple line, which indicates either the concentration that should protect 95% or 99% of species. The level of protection that is indicated corresponds to the level of protection that was used for the trigger value (TV) for that chemical. Where the data were sufficient to derive a high reliability (HR) TV, the blue line denotes/matches the TV concentration. However, if only a moderate (MR) or low (LR) reliability TV could be derived, the concentrations derived by the BurrliOZ software were further manipulated in order to obtain the TV. This manipulation involved dividing the concentration by an acute to chronic ratio or by a default assessment factor. The magnitude of the assessment factor varied depending on the type and amount of toxicity data. The document, 'Description of how each toxicant trigger value was derived' (file 'TOX-Tvderivation'), indicates what level of protection the blue line corresponds to or whether the BurrliOZ figure was subject to further manipulation."

BurrliOZ can alternate the scale of the 'x' axis between a normal and a logarithm to the base 10 scale (the latter indicated as 'E' in the concentration range). Both types of plots are presented in this document. The type of plot that best presented the distribution of the toxicity data and the concentration that protects either 95% or 99% of species is presented. Occasionally, both types of plots are presented."





The caption for the 'x' axis states the concentration of toxicant in a file name. The file names" were chosen to be as self-explanatory as possible. But there were character limitations. Most file names end with an 'F', 'M' or 'FM' that indicate the toxicity data were measured in freshwater, marine water, and fresh and marine water respectively. The files referred to in the 'x' axis are not provided as part of the Water Quality Guidelines."

References

Campbell E, Palmer MJ, Shao Q, Warne MStJ & Wilson D 2000. *BurrliOZ: A computer program for calculating toxicant trigger values for the ANZECC and ARMCANZ water quality guidelines*. Perth WA.

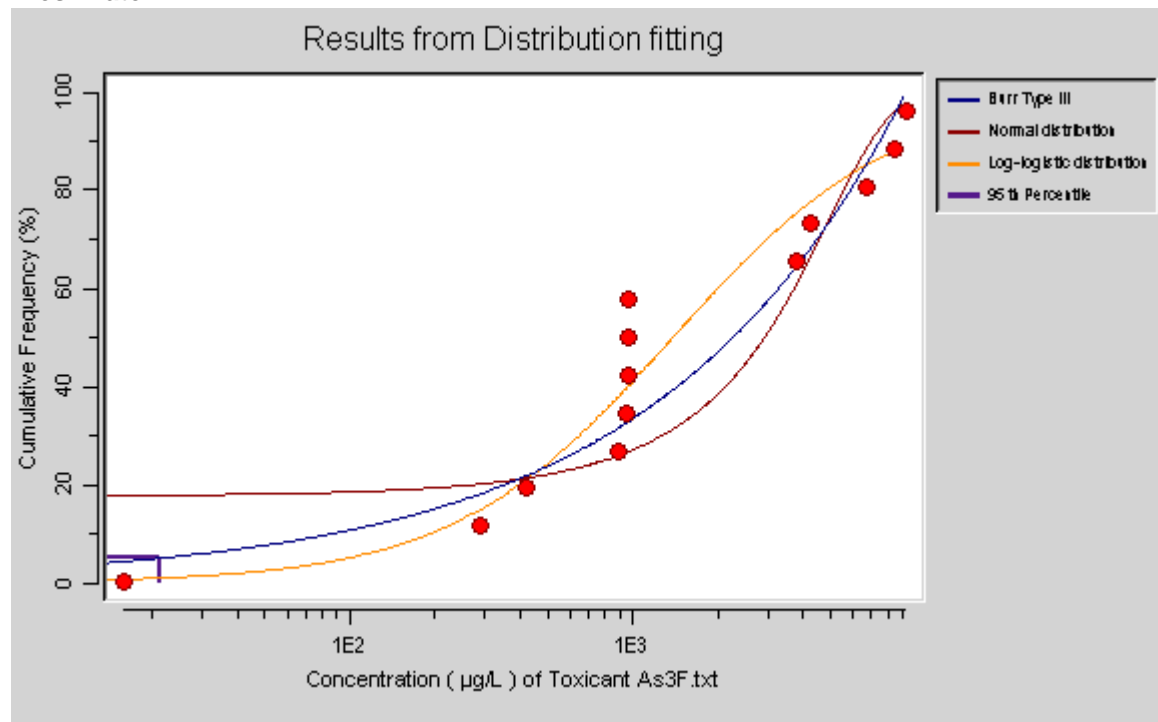
Aldenberg T & Slob W 1993. Confidence limits for hazardous concentrations based on logistically distributed NOEC toxicity data. *Ecotoxicology and Environmental Safety* 25, 48–63.

Wagner C & Løkke H 1991. Estimation of ecotoxicological protection levels from NOEC toxicity data. *Water Research* 25, 1237–1242.

KEY to line colours in graphs		Burr Type III
		Normal distribution
		Log-logistic distribution
		95 th Percentile

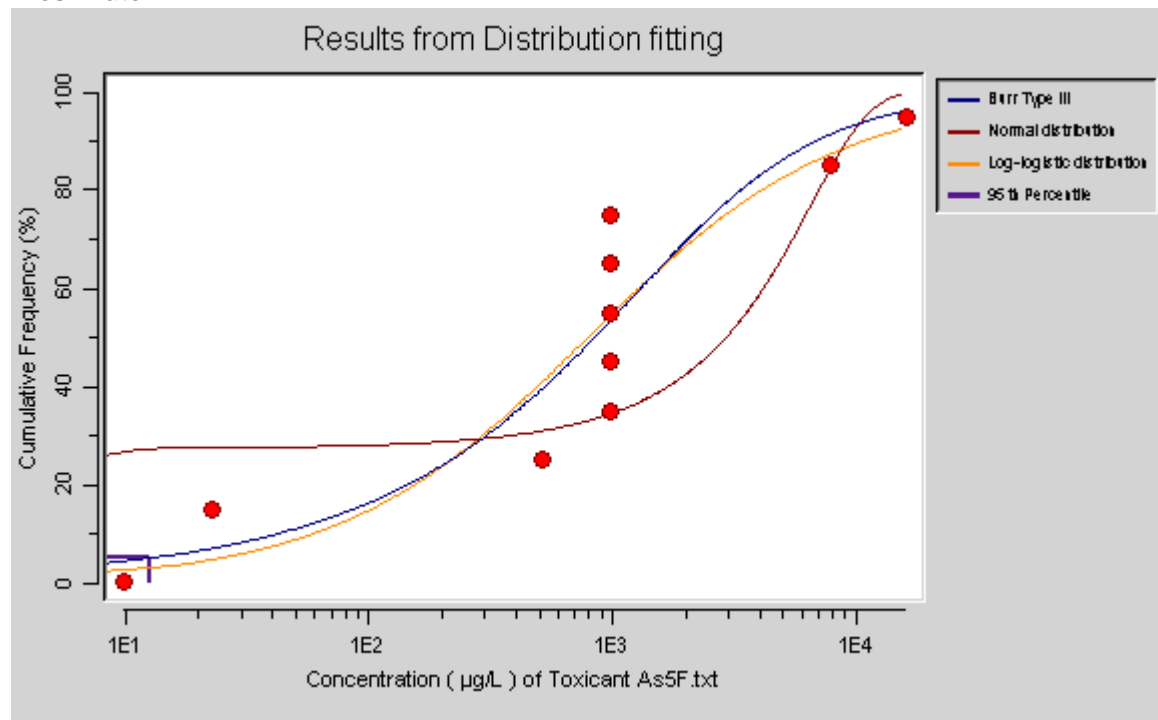
Arsenic (III)

Freshwater



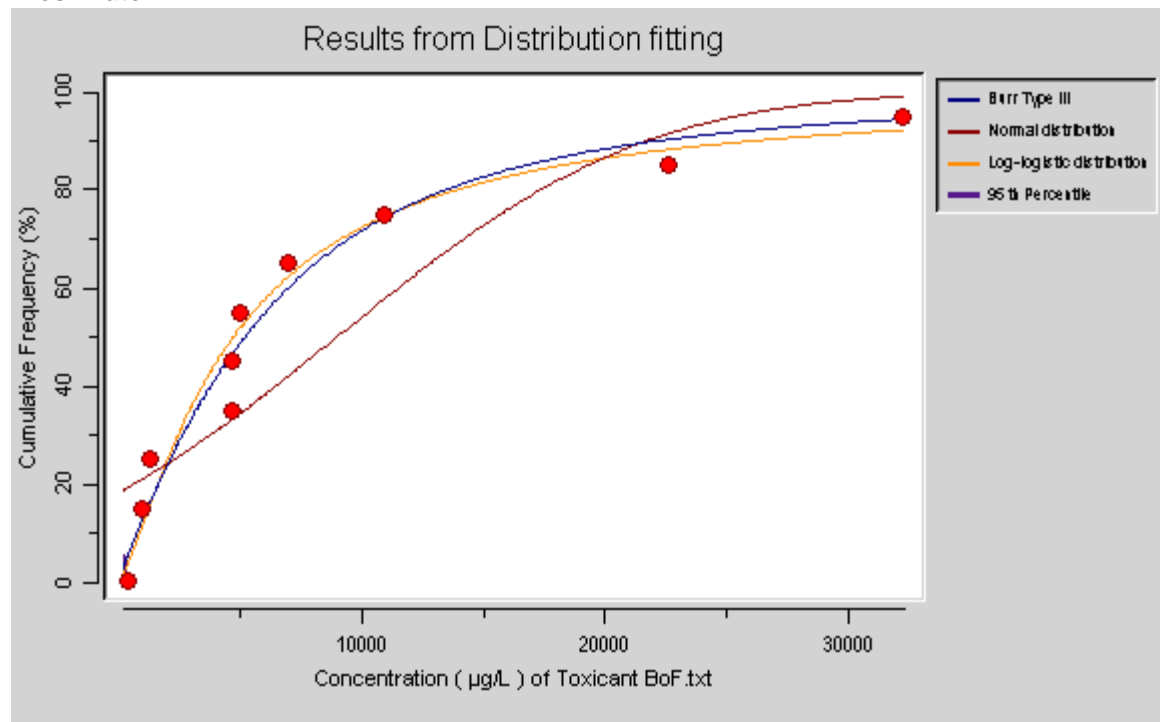
Arsenic (V)

Freshwater



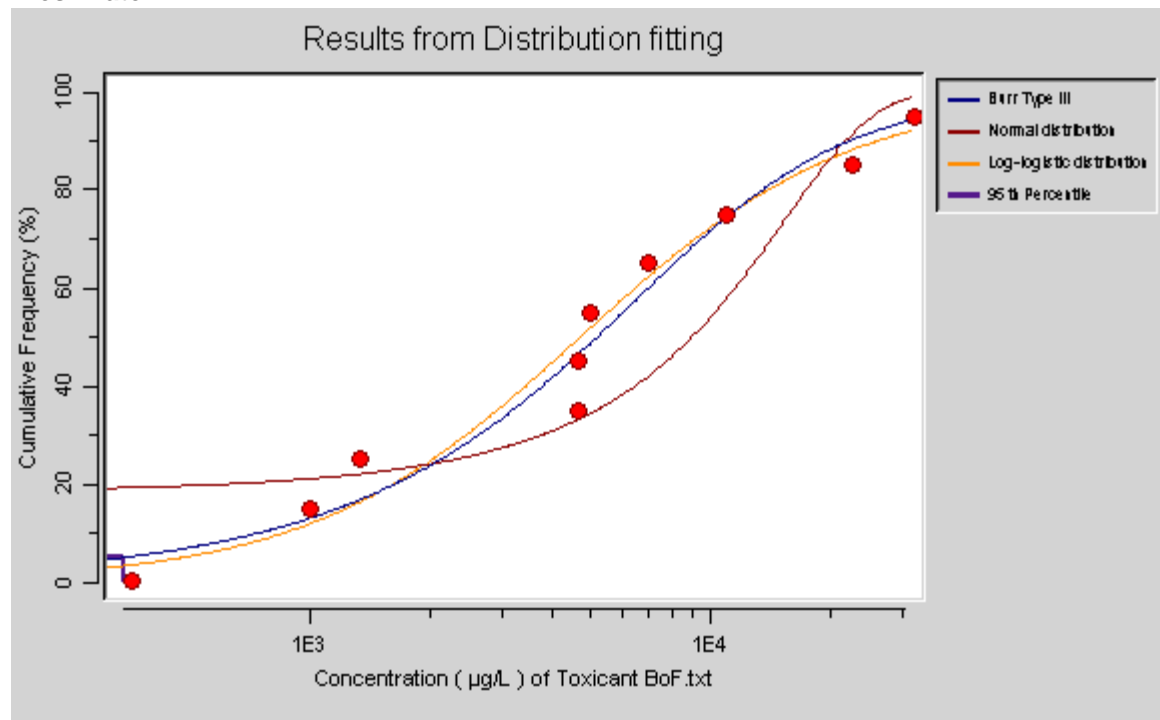
Boron

Freshwater



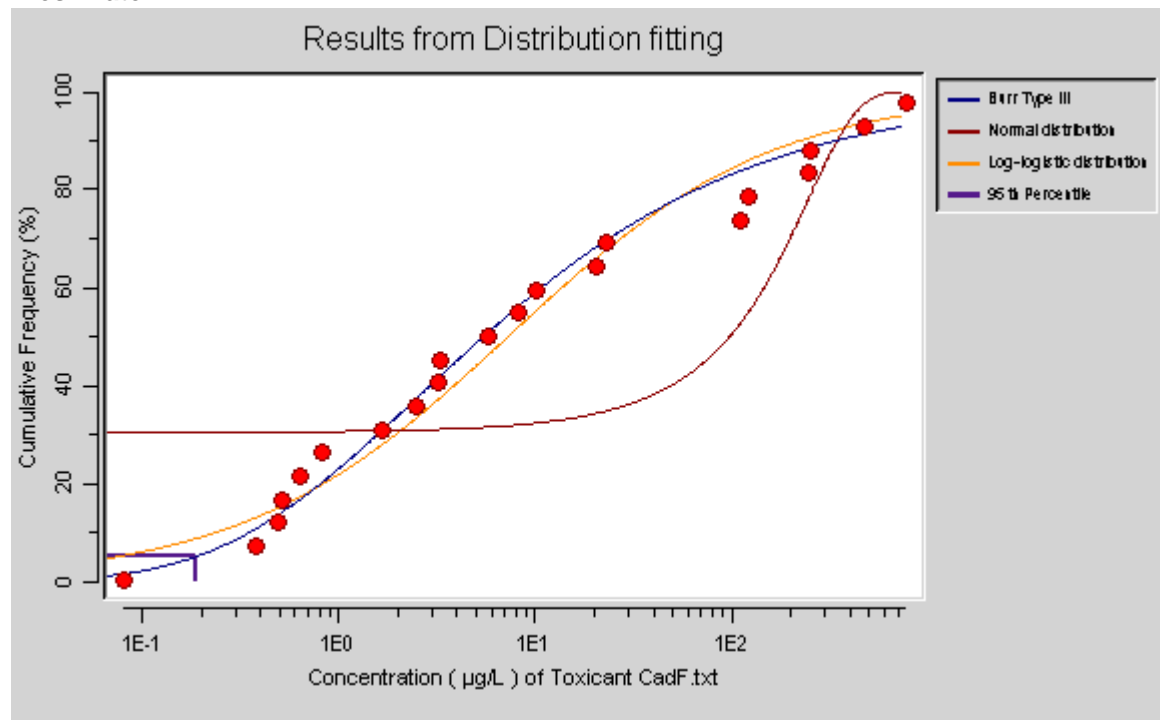
Boron

Freshwater



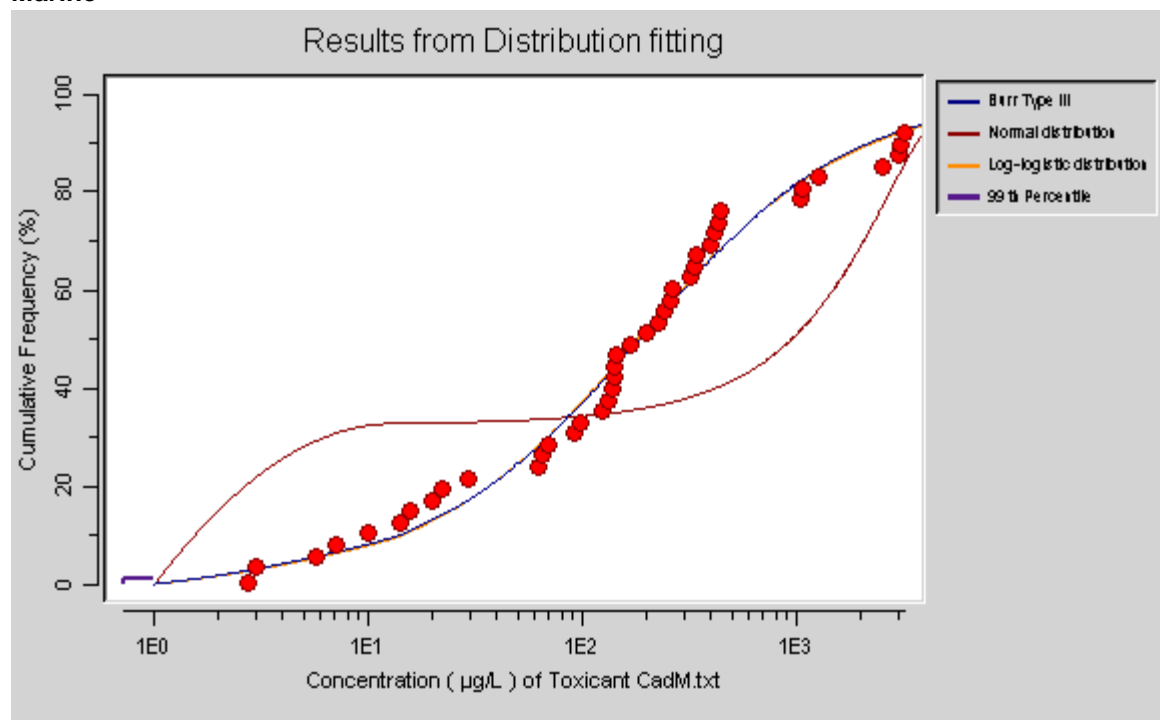
Cadmium

Freshwater



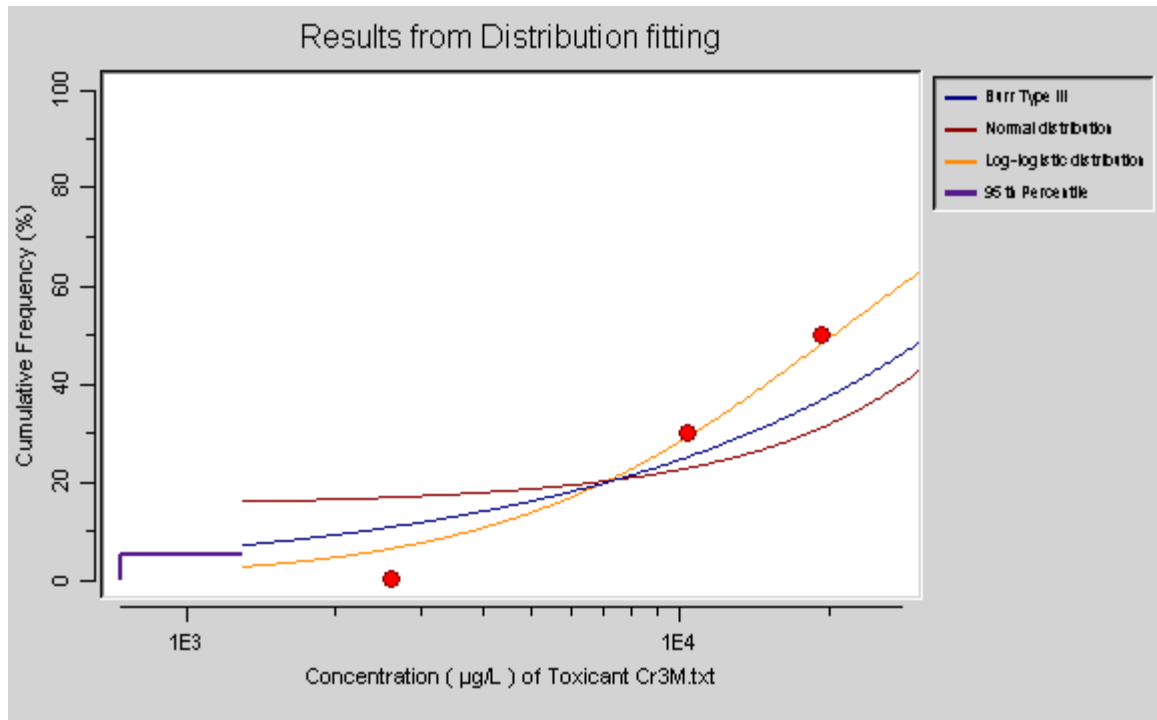
Cadmium

Marine



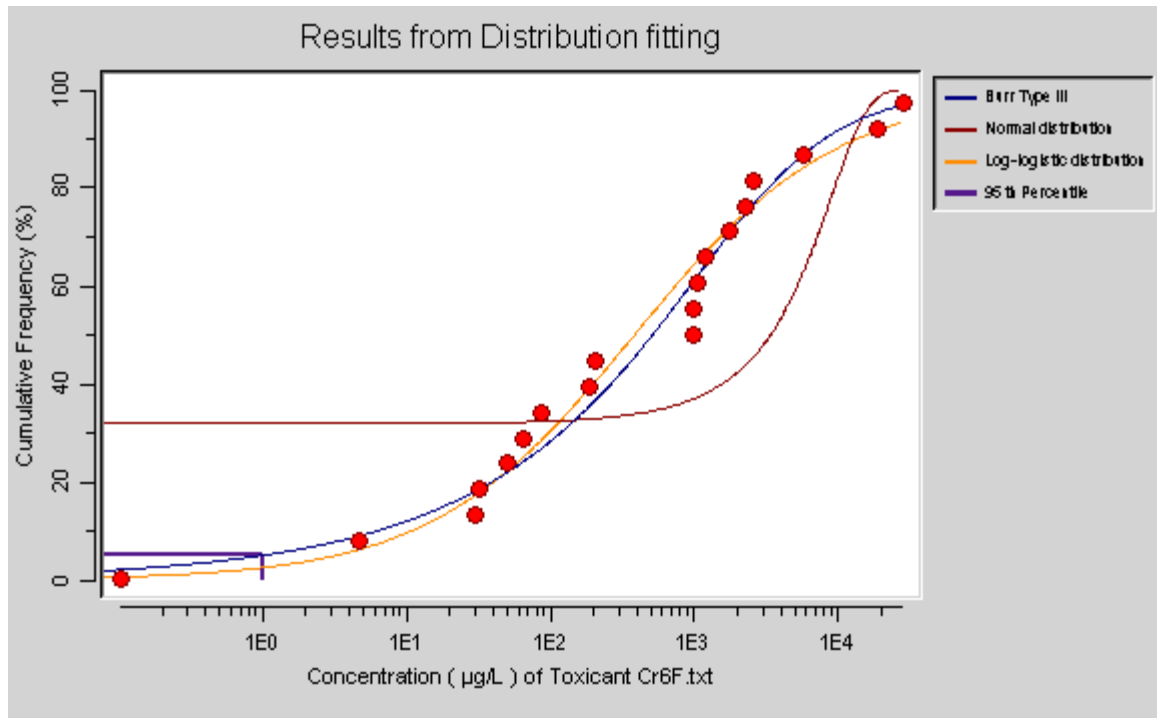
Chromium (III)

Marine



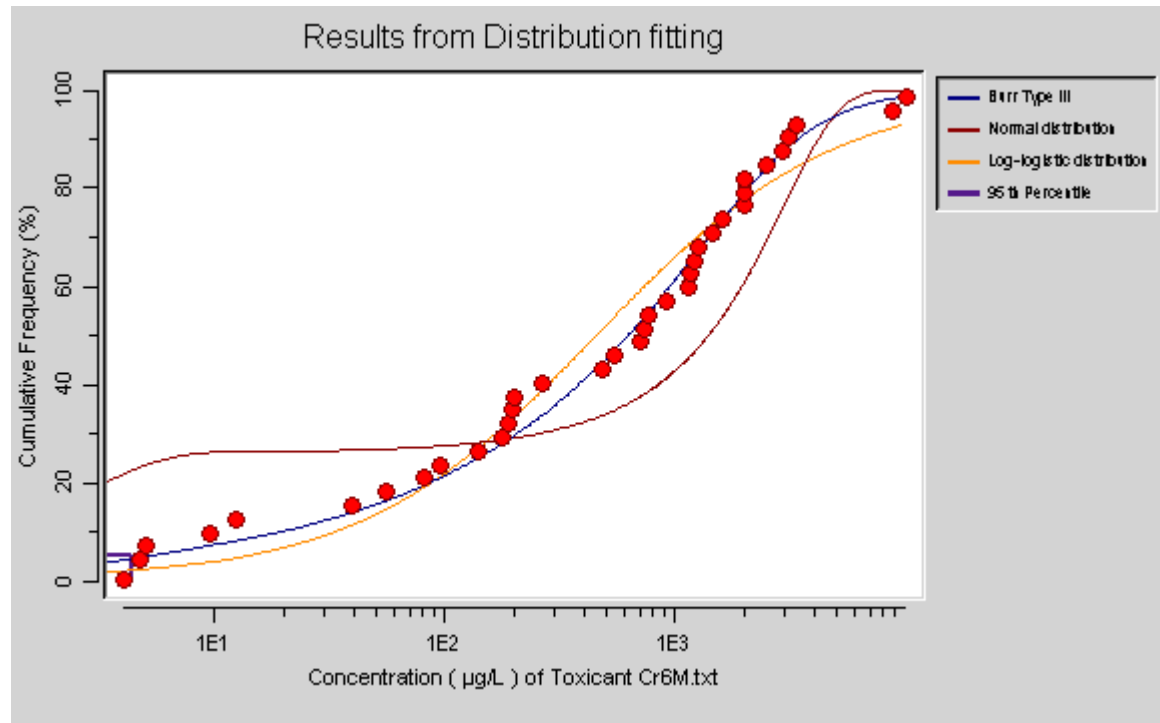
Chromium (VI)

Freshwater



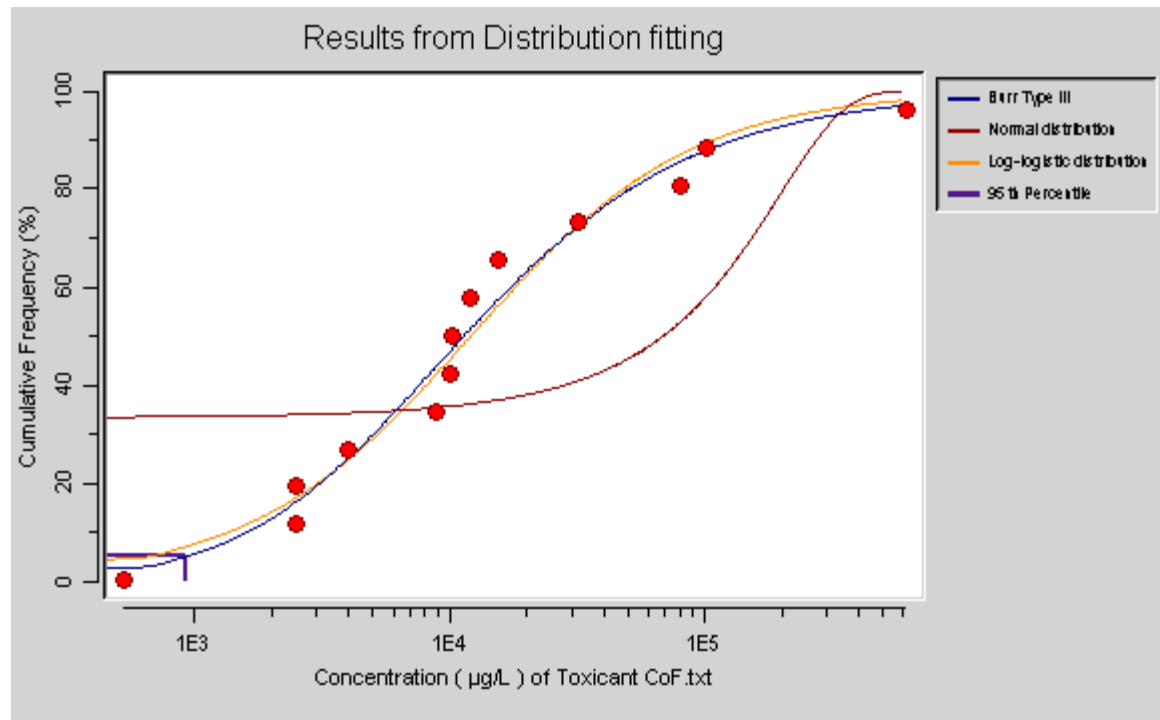
Chromium (VI)

Marine



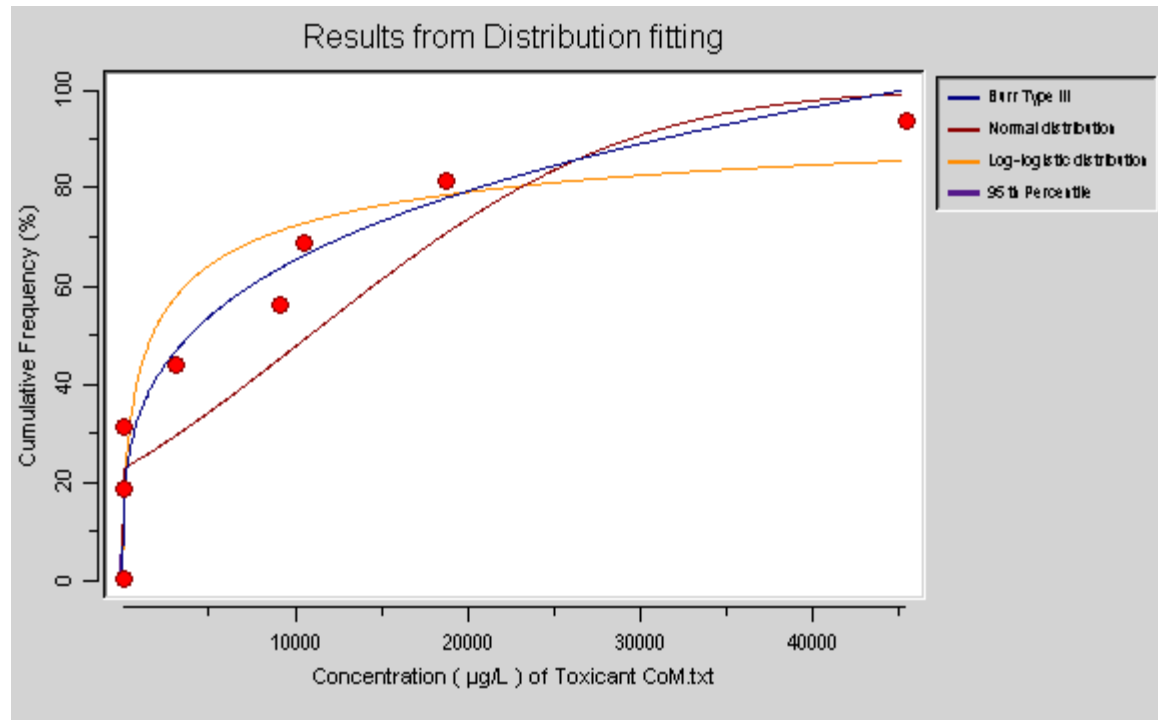
Cobalt

Freshwater



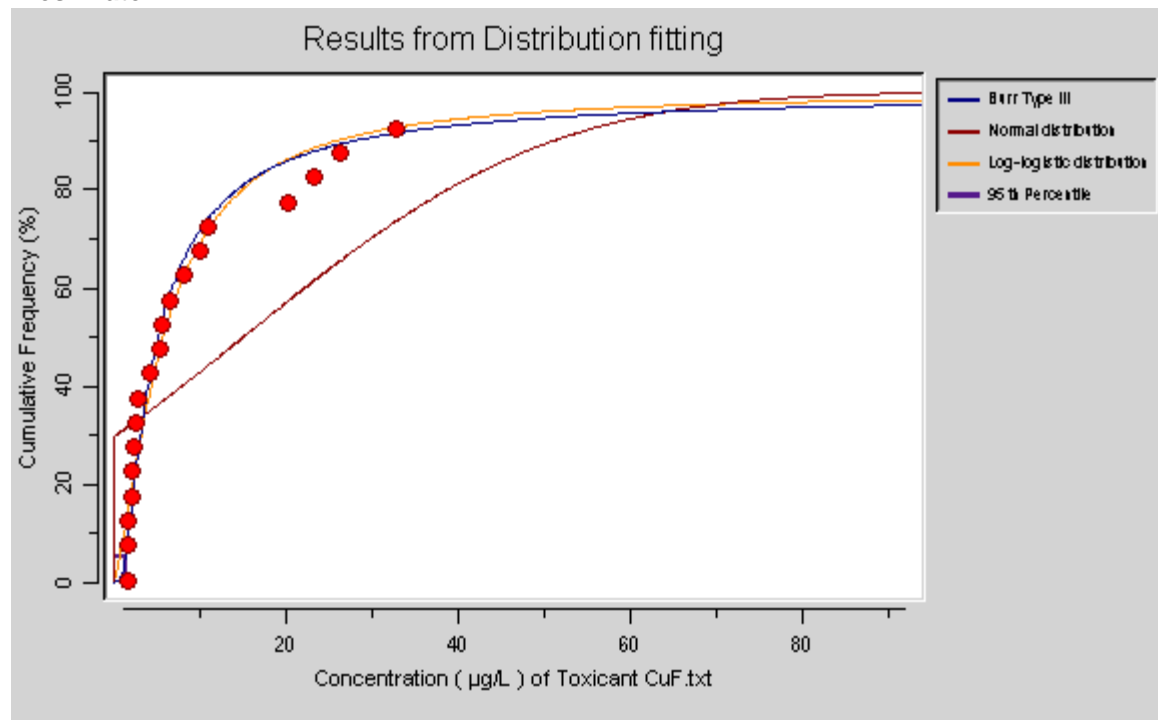
Cobalt

Marine



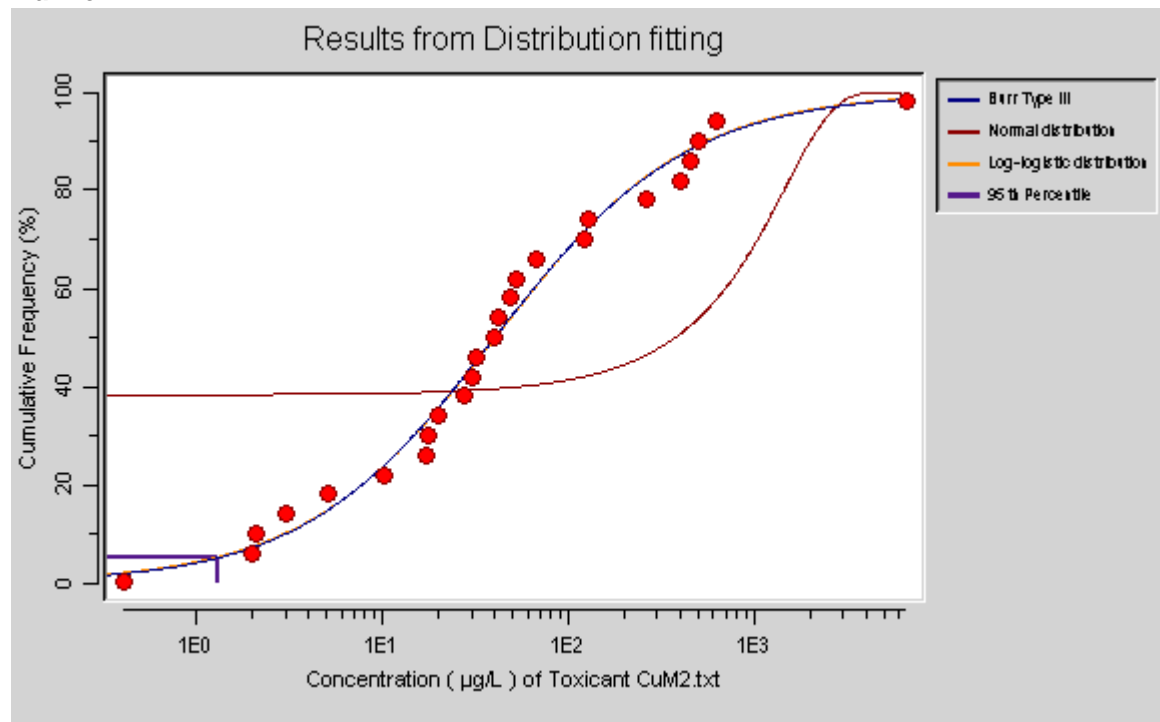
Copper

Freshwater



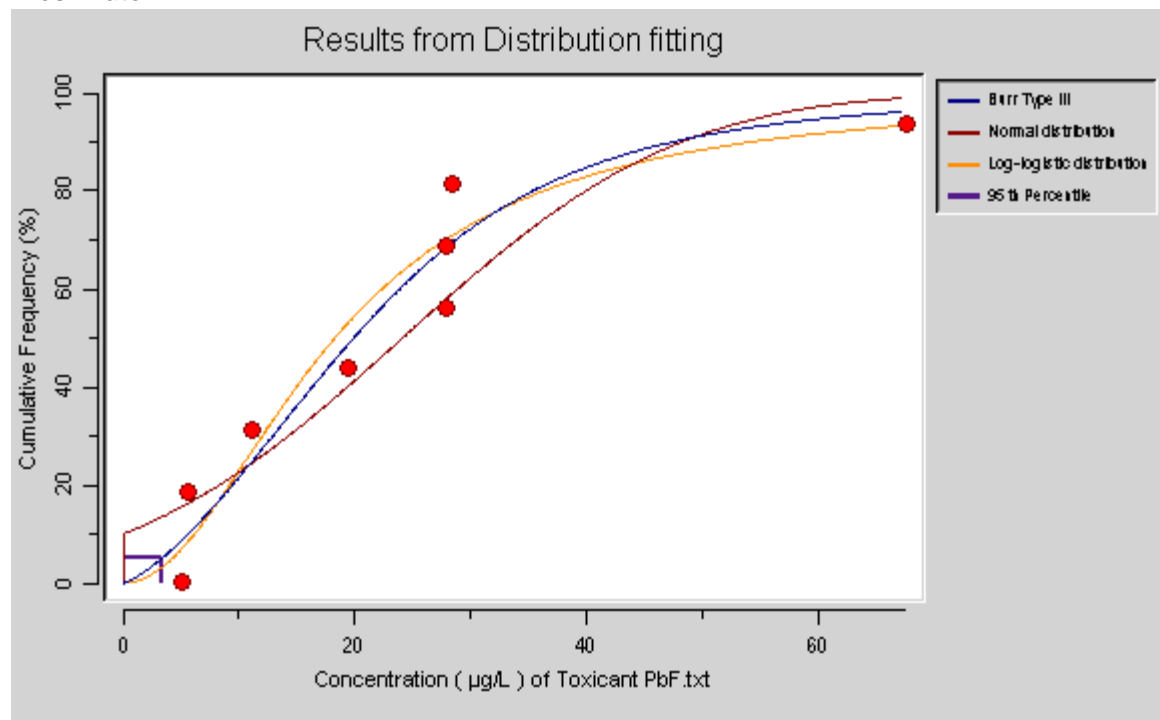
Copper

Marine



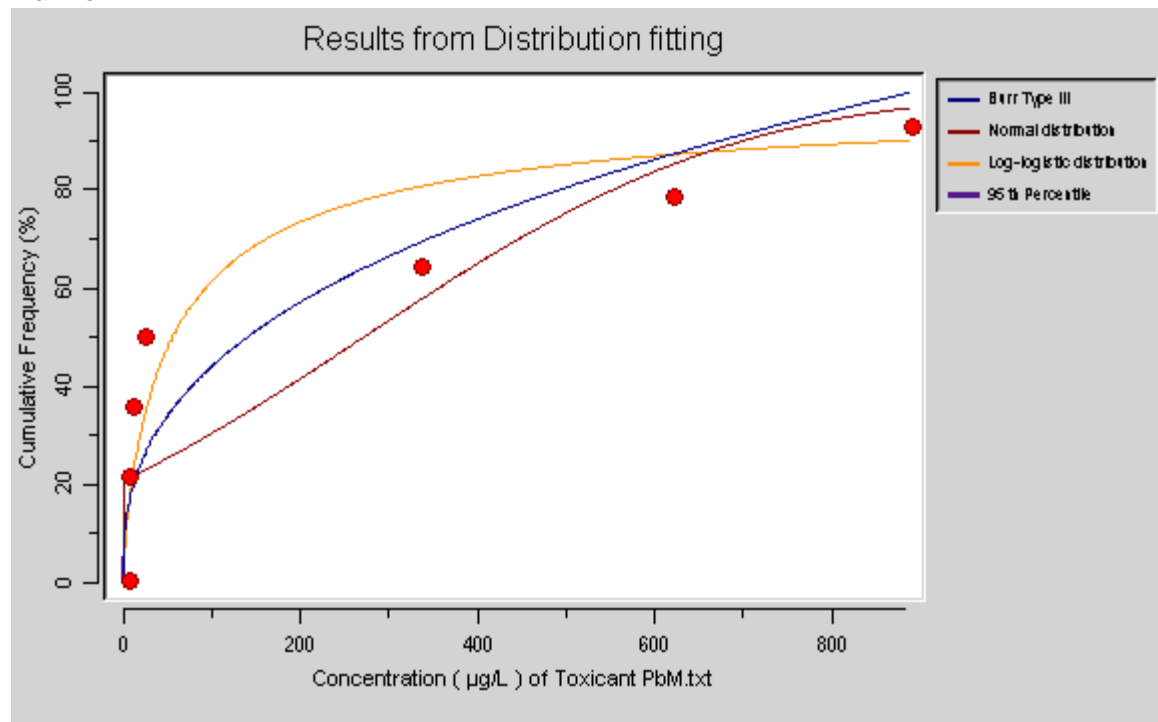
Lead

Freshwater



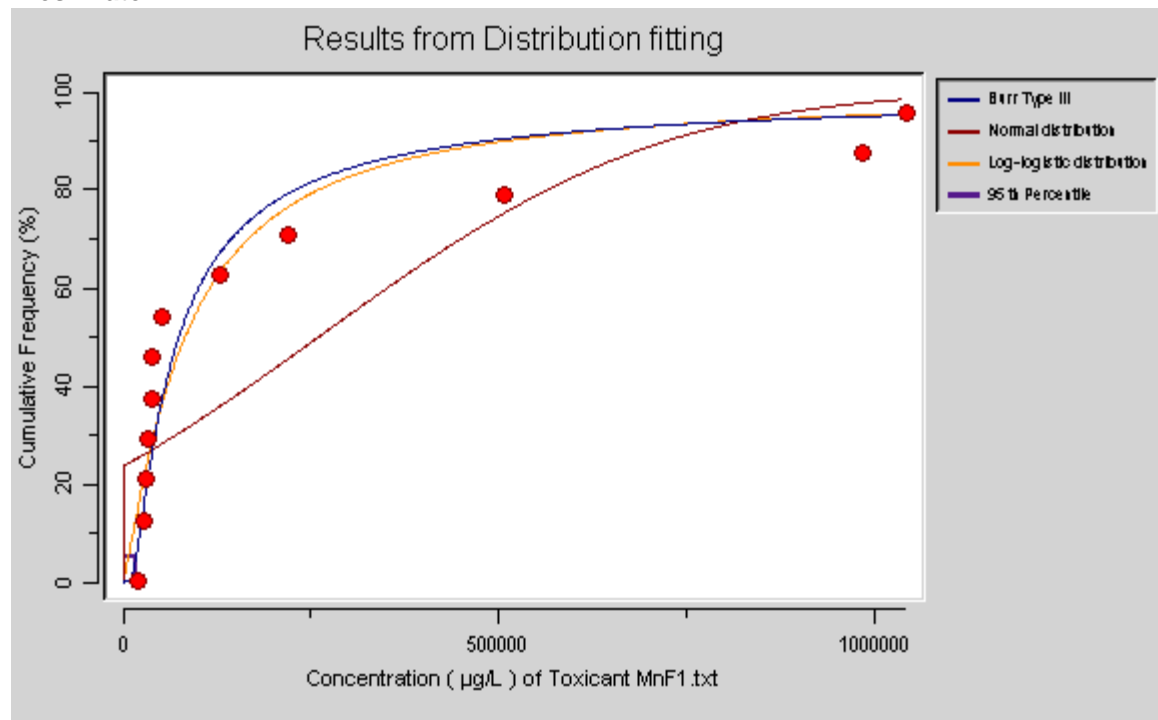
Lead

Marine



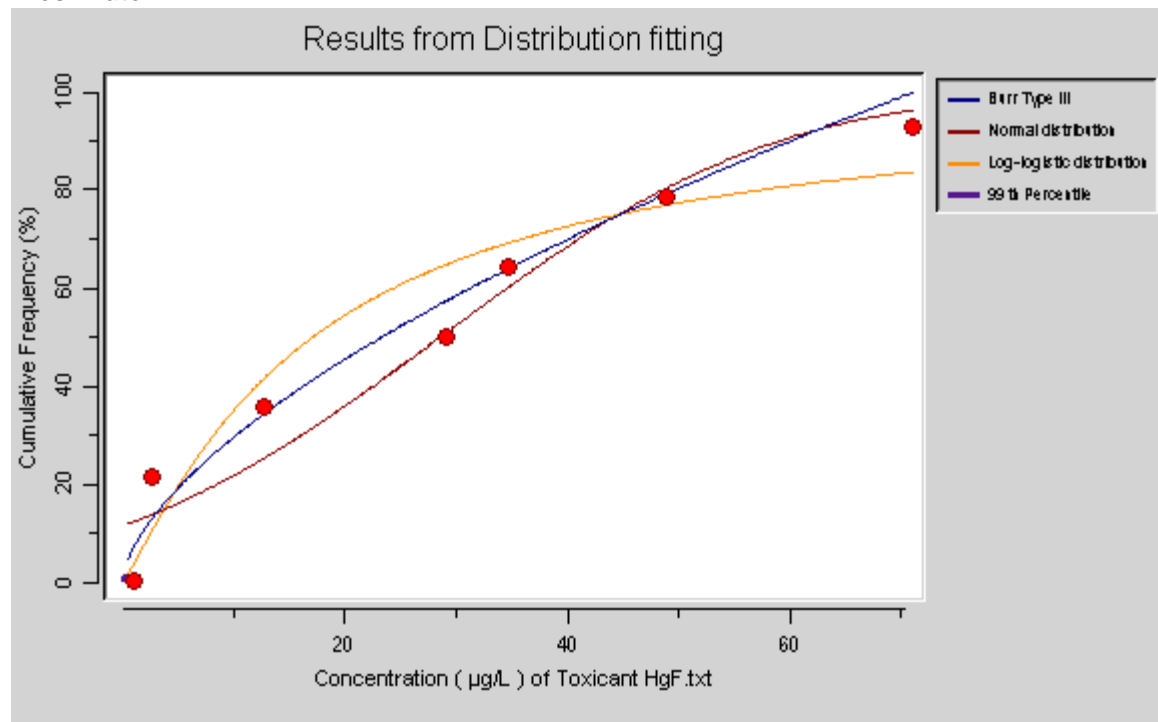
Manganese

Freshwater



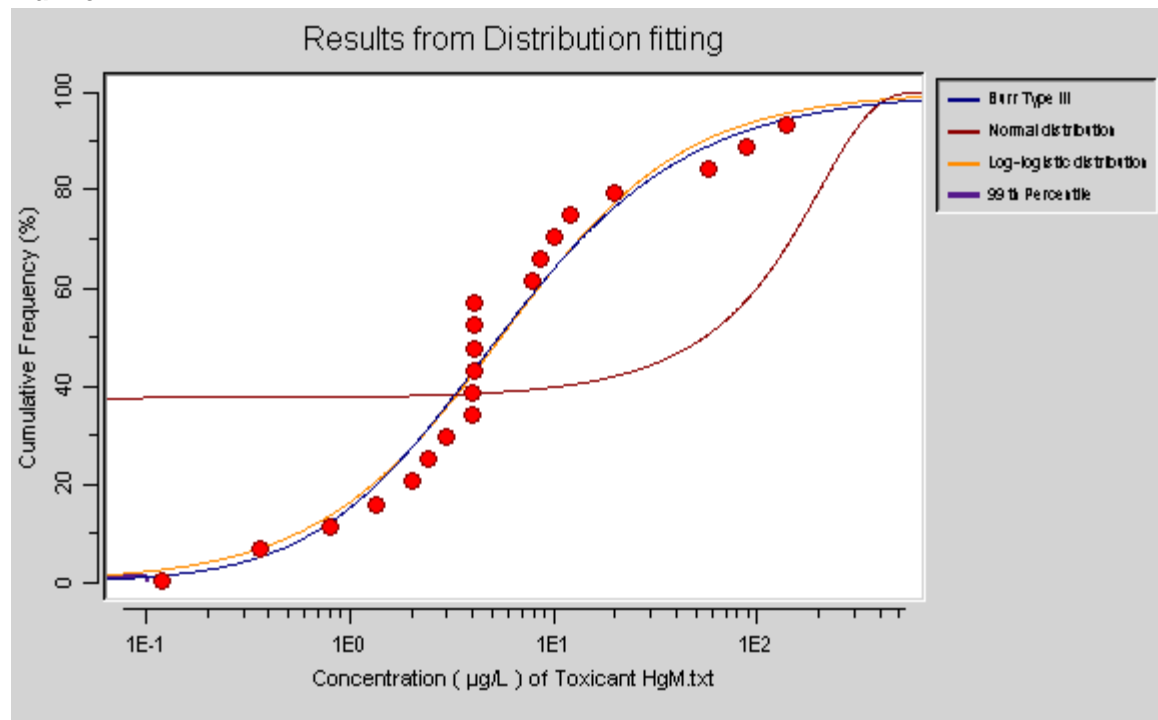
Mercury

Freshwater



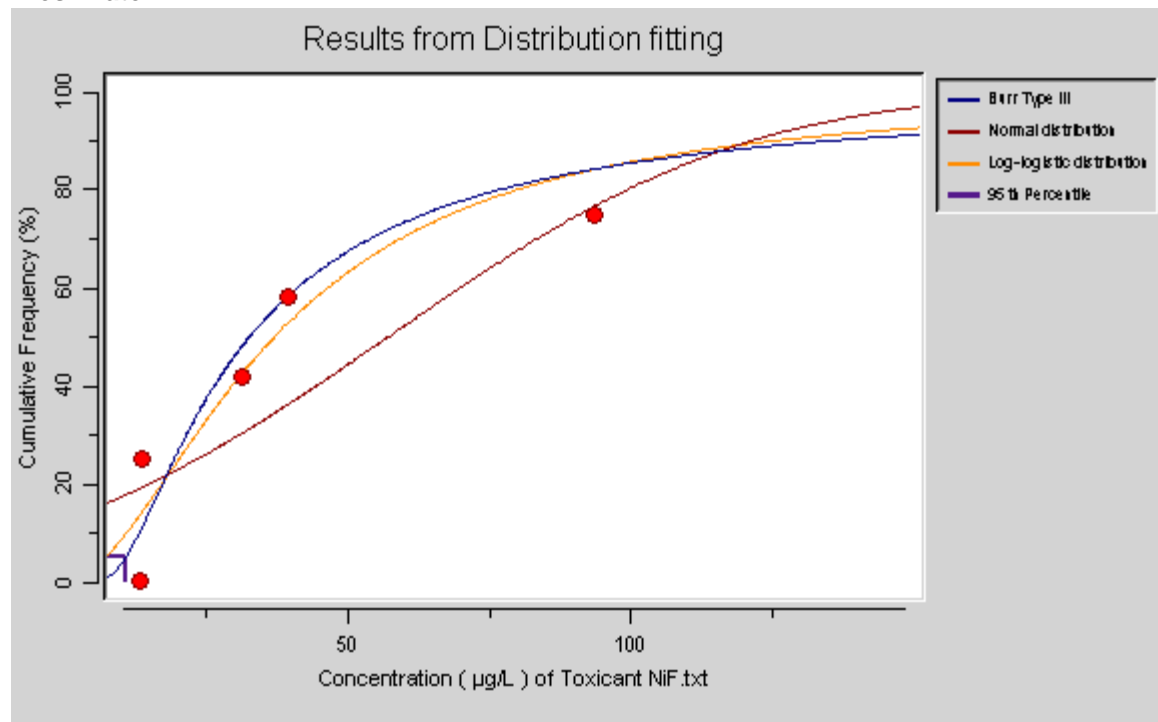
Mercury

Marine



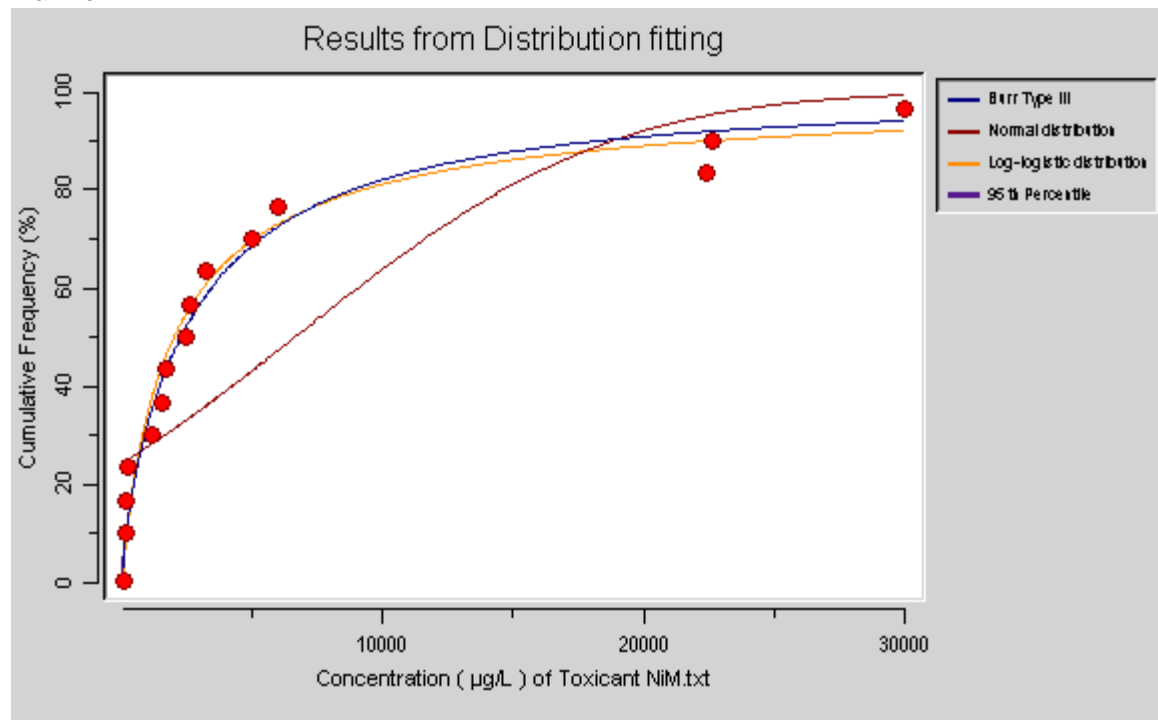
Nickel

Freshwater



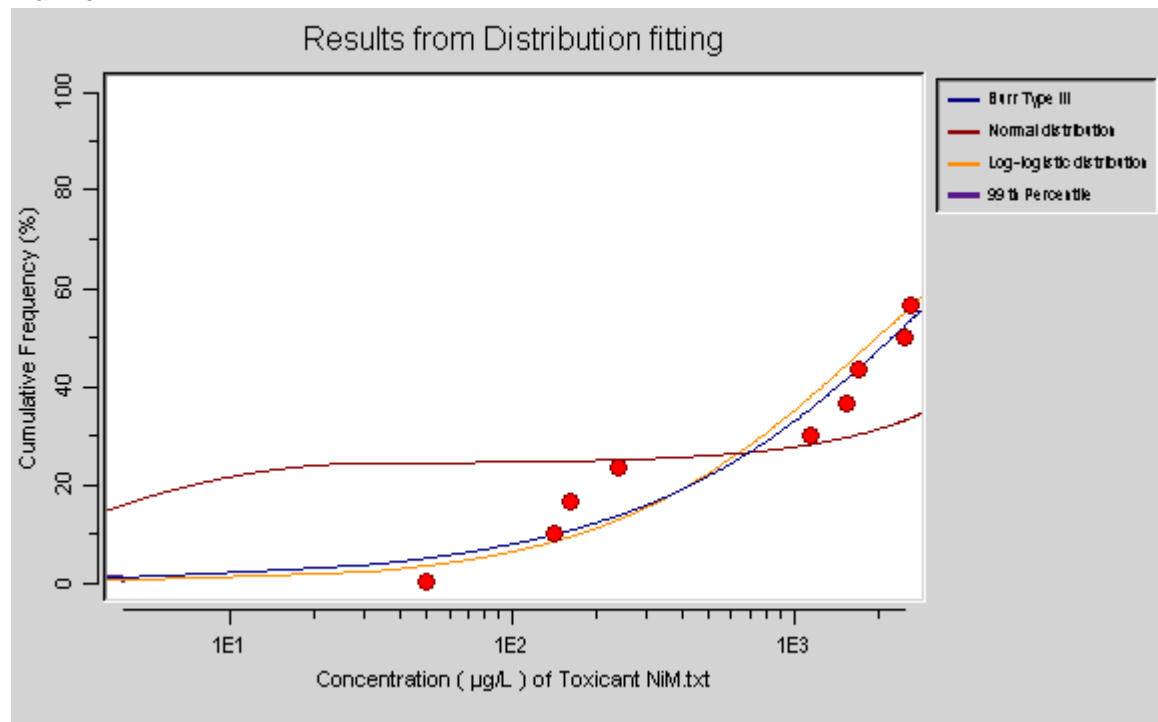
Nickel

Marine



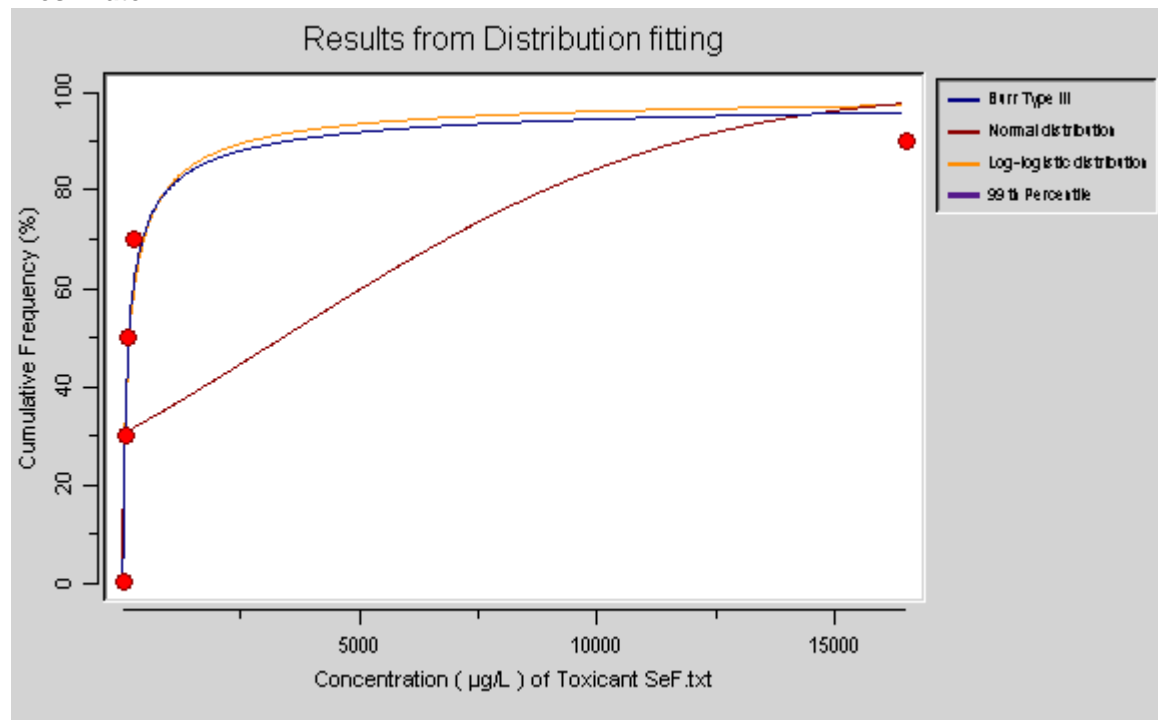
Nickel

Marine



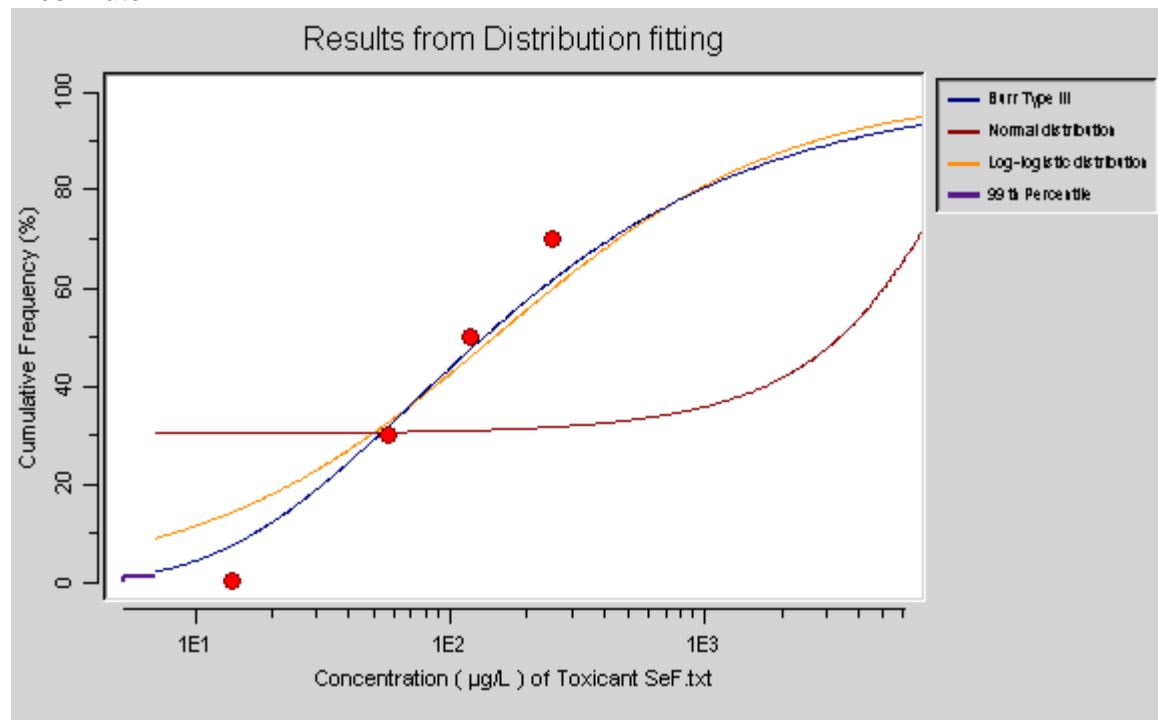
Total Selenium

Freshwater



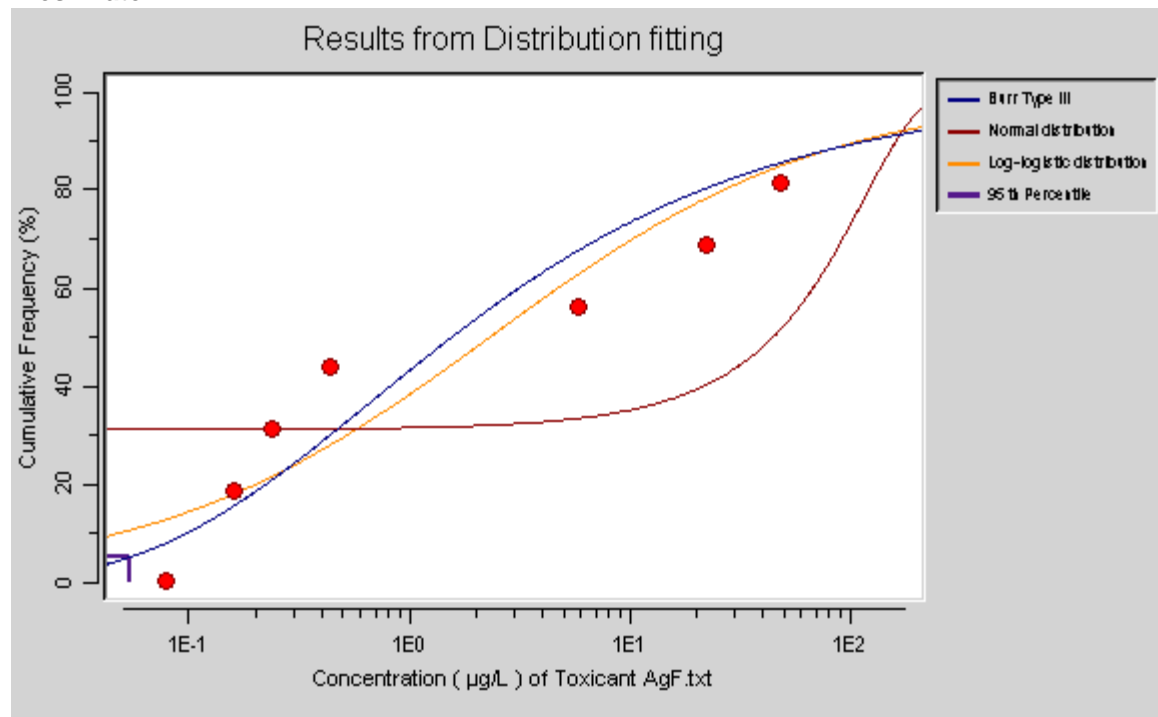
Total Selenium

Freshwater



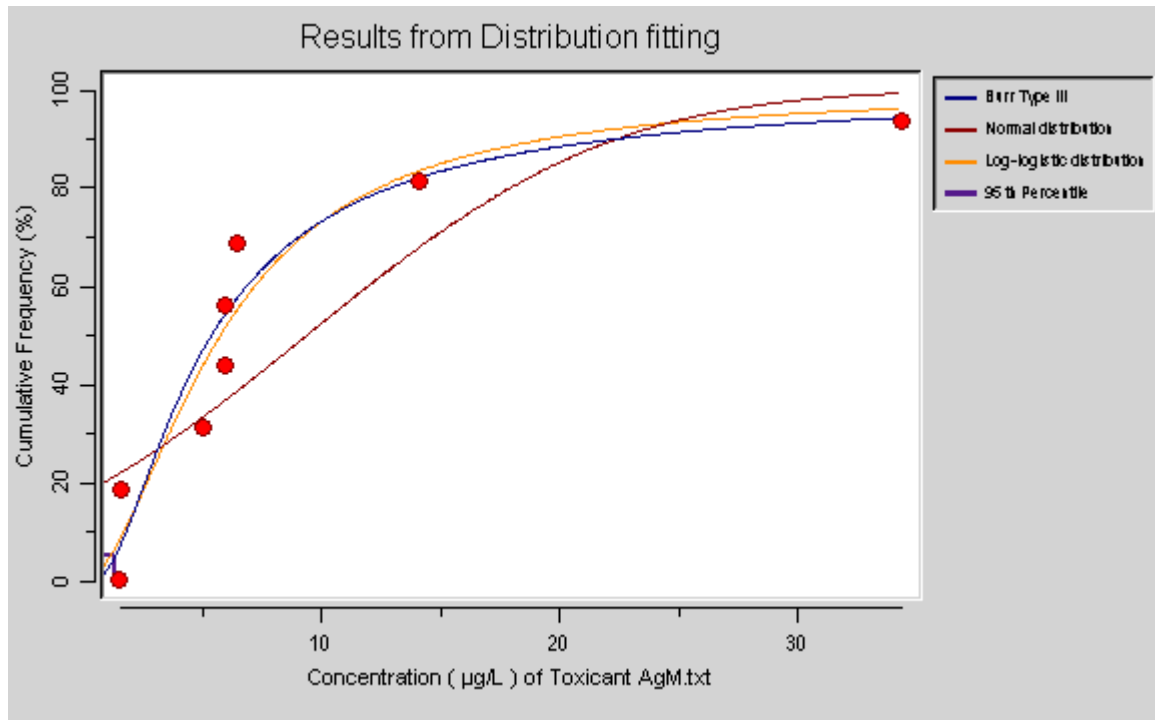
Silver

Freshwater



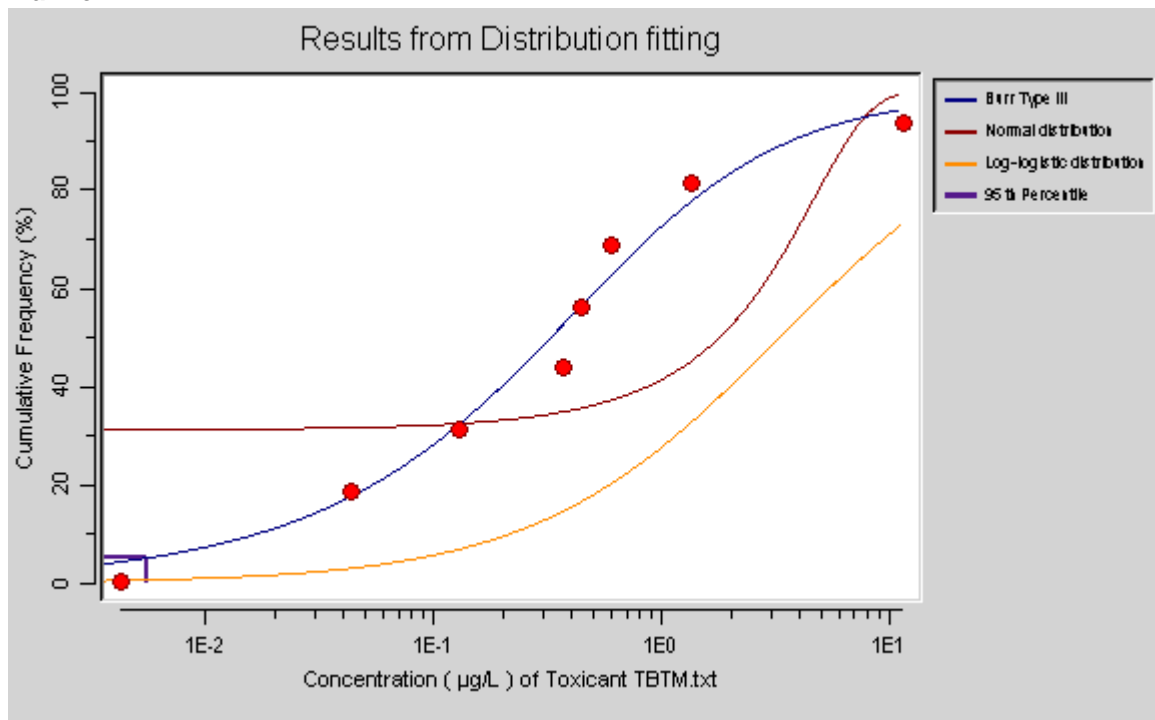
Silver

Marine



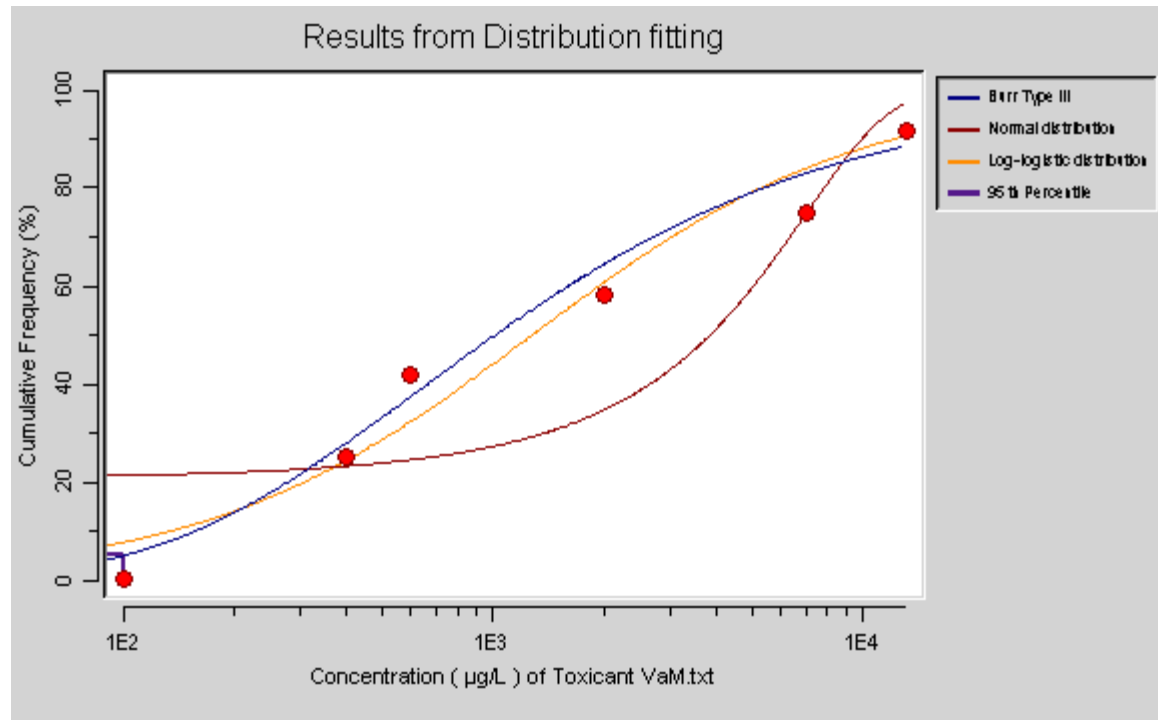
Tributyltin

Marine



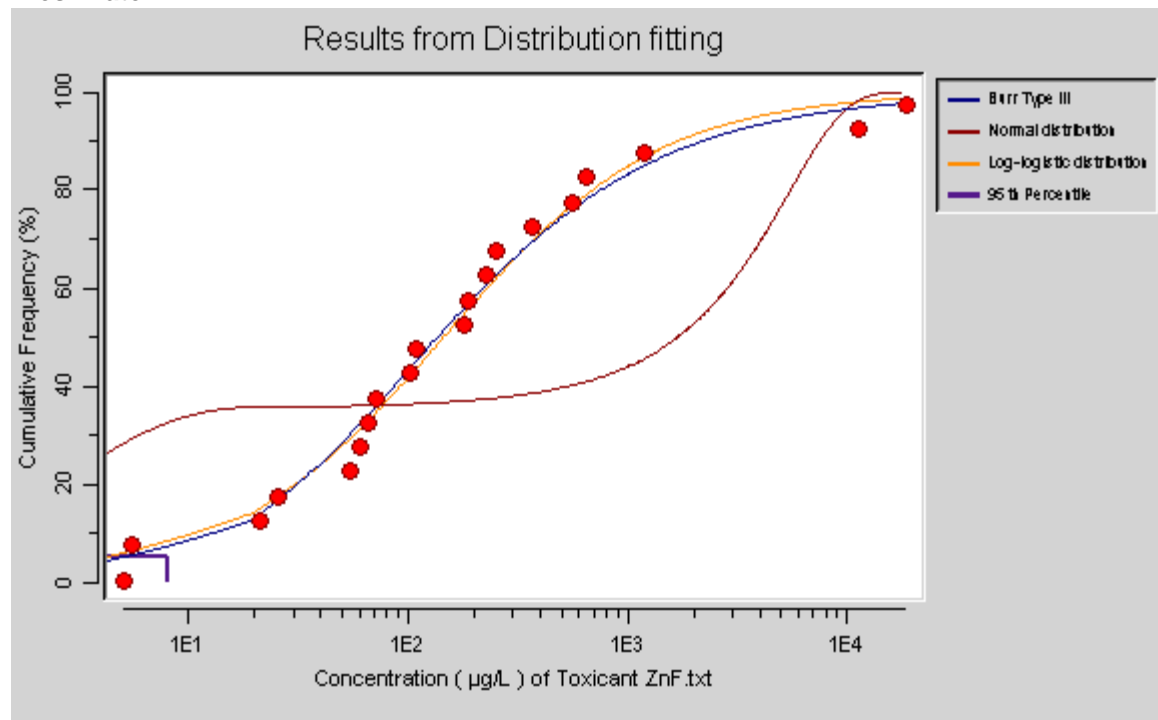
Vanadium

Marine



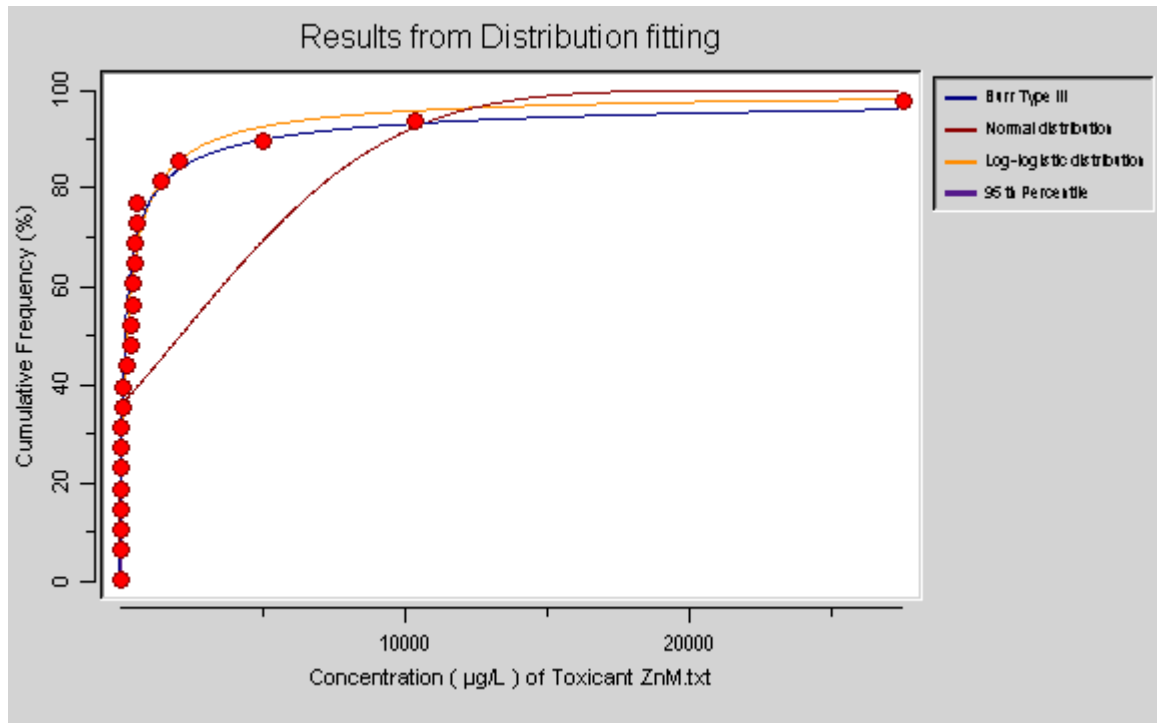
Zinc

Freshwater



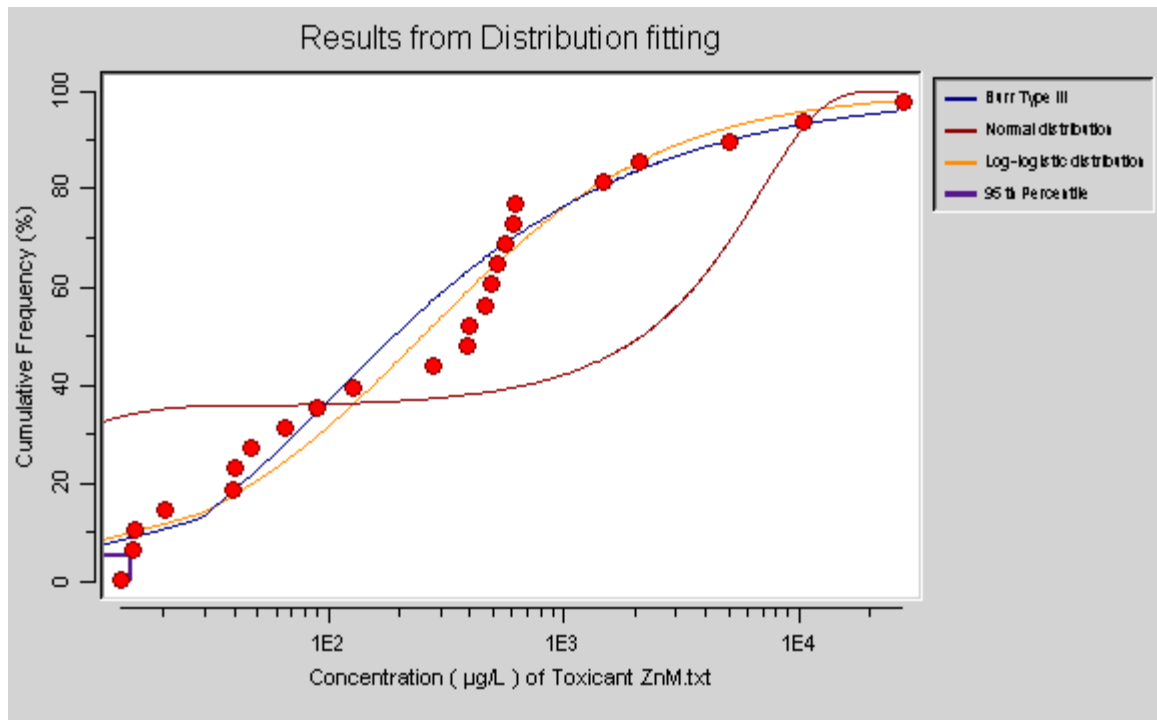
Zinc

Marine



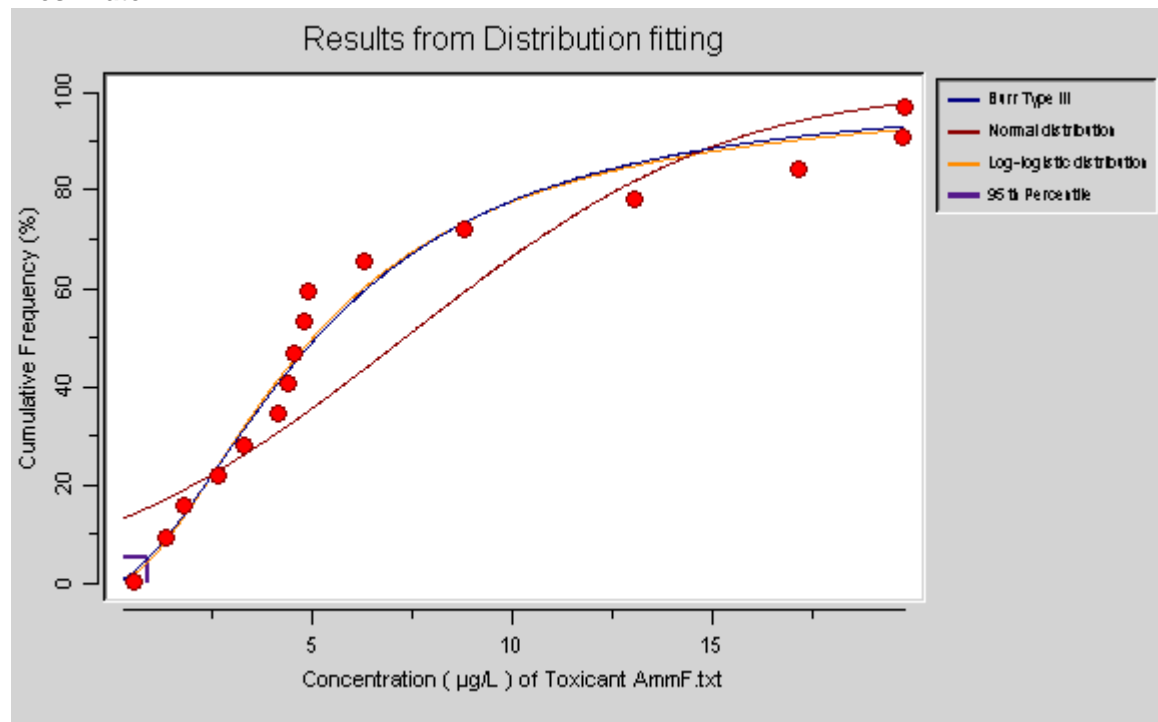
Zinc

Marine



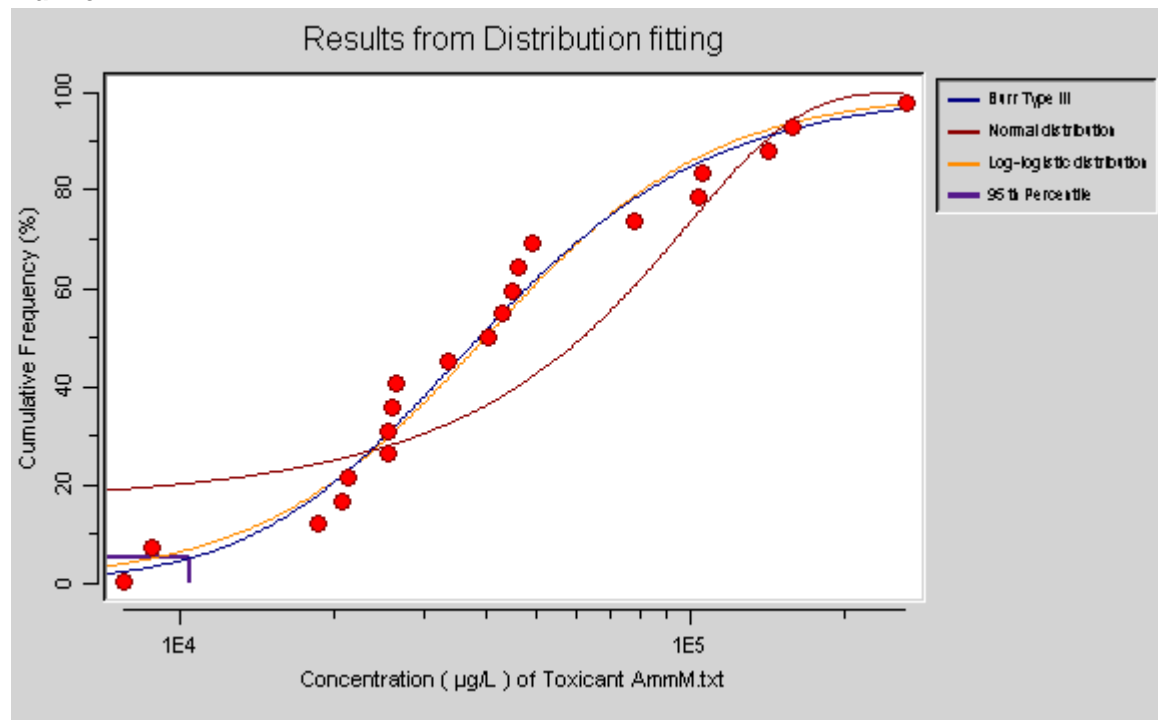
Ammonia

Freshwater



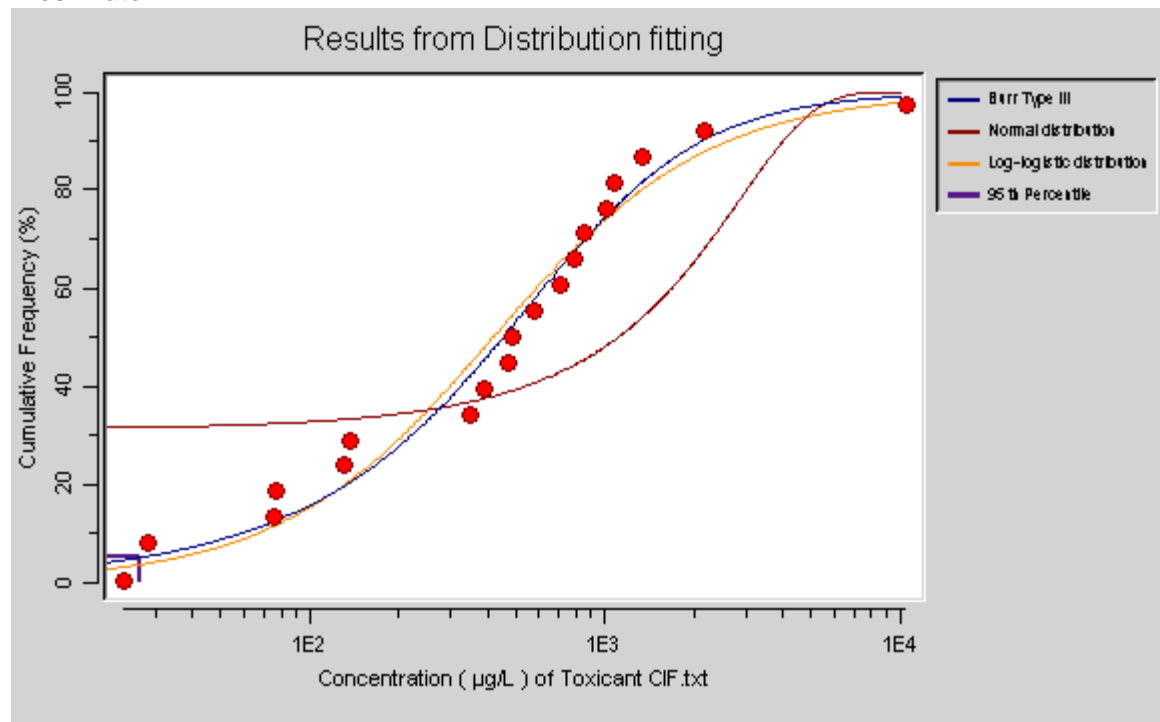
Ammonia

Marine



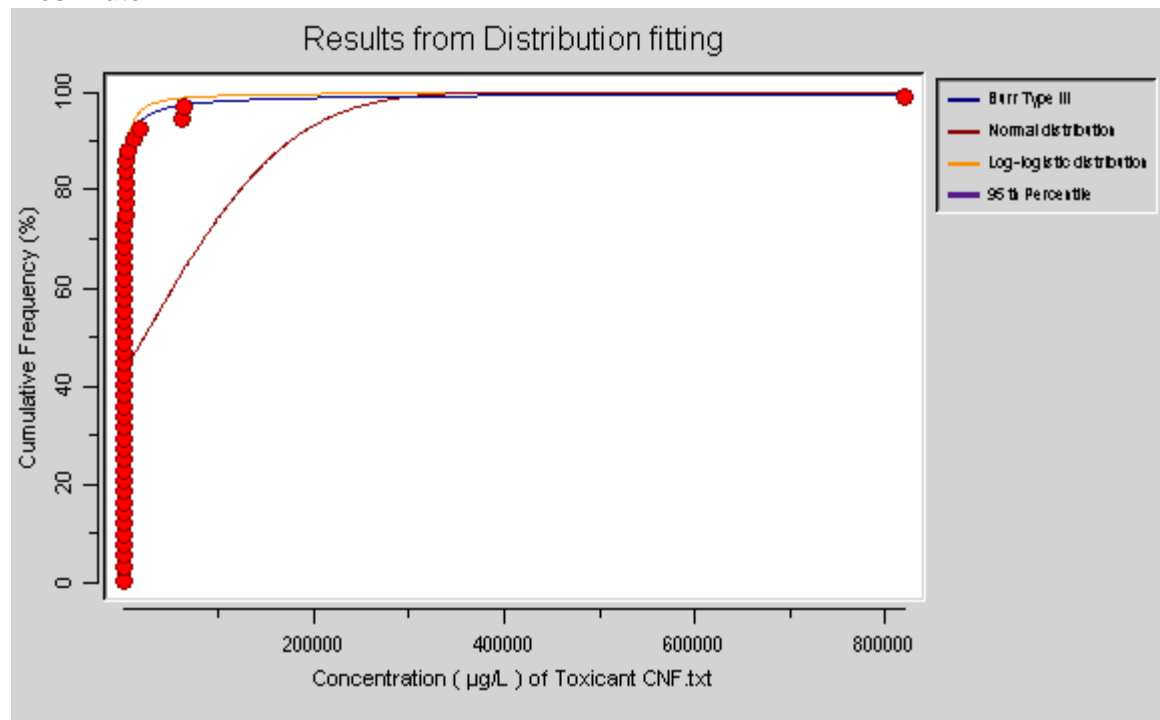
Chlorine

Freshwater



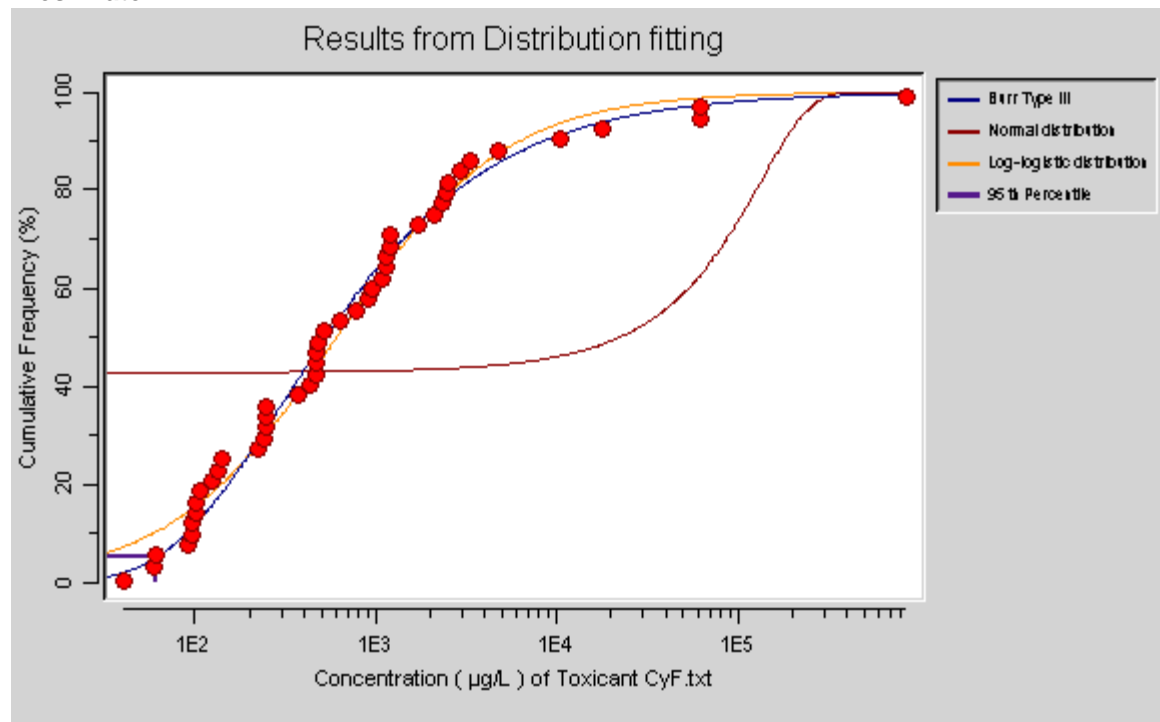
Cyanide

Freshwater



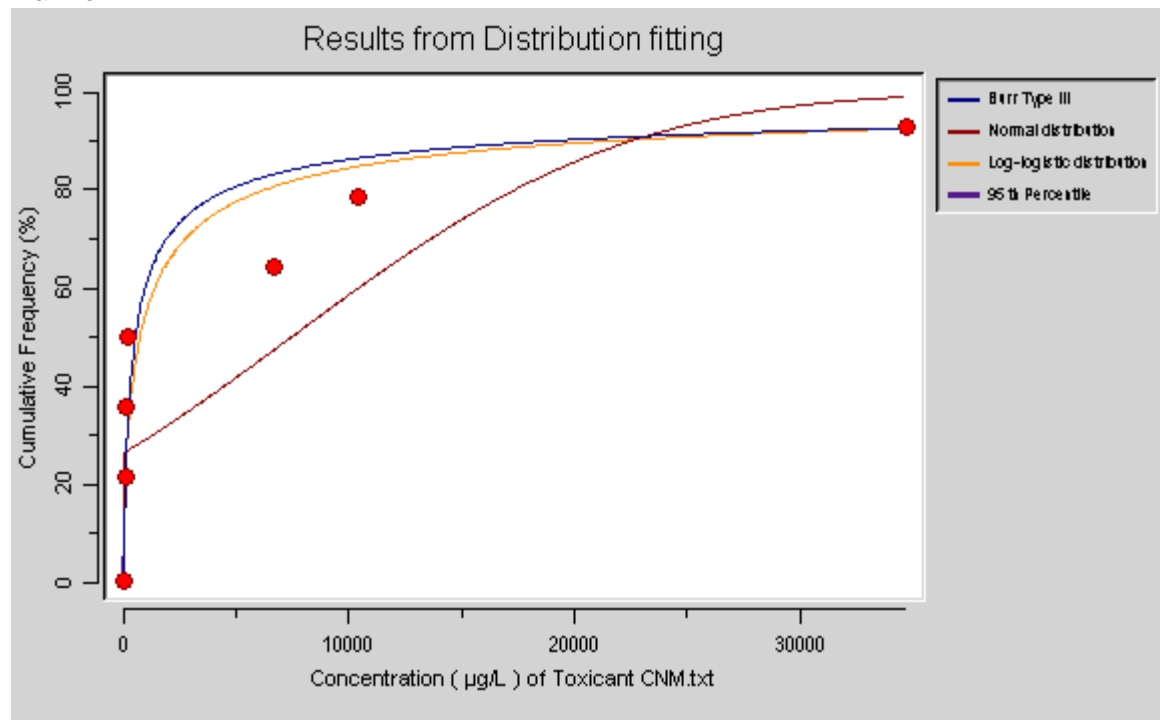
Cyanide

Freshwater



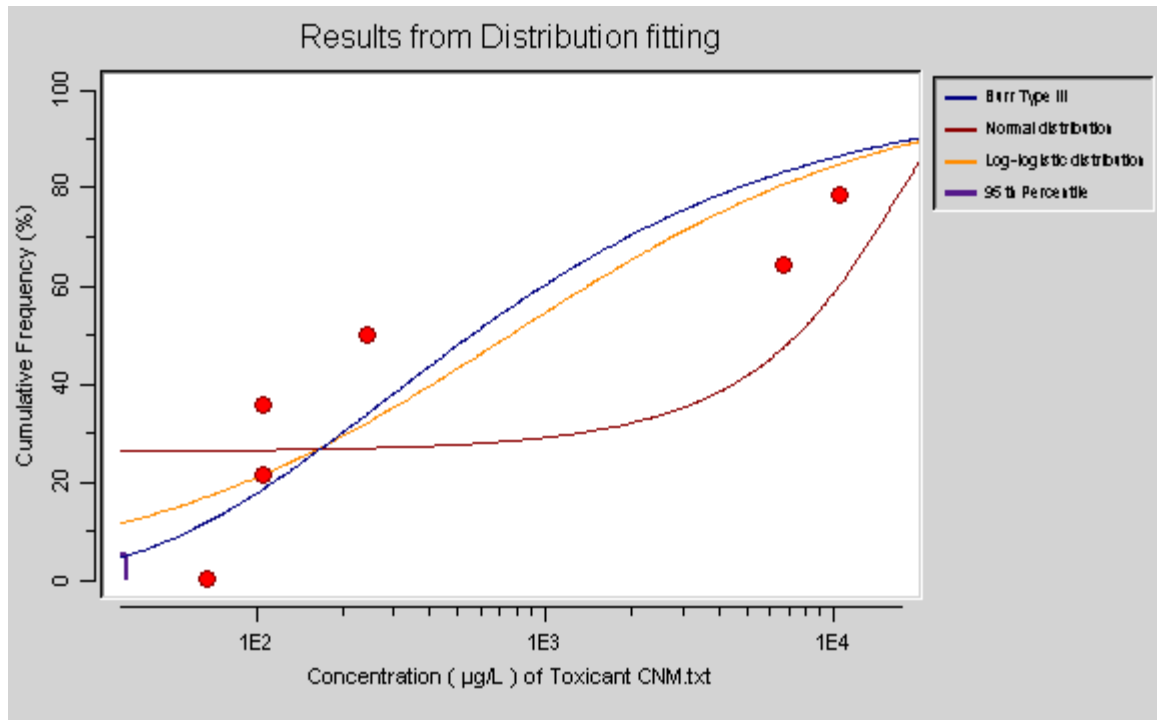
Cyanide

Marine



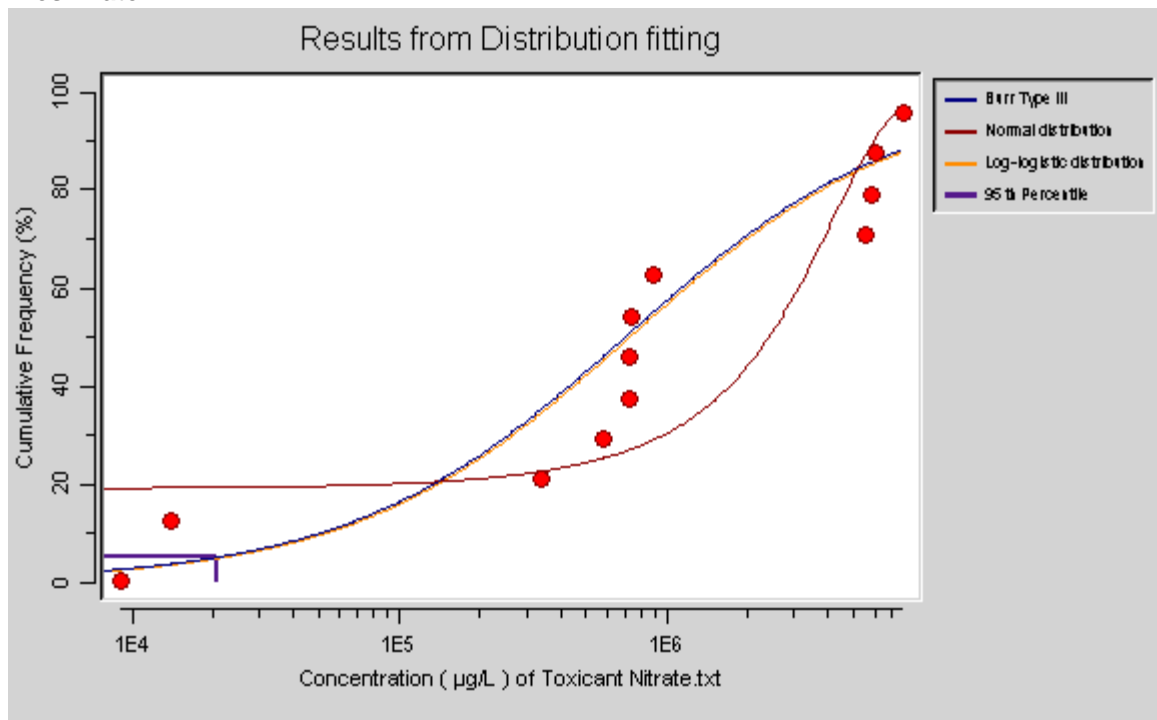
Cyanide

Marine



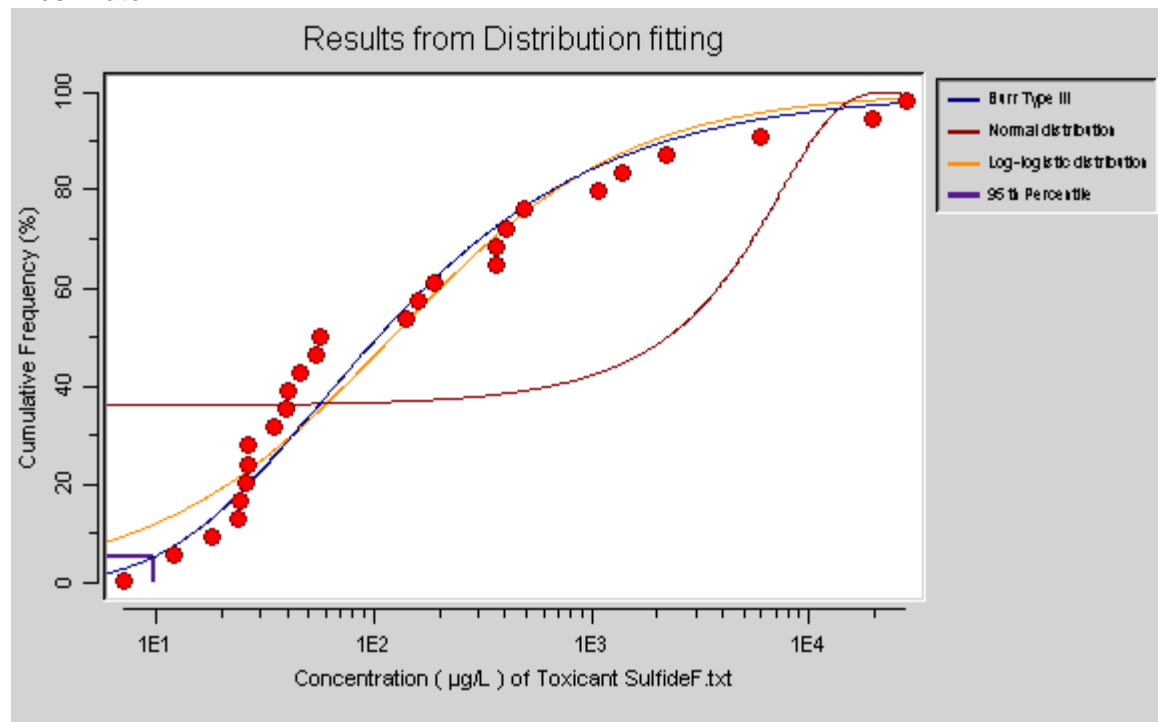
Nitrate

Freshwater



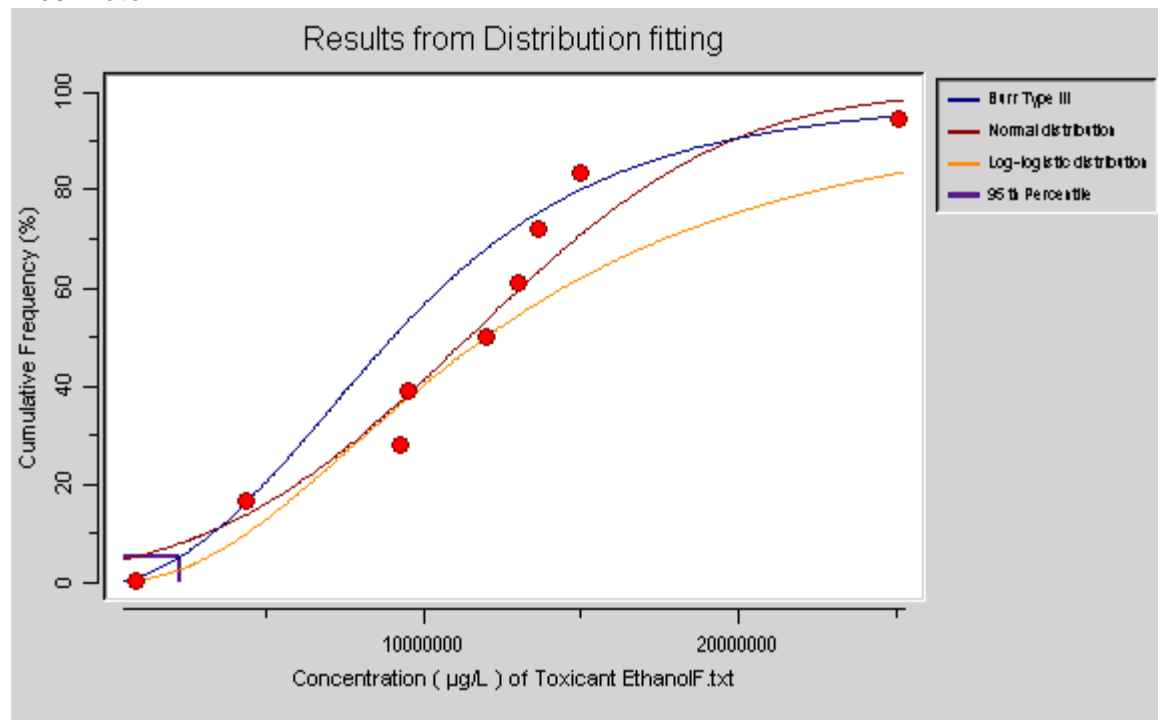
Sulfide

Freshwater



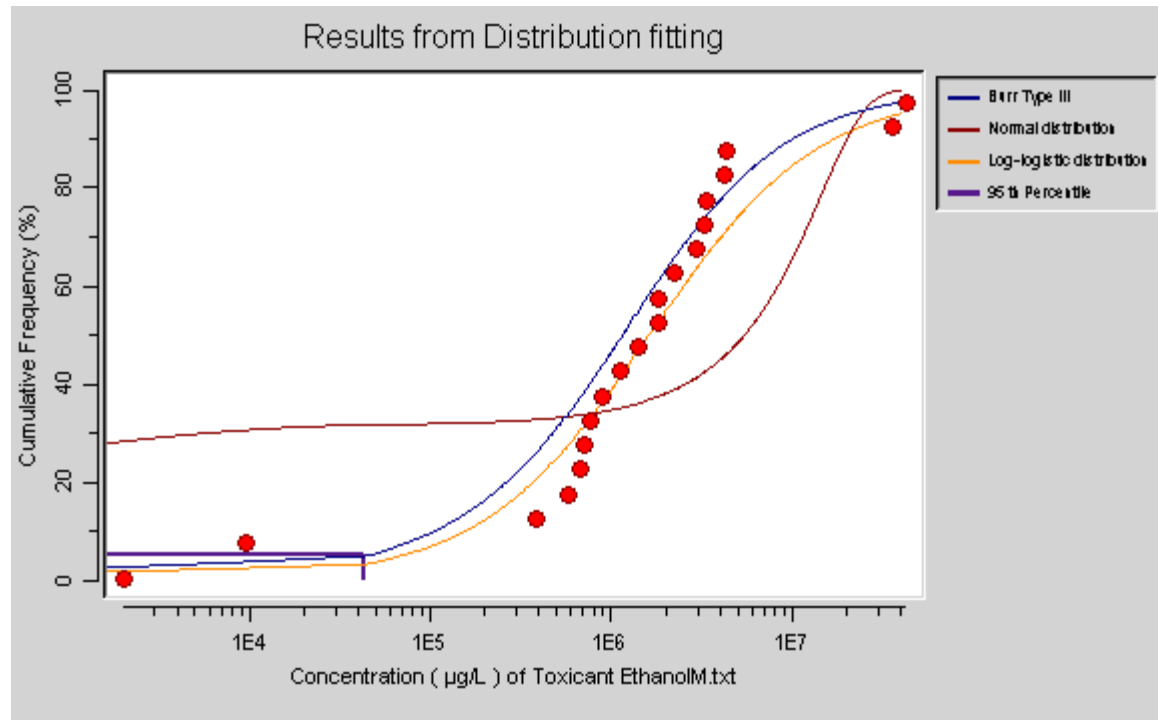
Ethanol

Freshwater



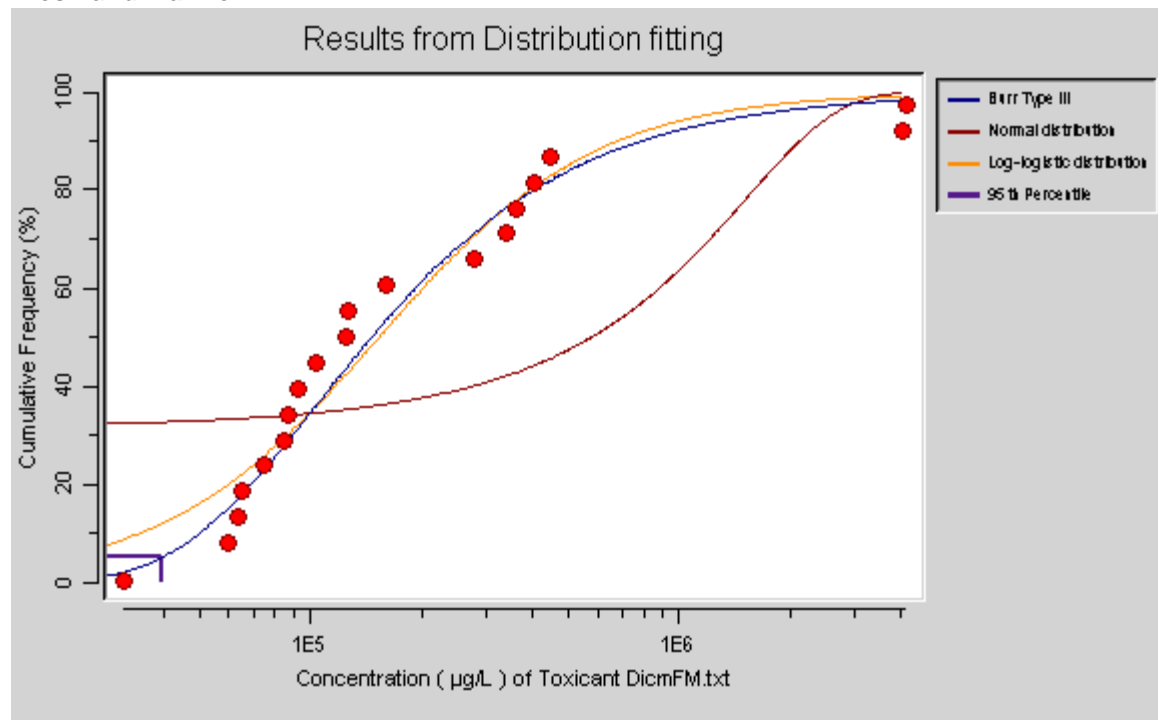
Ethanol

Marine



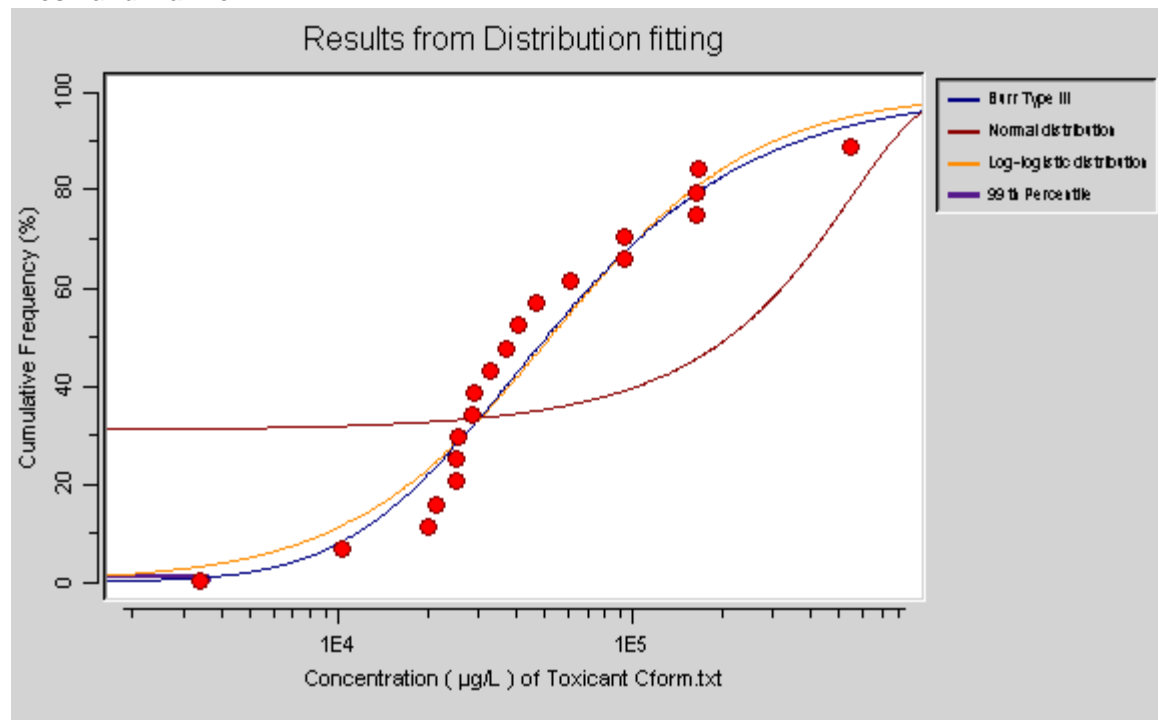
Dichloromethane

Fresh and Marine



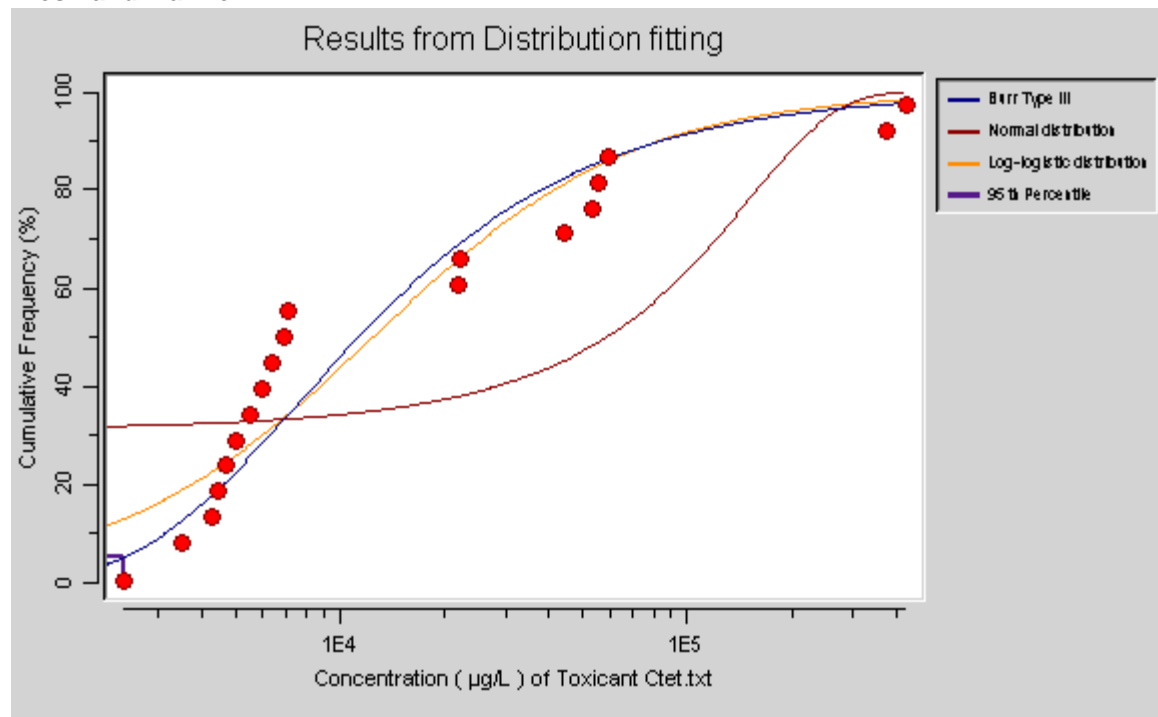
Chloroform

Fresh and Marine



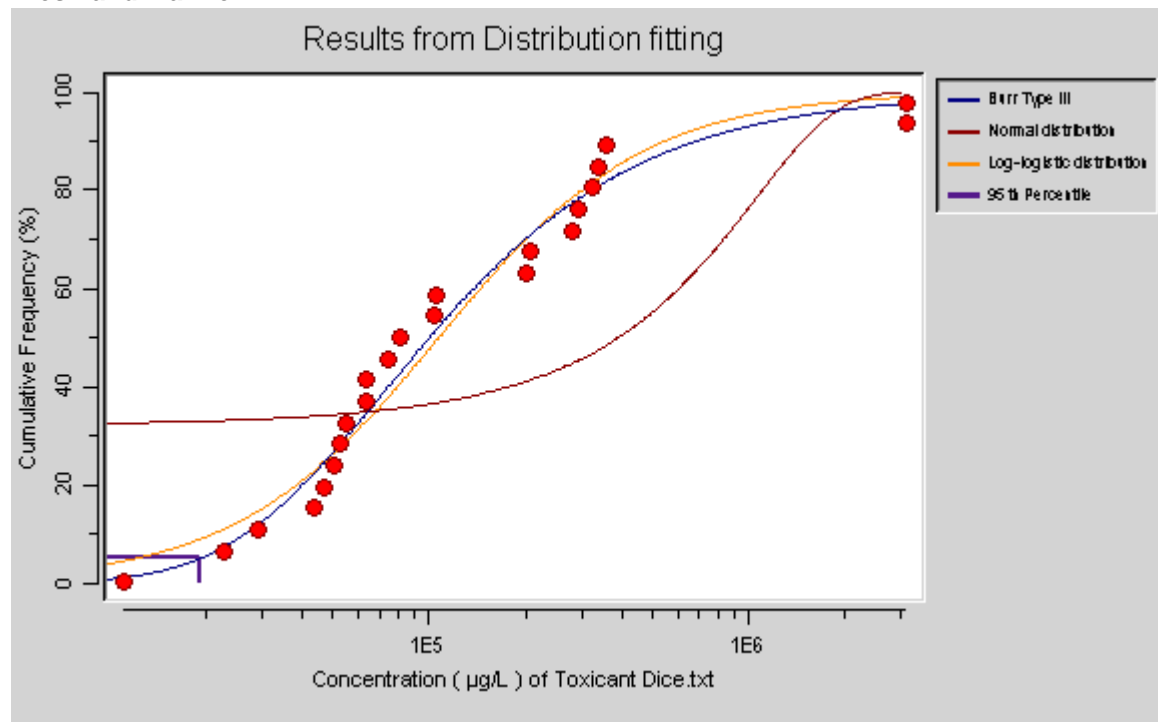
Carbon Tetrachloride

Fresh and Marine



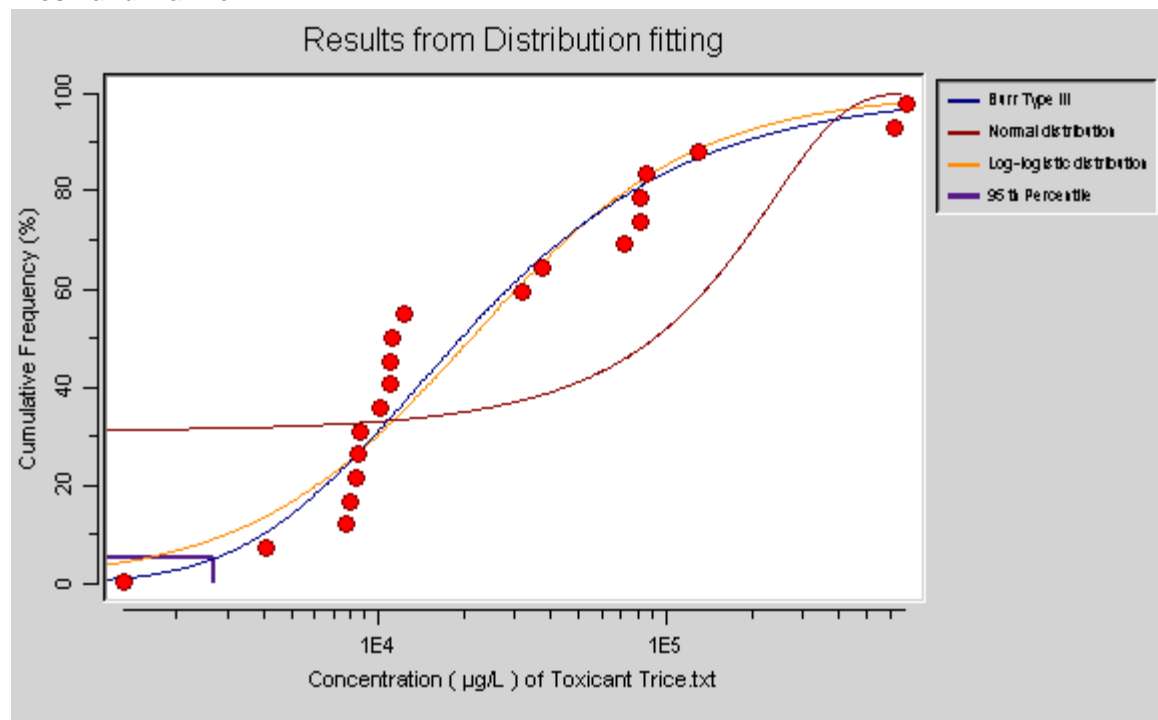
1,2-dichloroethane

Fresh and Marine



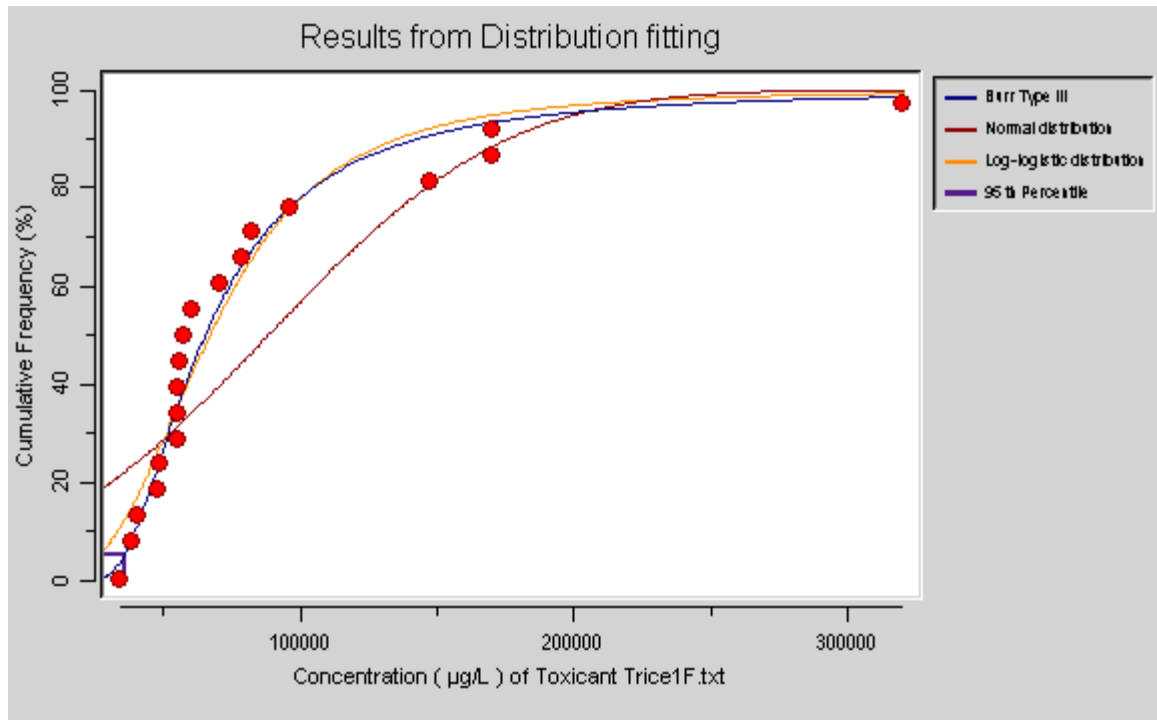
1,1,1-trichloroethane

Fresh and Marine



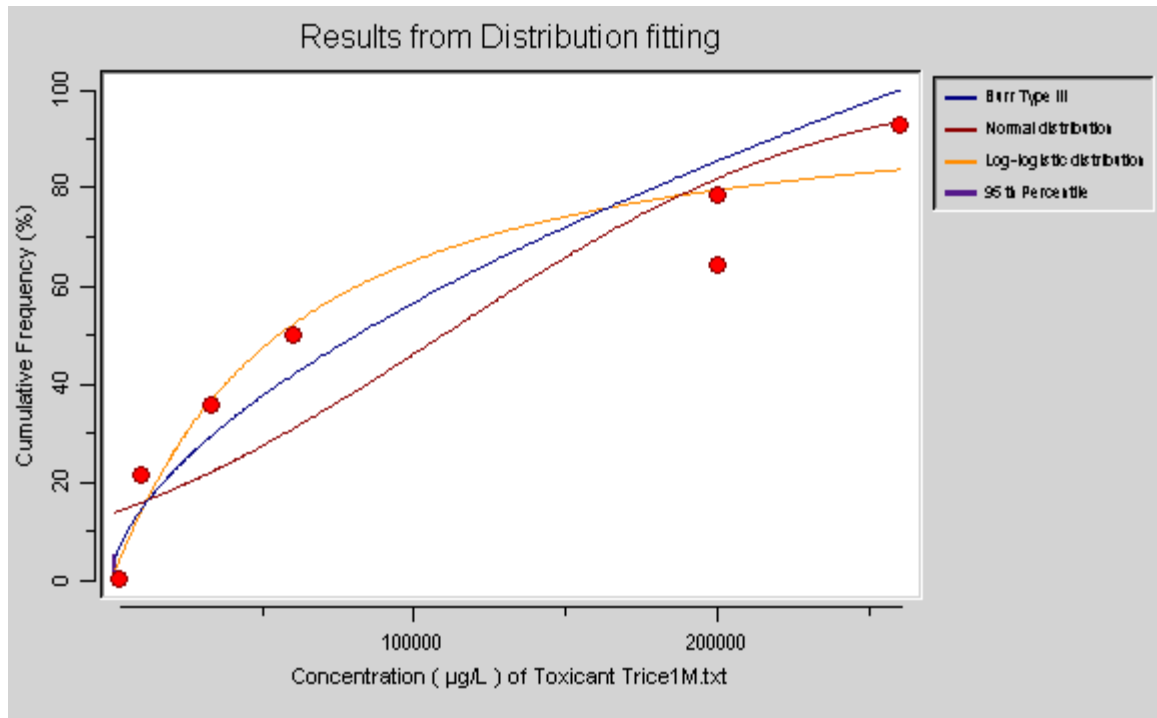
1,1,2-trichloroethane

Freshwater



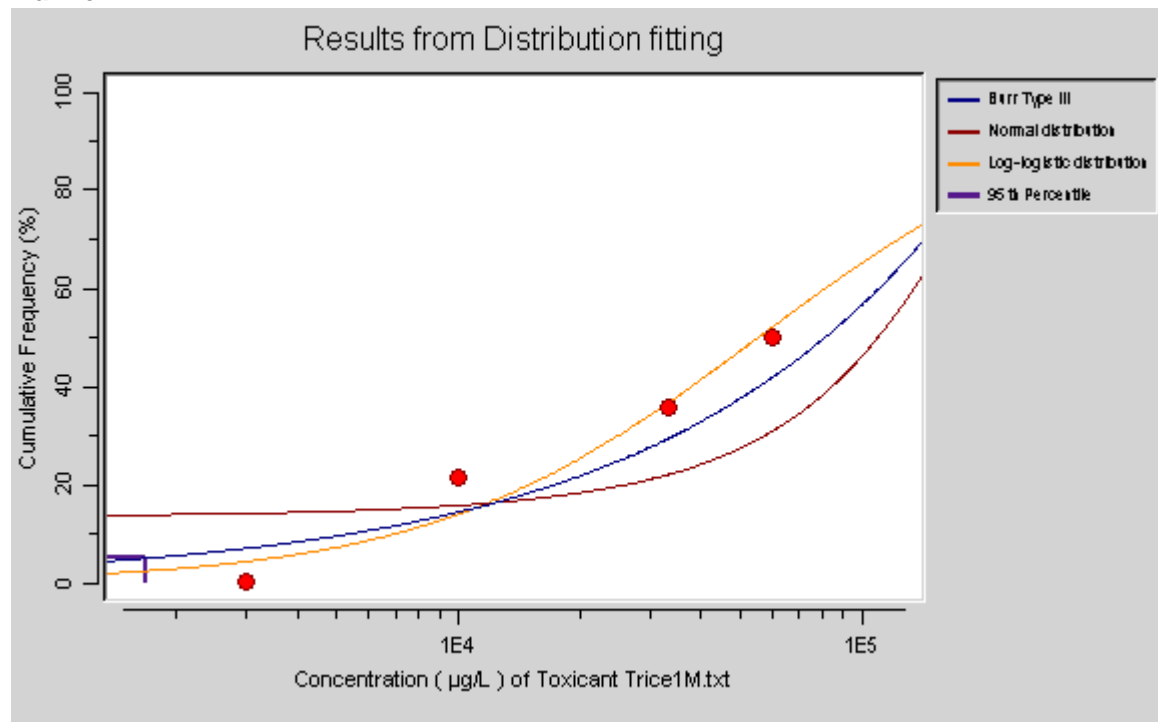
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Marine



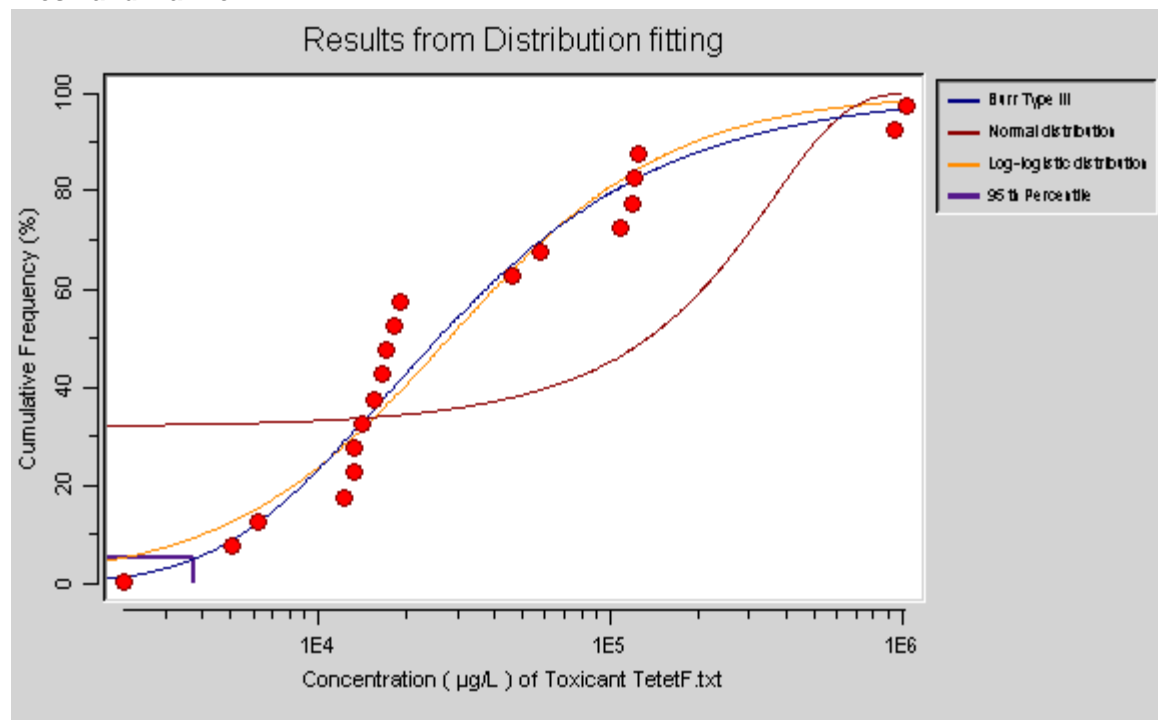
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Marine



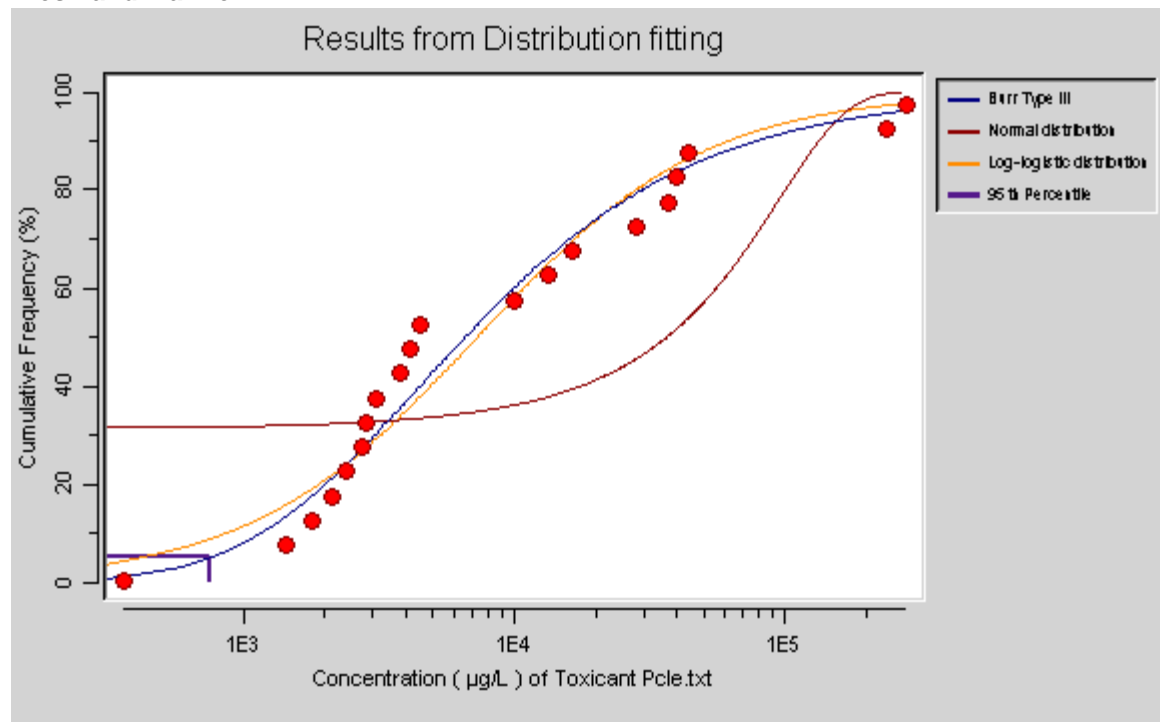
1,1,2,2-tetrachloroethane

Fresh and Marine



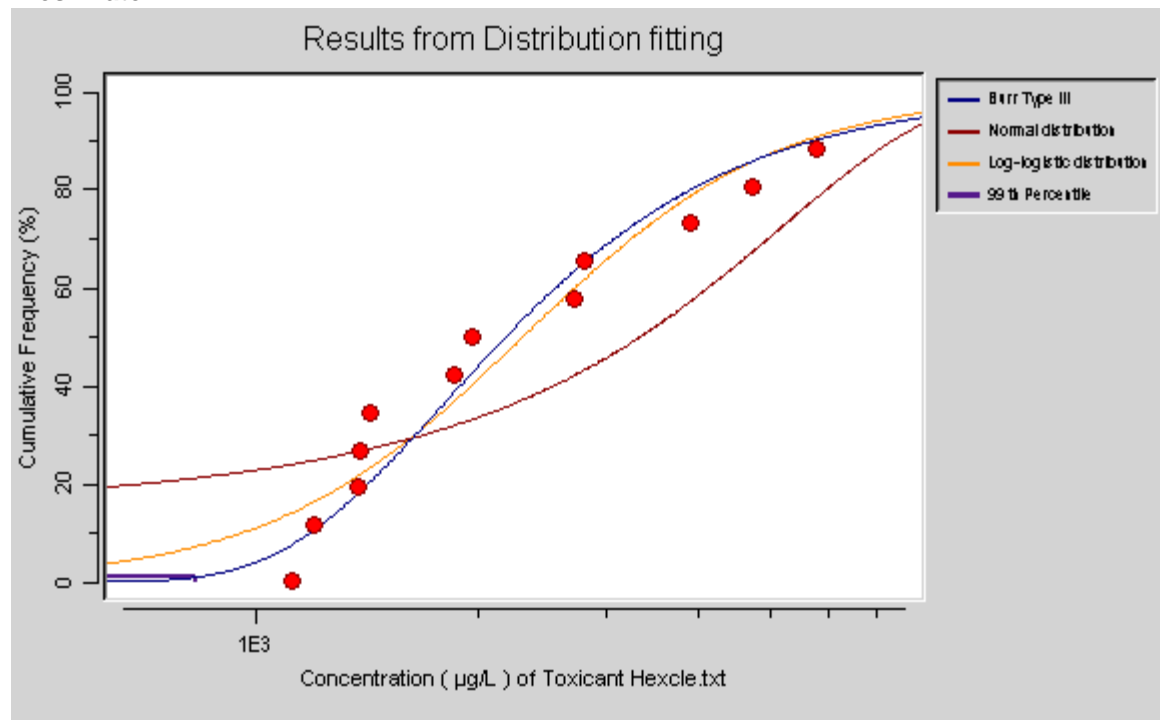
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Fresh and Marine



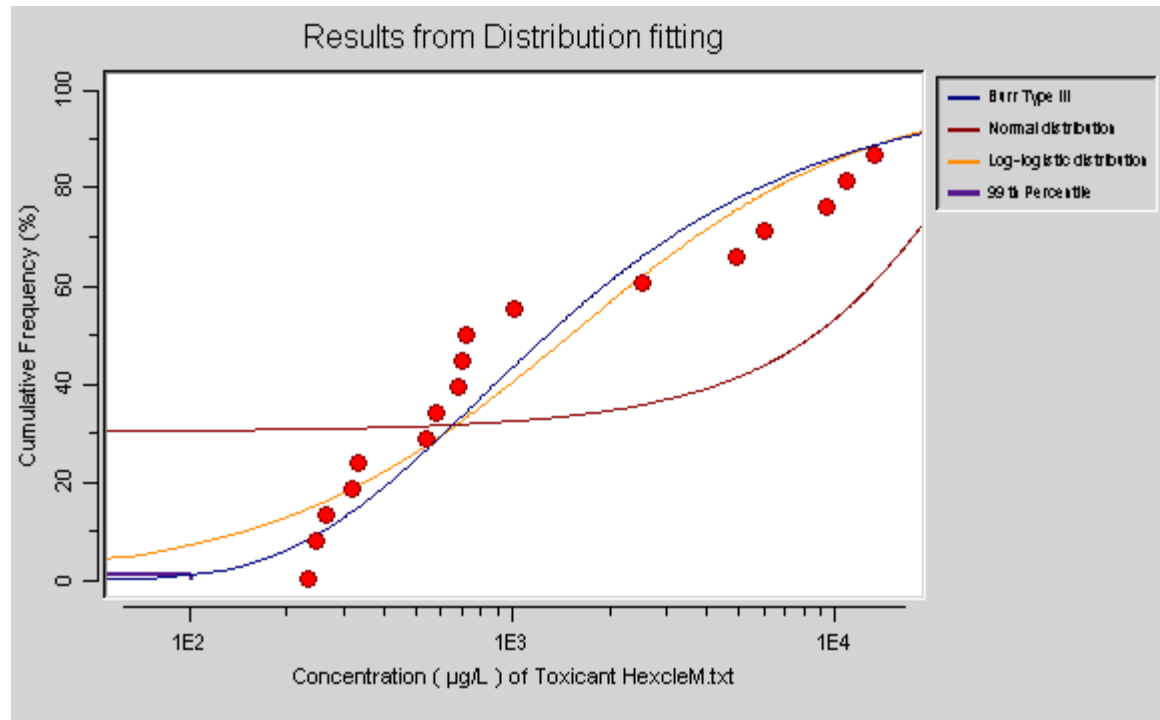
Hexachloroethane

Freshwater



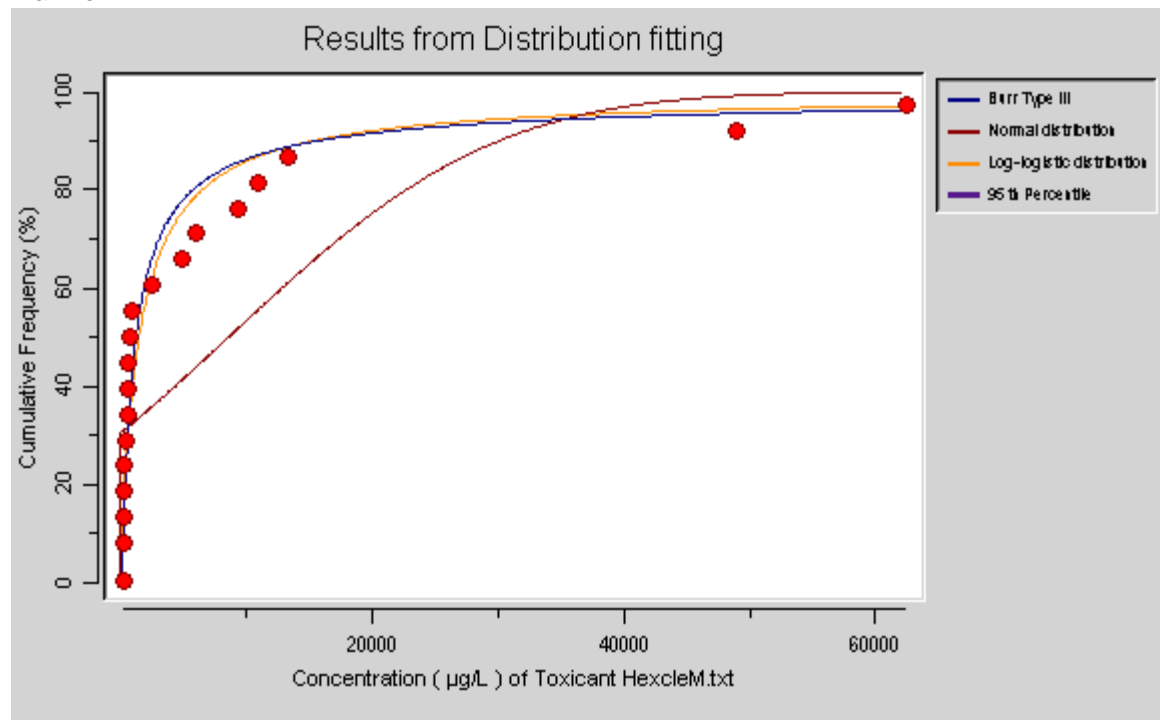
Hexachloroethane

Marine



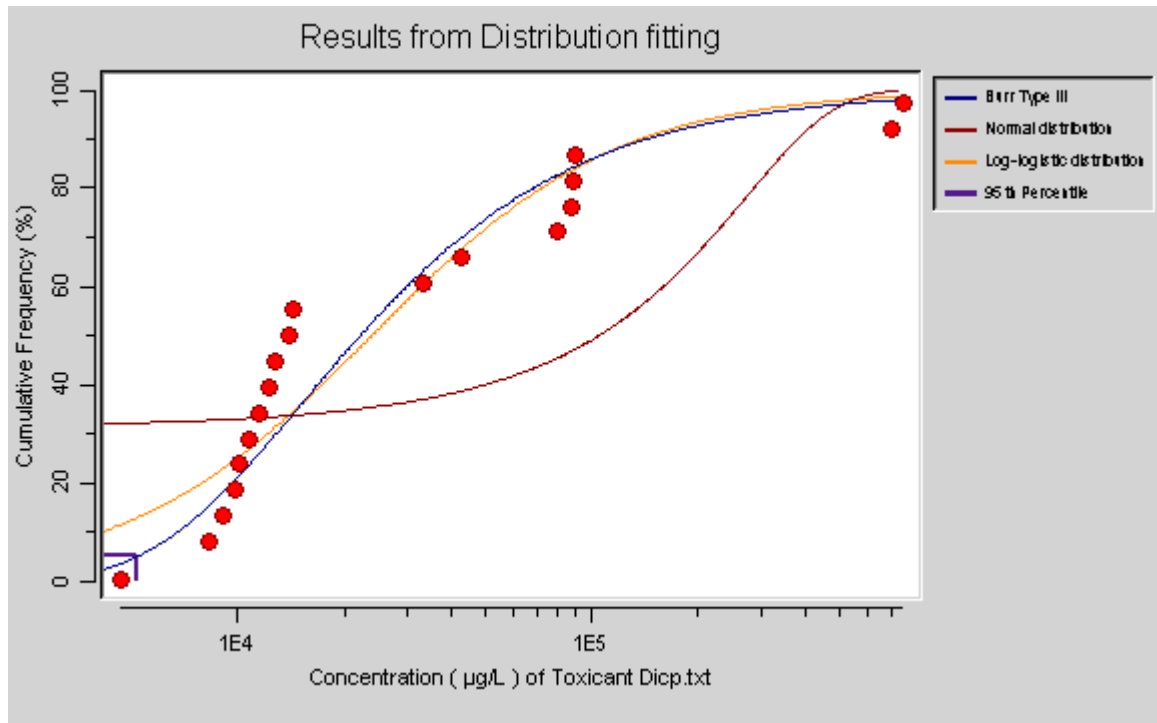
Hexachloroethane

Marine



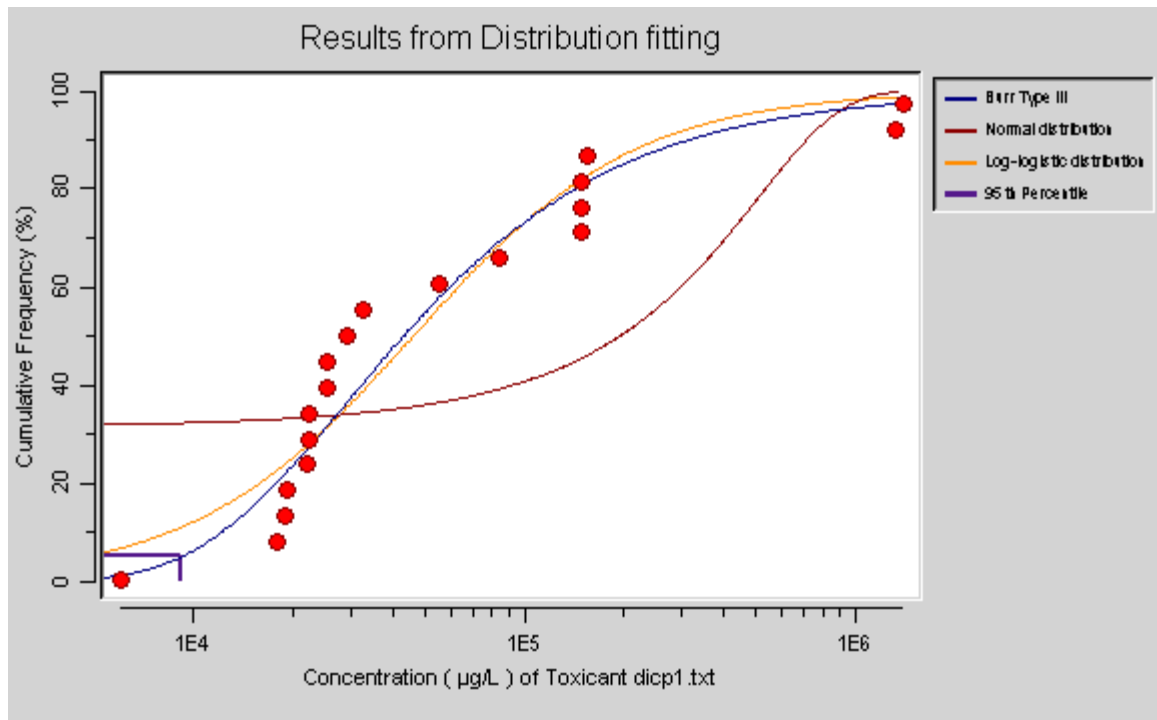
1,1-dichloropropane

Fresh and Marine



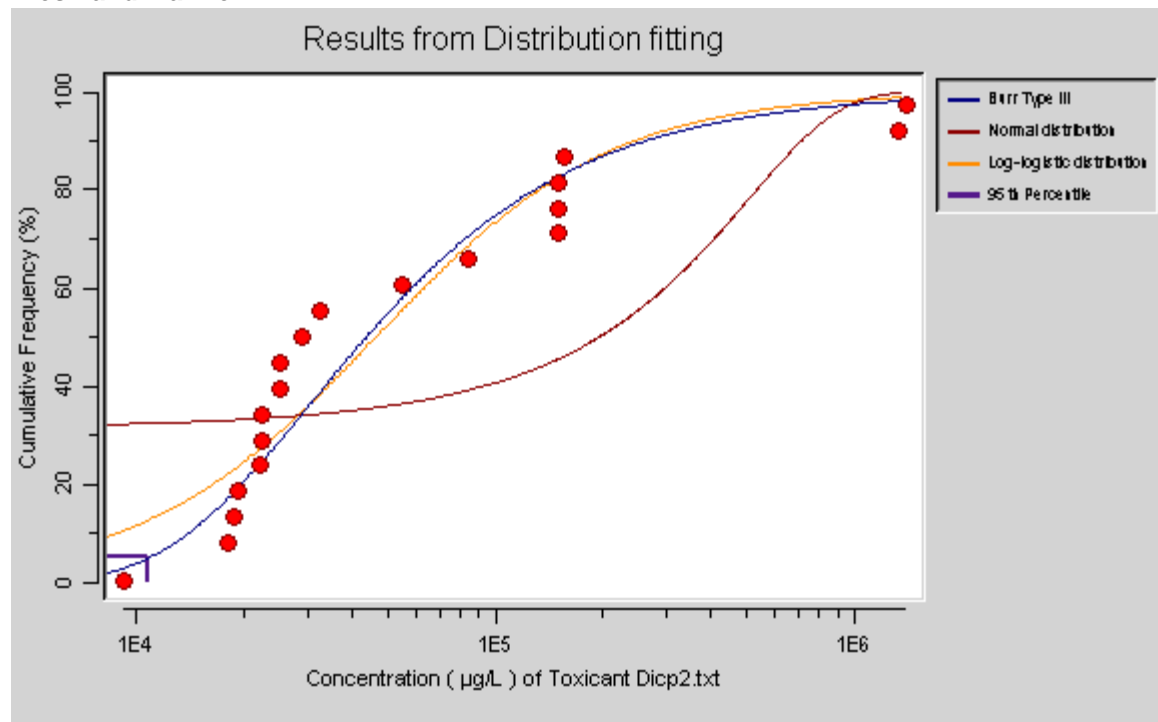
1,2-dichloropropane

Fresh and Marine



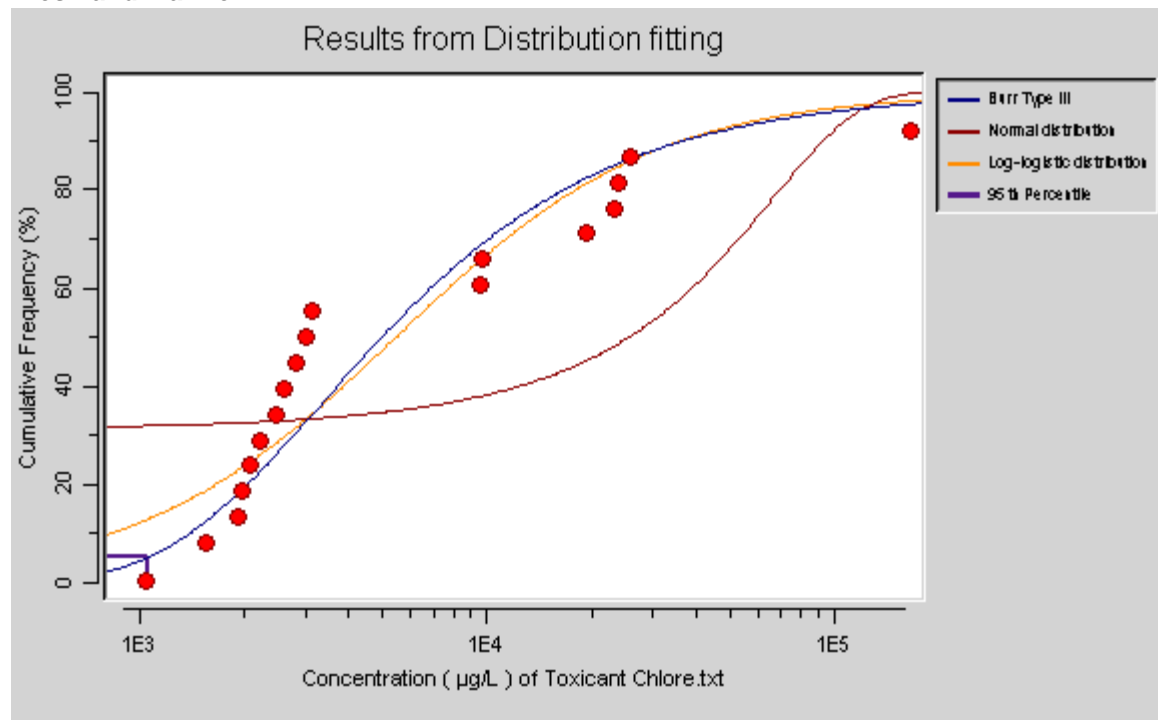
1,3-dichloropropane

Fresh and Marine



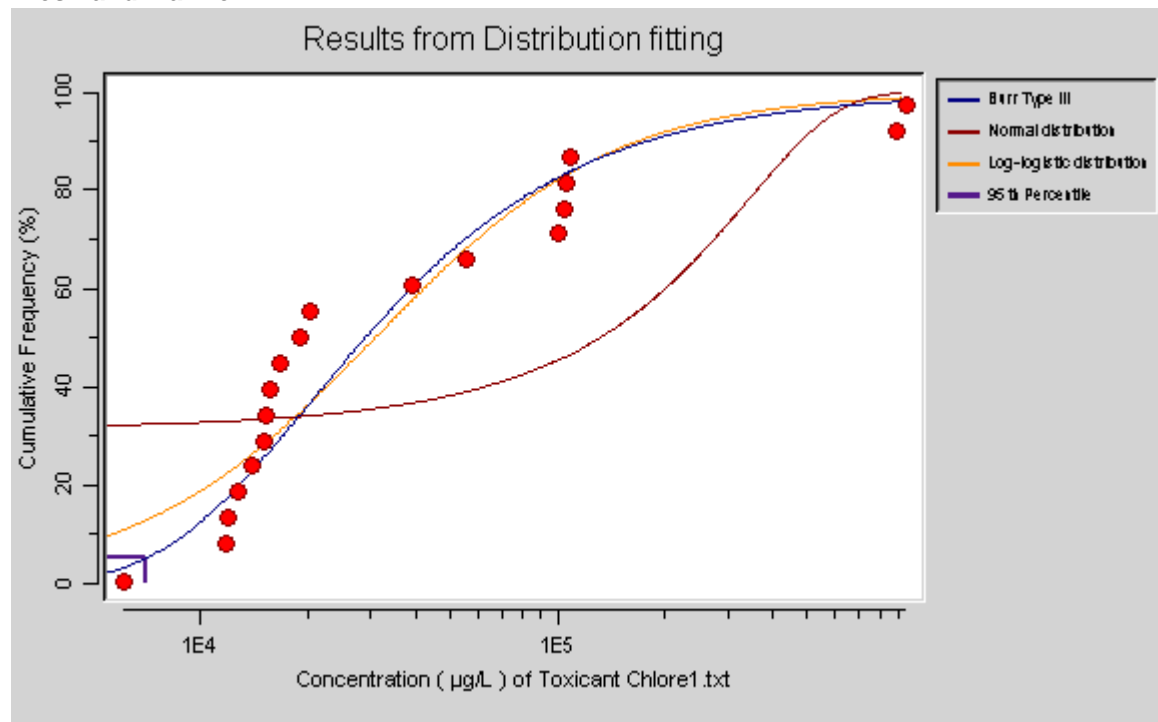
Chloroethylene

Fresh and Marine



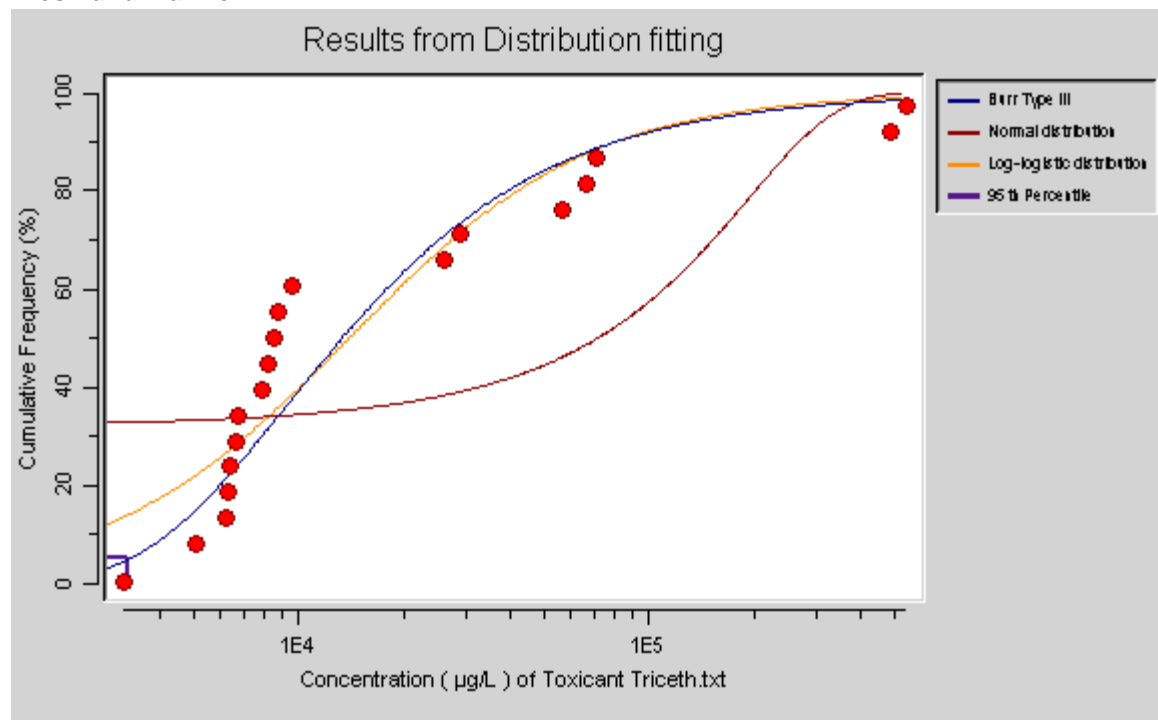
1,1-dichloroethylene

Fresh and Marine



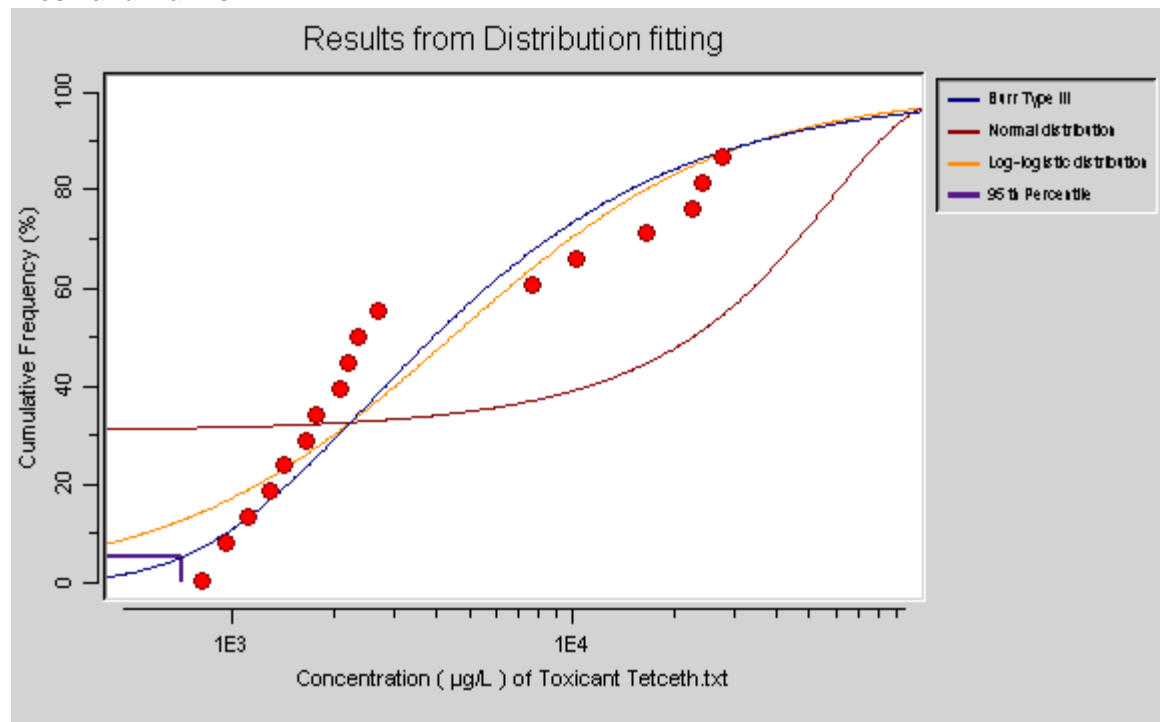
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Fresh and Marine



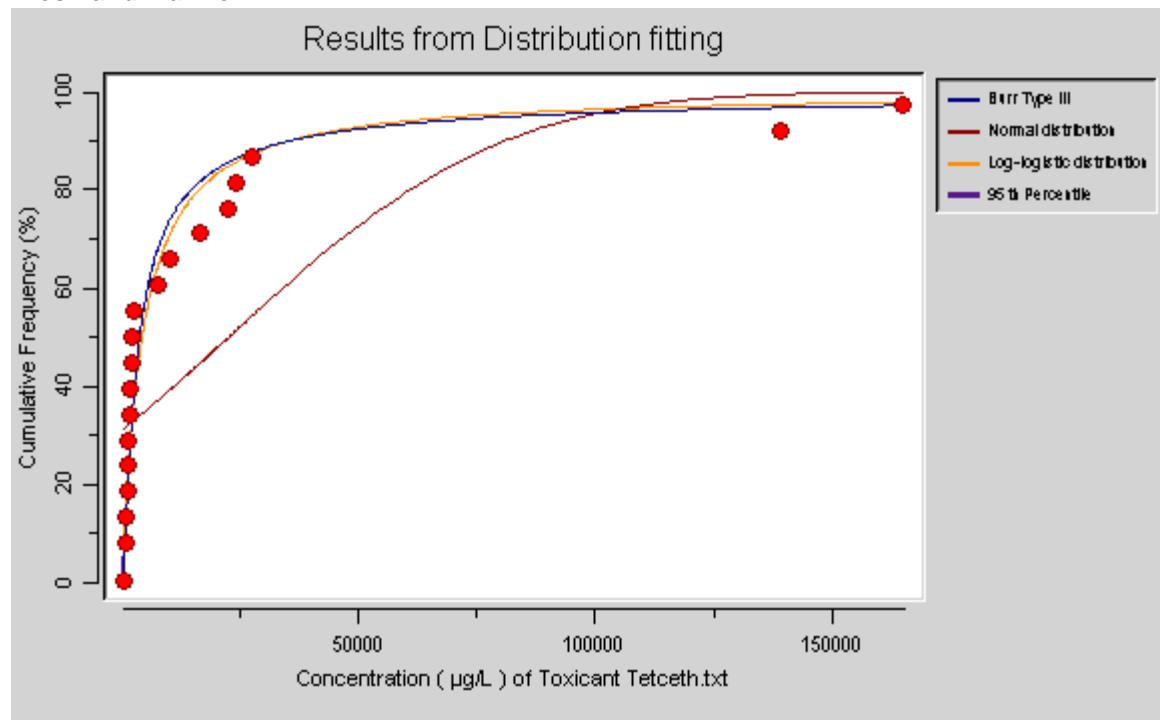
1,1,2,2-tetrachloroethylene

Fresh and Marine



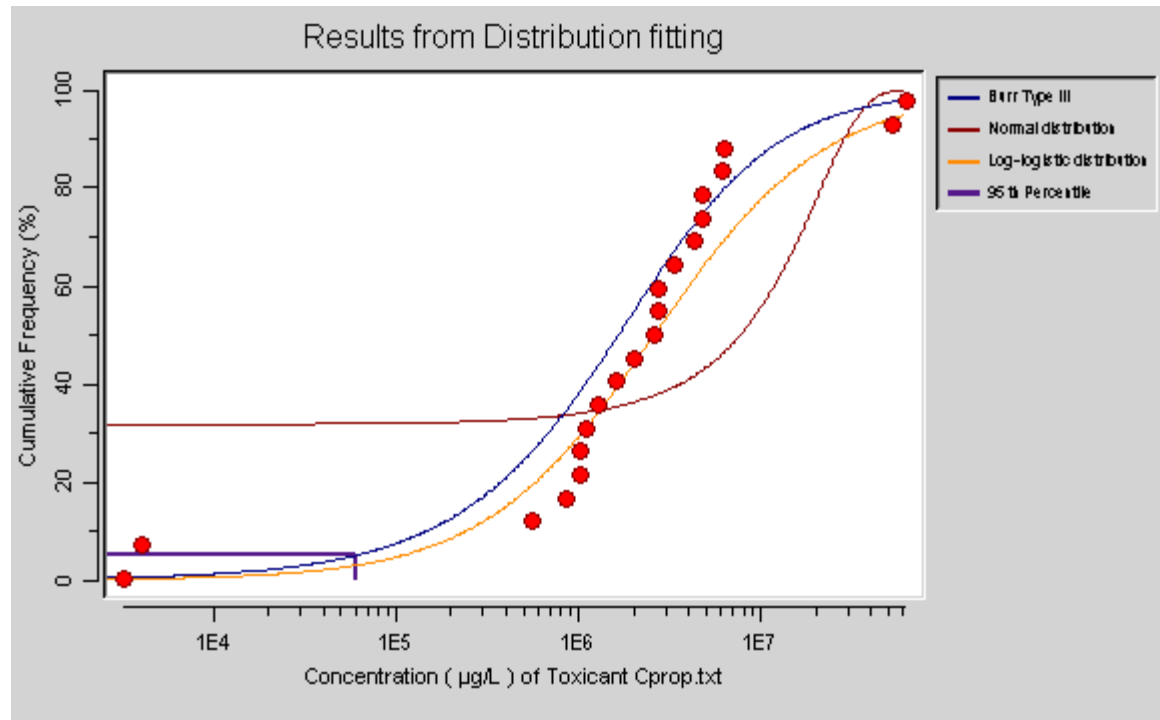
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Fresh and Marine



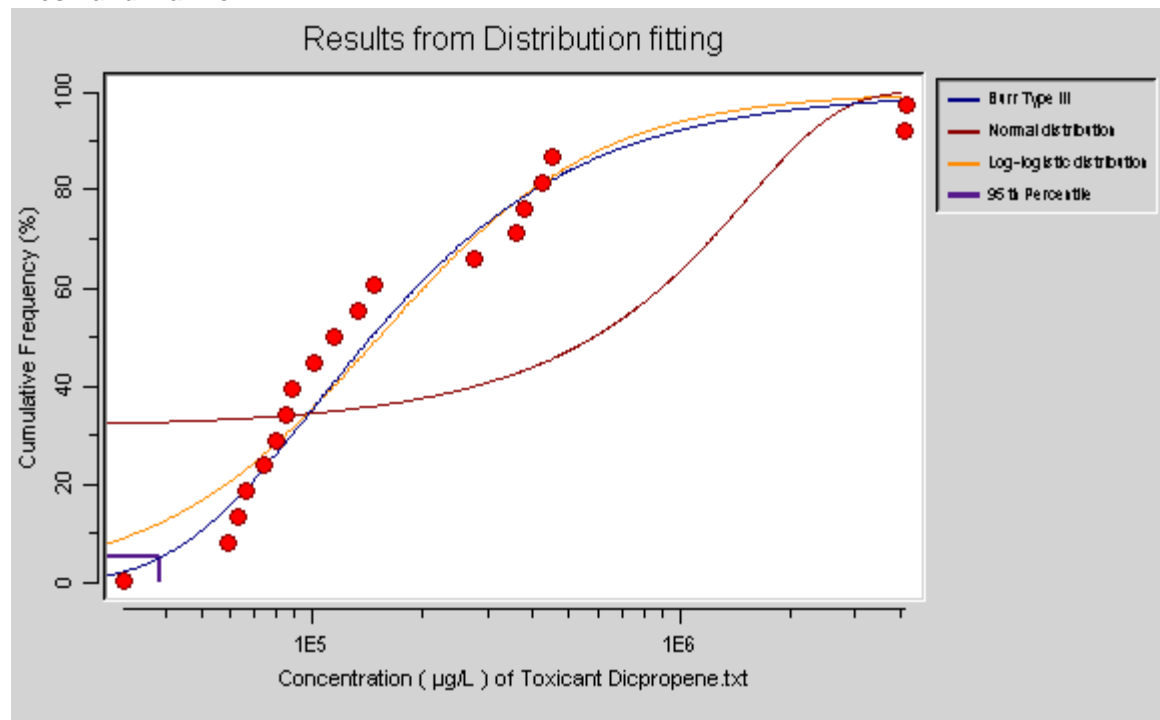
3-chloropropene

Fresh and Marine



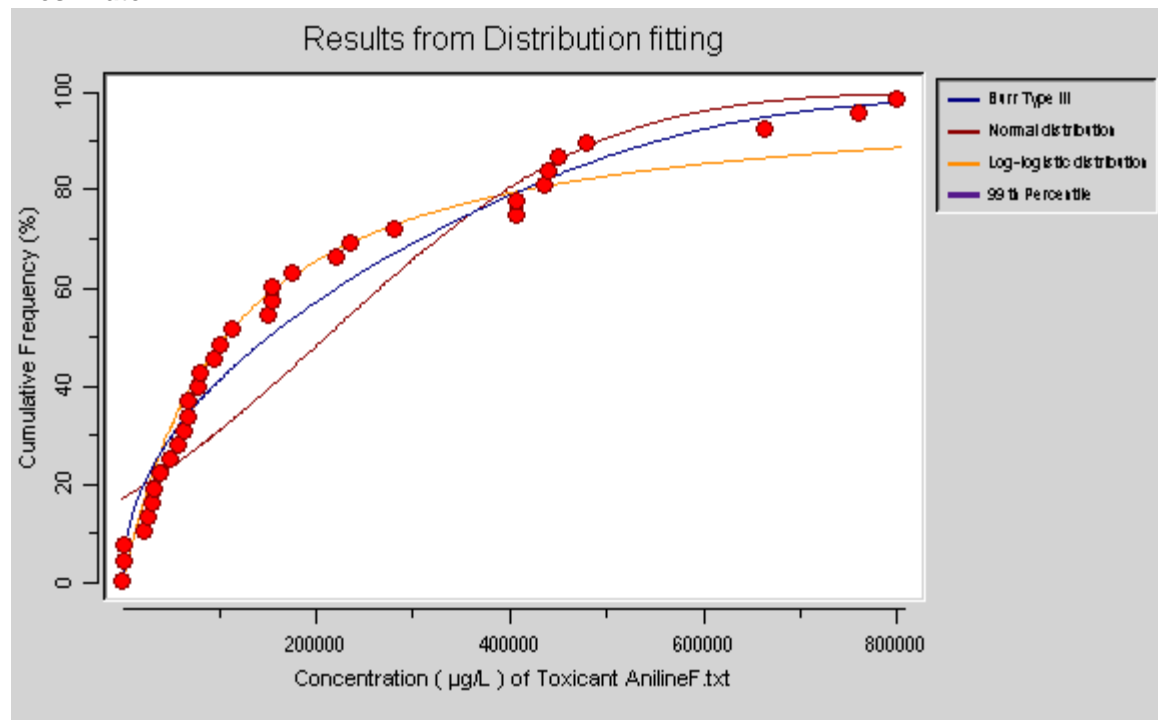
1,3-dichloropropene

Fresh and Marine



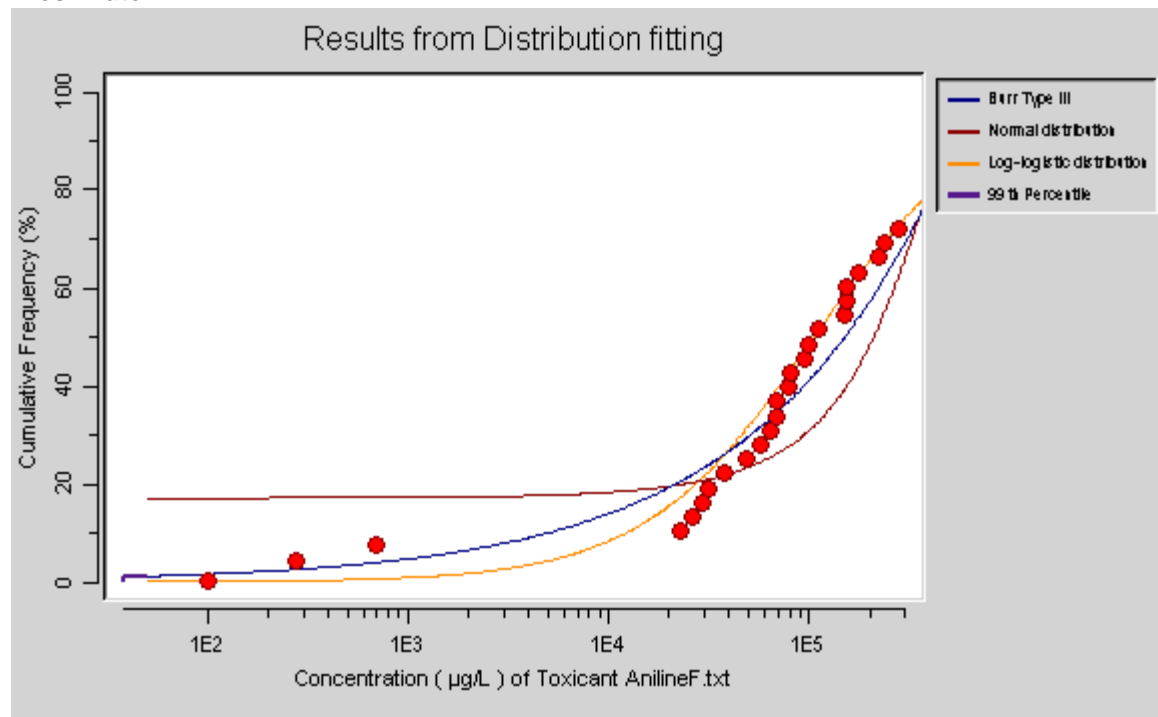
Aniline

Freshwater



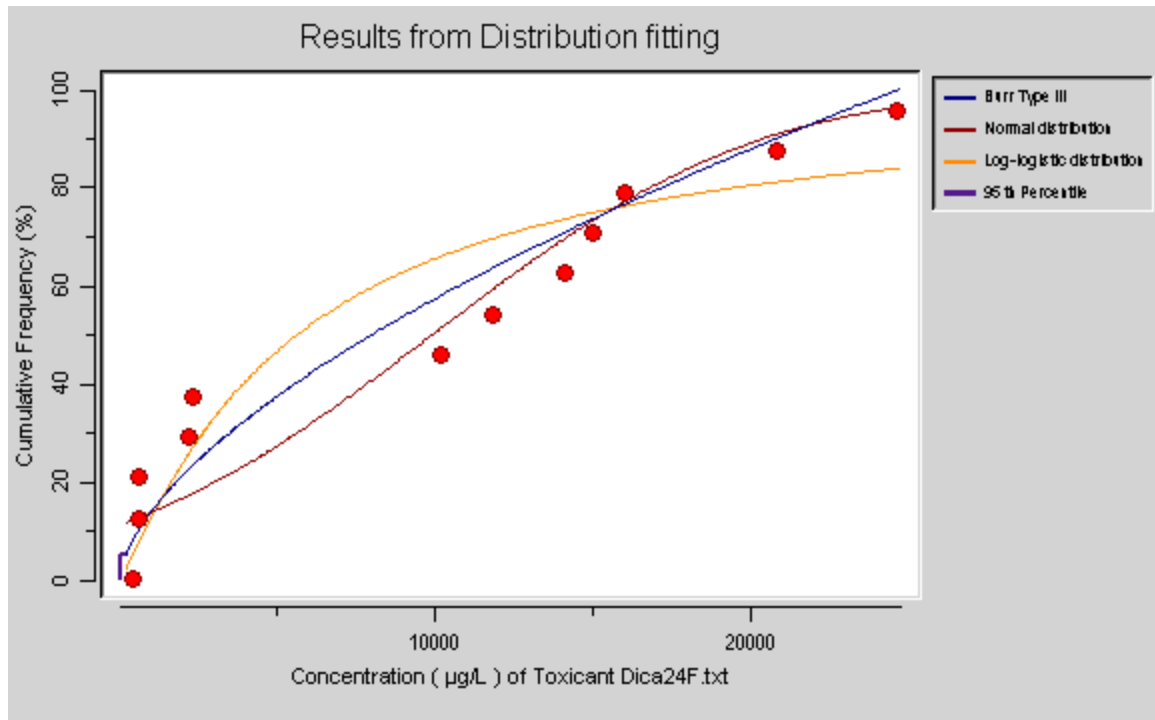
Aniline

Freshwater



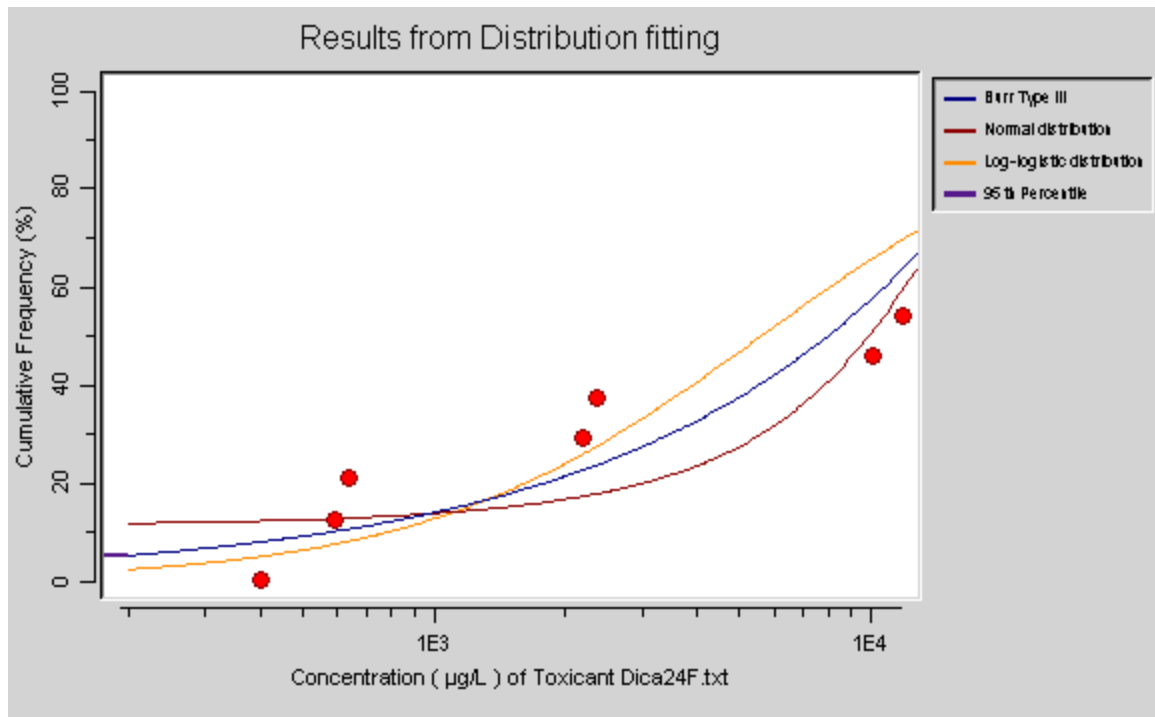
2,4-dichloroaniline

Freshwater



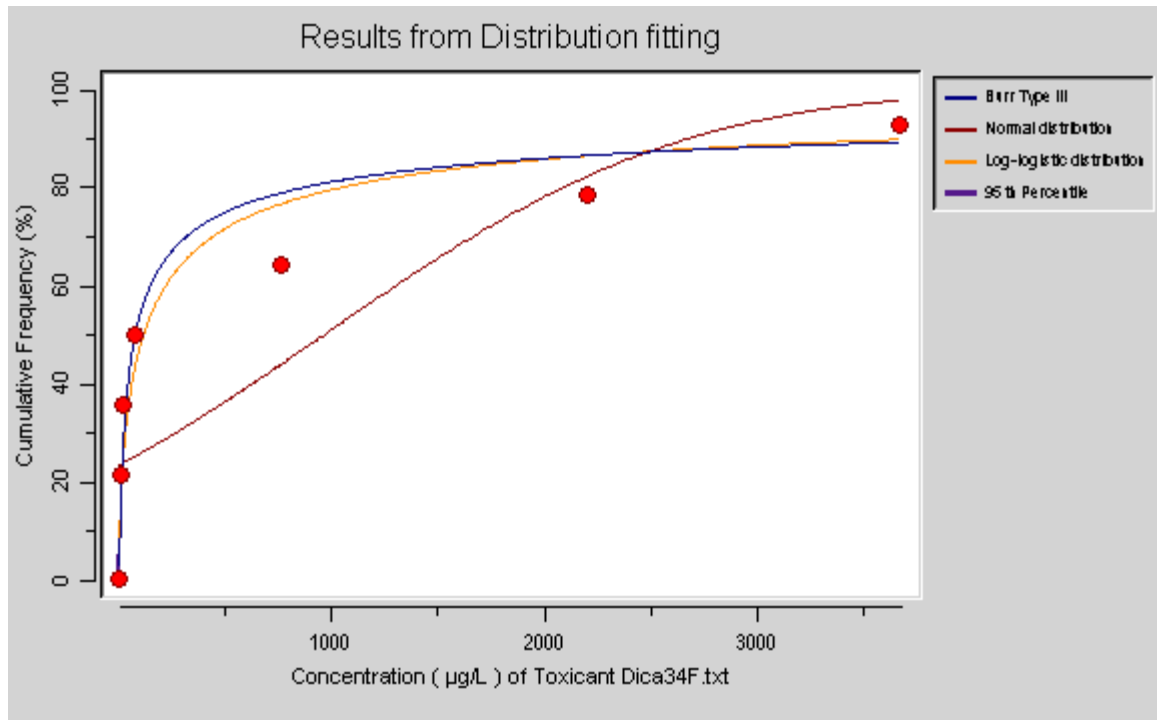
2,4-dichloroaniline

Freshwater



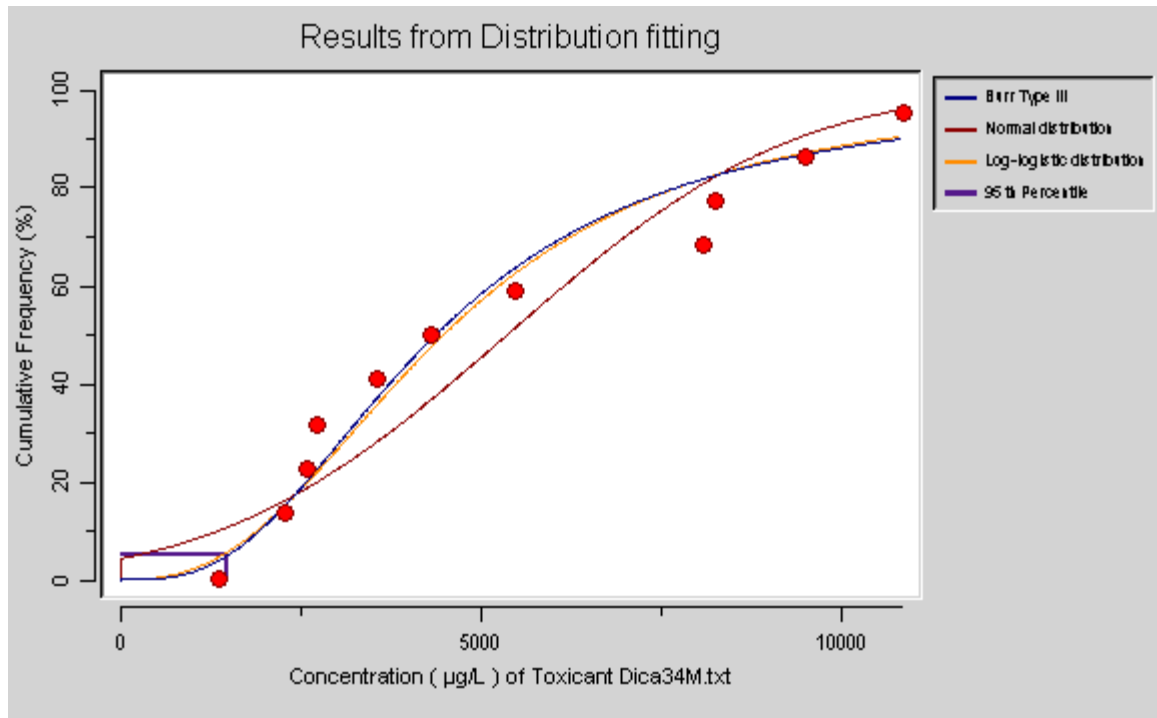
3,4-dichloroaniline

Freshwater



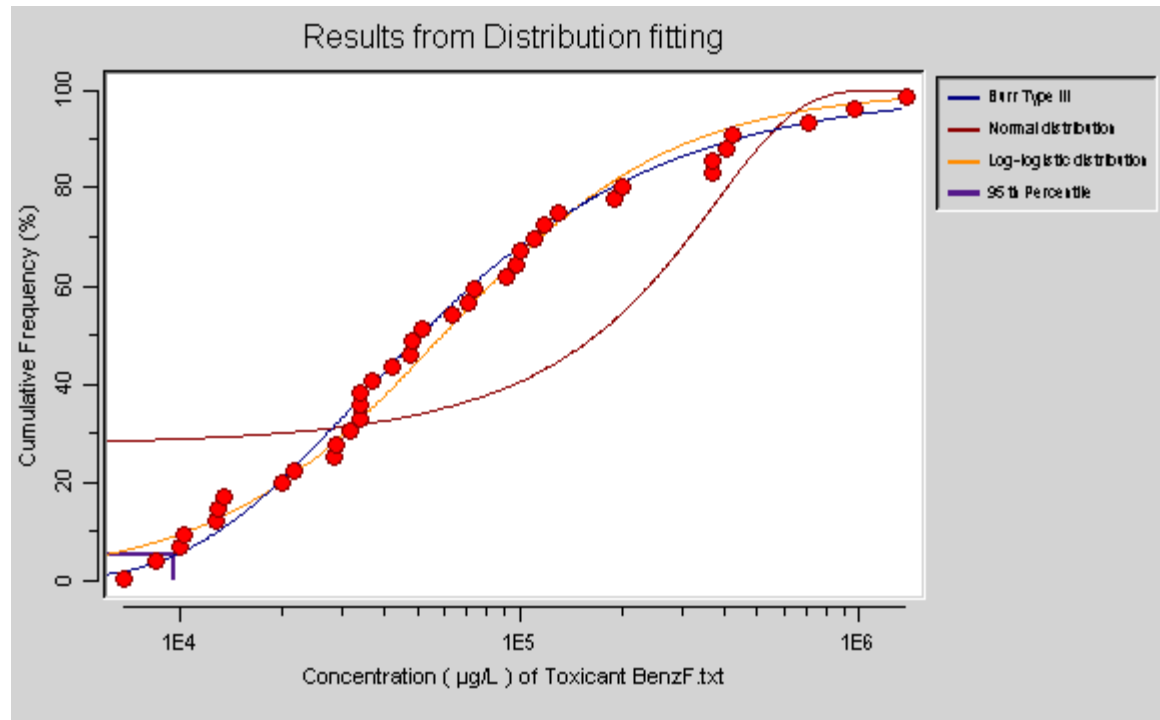
3,4-dichloroaniline

Marine



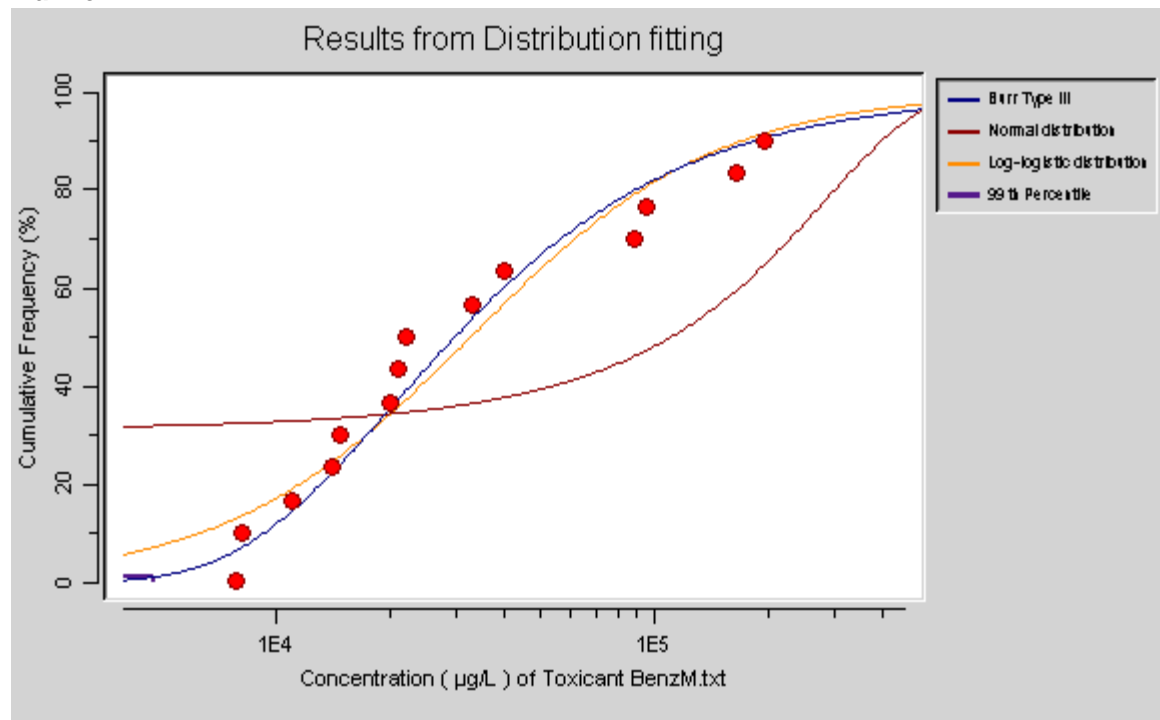
Benzene

Freshwater



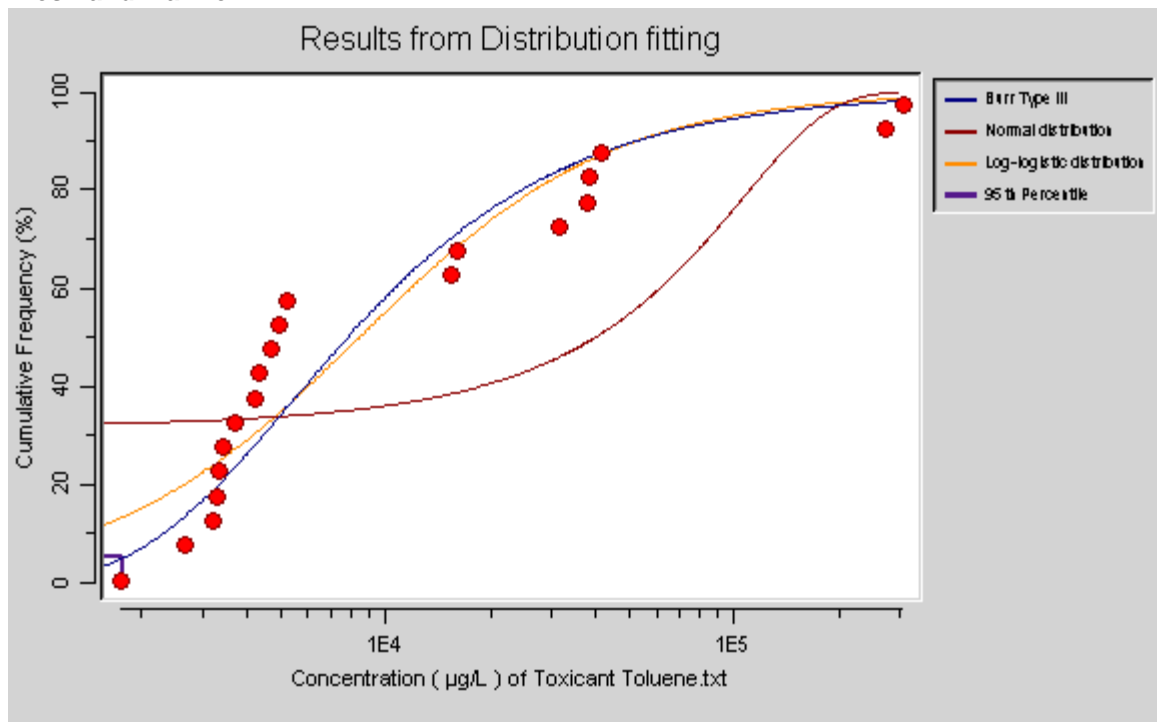
Benzene

Marine



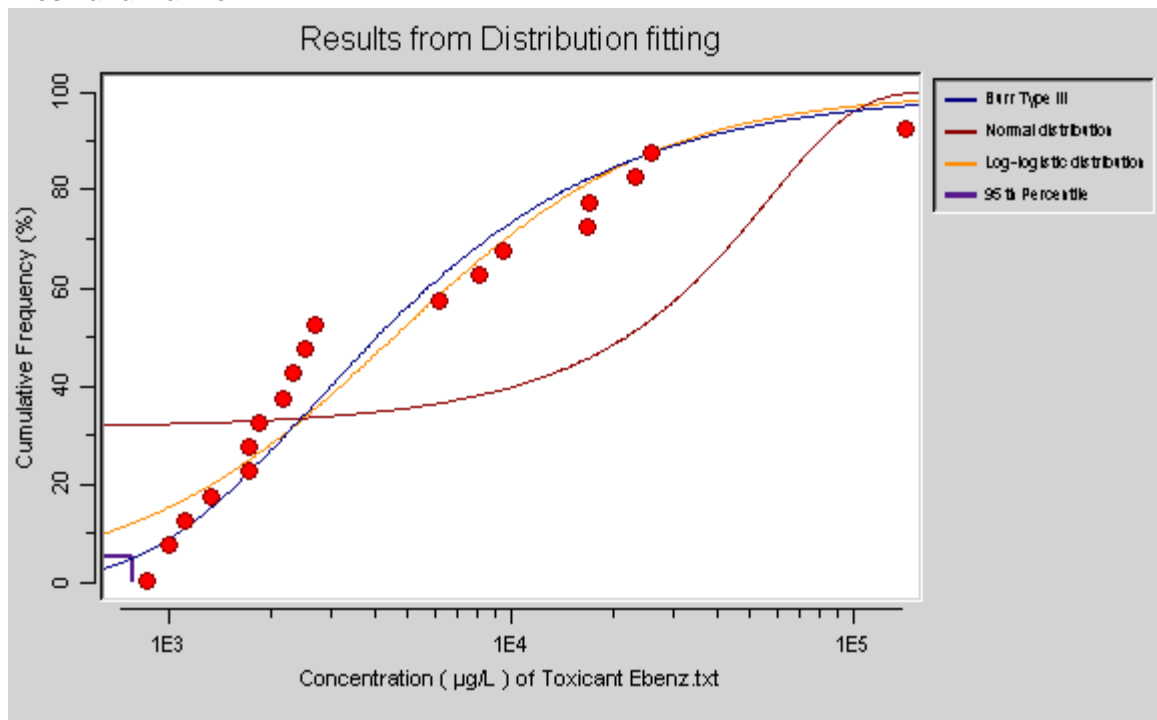
Toluene

Fresh and Marine



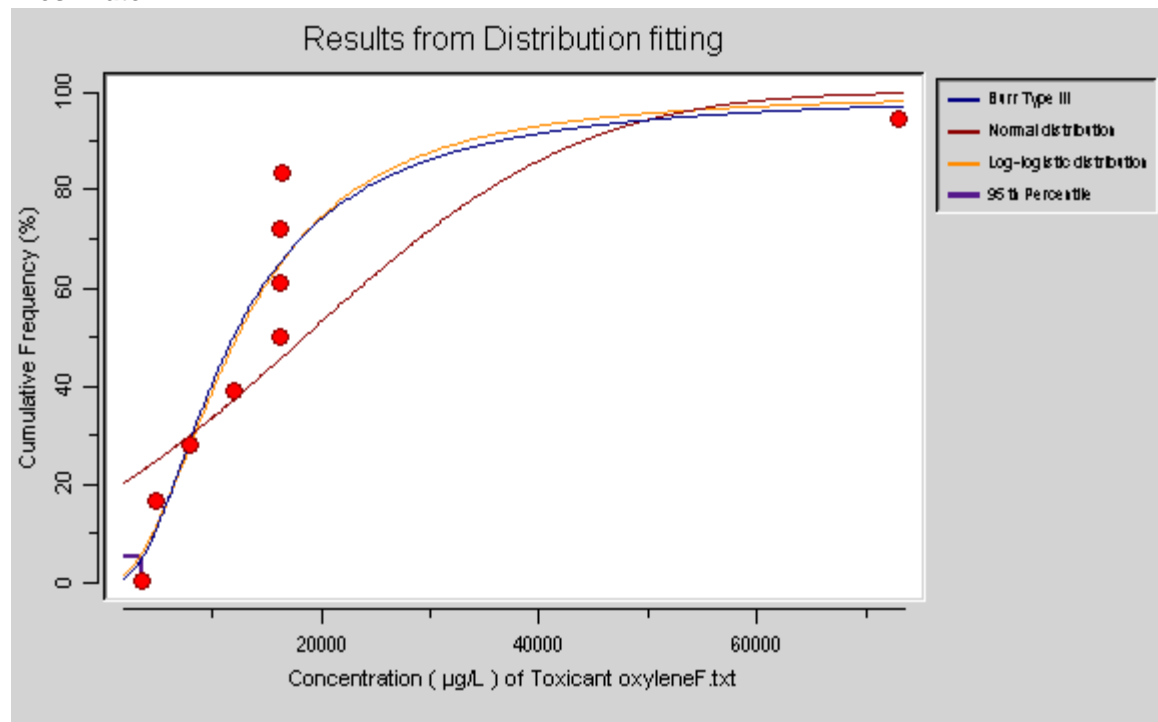
Ethylbenzene

Fresh and Marine



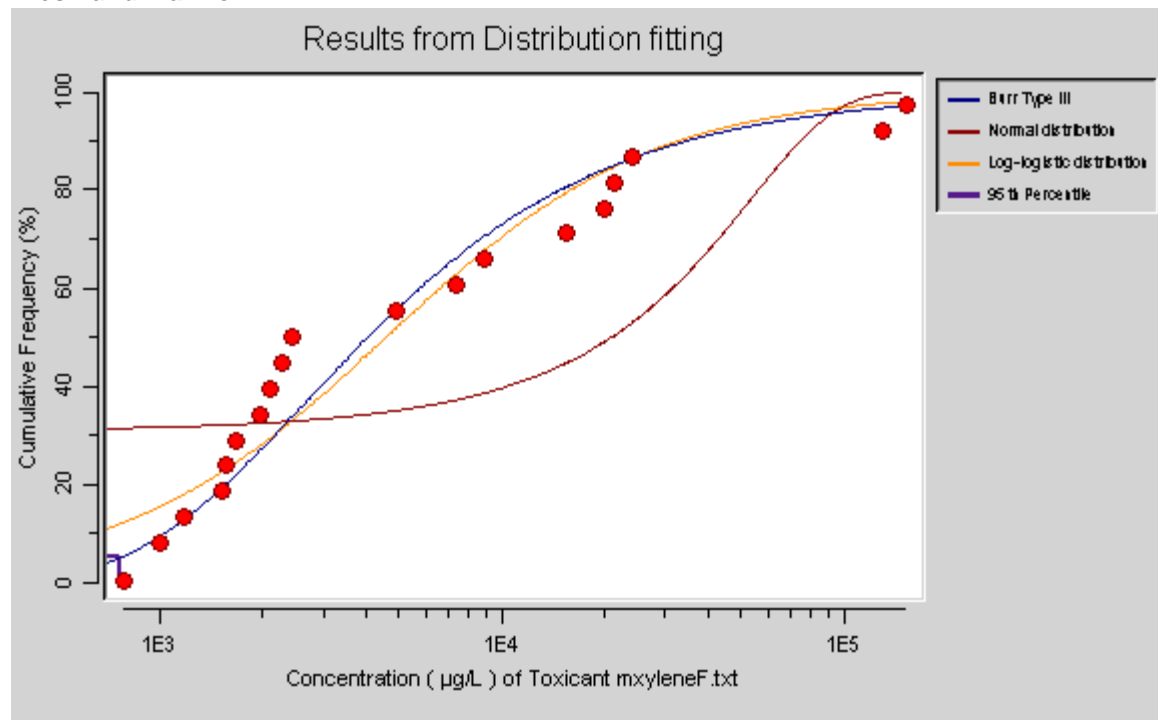
o-xylene

Freshwater



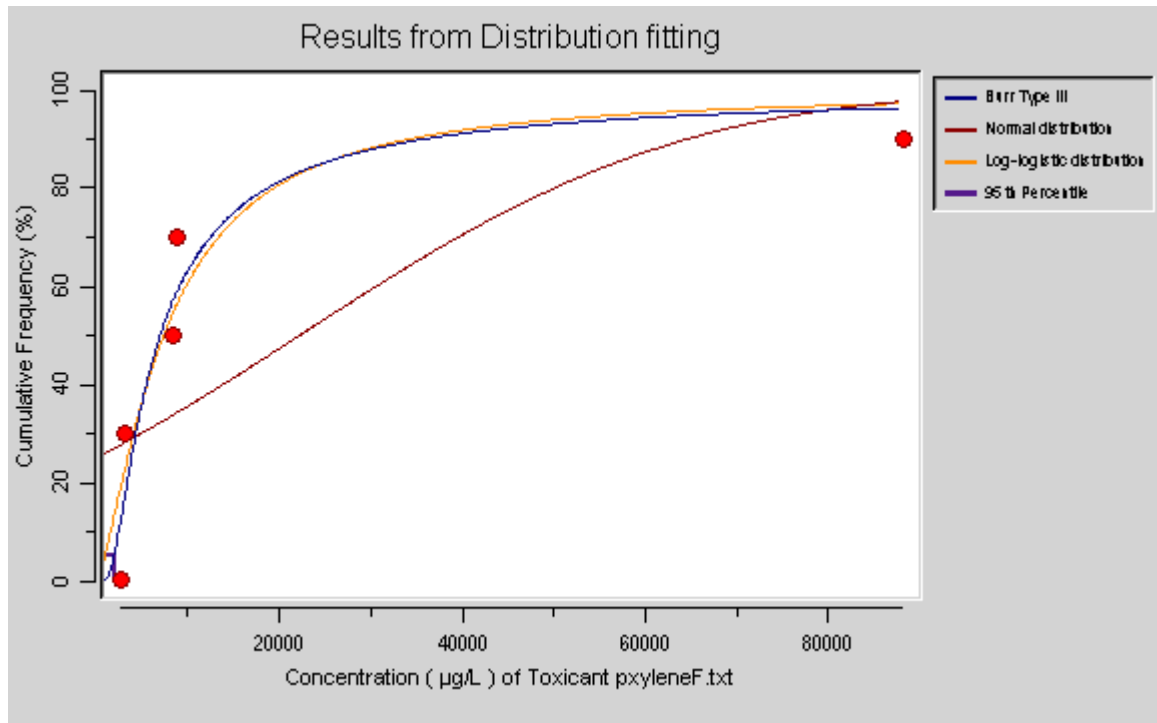
m-xylene

Fresh and Marine



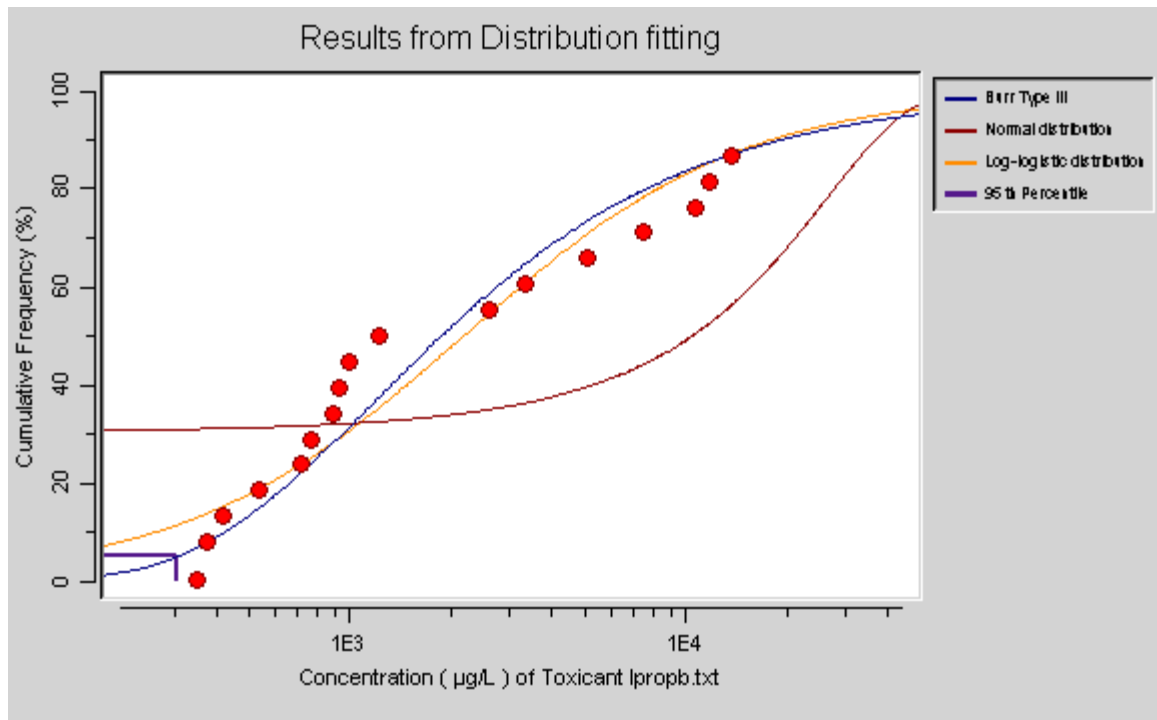
p-xylene

Fresh



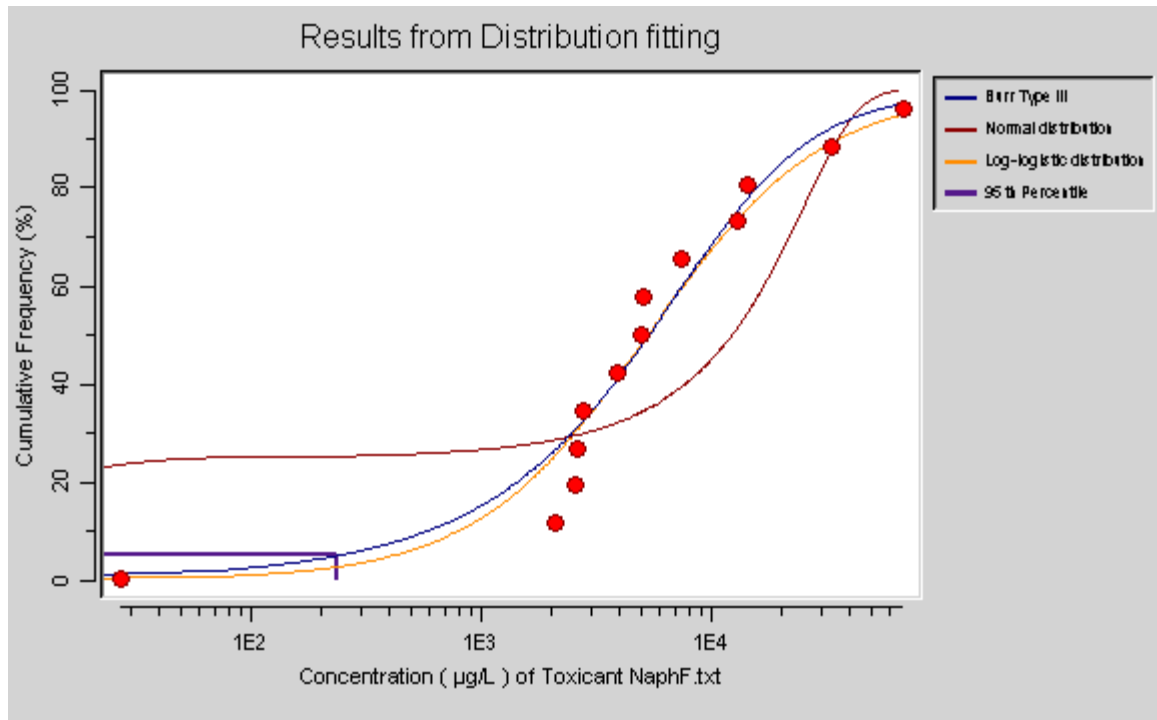
Isopropylbenzene

Fresh and Marine



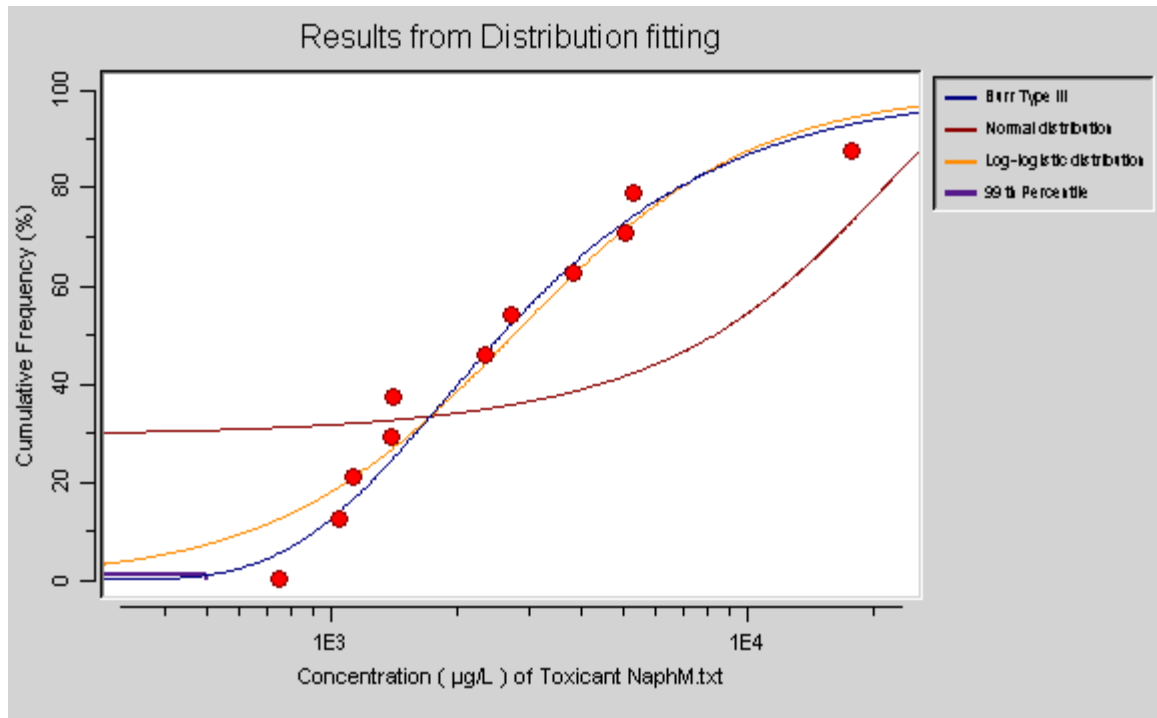
Naphthalene

Fresh



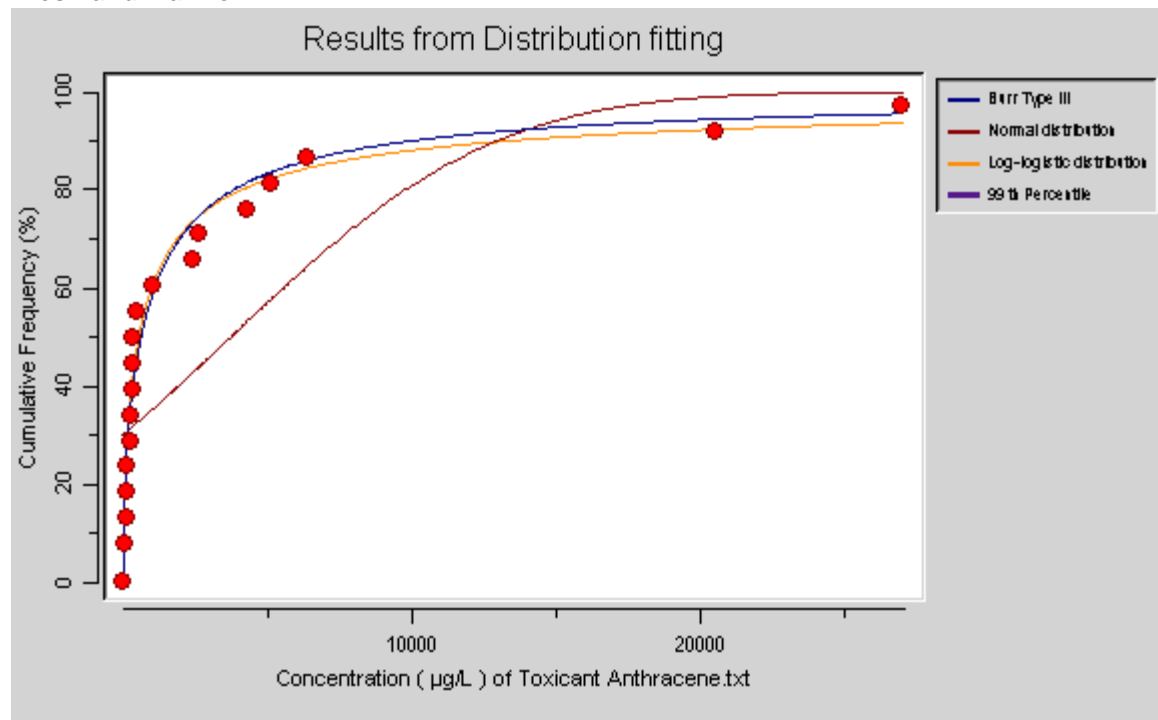
Naphthalene

Marine



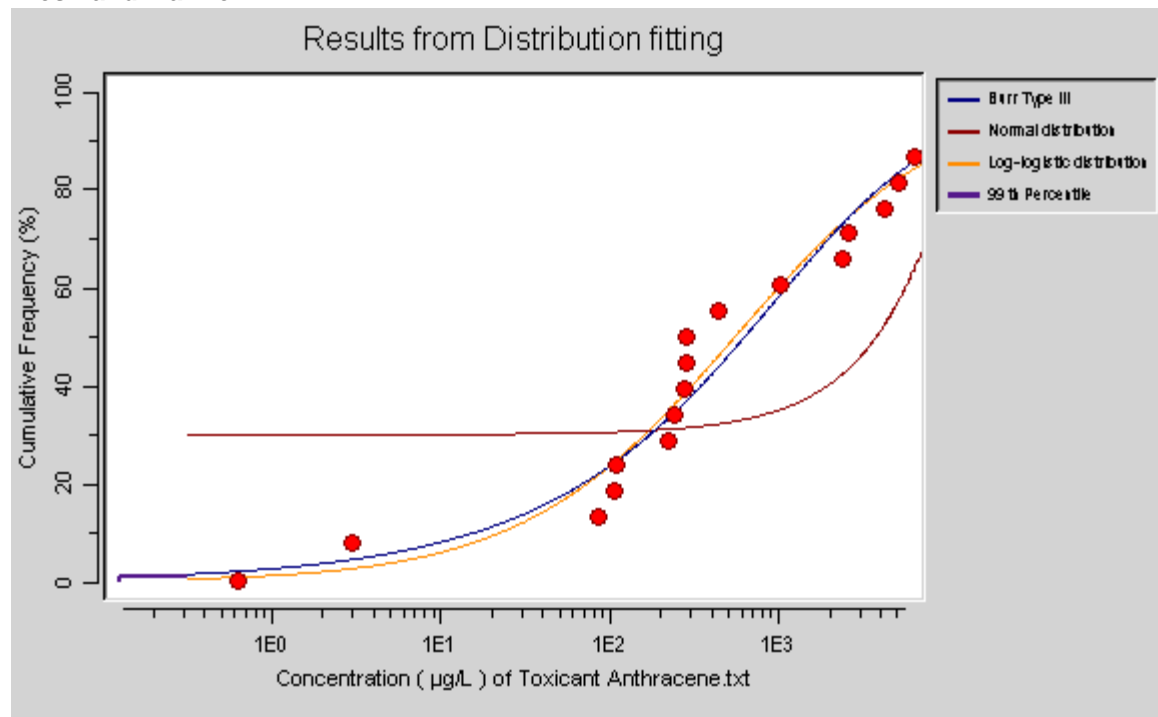
Anthracene

Fresh and Marine



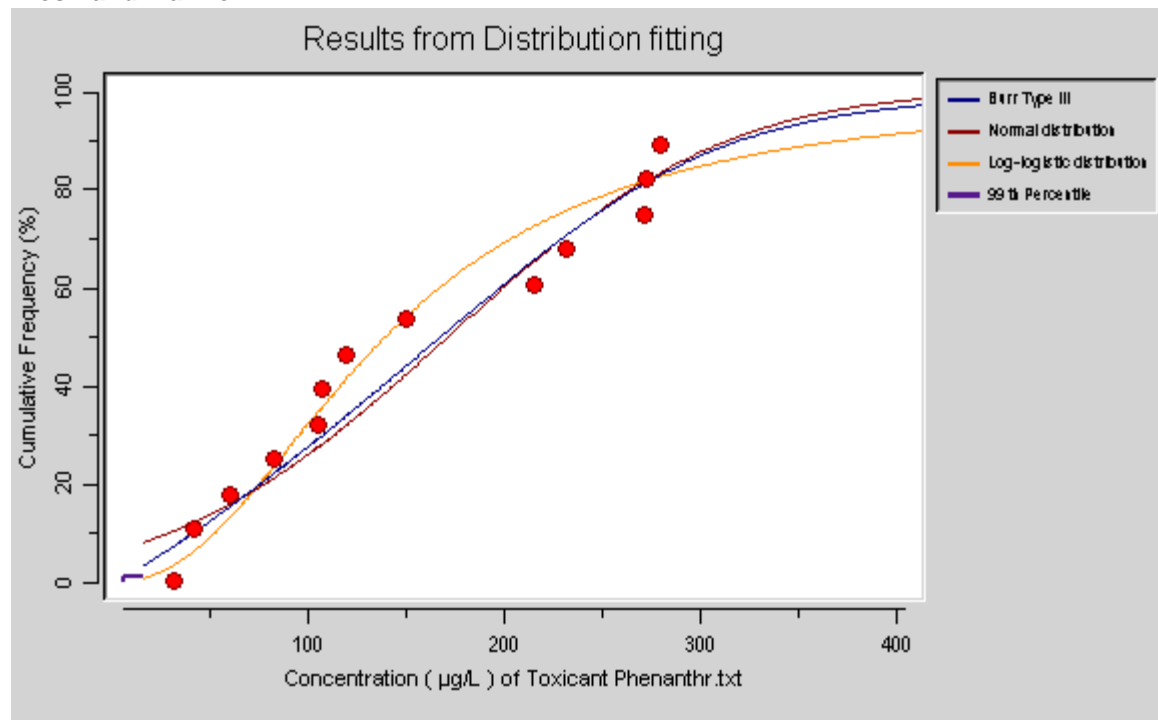
Anthracene

Fresh and Marine



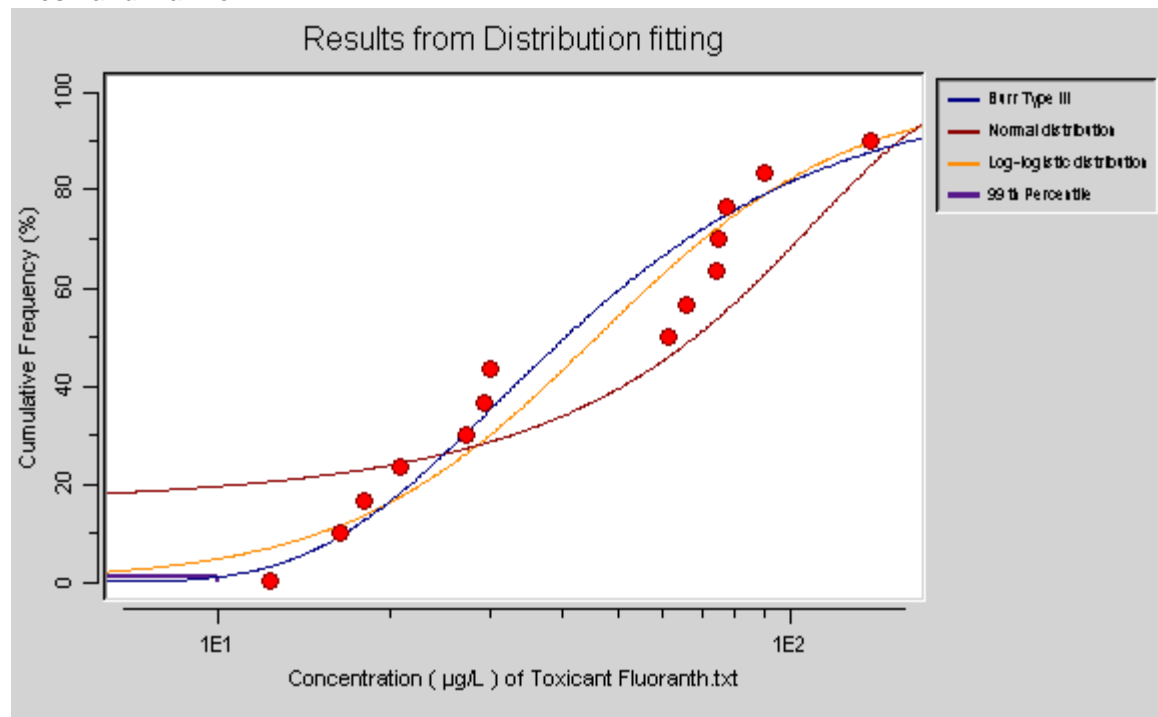
Phenanthrene

Fresh and Marine



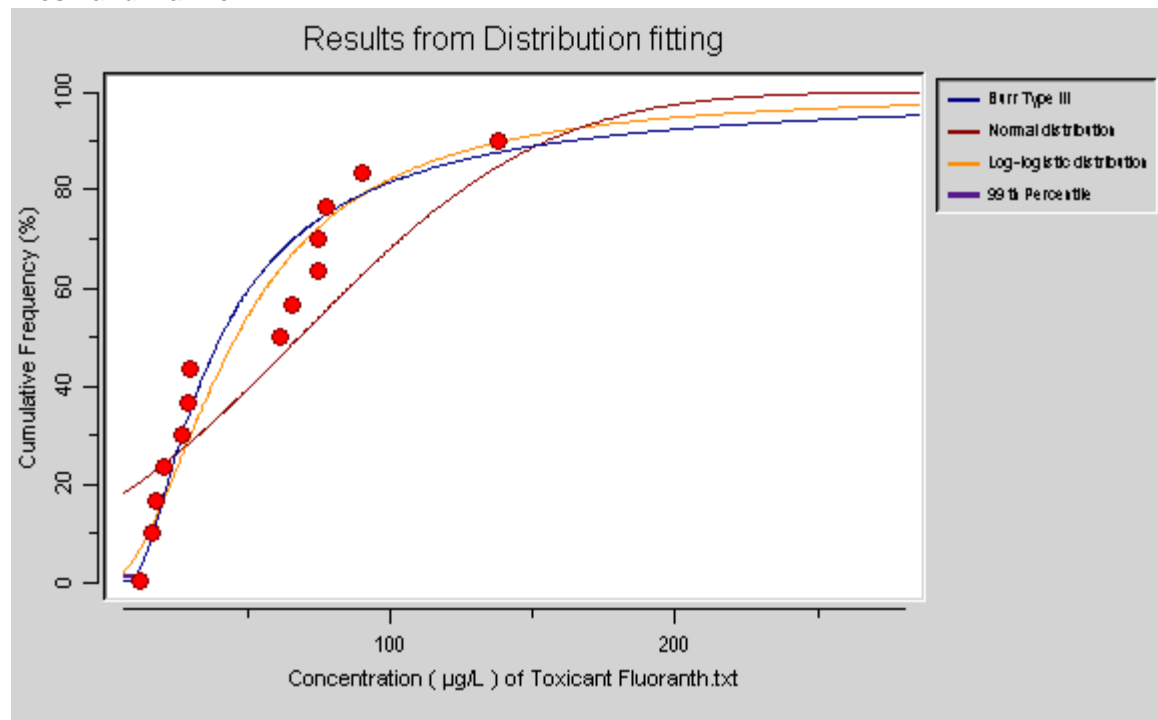
Fluoranthene

Fresh and Marine



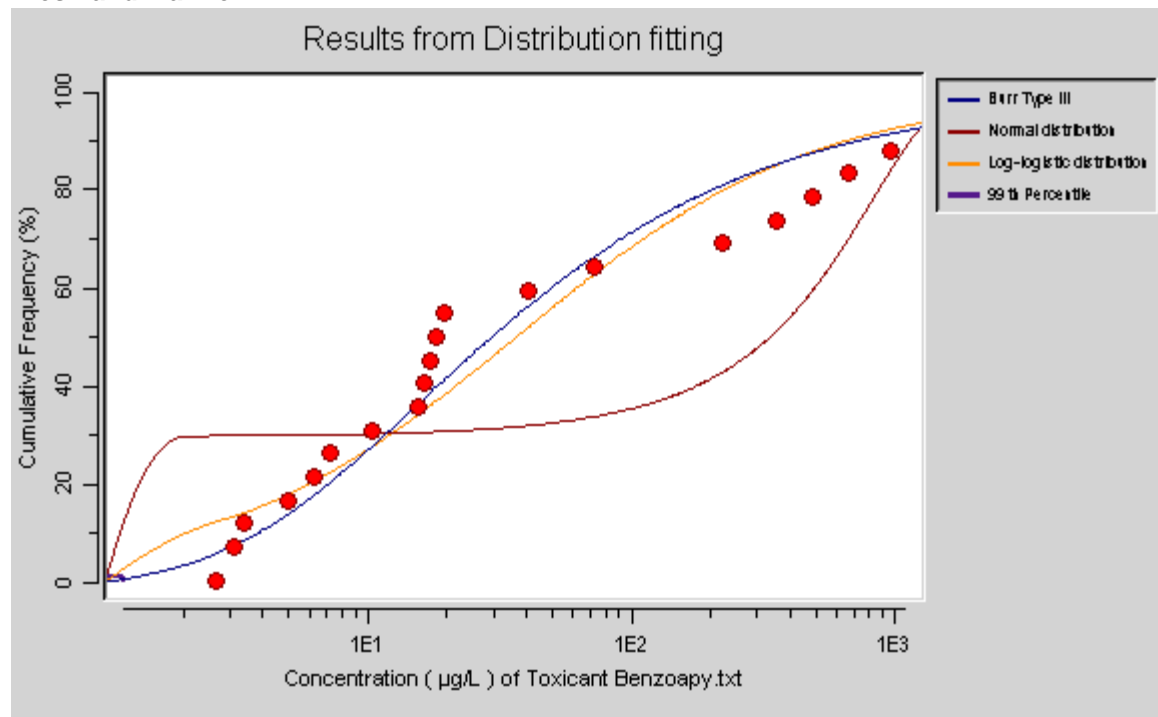
Fluoranthene

Fresh and Marine



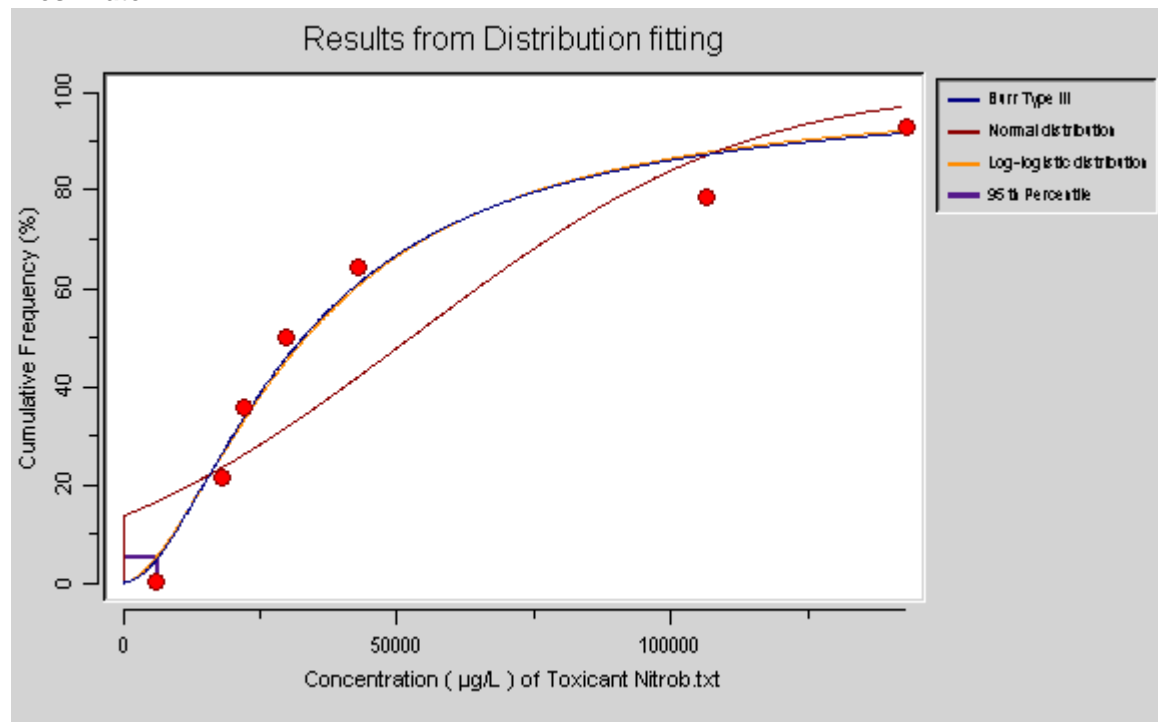
Benzo[a]pyrene

Fresh and Marine



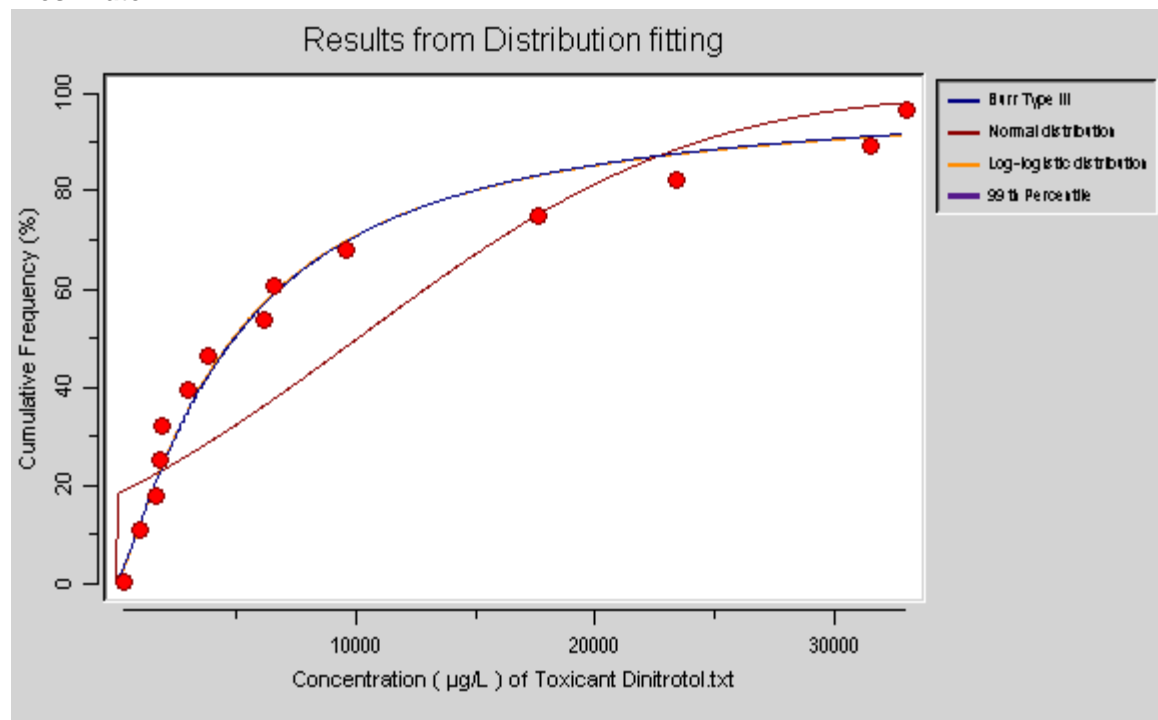
Nitrobenzene

Freshwater



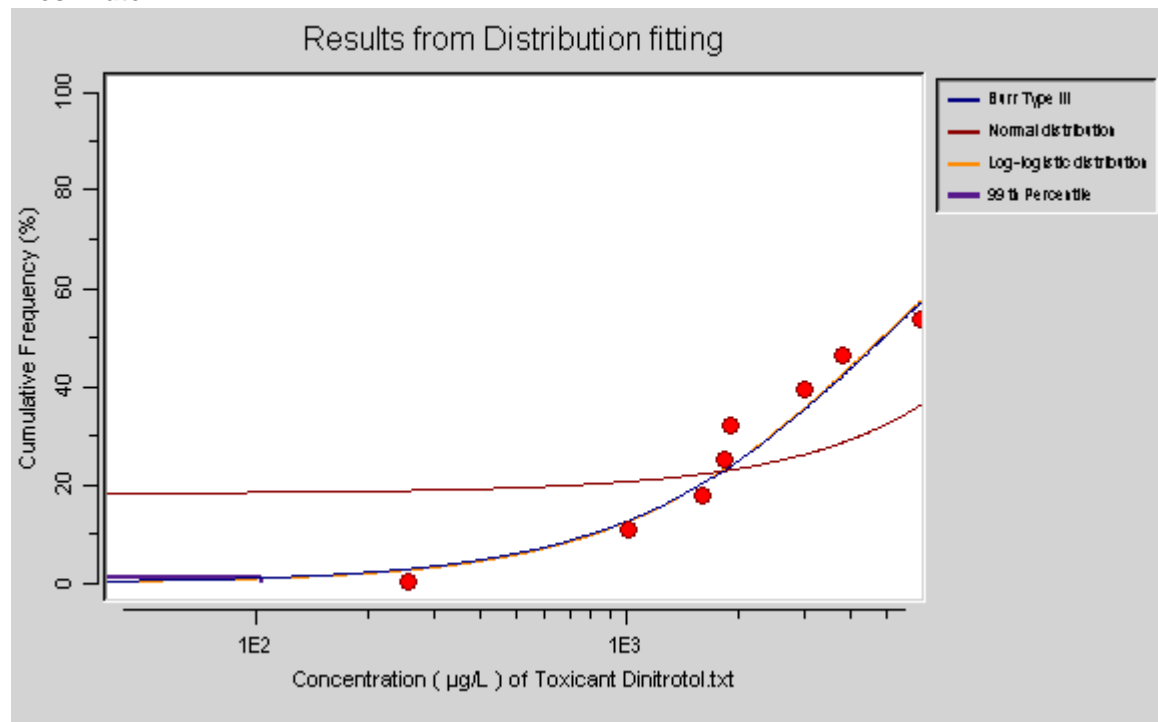
2,4-dinitrotoluene

Freshwater



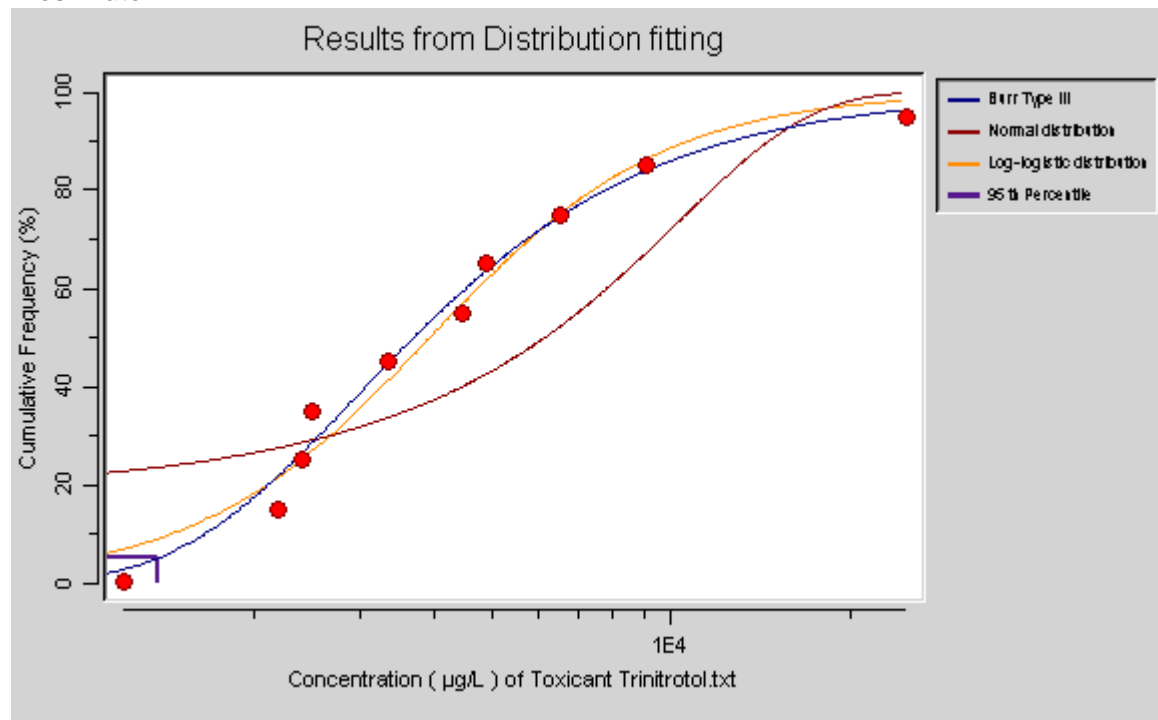
2,4-dinitrotoluene

Freshwater



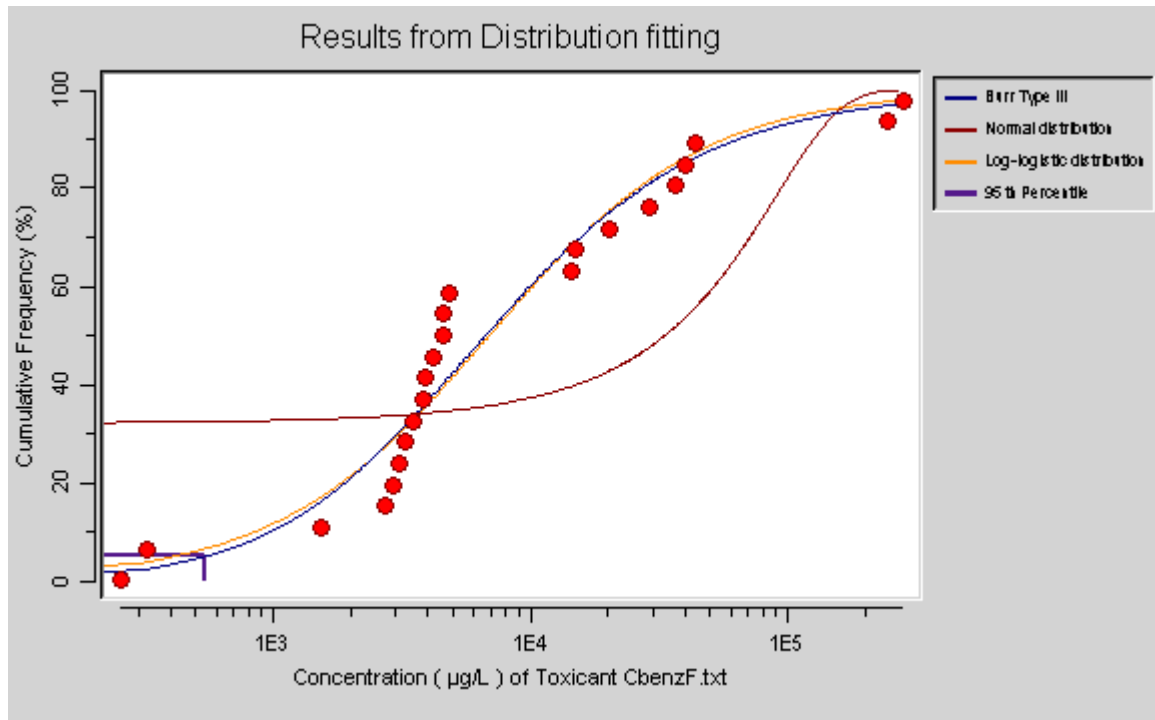
2,4,6-trinitrotoluene

Freshwater



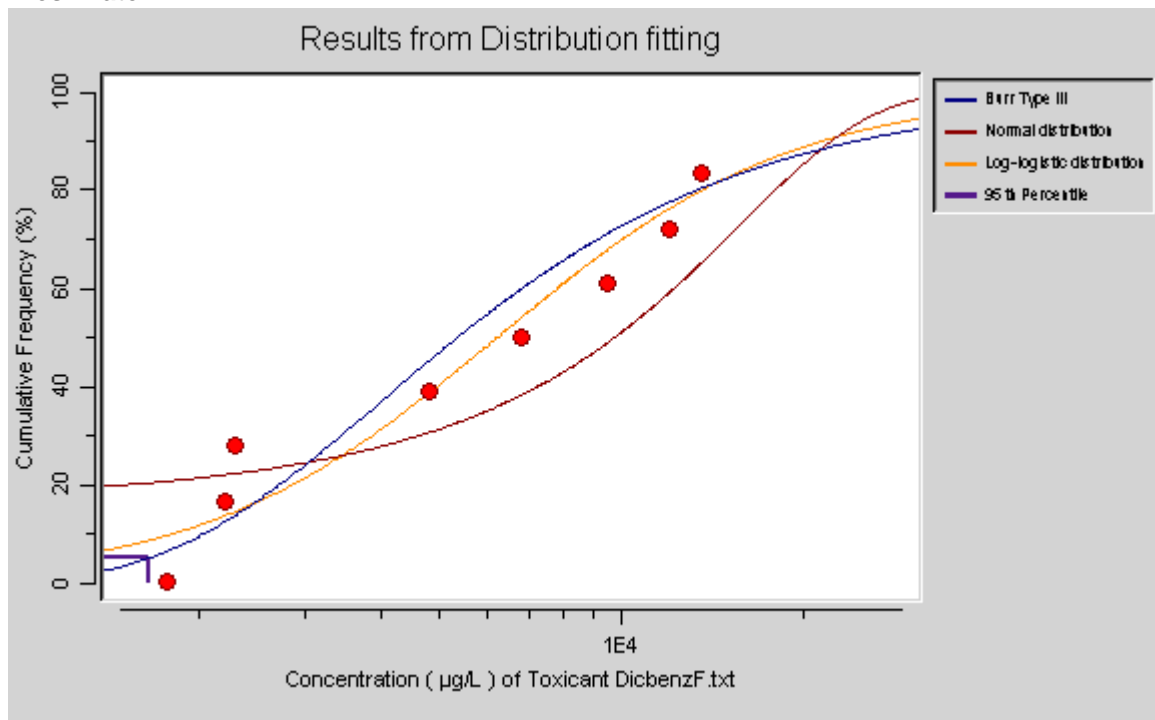
Chlorobenzene

Fresh and Marine



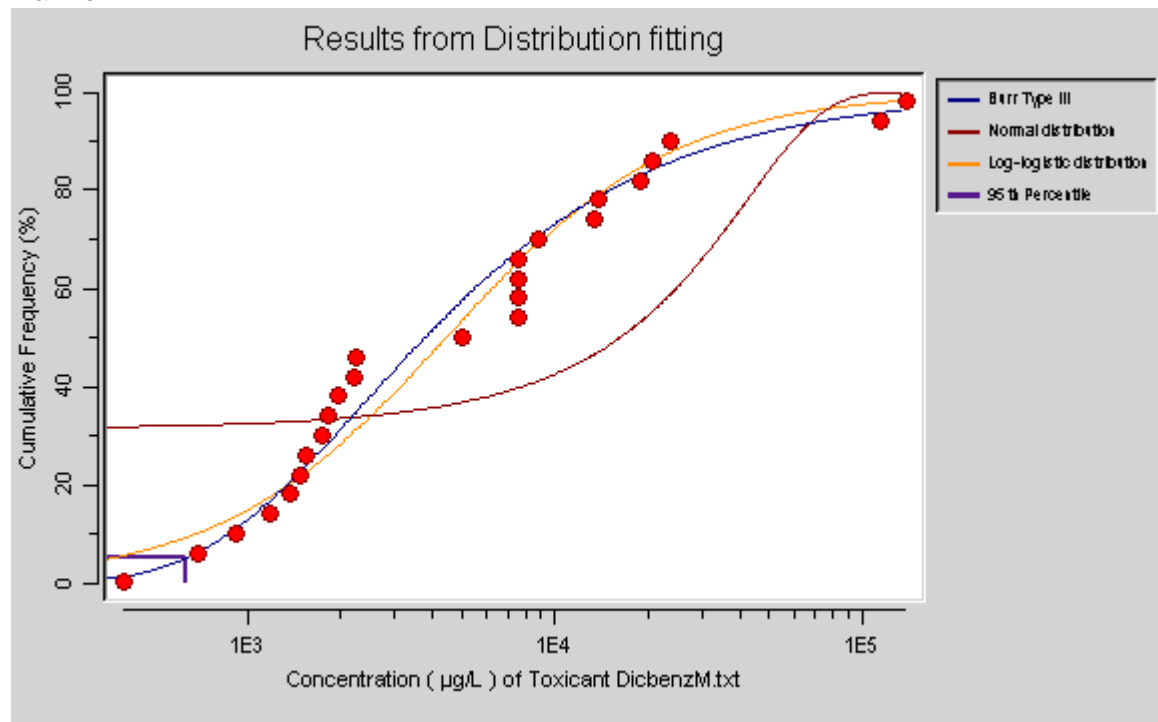
1,2-dichlorobenzene

Freshwater



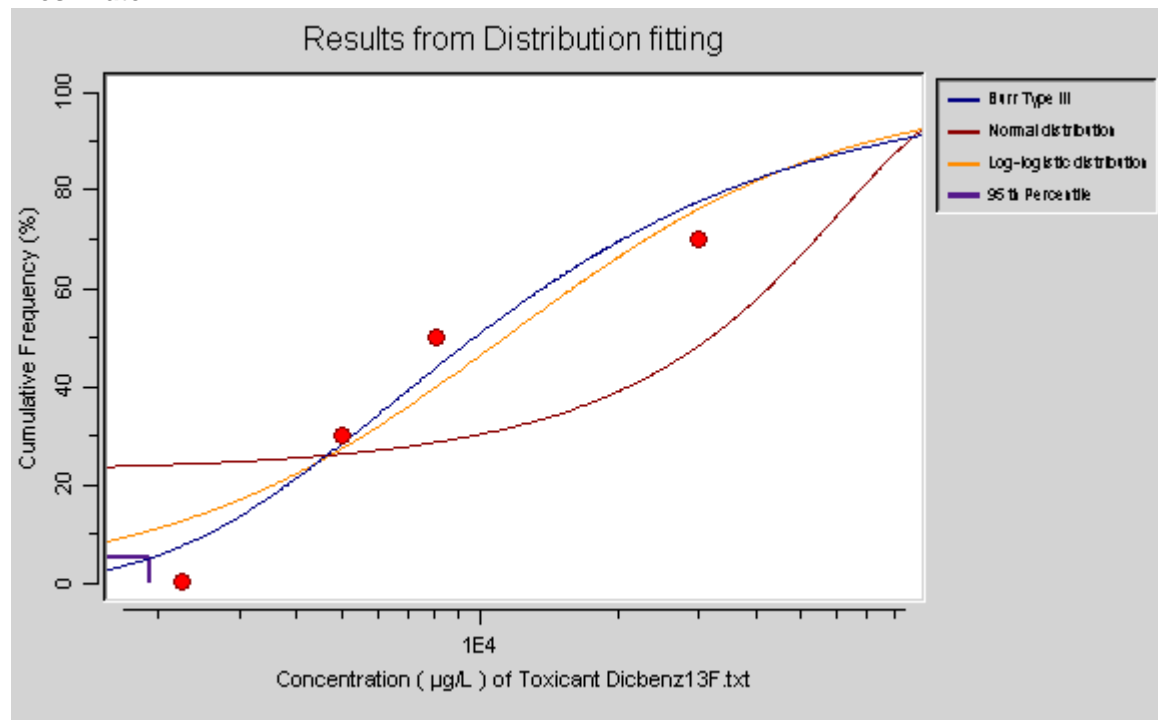
1,2-dichlorobenzene

Marine



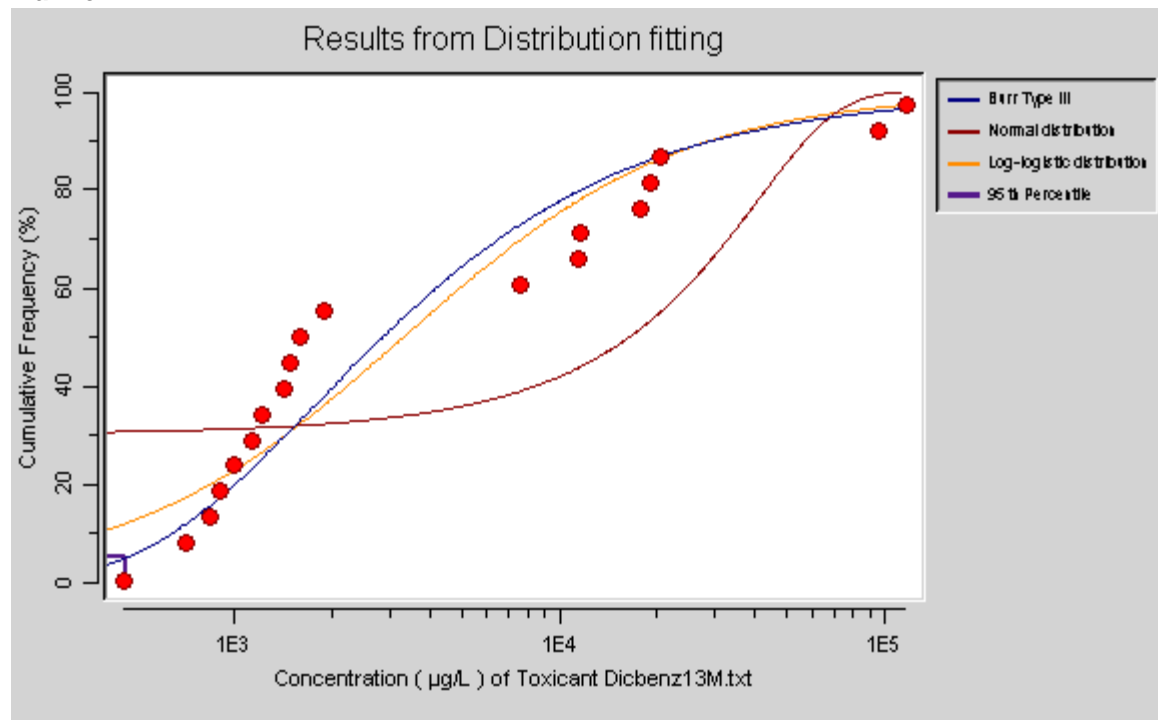
1,3-dichlorobenzene

Freshwater



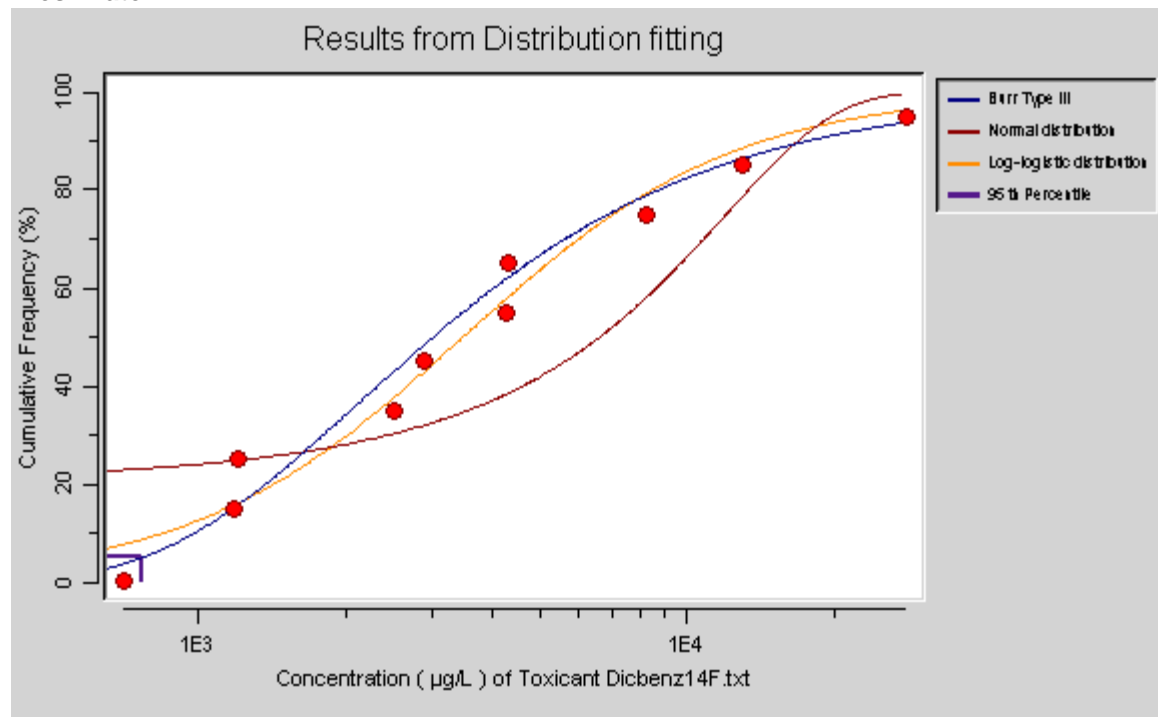
1,3-dichlorobenzene

Marine



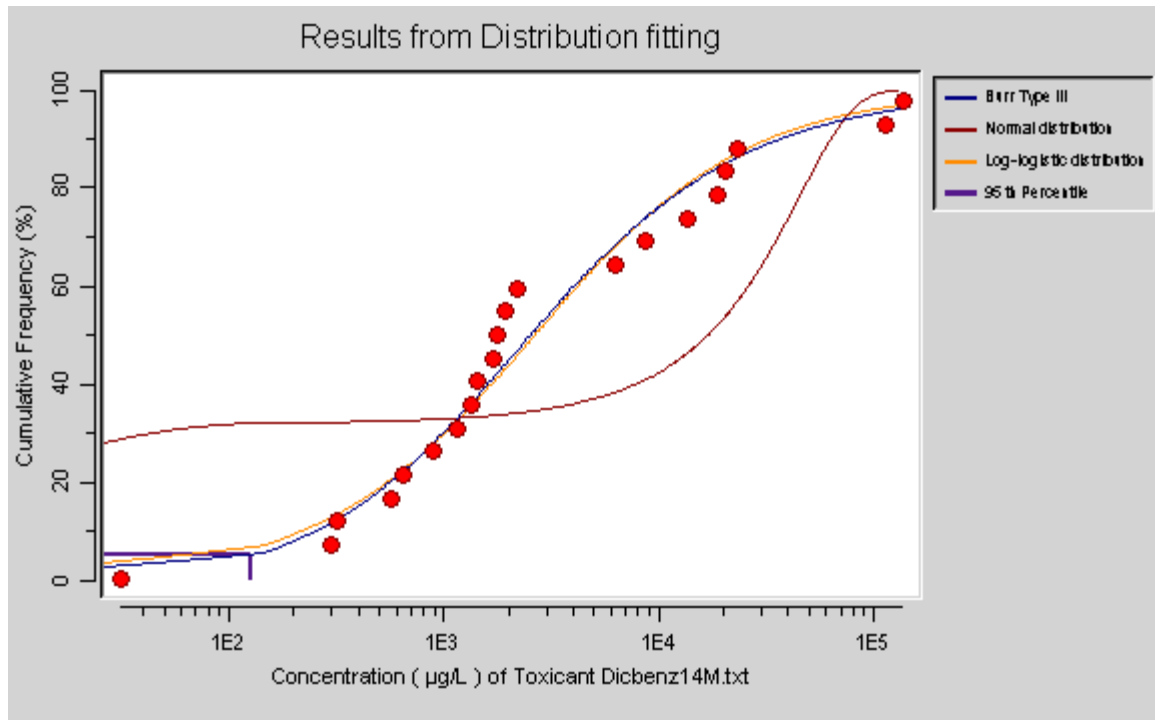
1,4-dichlorobenzene

Freshwater



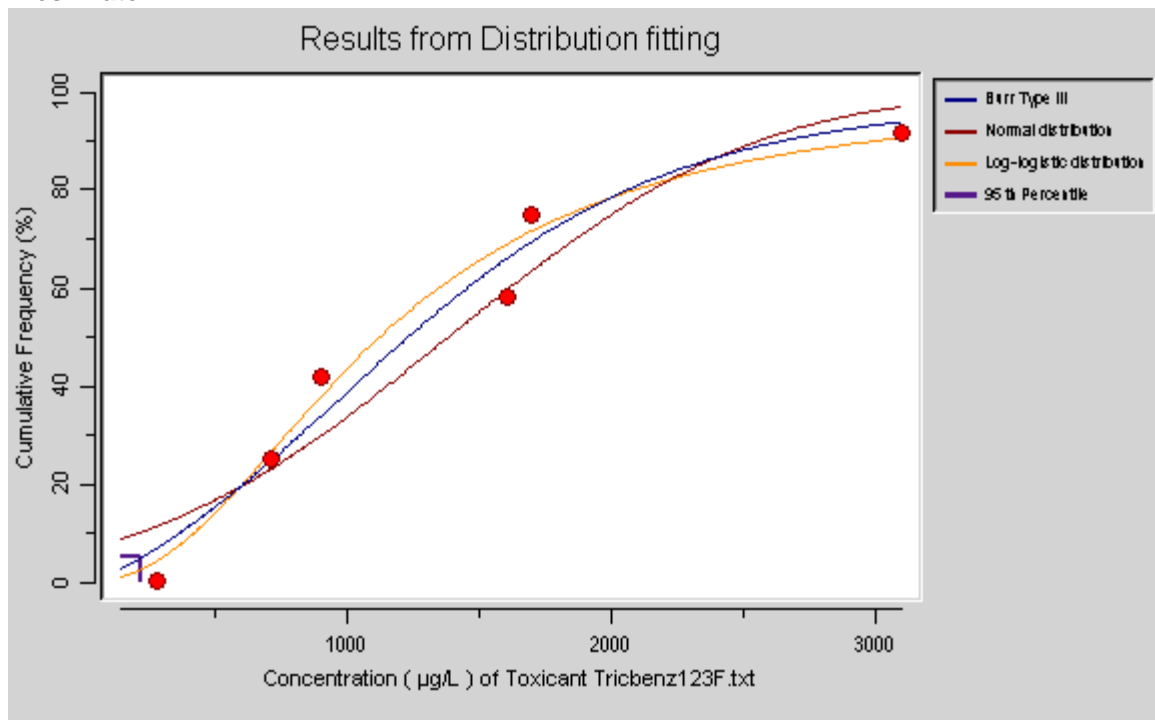
1,4-dichlorobenzene

Marine



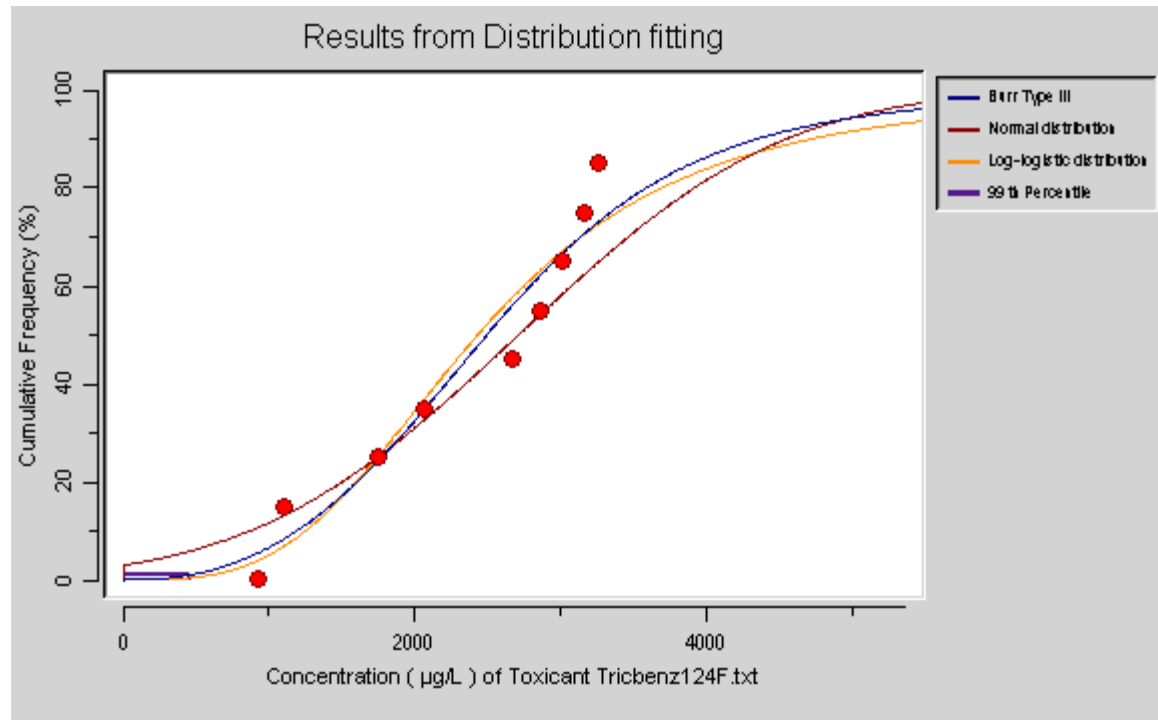
1,2,3-trichlorobenzene

Freshwater



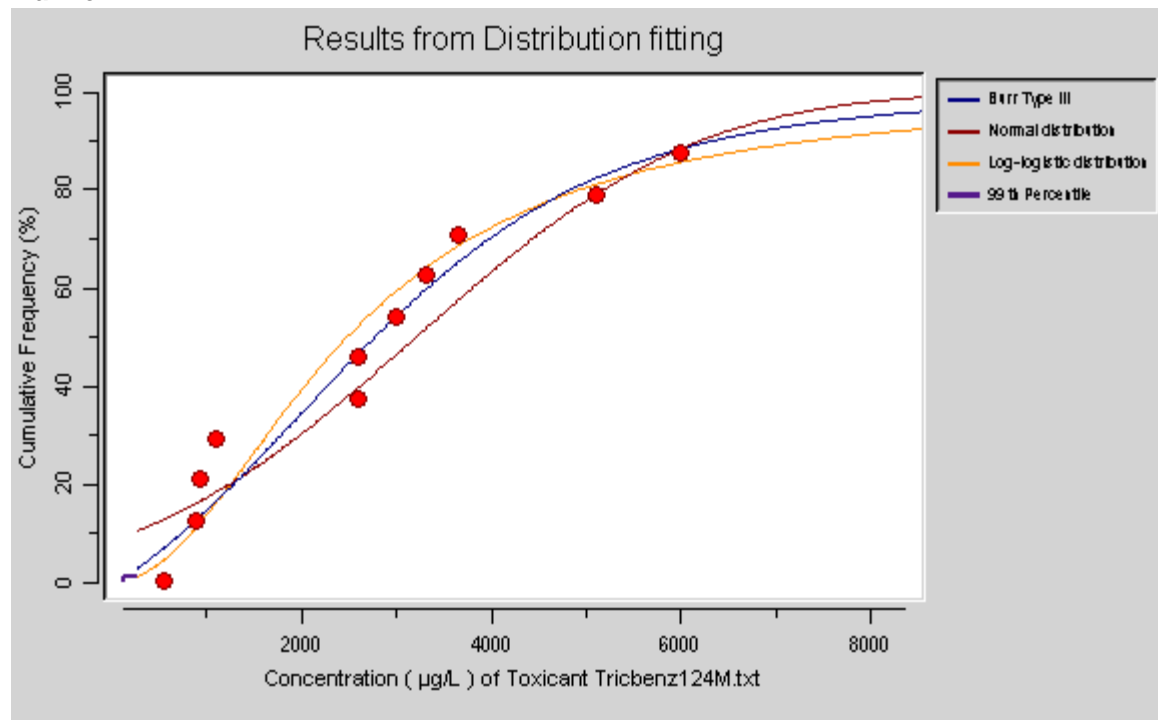
1,2,4-trichlorobenzene

Freshwater



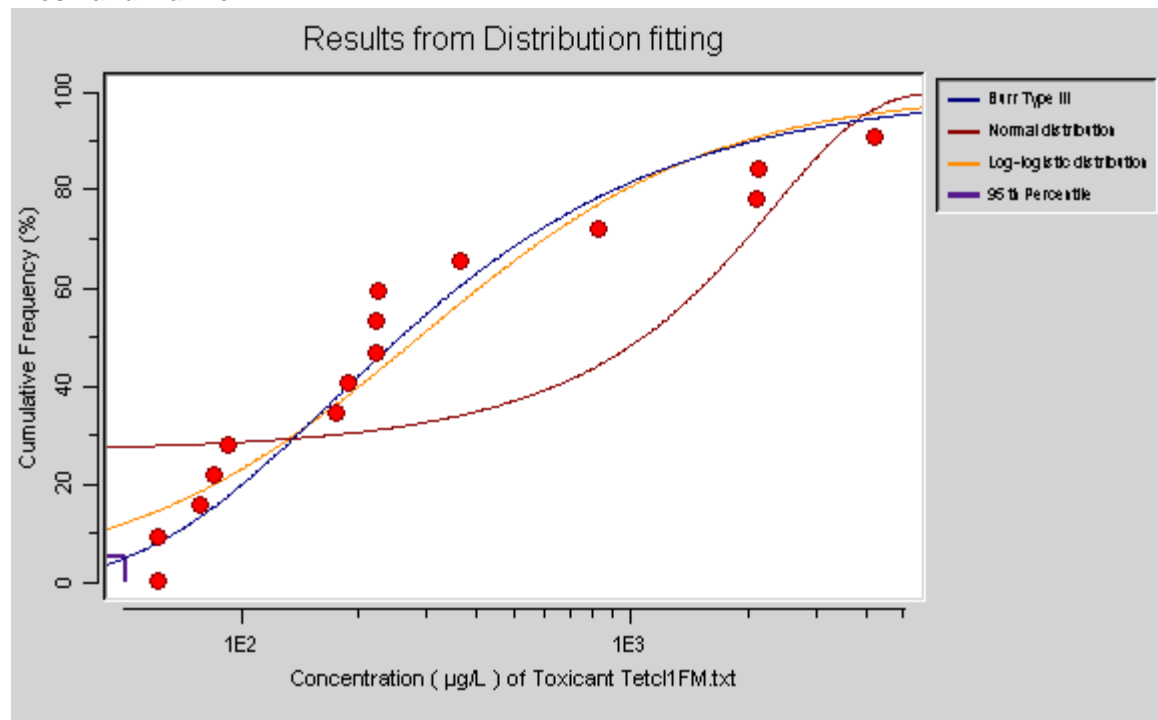
1,2,4-trichlorobenzene

Marine



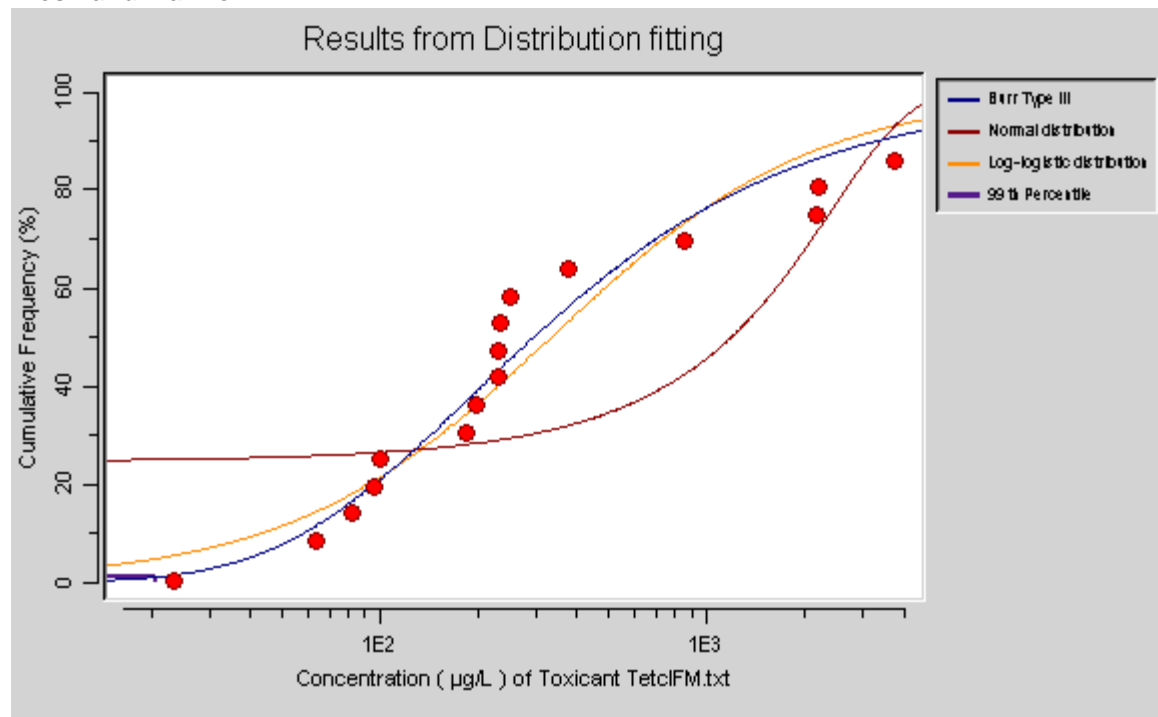
1,3,5-trichlorobenzene

Fresh and Marine



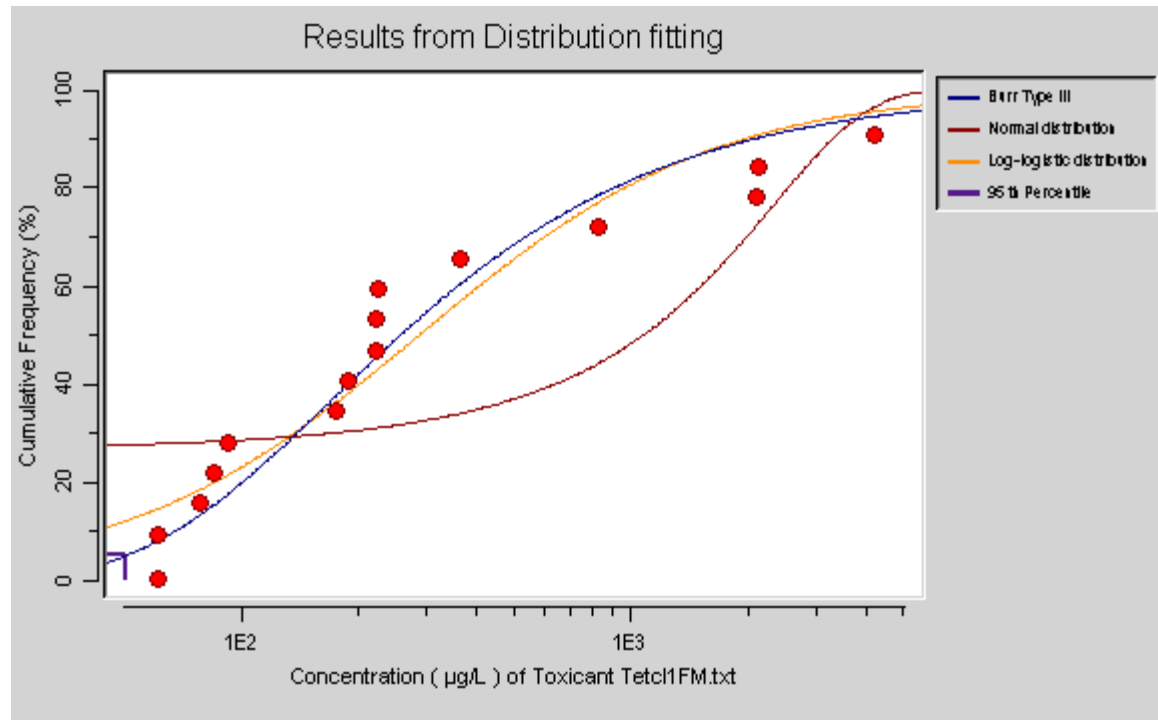
1,2,3,4-tetrachlorobenzene

Fresh and Marine



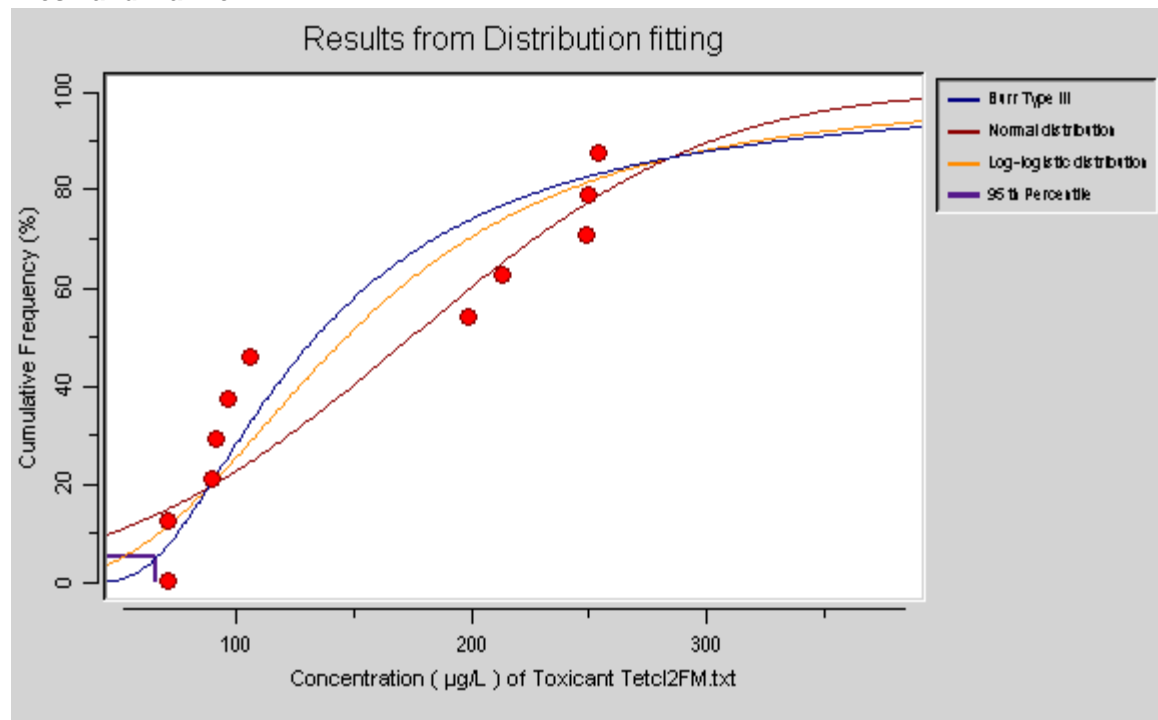
1,2,3,5-tetrachlorobenzene

Fresh and Marine



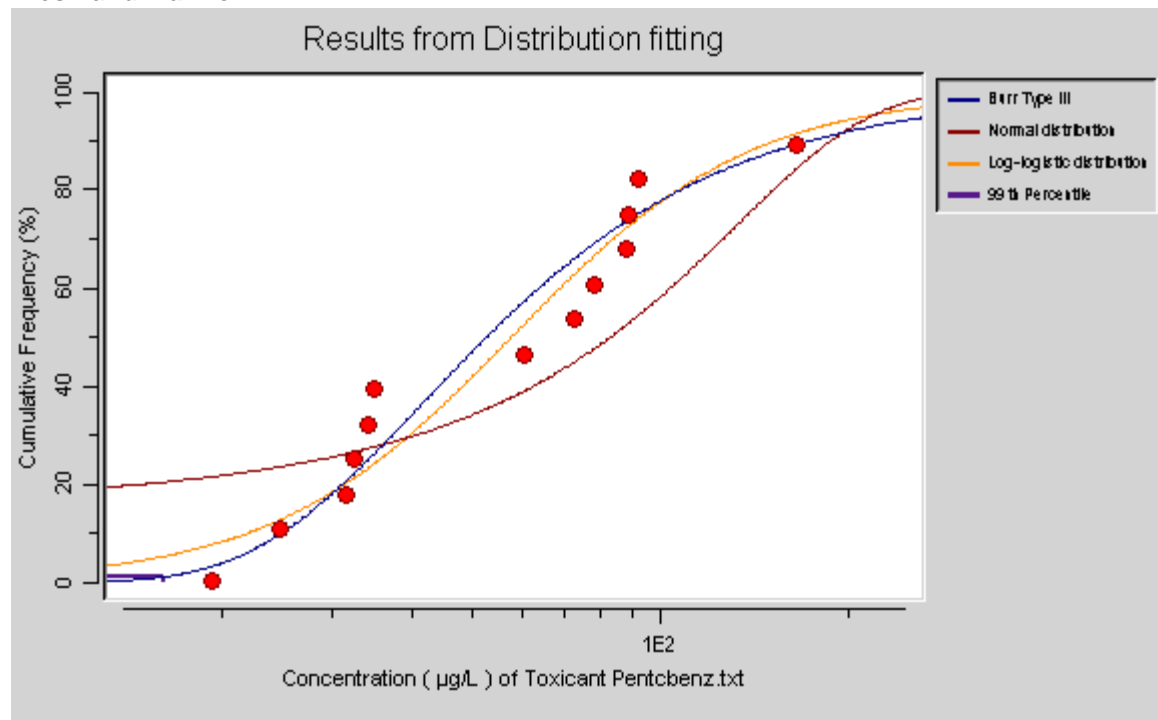
1,2,4,5-tetrachlorobenzene

Fresh and Marine



Pentachlorobenzene

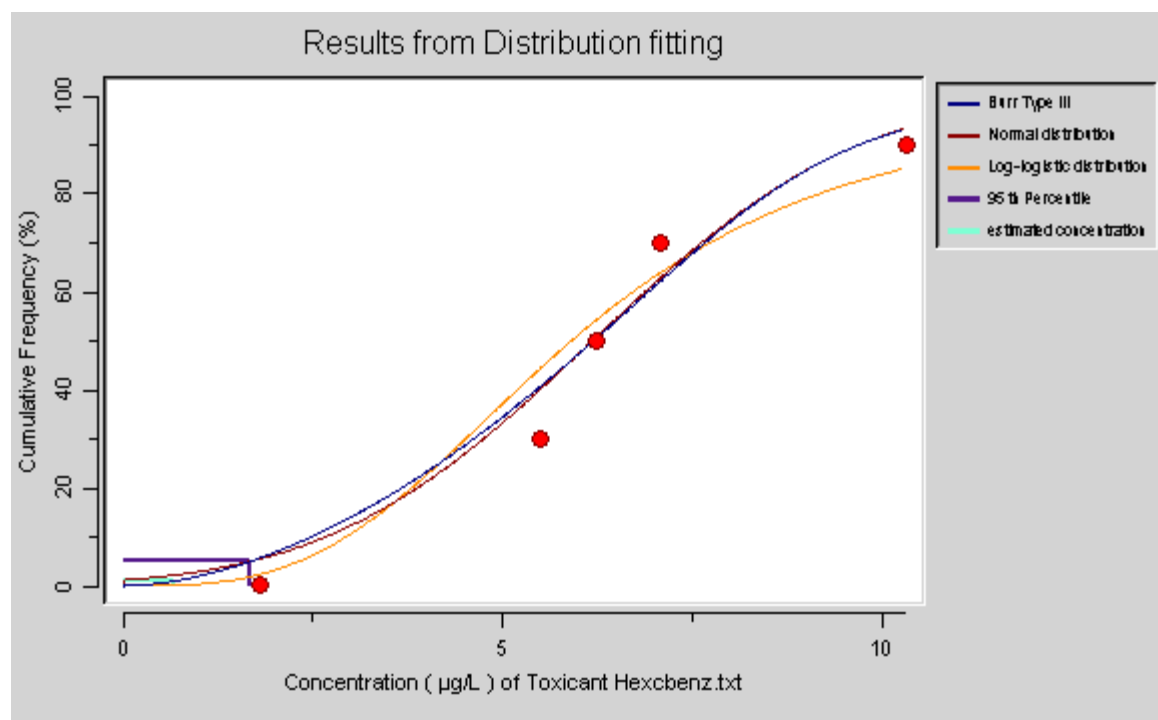
Fresh and Marine



Hexachlorobenzene

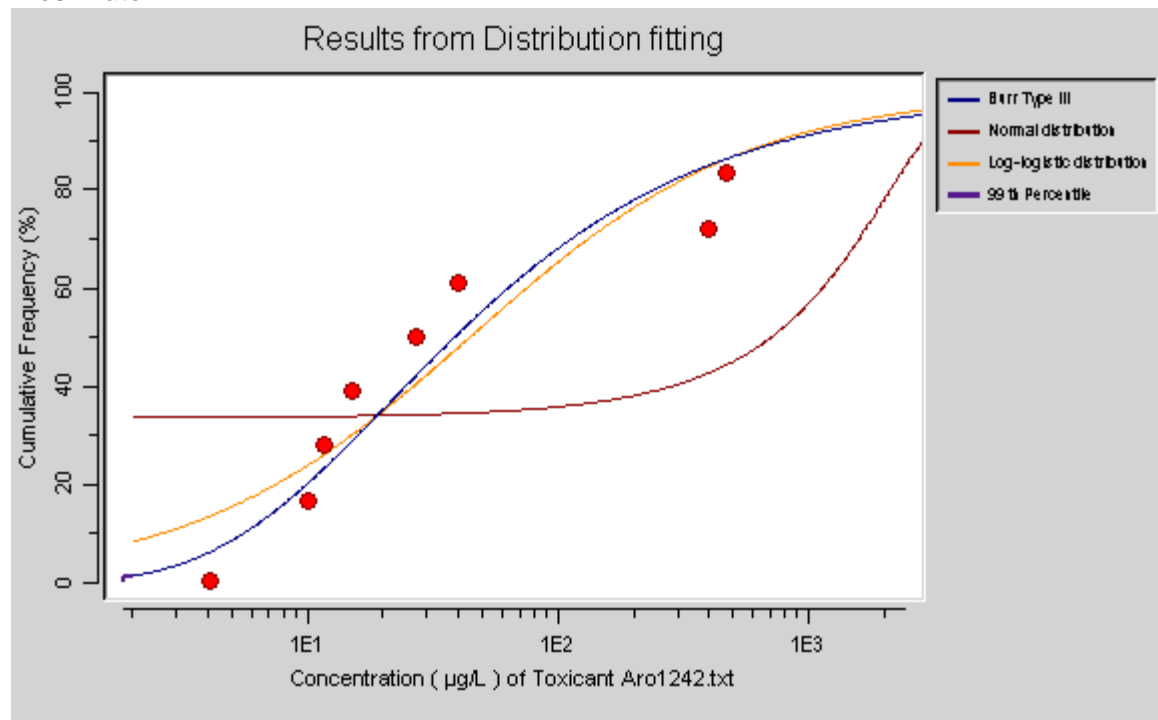
Fresh and Marine

In this plot the dark blue line indicates the PC95 50% while the light blue line is the PC99 50%.



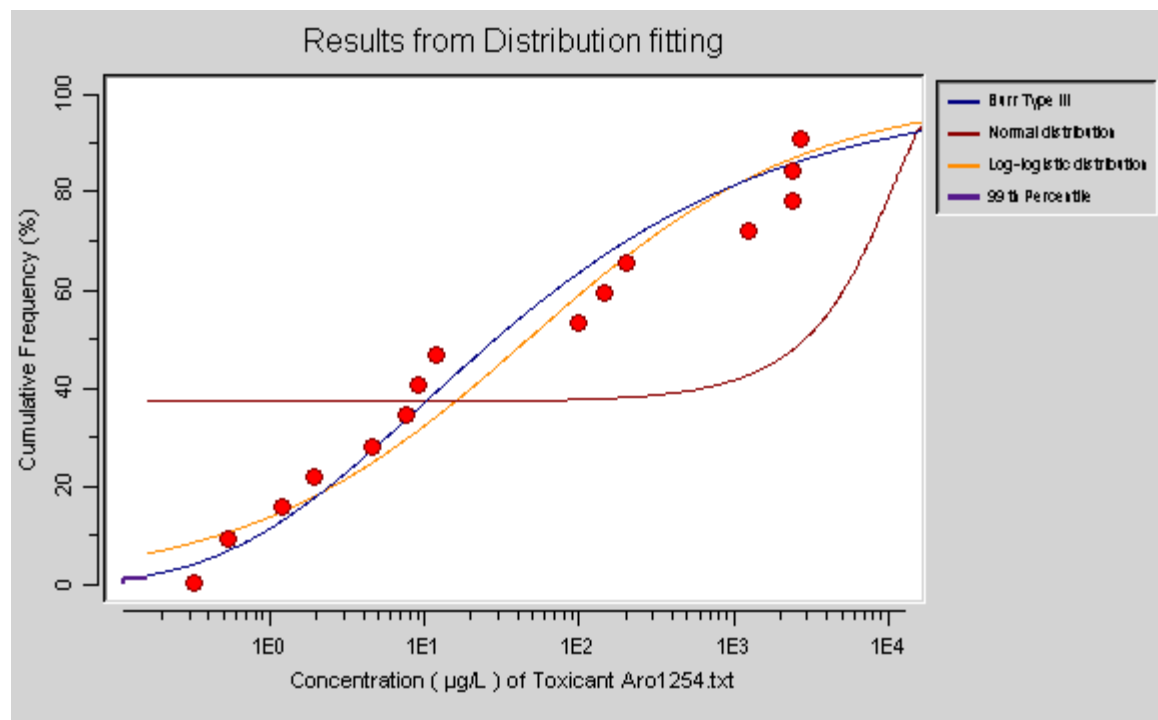
Aroclor 1242

Freshwater



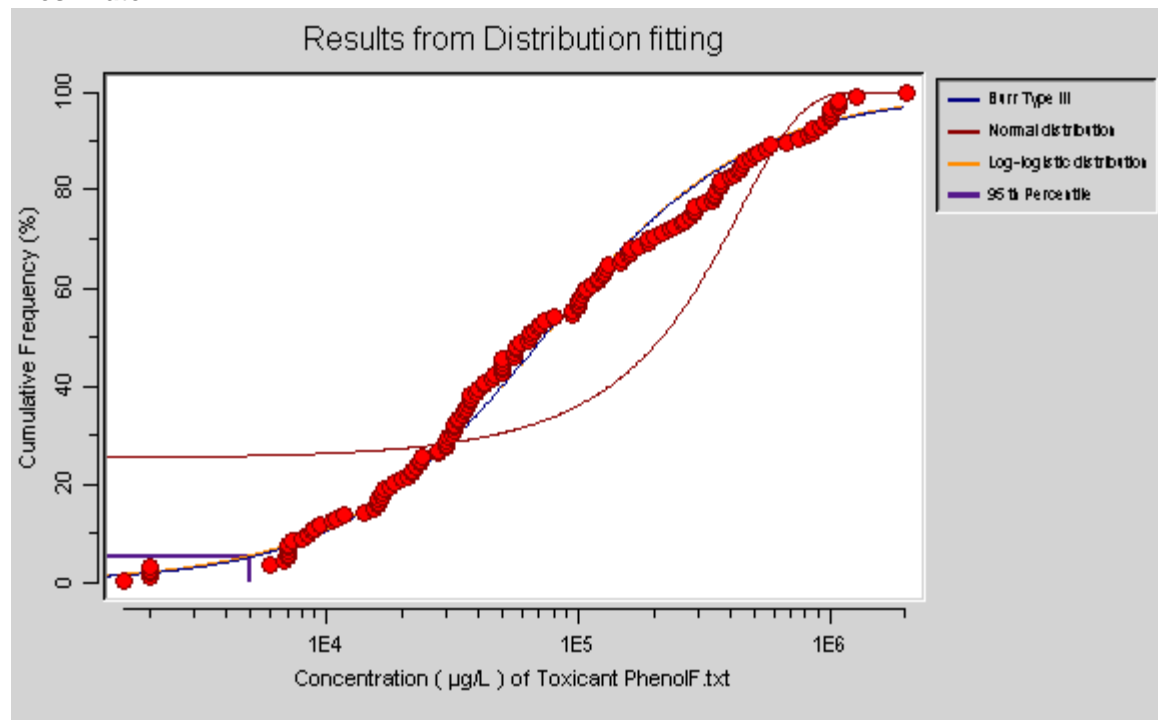
Aroclor 1254

Freshwater



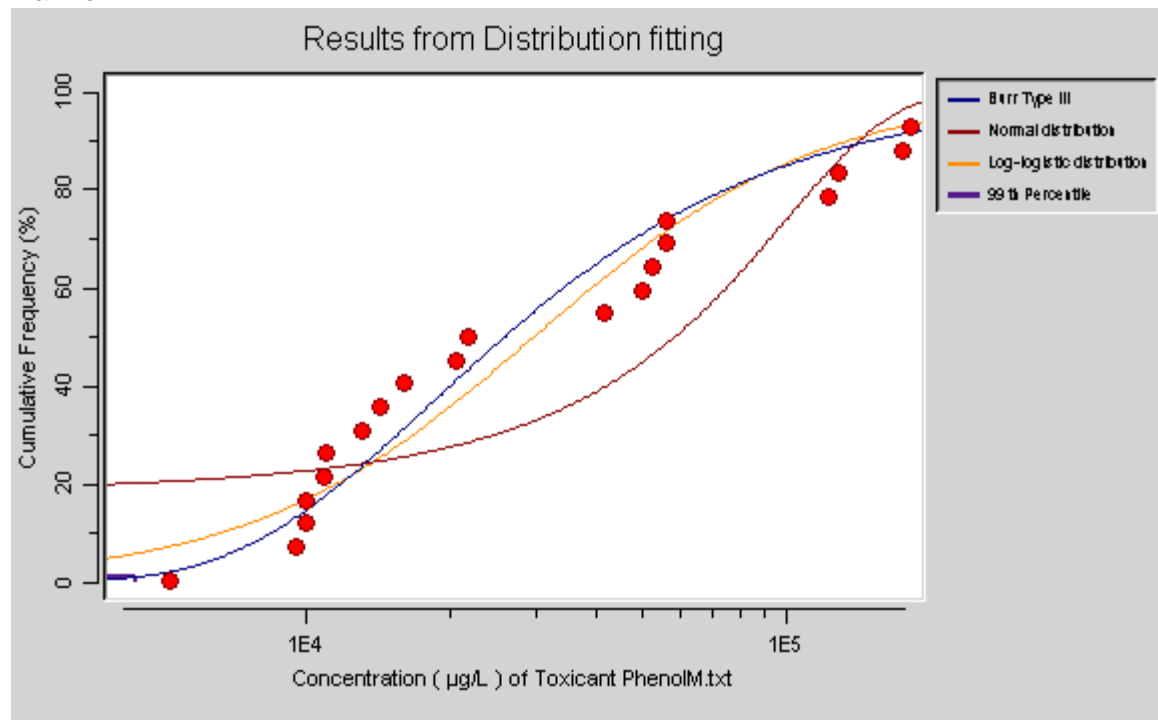
Phenol

Freshwater



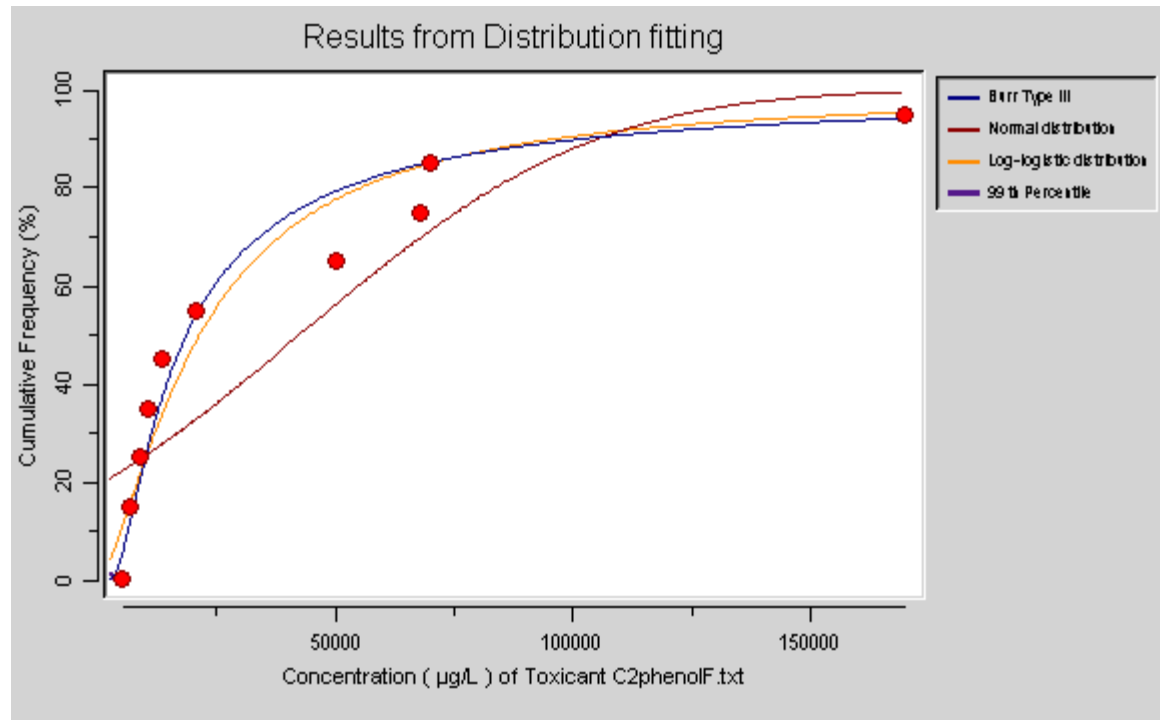
Phenol

Marine



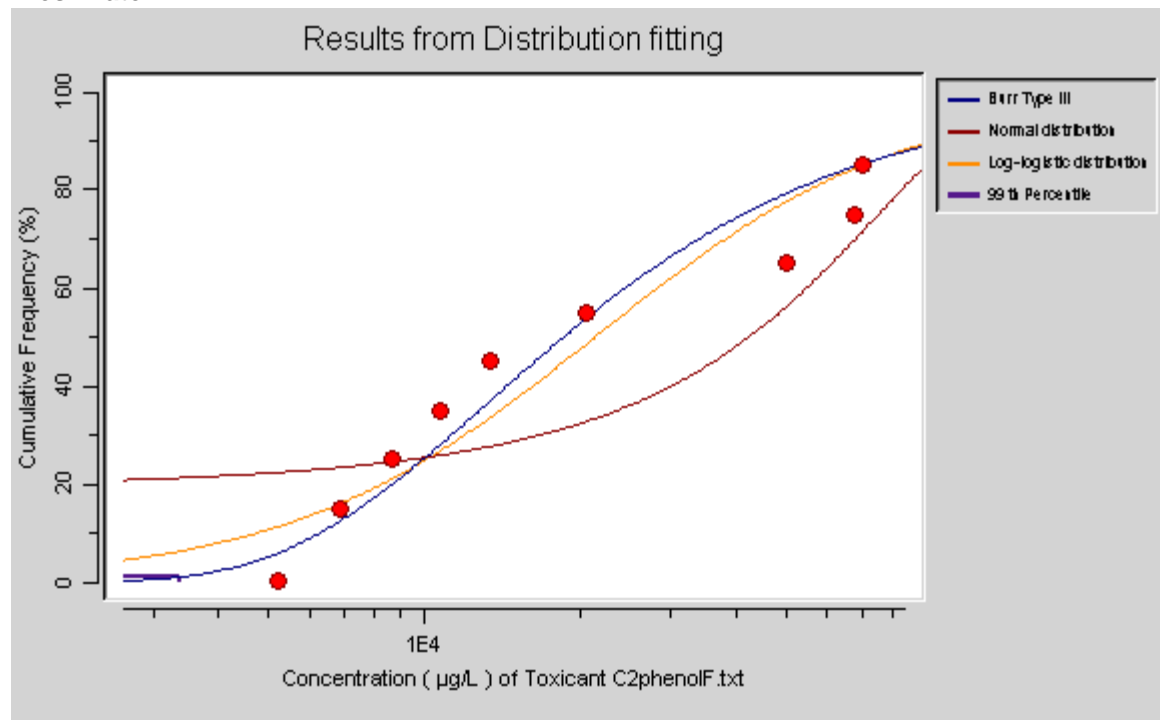
2-chlorophenol

Freshwater



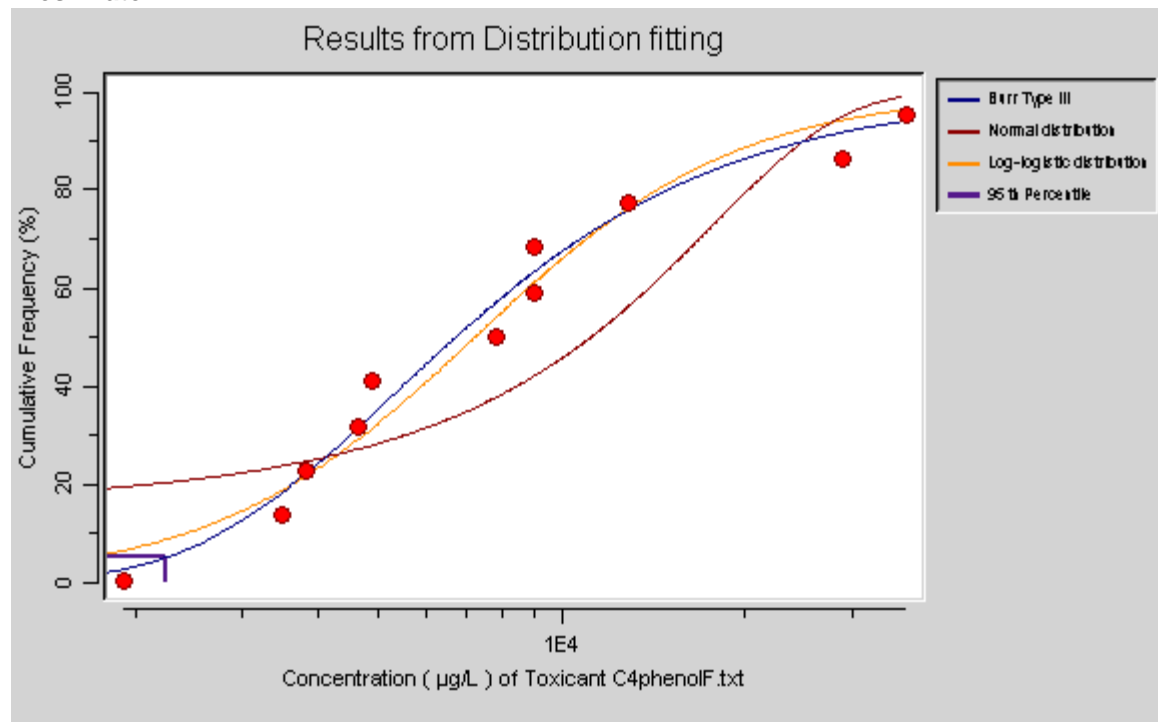
2-chlorophenol

Freshwater



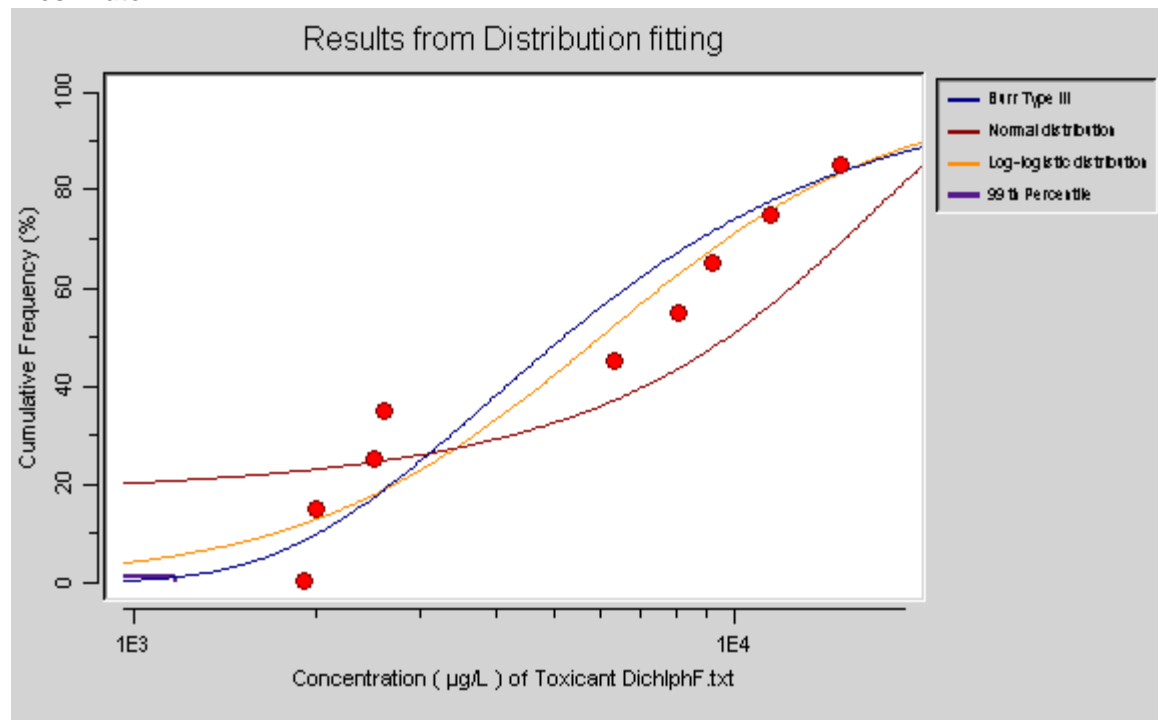
4-chlorophenol

Freshwater



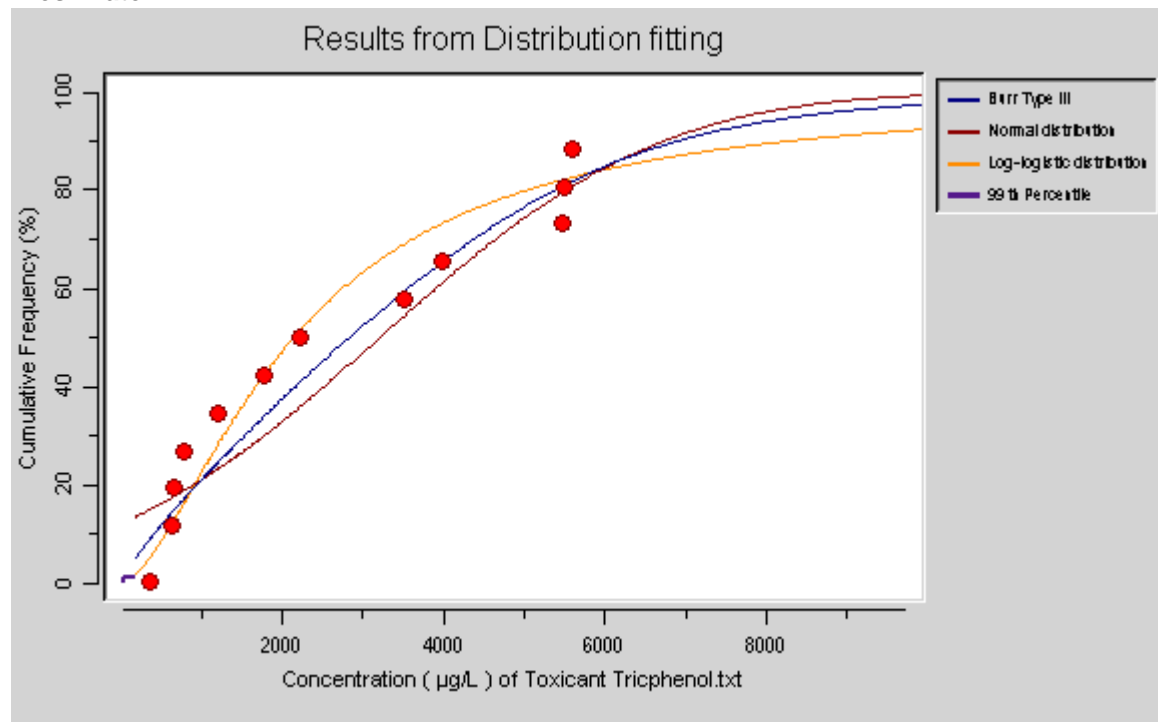
2,4-dichlorophenol

Freshwater



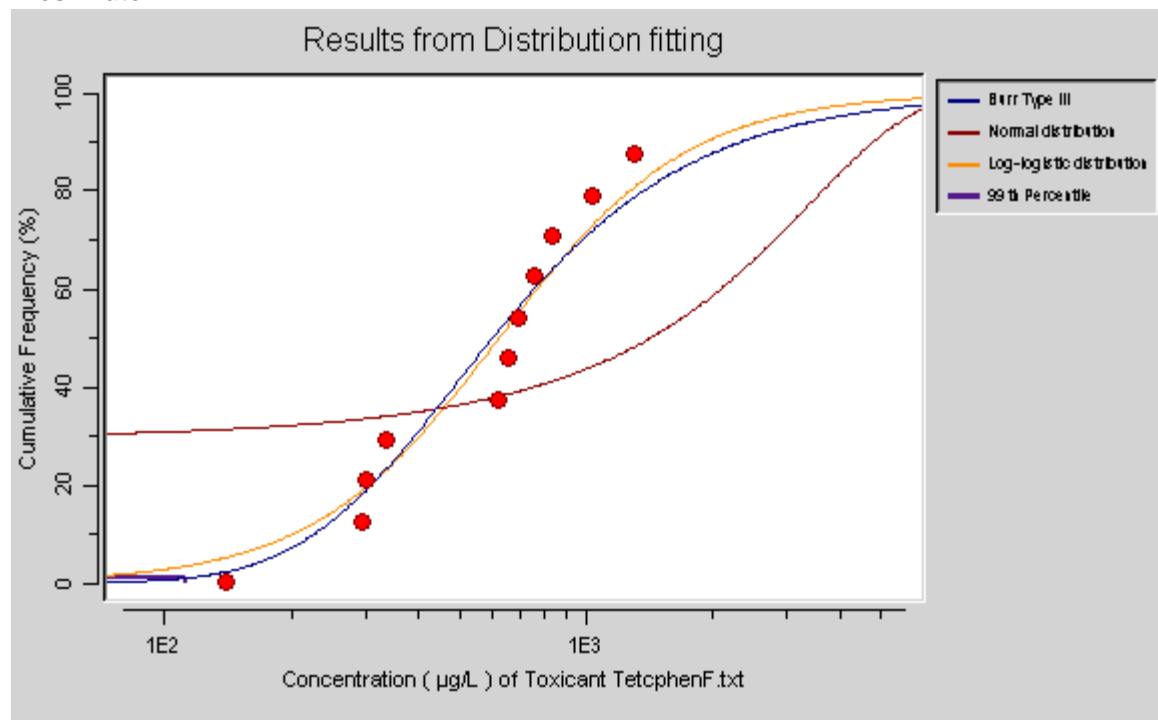
2,4,6-trichlorophenol

Freshwater



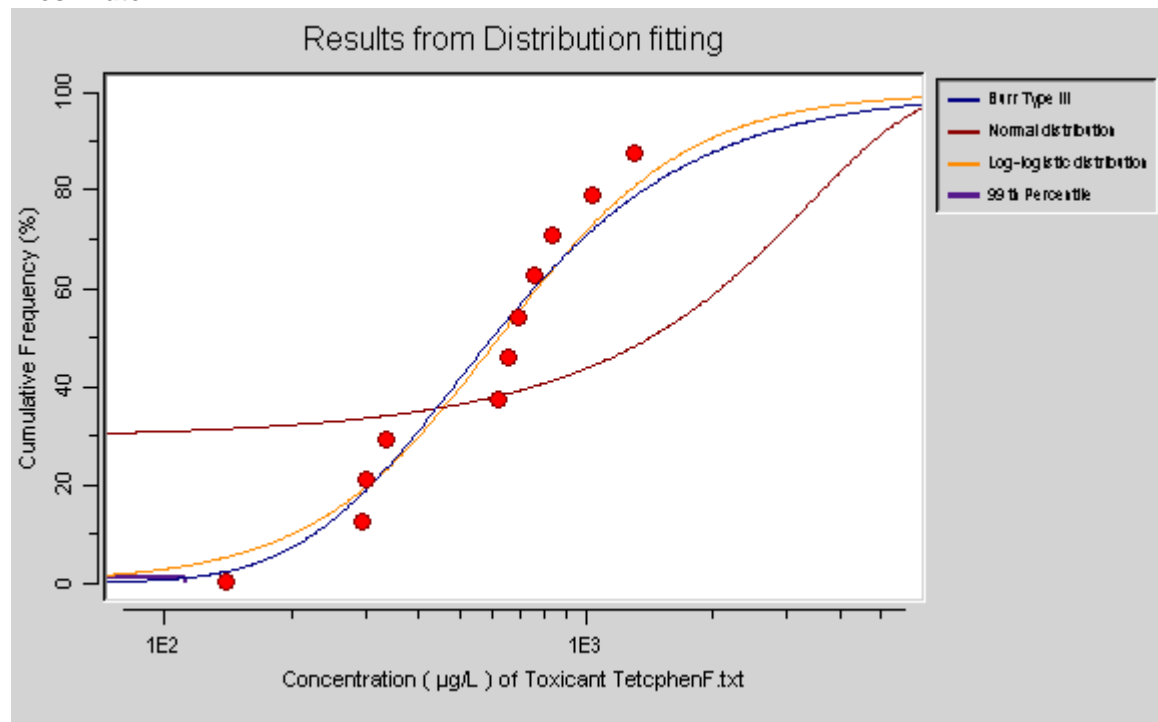
2,4,6-trichlorophenol

Freshwater



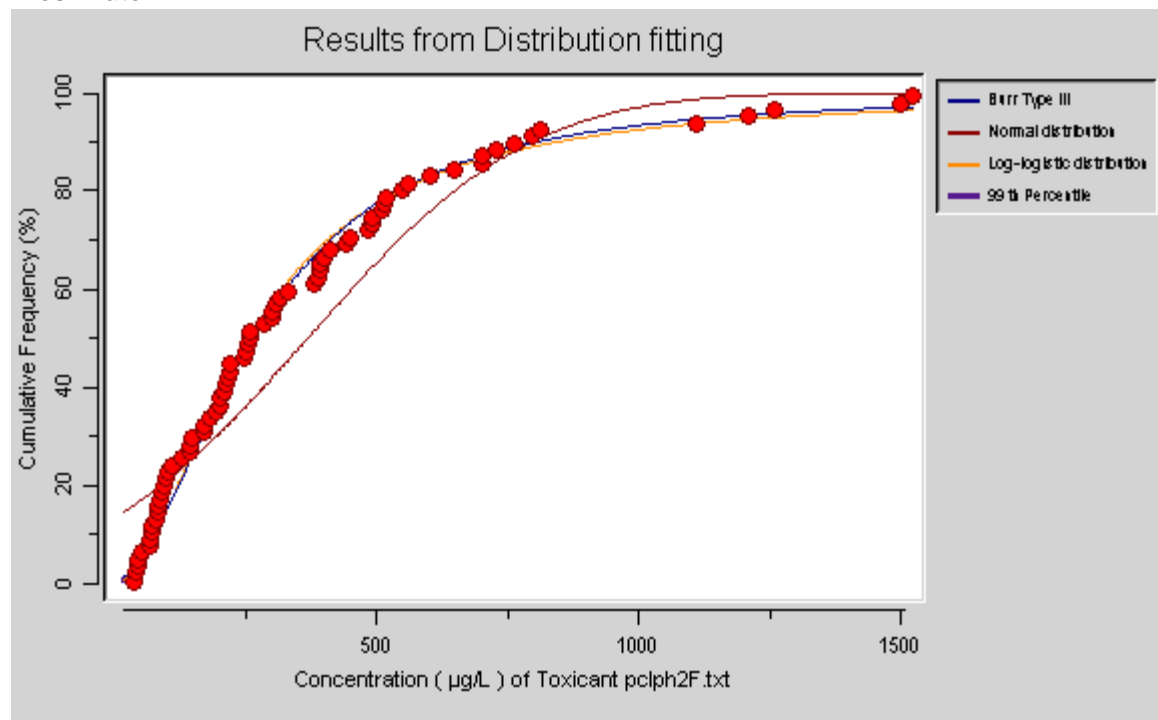
2,3,4,6-tetrachlorophenol

Freshwater



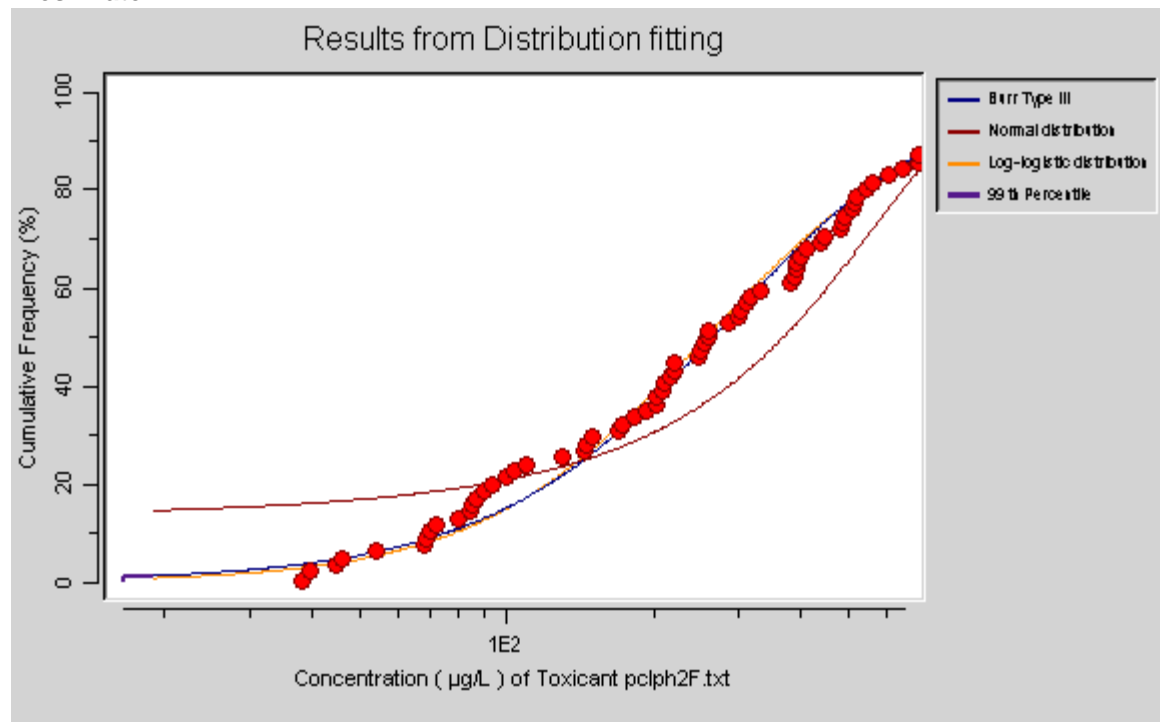
Pentachlorophenol

Freshwater



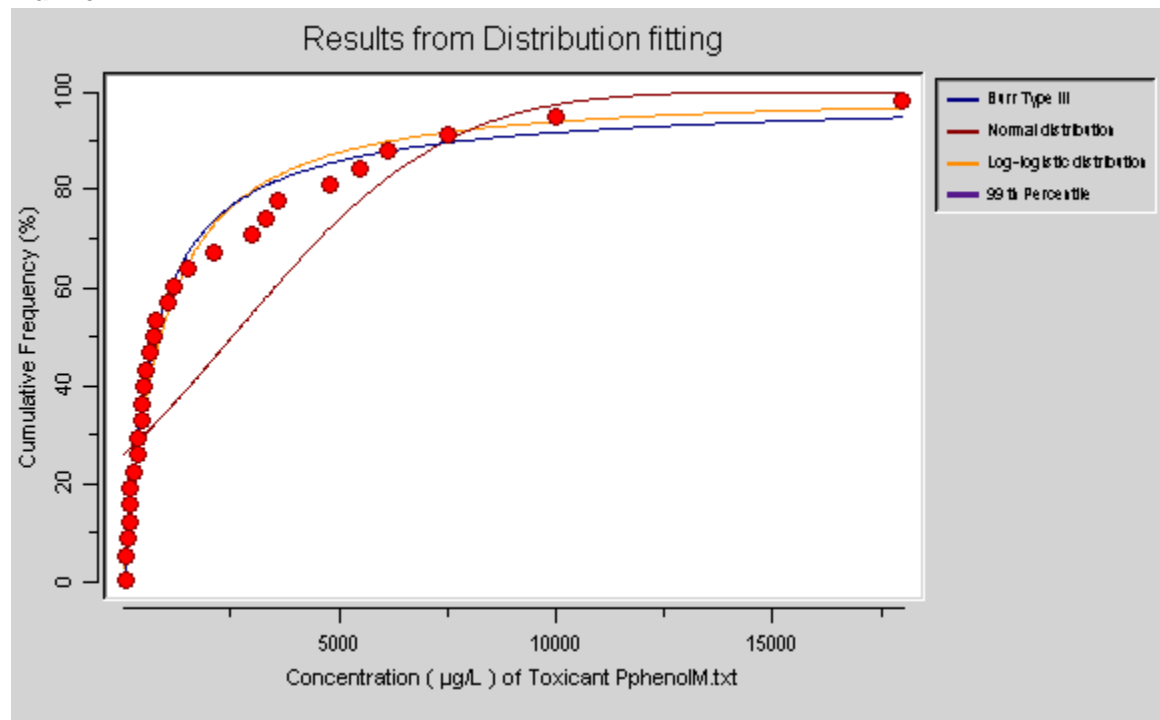
Pentachlorophenol

Freshwater



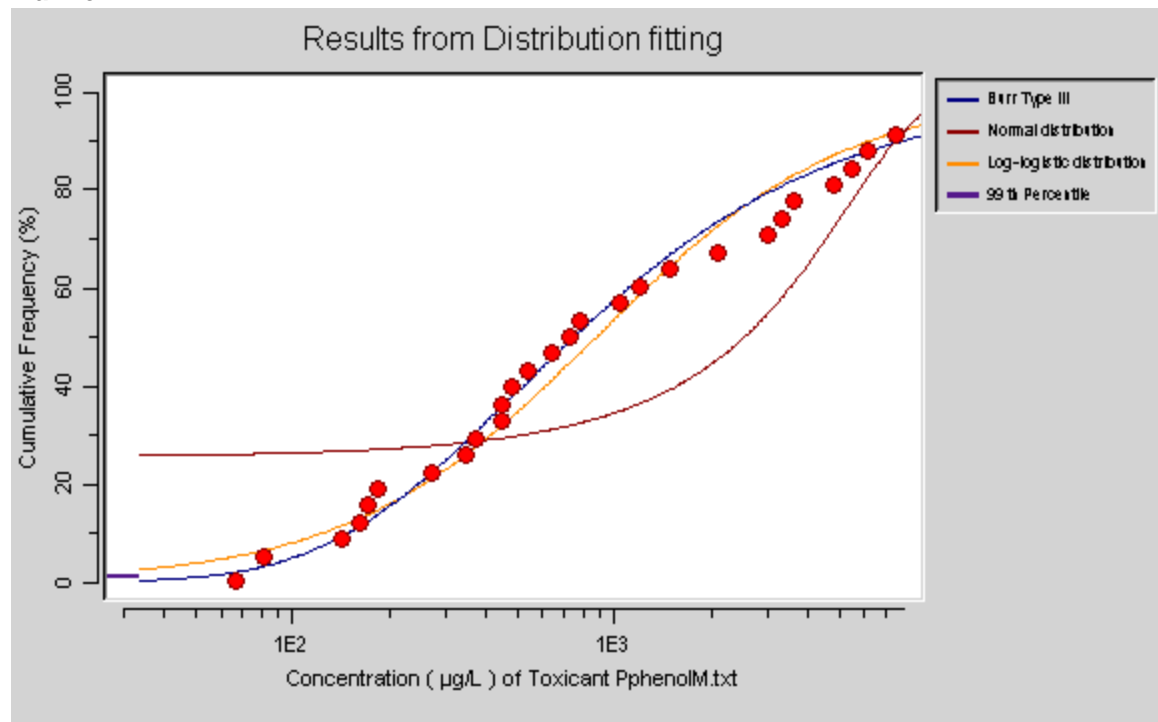
Pentachlorophenol

Marine



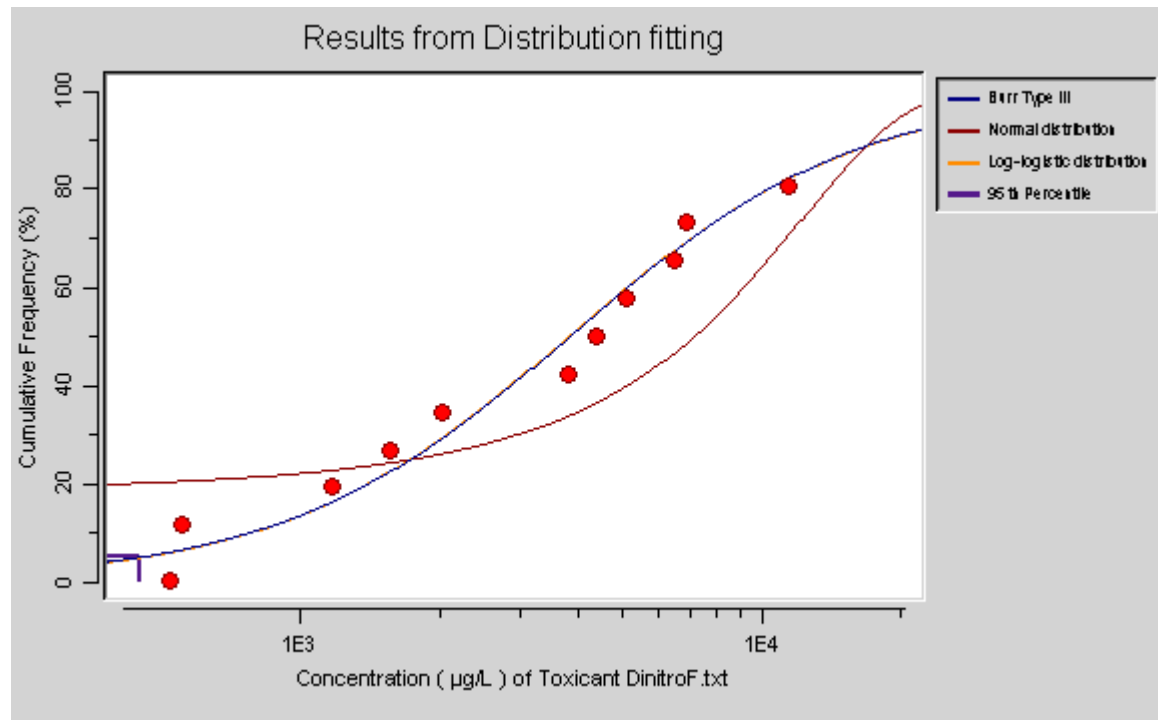
Pentachlorophenol

Marine



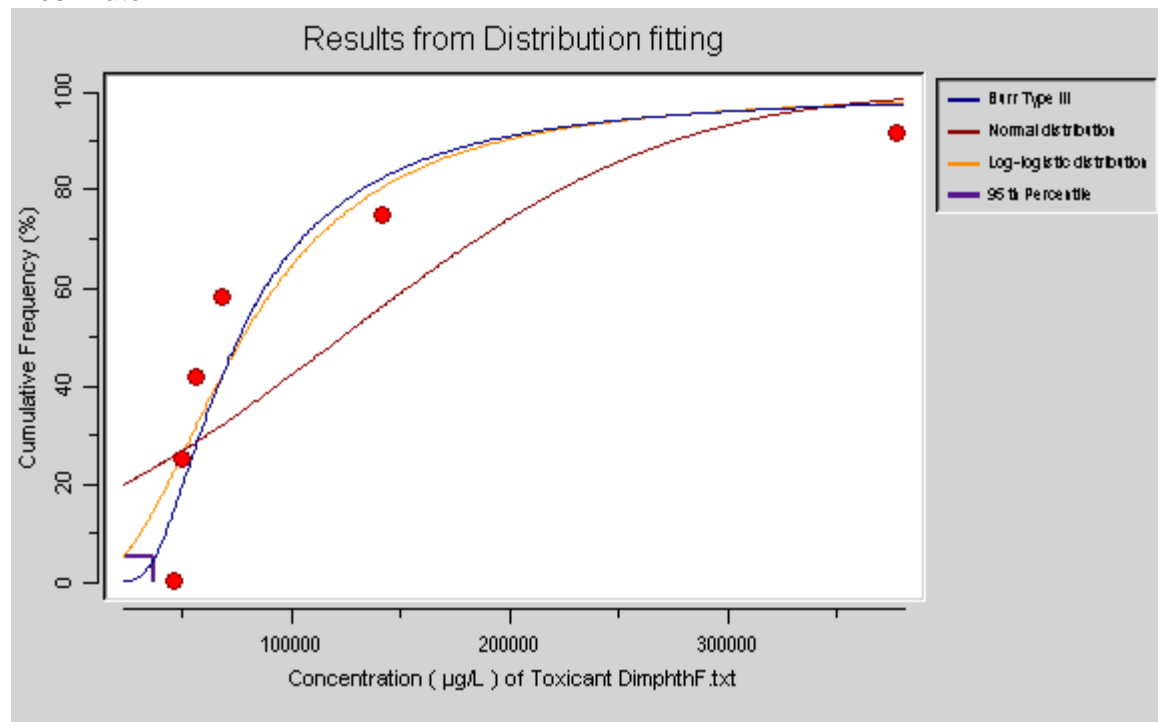
2,4-dinitrophenol

Freshwater



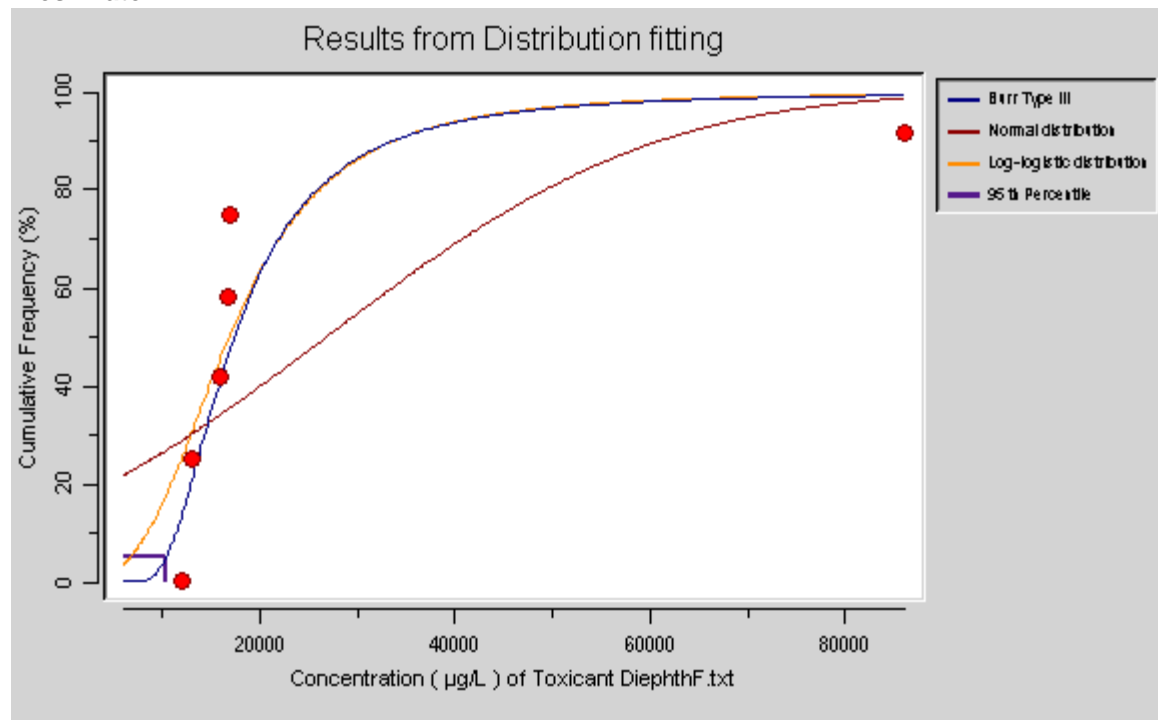
Dimethylphthalate

Freshwater



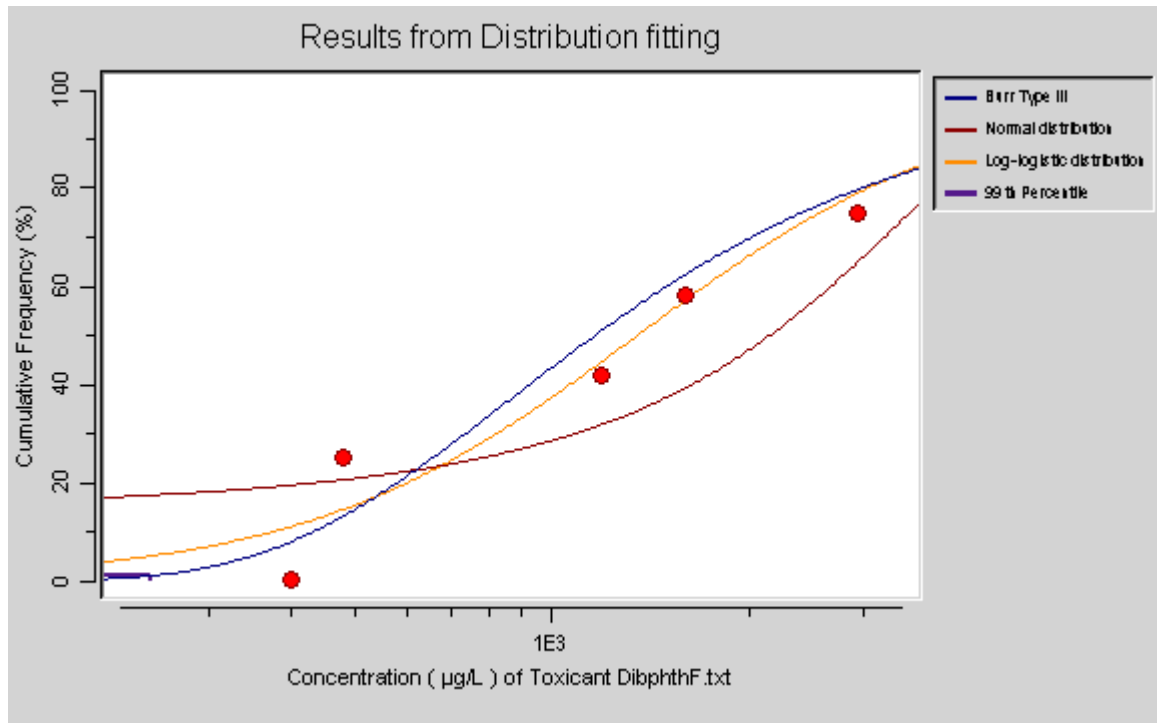
Diethylphthalate

Freshwater



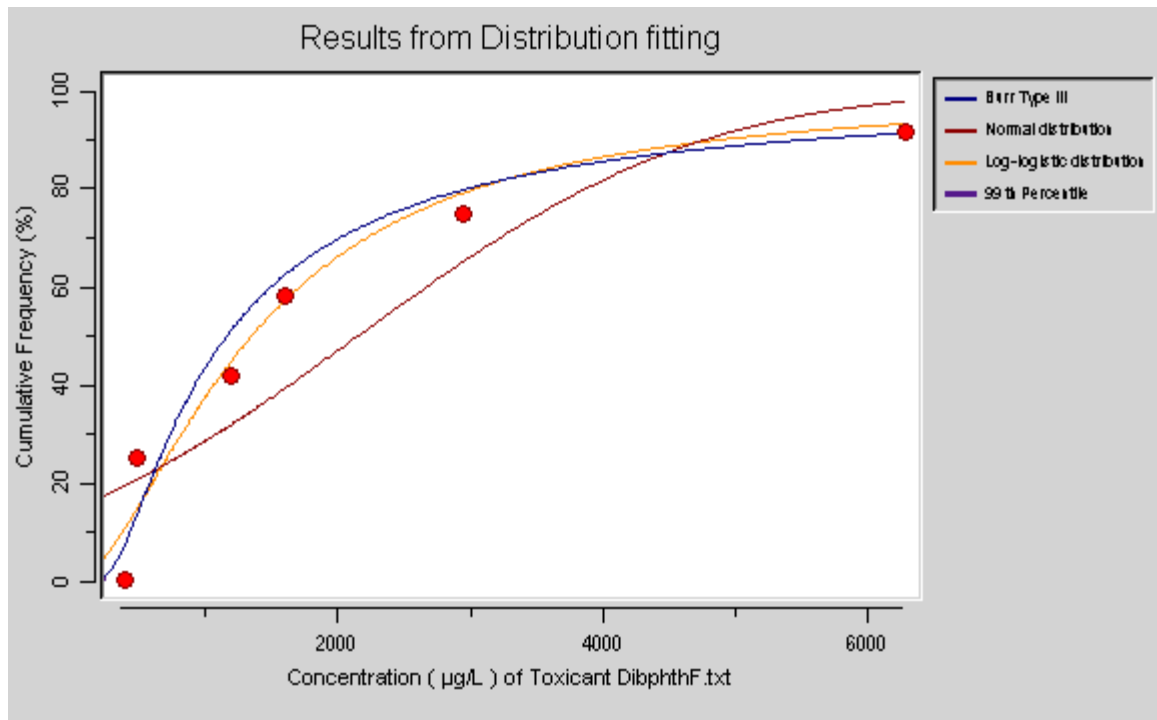
Dibutylphthalate

Freshwater



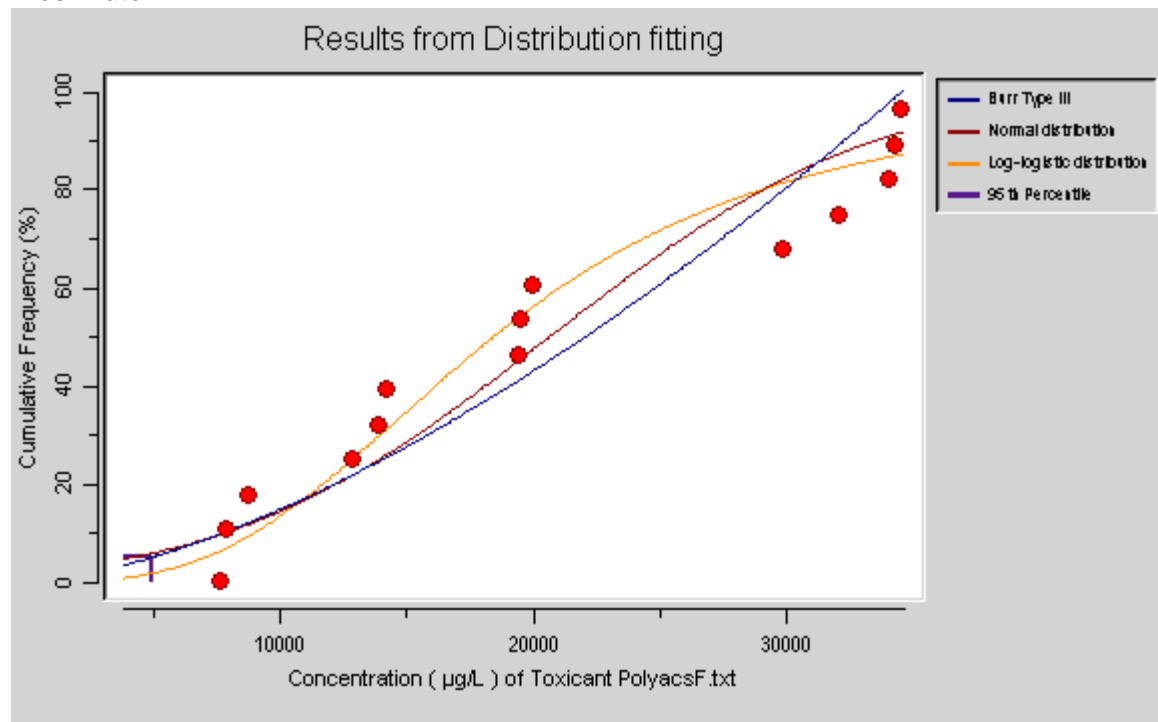
Dibutylphthalate

Freshwater



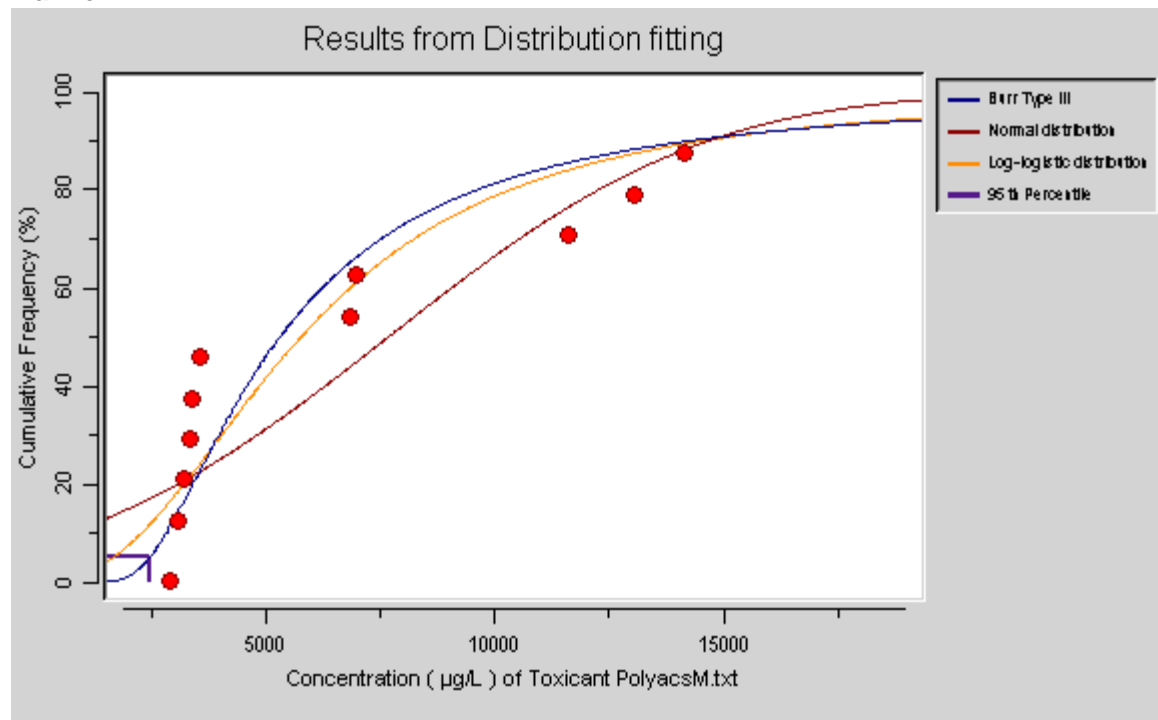
Polyacrylonitrile

Freshwater



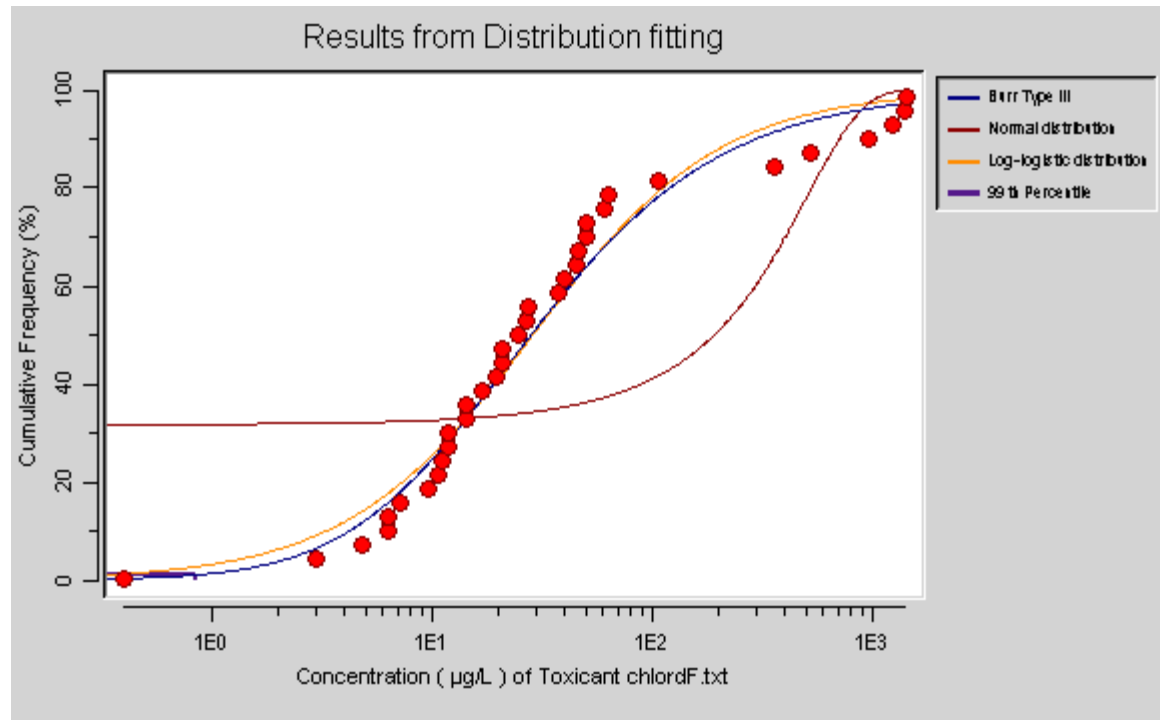
Polyacrylonitrile

Marine



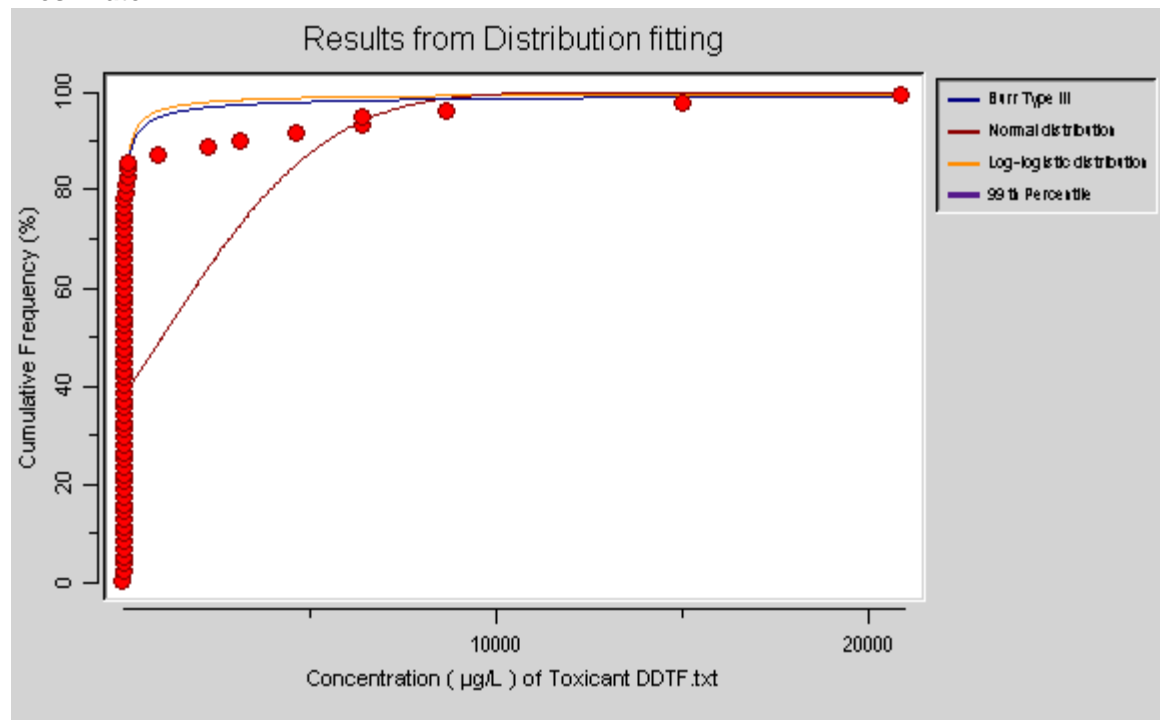
Chlordane

Freshwater



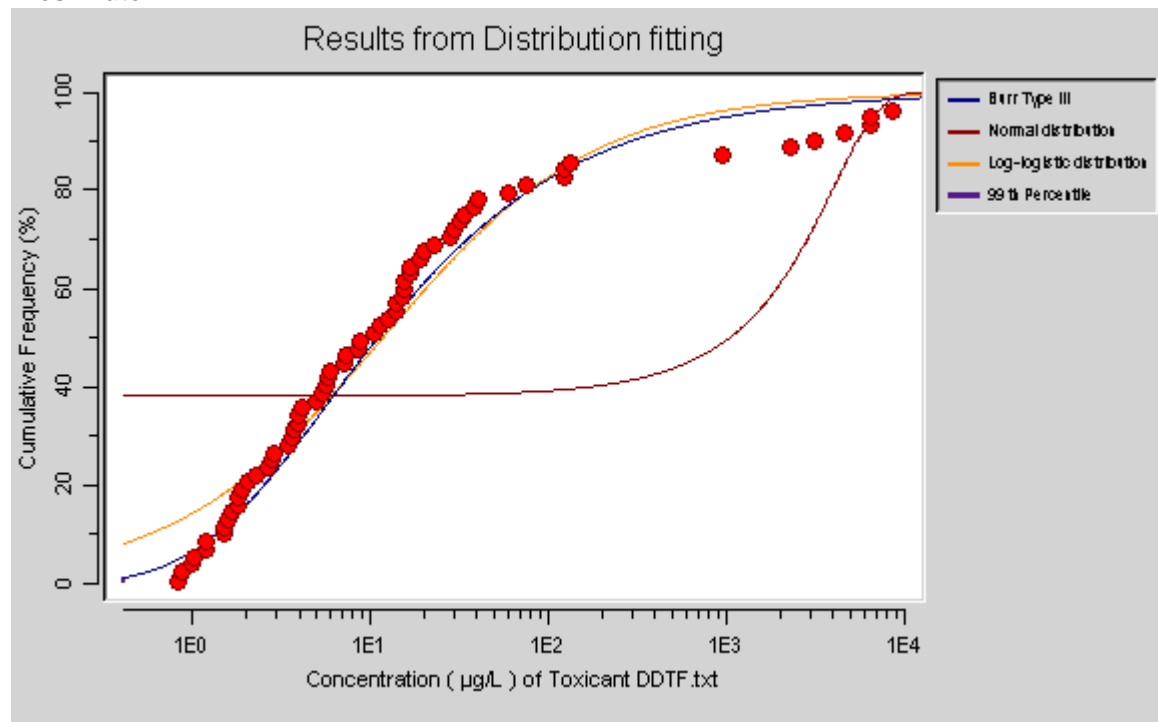
DDT

Freshwater



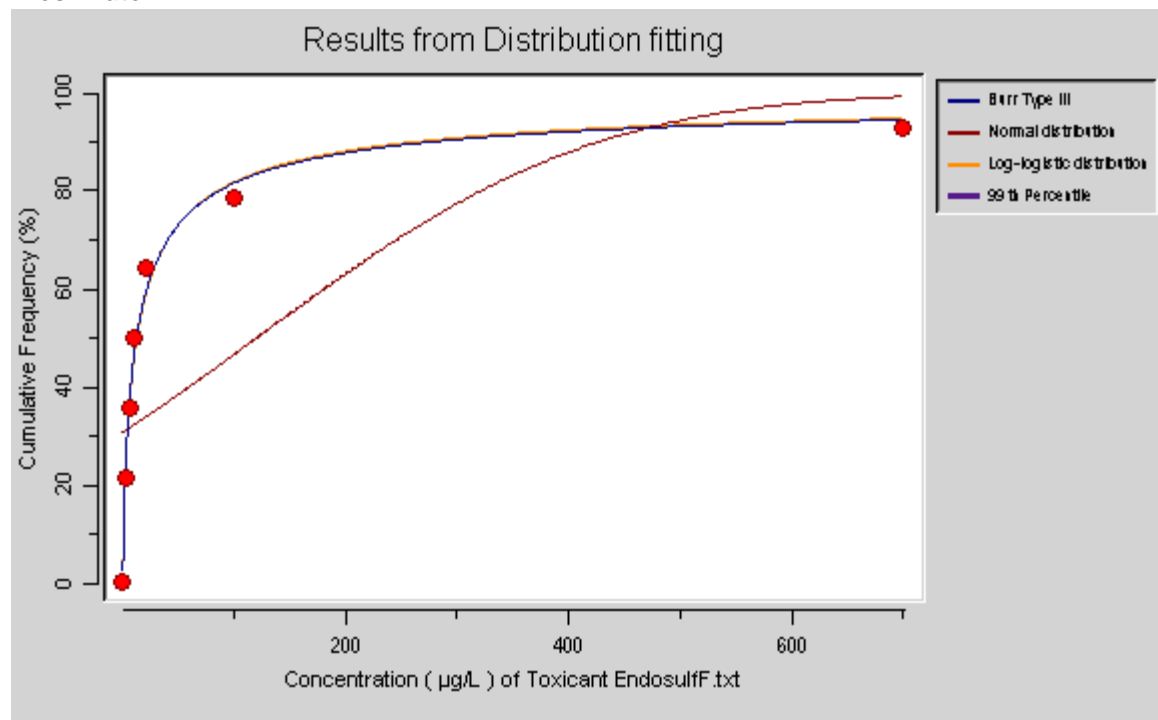
DDT

Freshwater



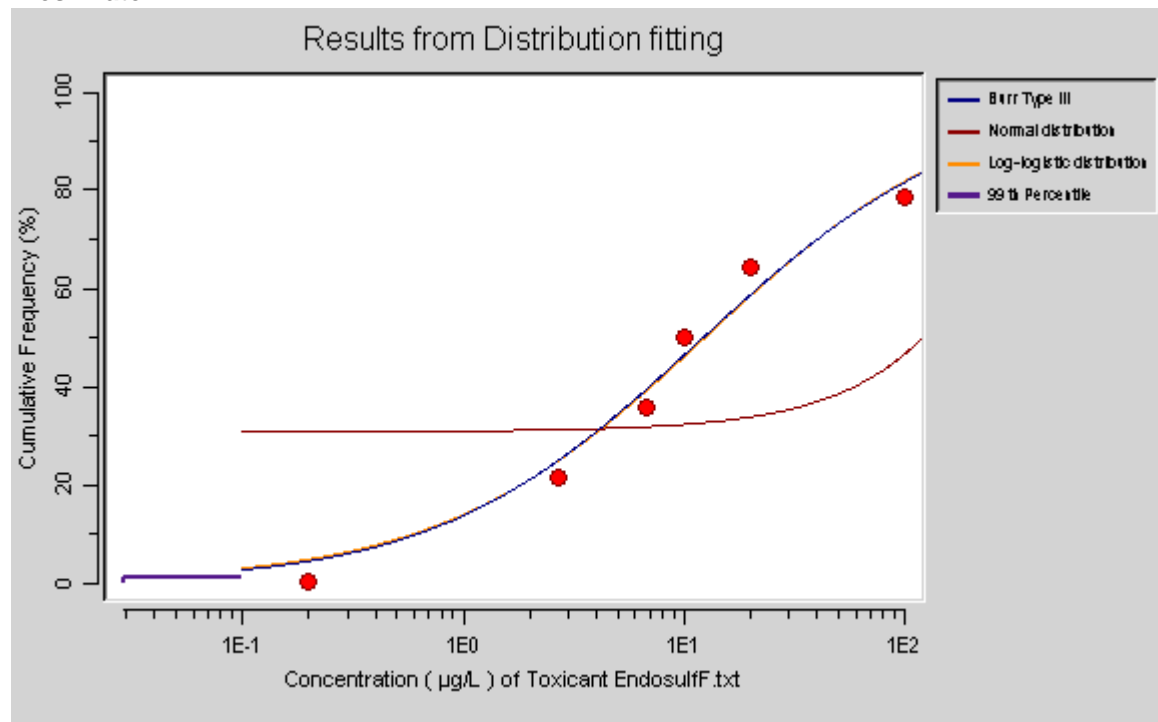
Endosulfan

Freshwater



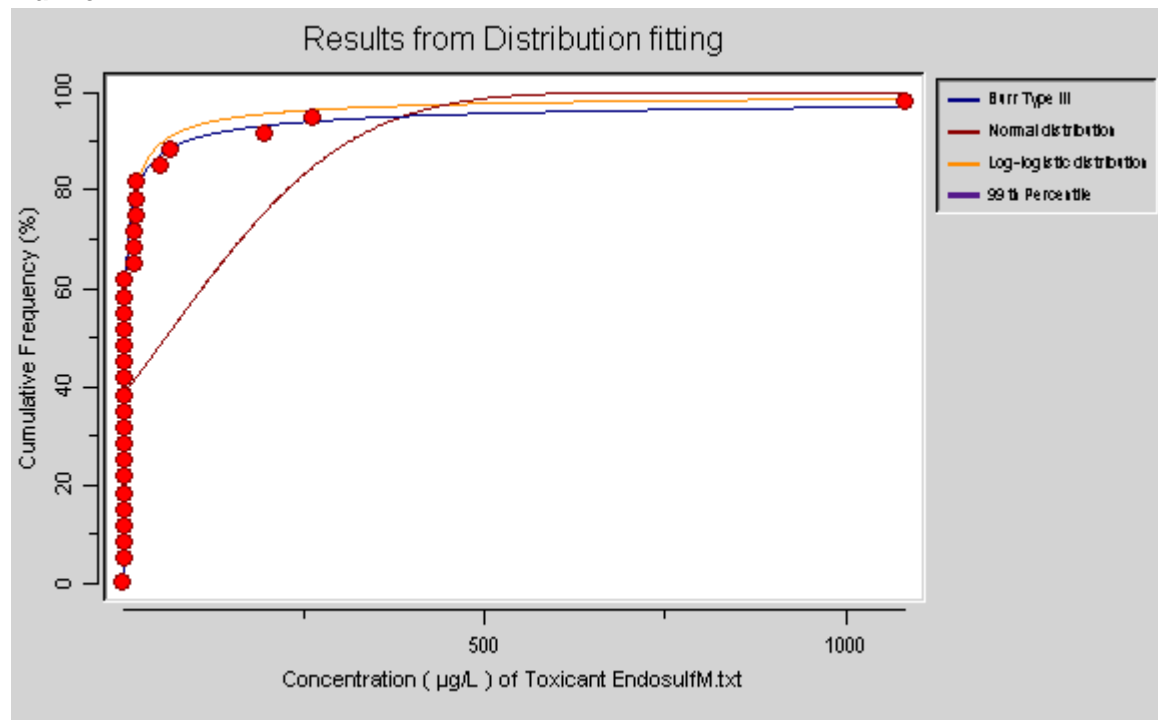
Endosulfan

Freshwater



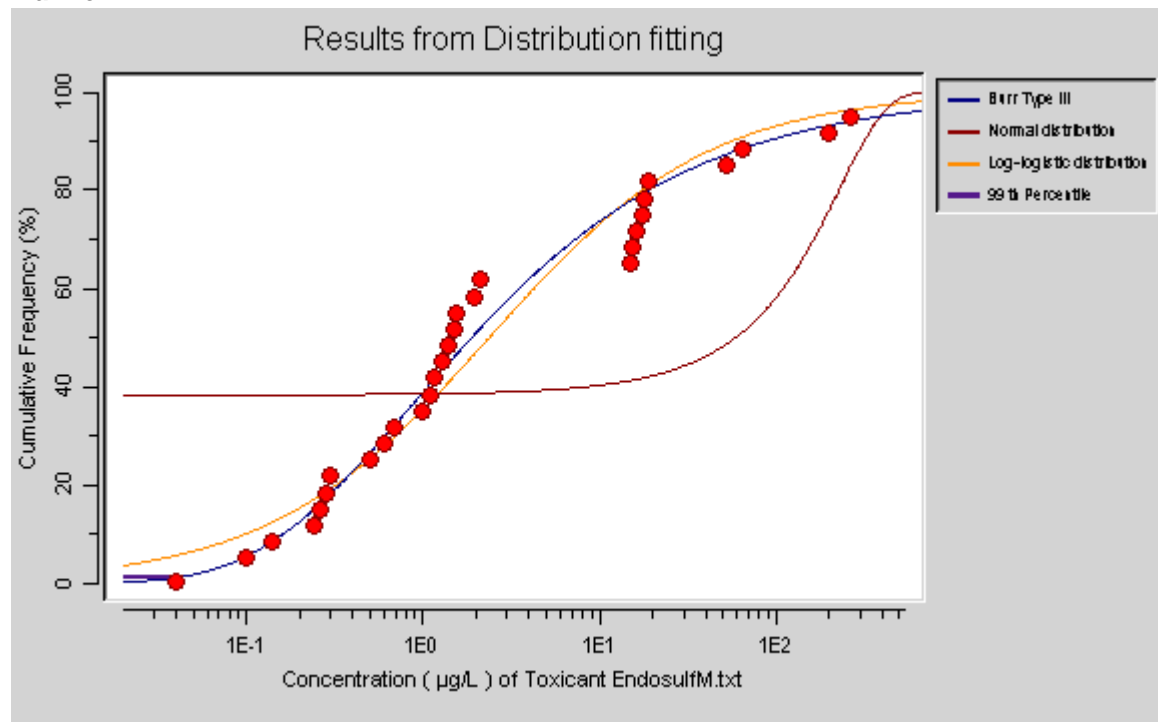
Endosulfan

Marine



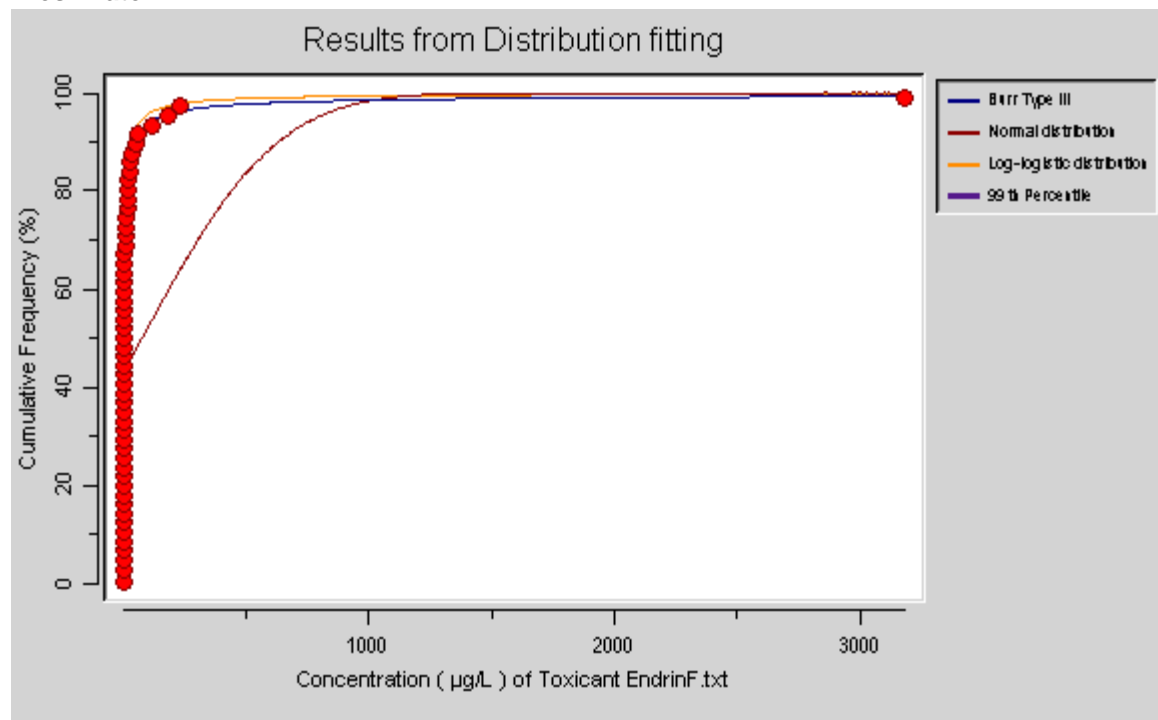
Endosulfan

Marine



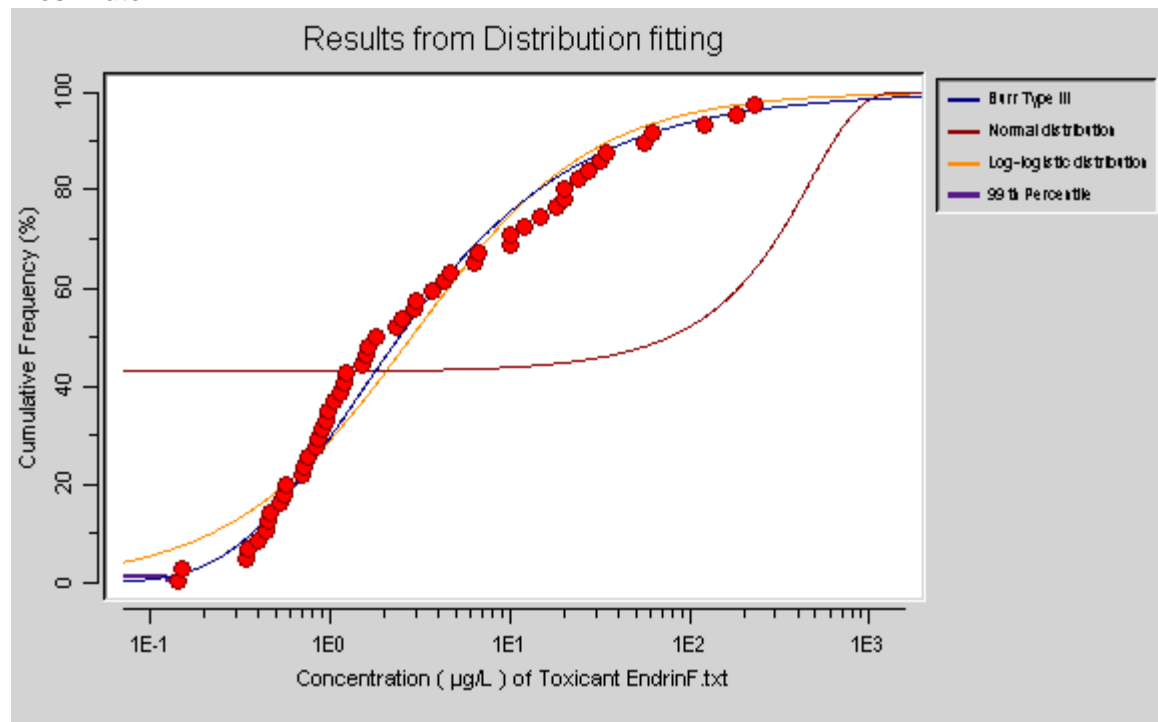
Endrin

Freshwater



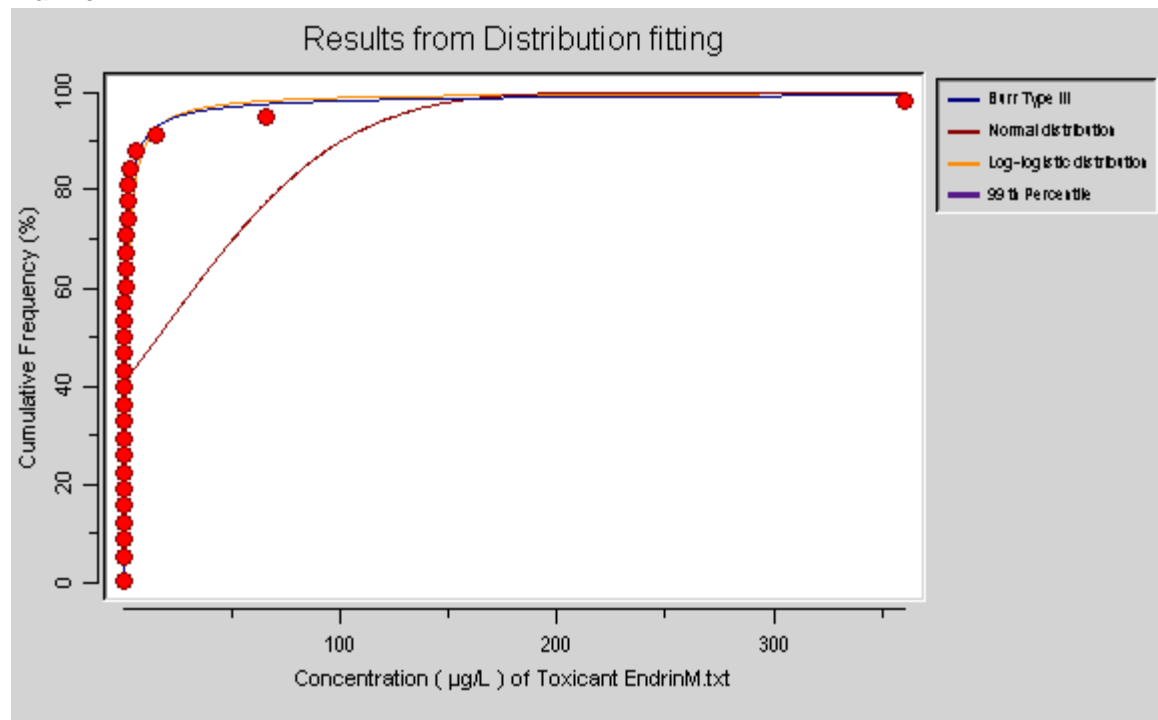
Endrin

Freshwater



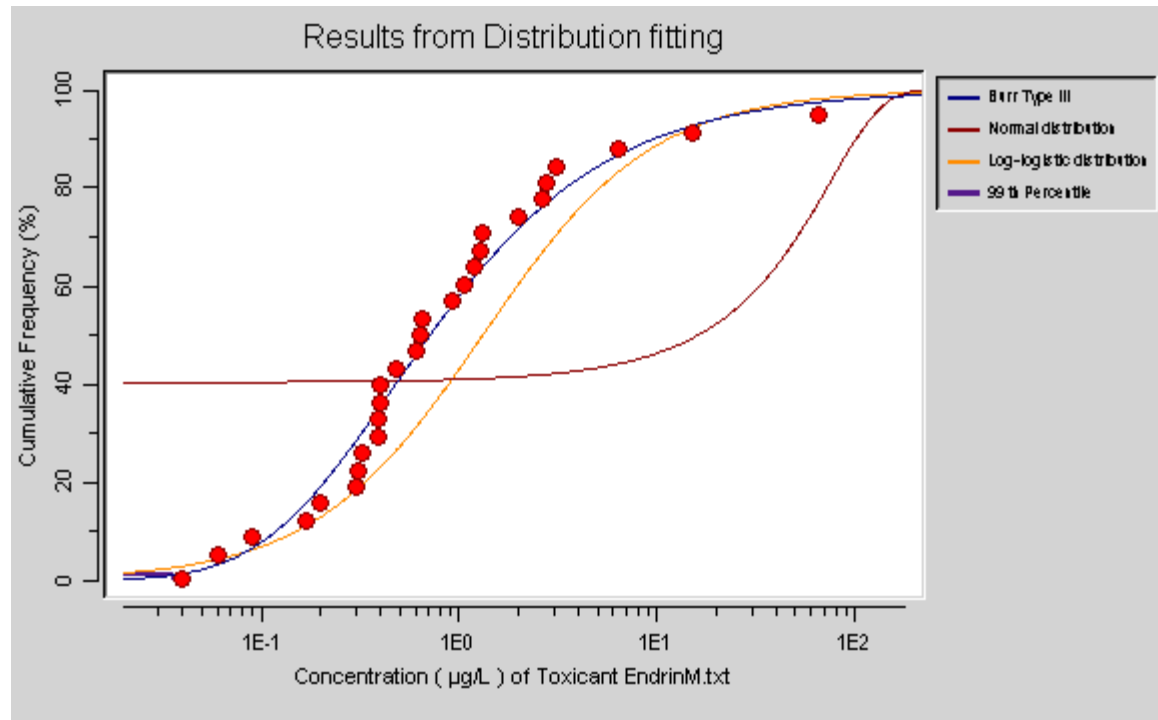
Endrin

Marine



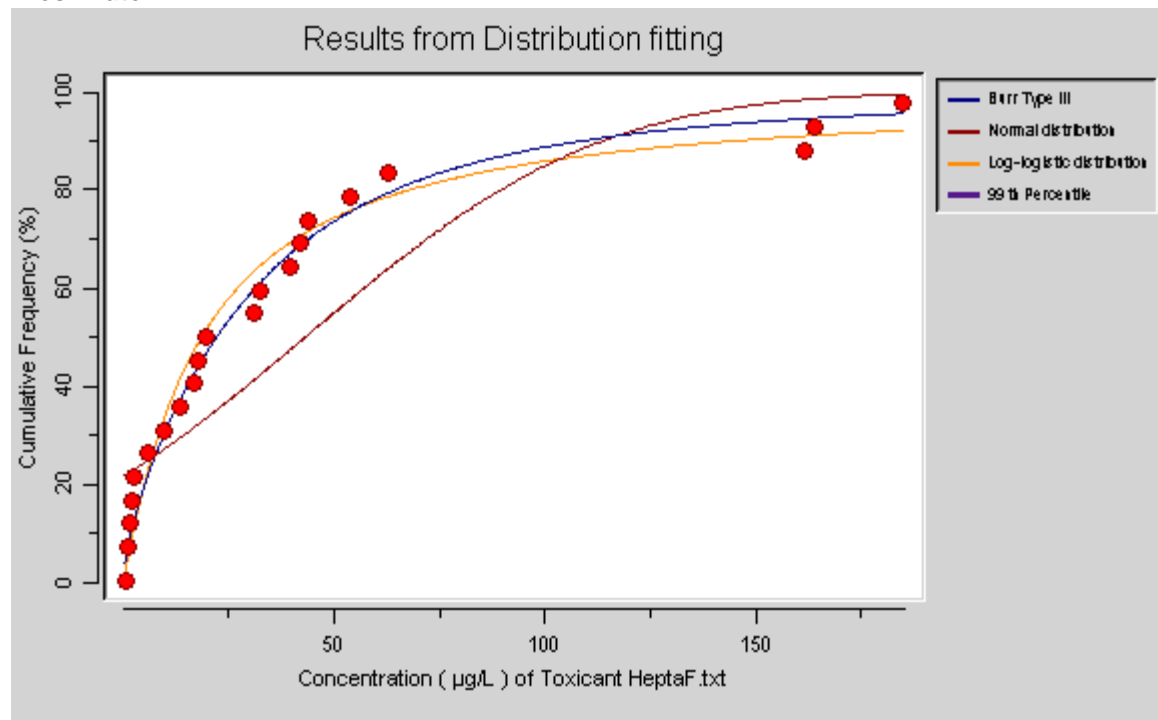
Endrin

Marine



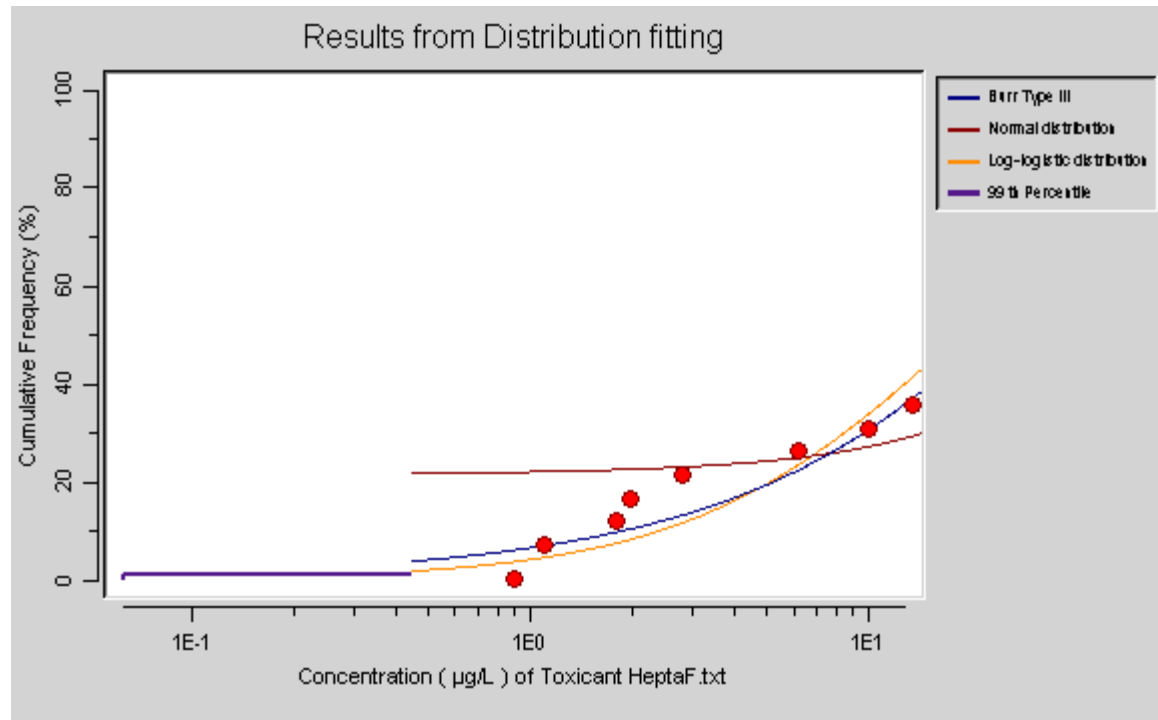
Heptachlor

Freshwater



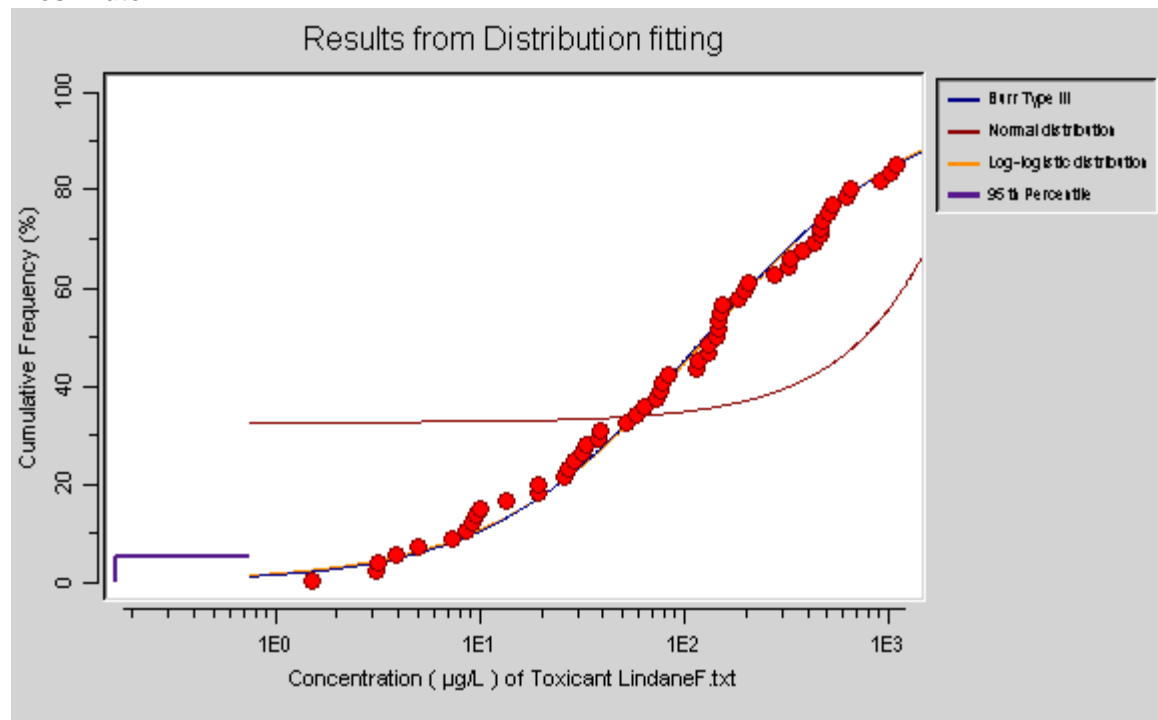
Heptachlor

Freshwater



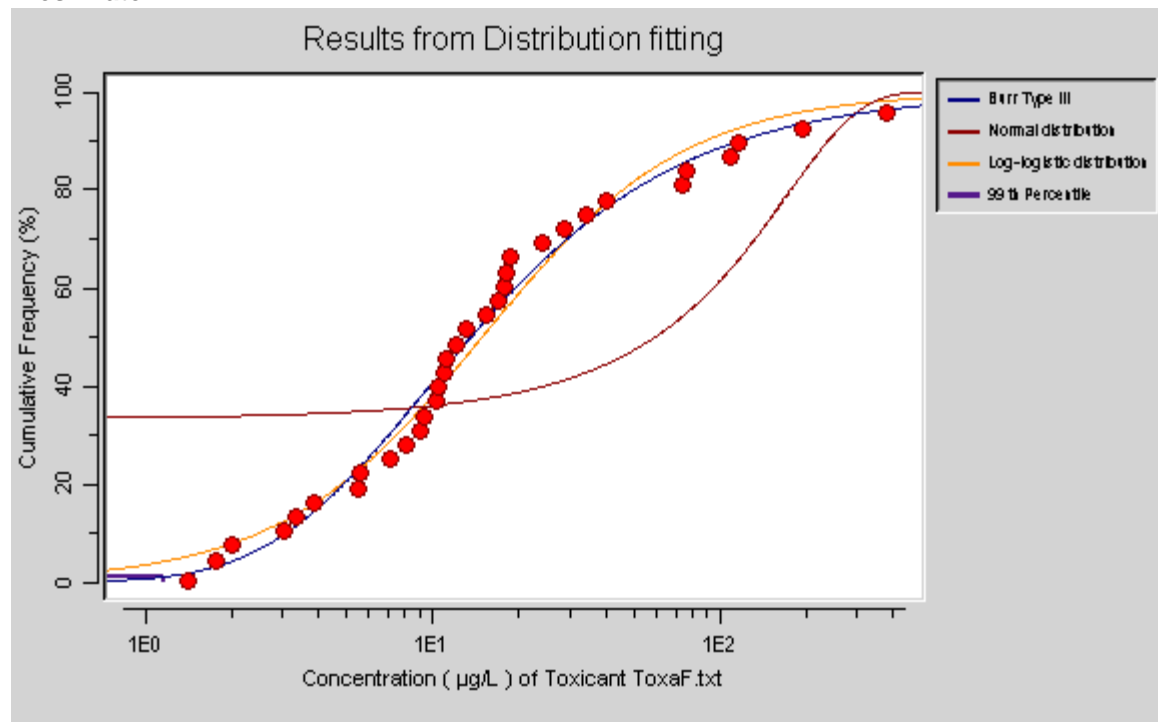
Lindane

Freshwater



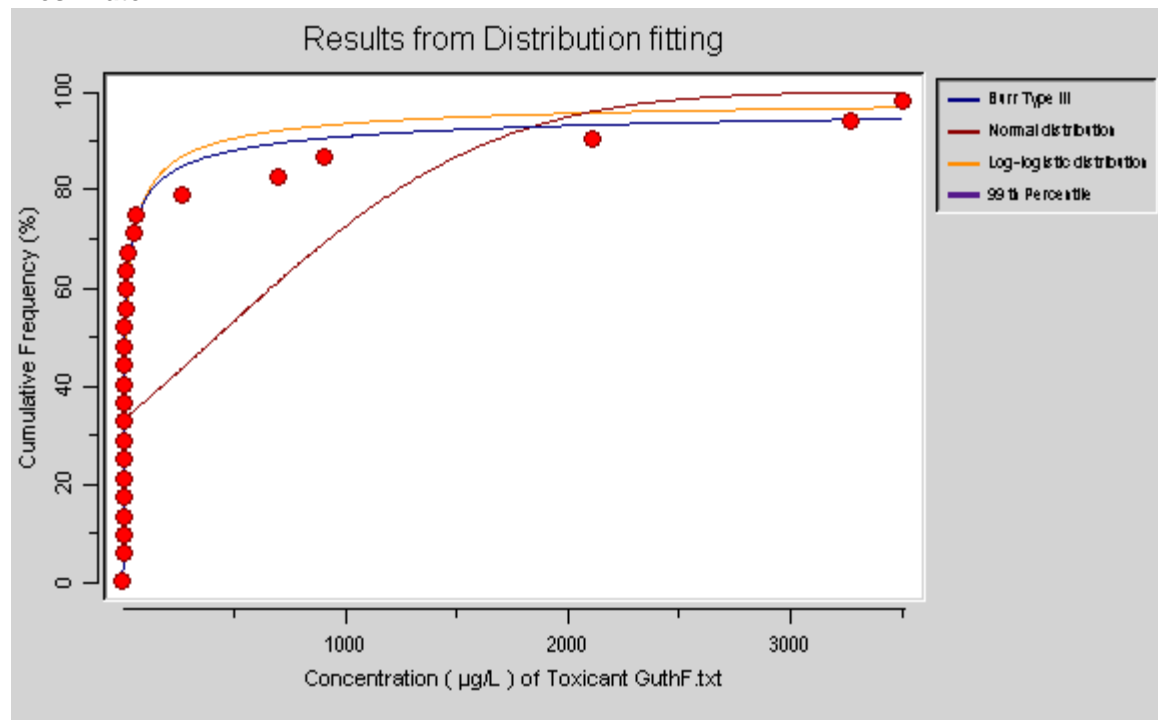
Toxaphene

Freshwater



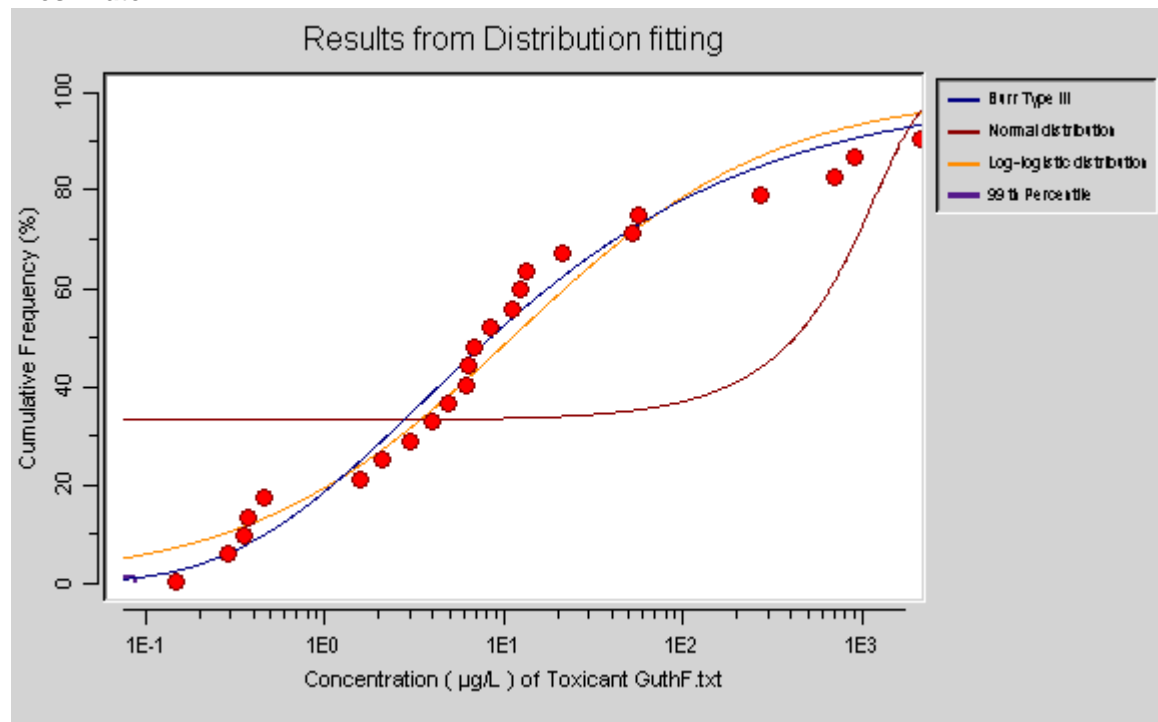
Guthion

Freshwater



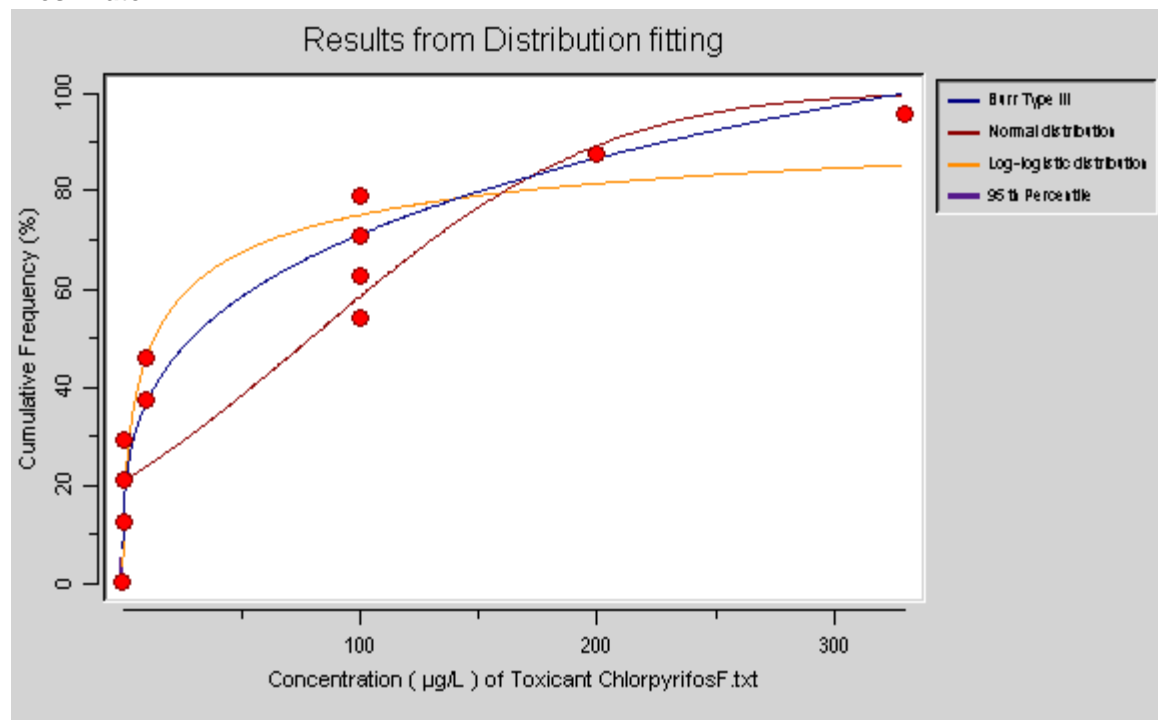
Guthion

Freshwater



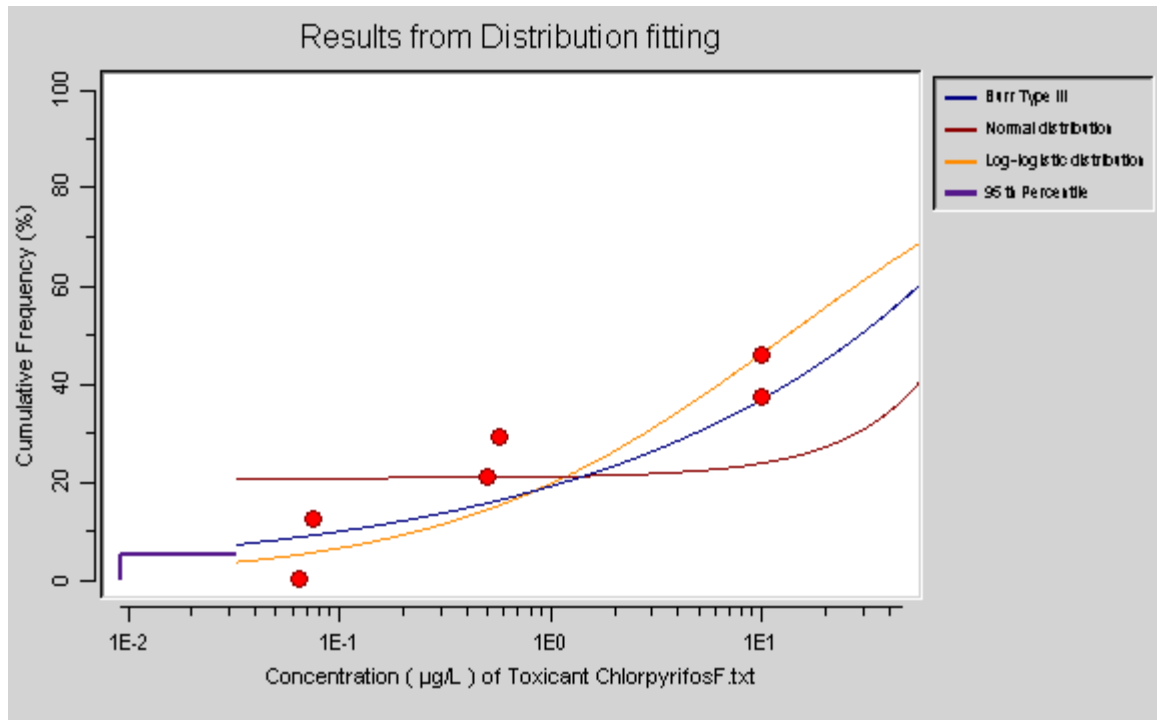
Chlorpyrifos

Freshwater



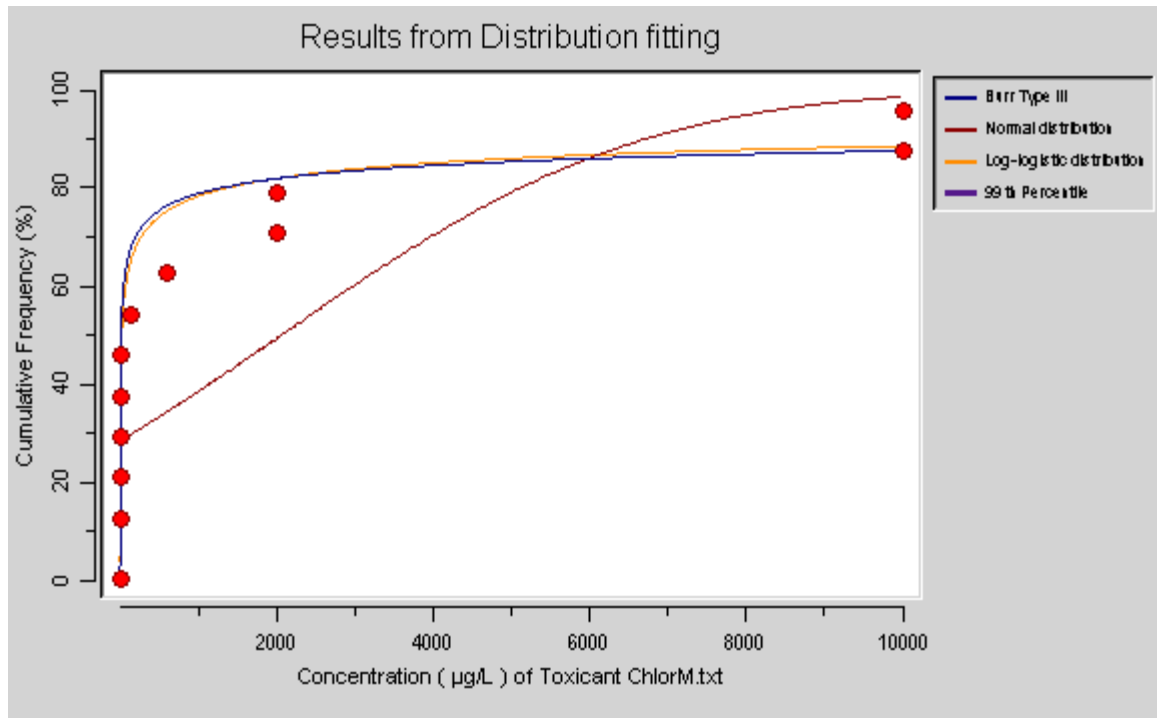
Chlorpyrifos

Freshwater



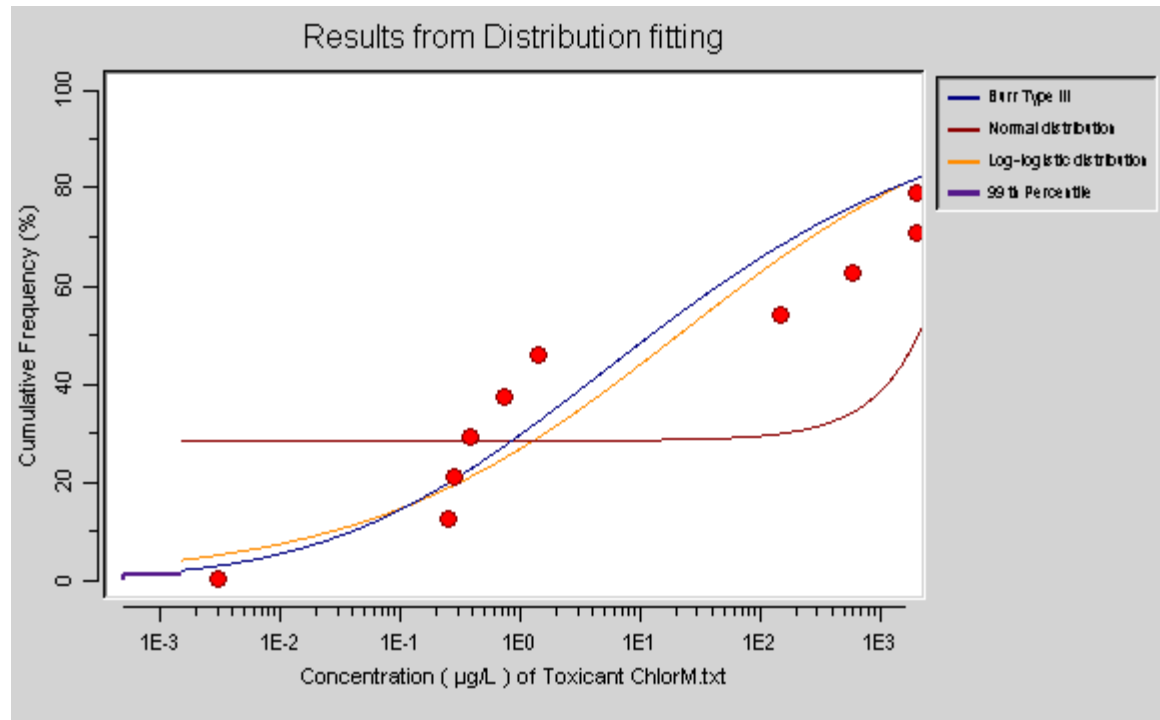
Chlorpyrifos

Marine



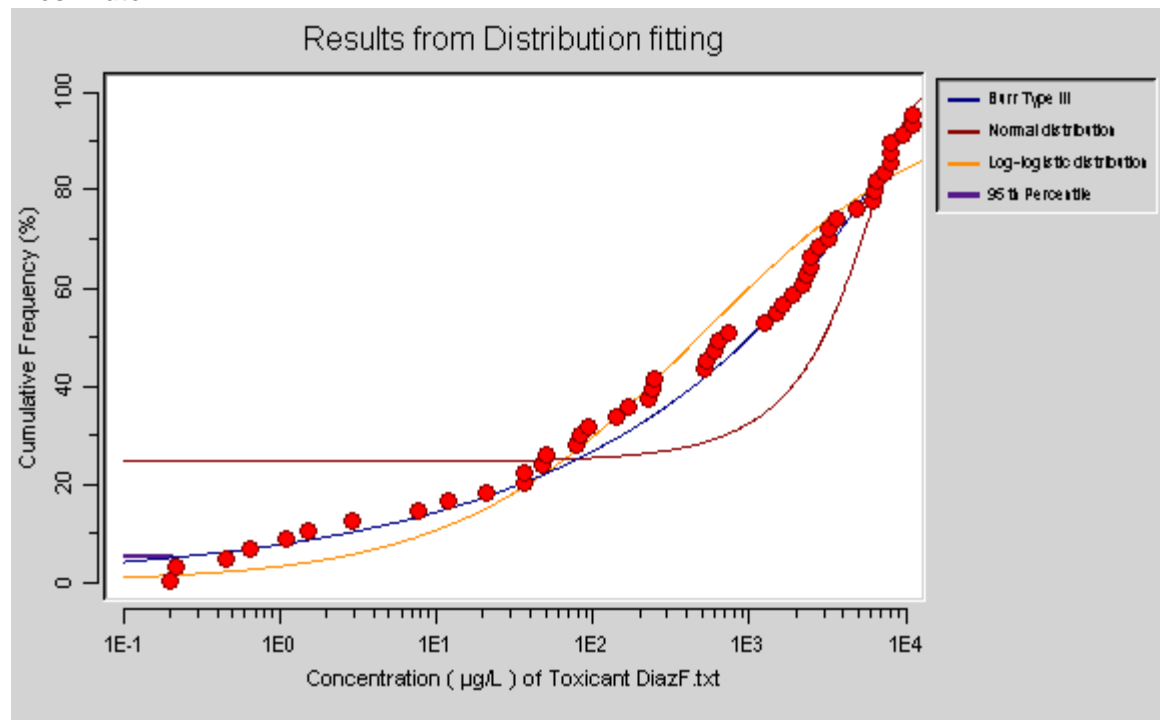
Chlorpyrifos

Marine



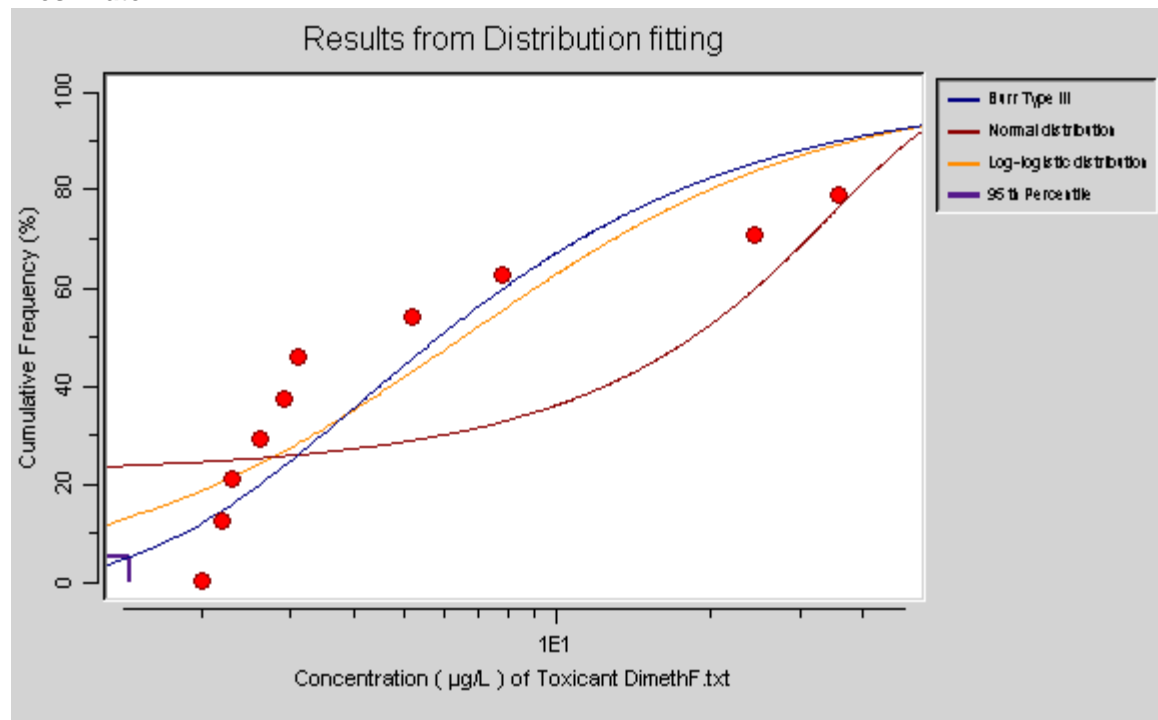
Diazinon

Freshwater



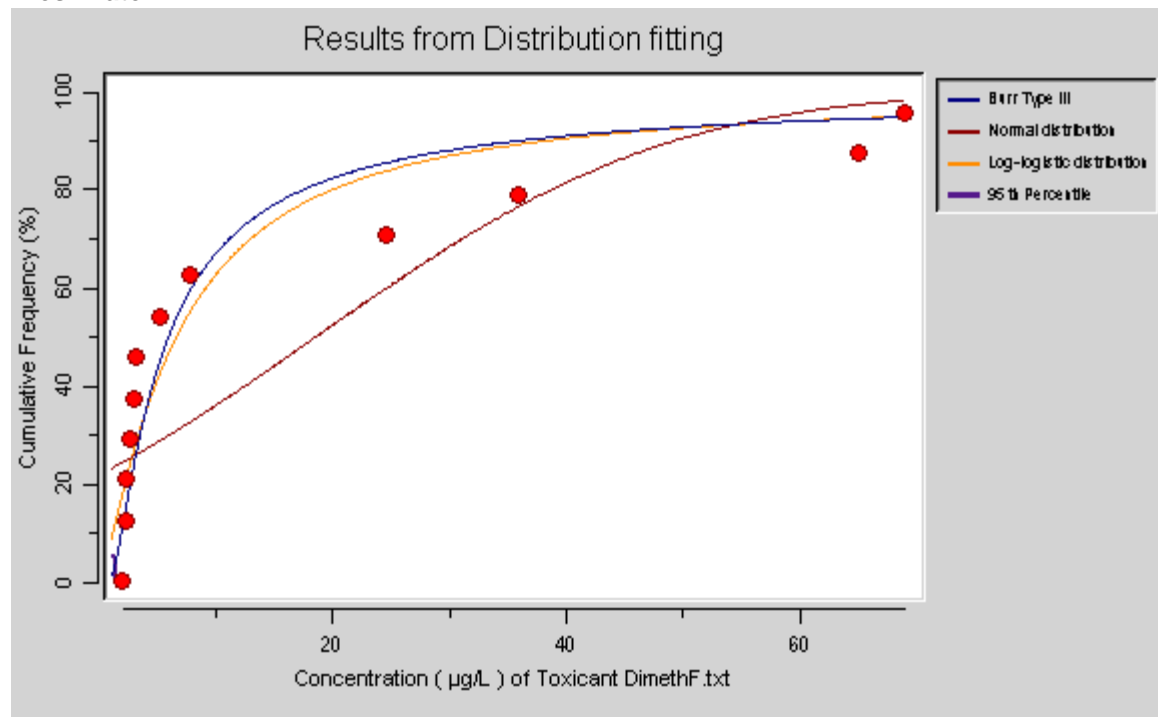
Dimethoate

Freshwater



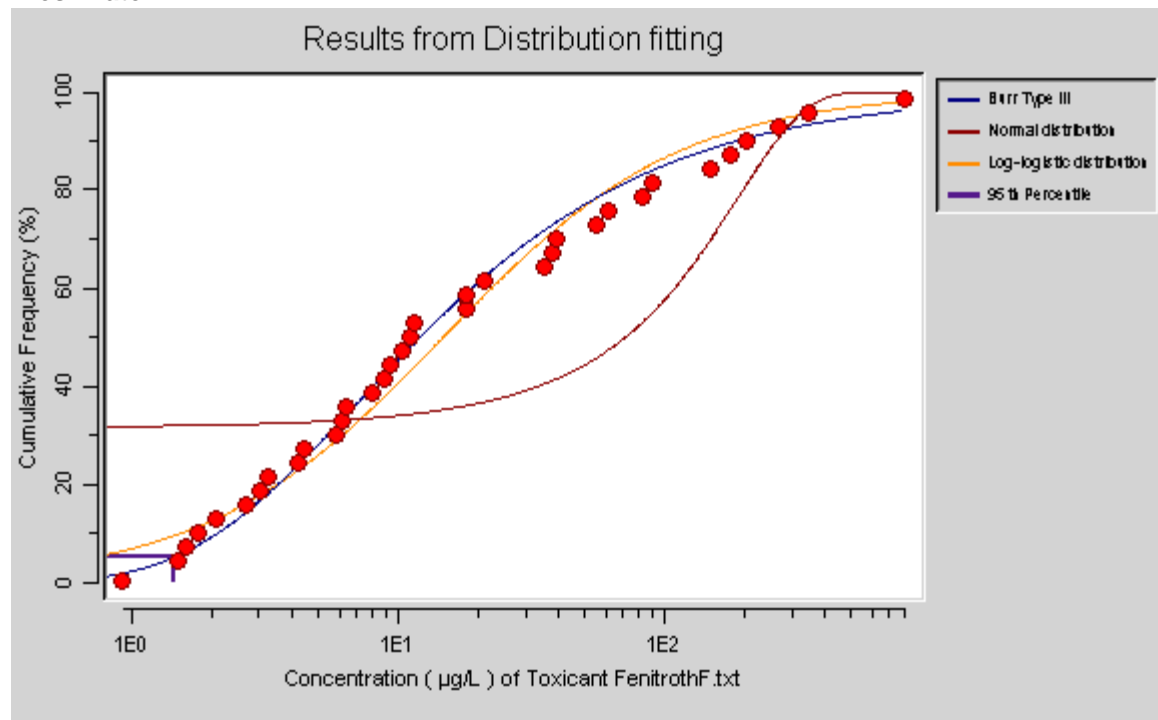
Dimethoate

Freshwater



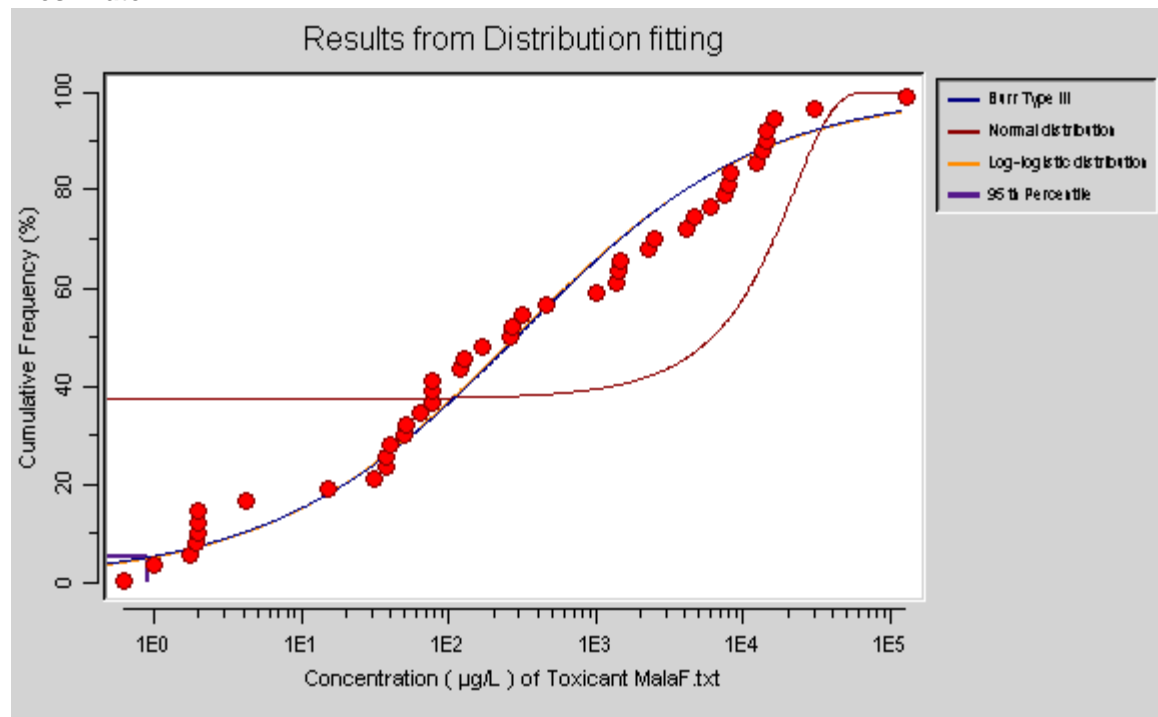
Fenitrothion

Freshwater



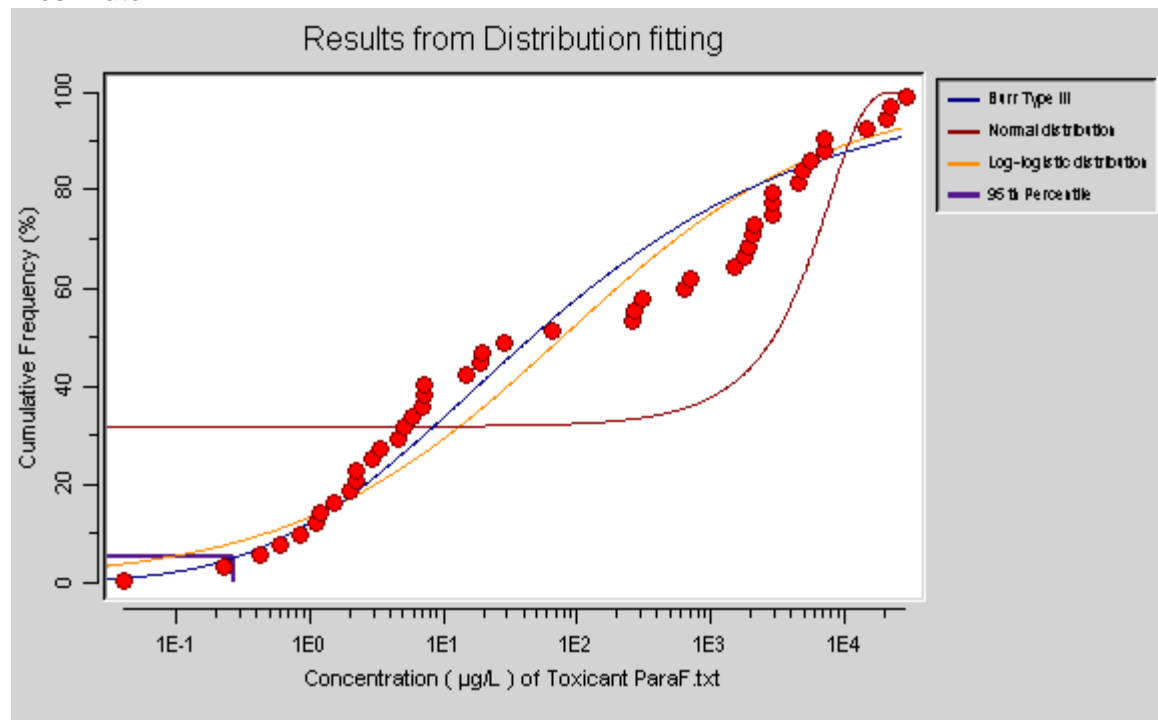
Malathion

Freshwater



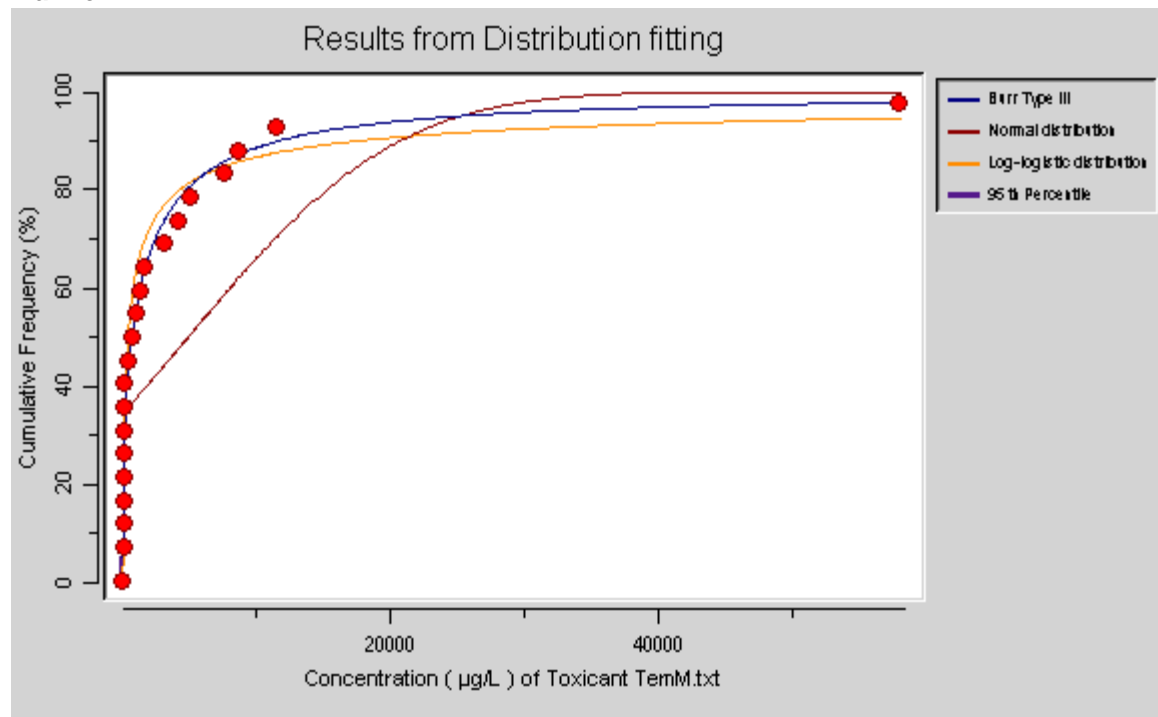
Parathion

Freshwater



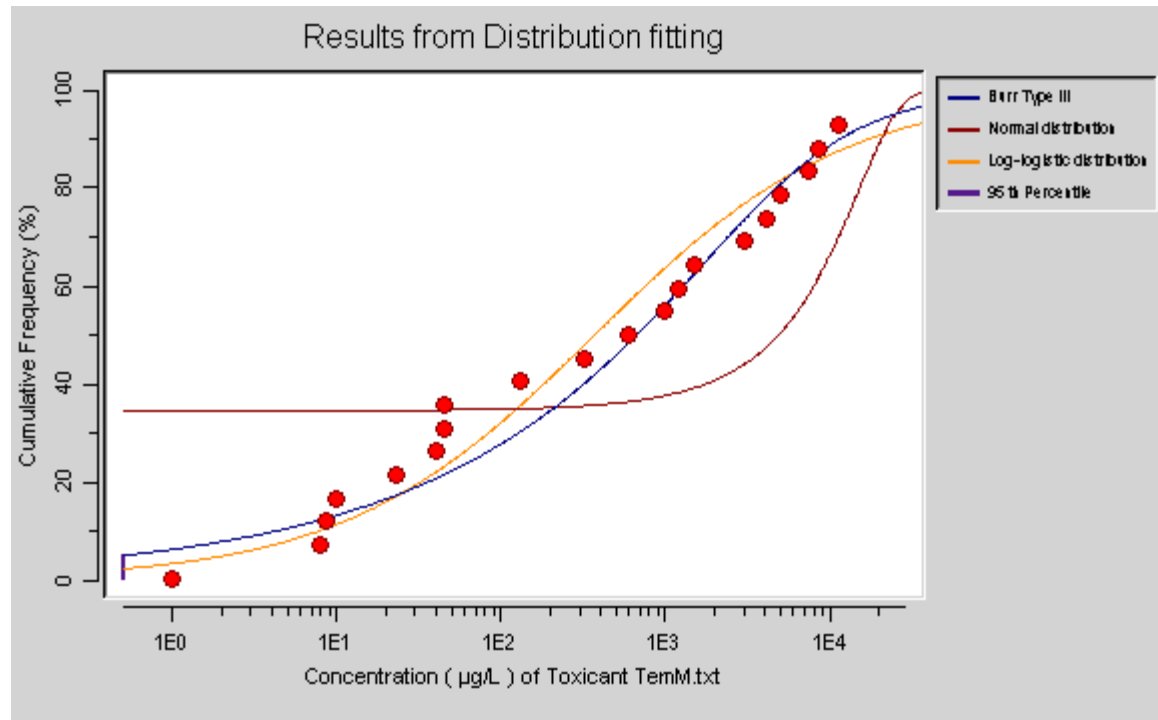
Temphos

Marine



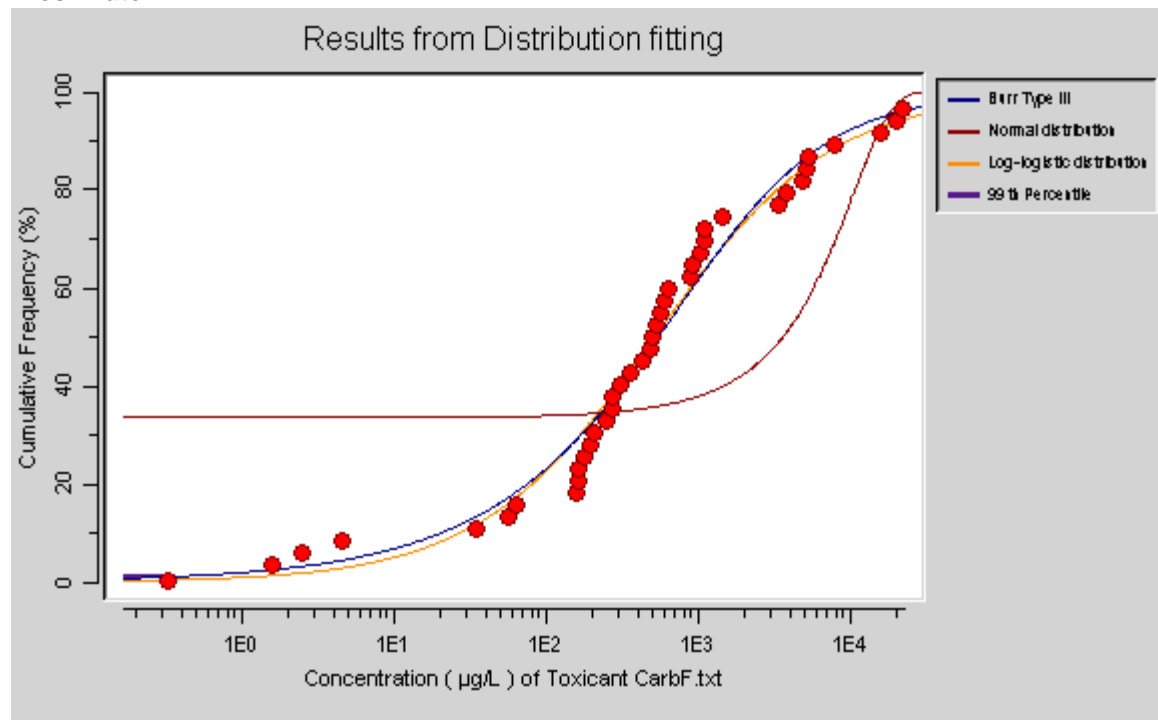
Temphos

Marine



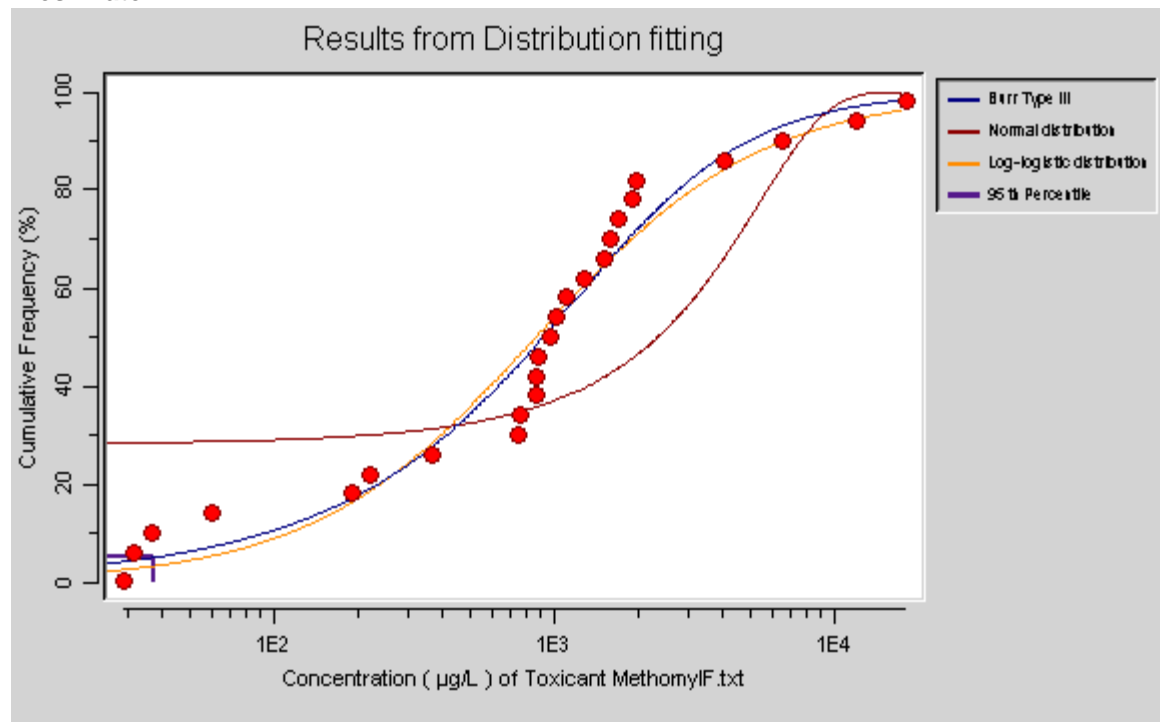
Carbofuran

Freshwater



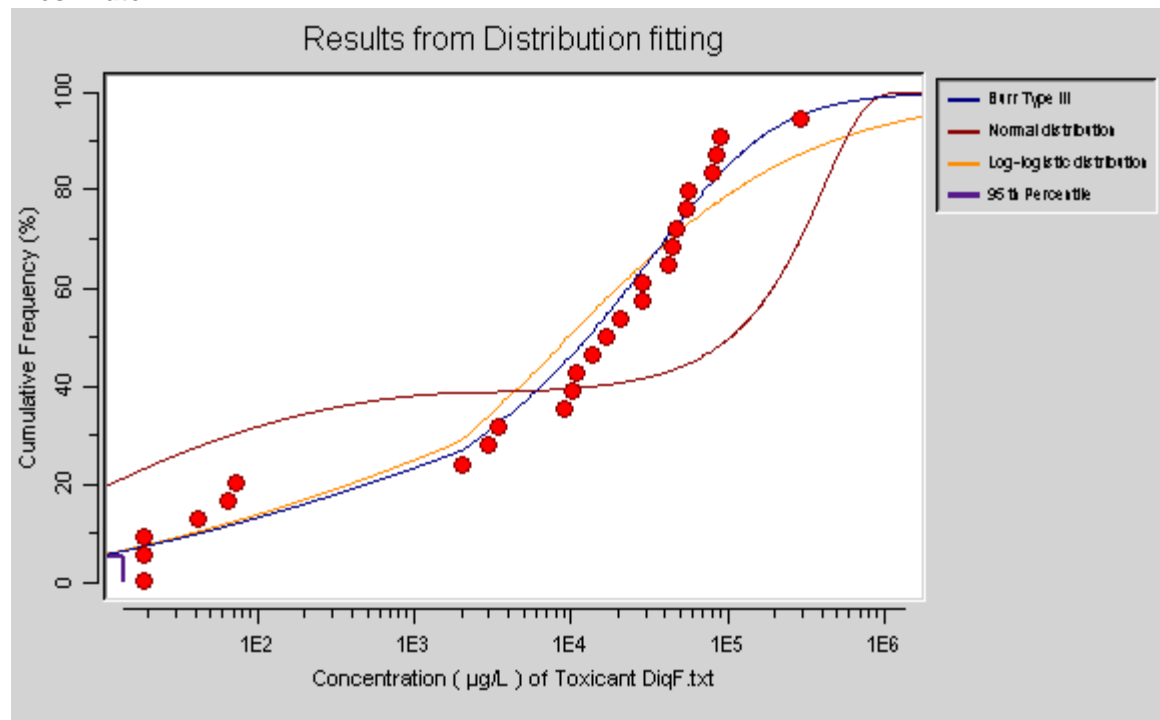
Methomyl

Freshwater



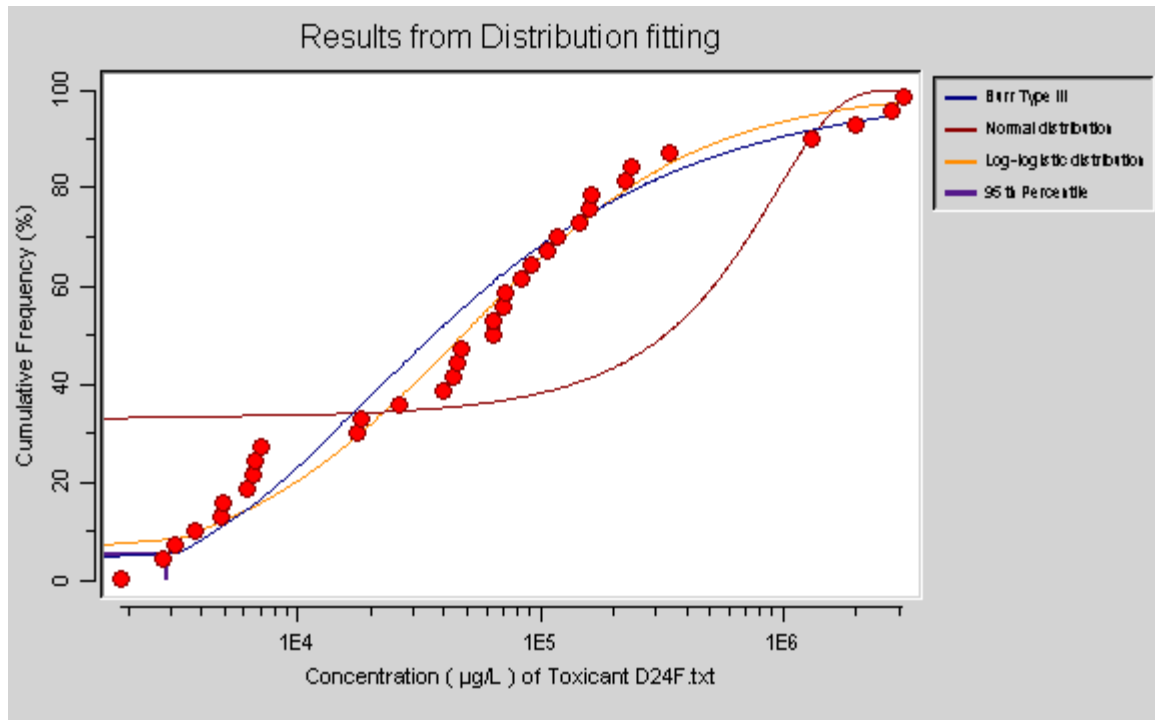
Diquat

Freshwater



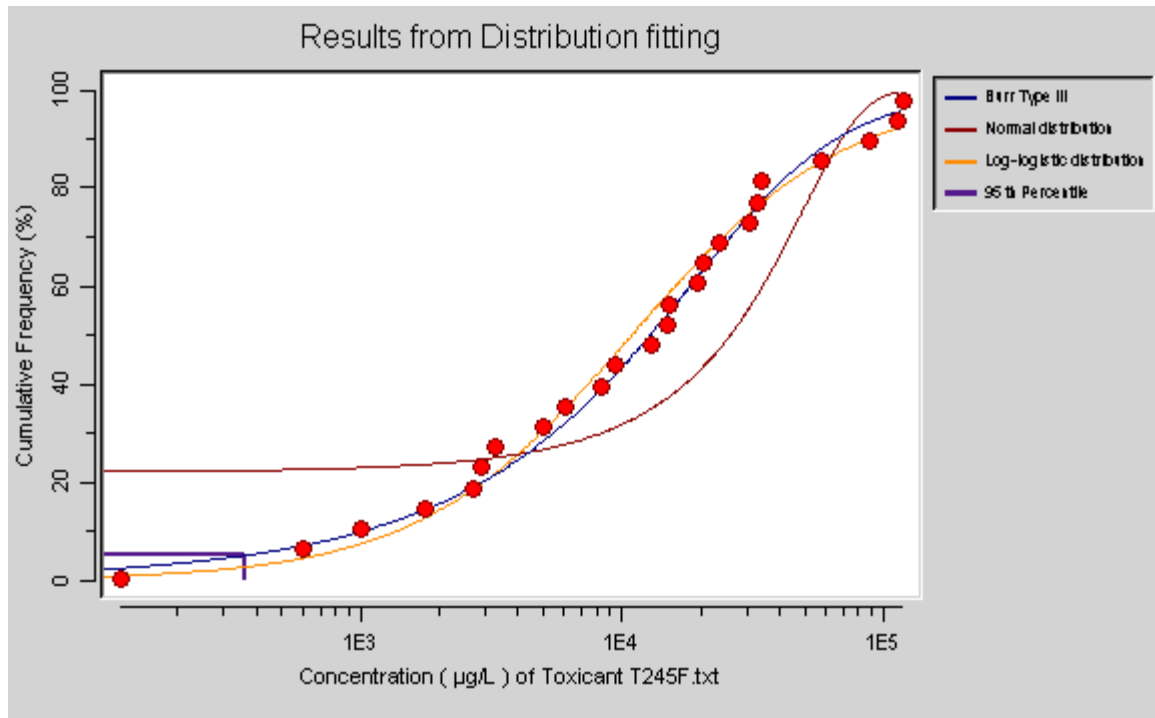
2,4-D

Freshwater



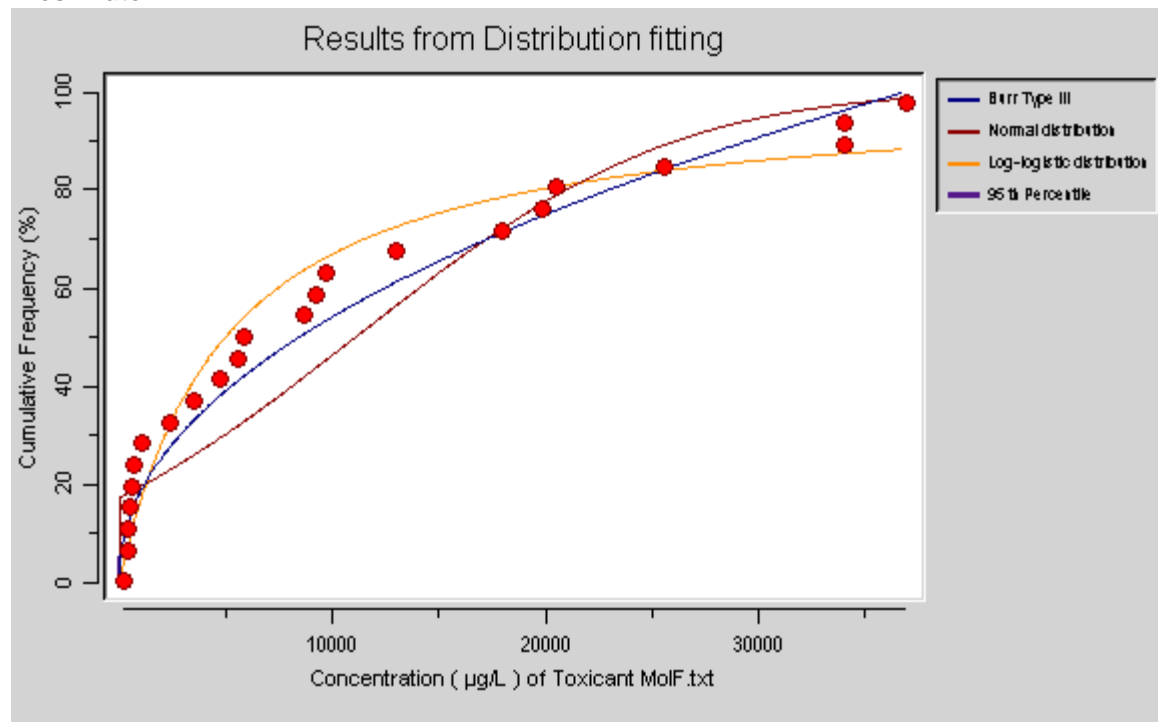
2,4,5-T

Freshwater



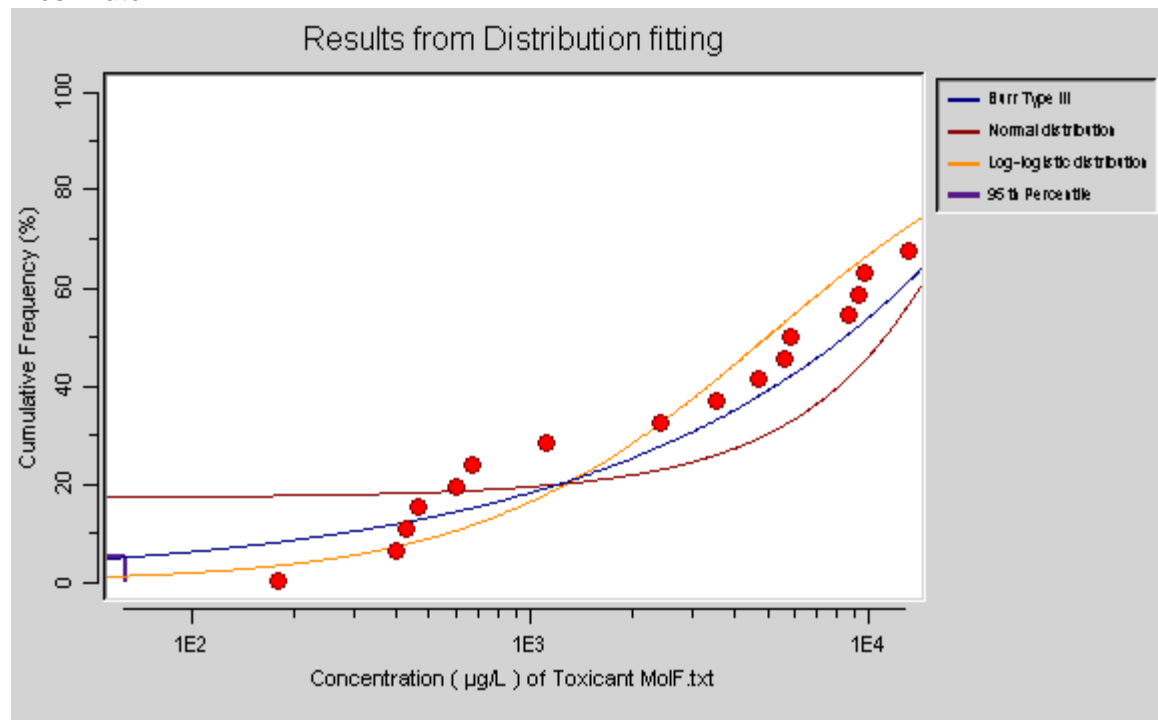
Molinate

Freshwater



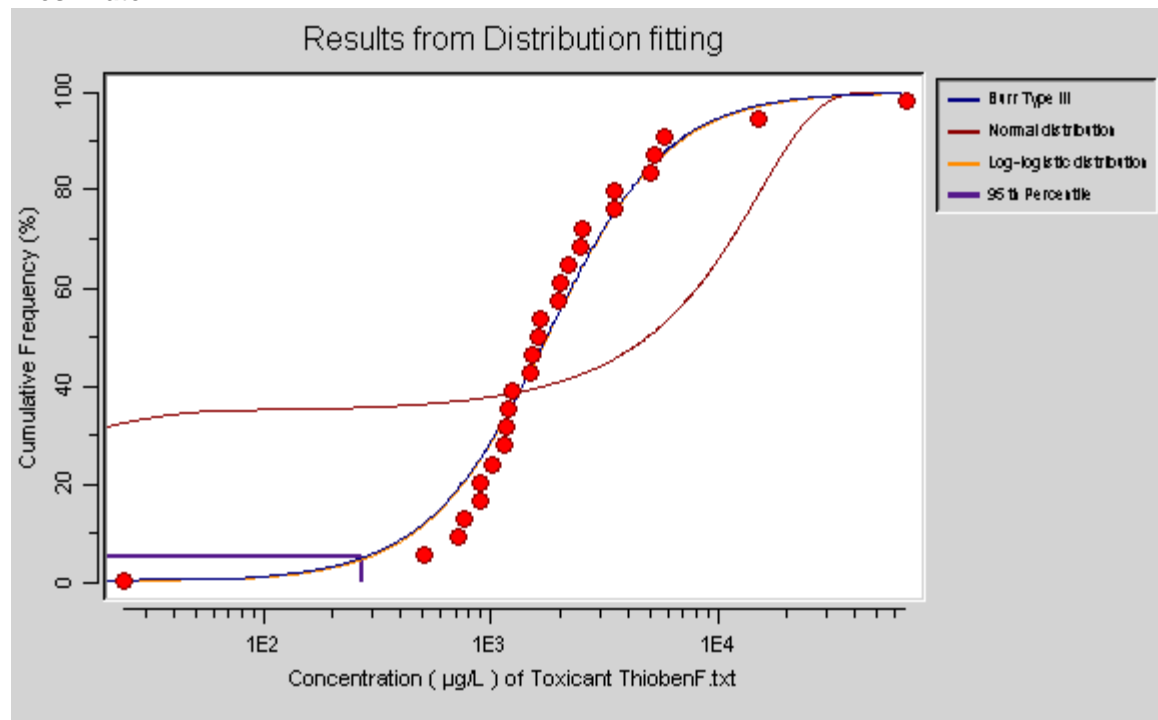
Molinate

Freshwater



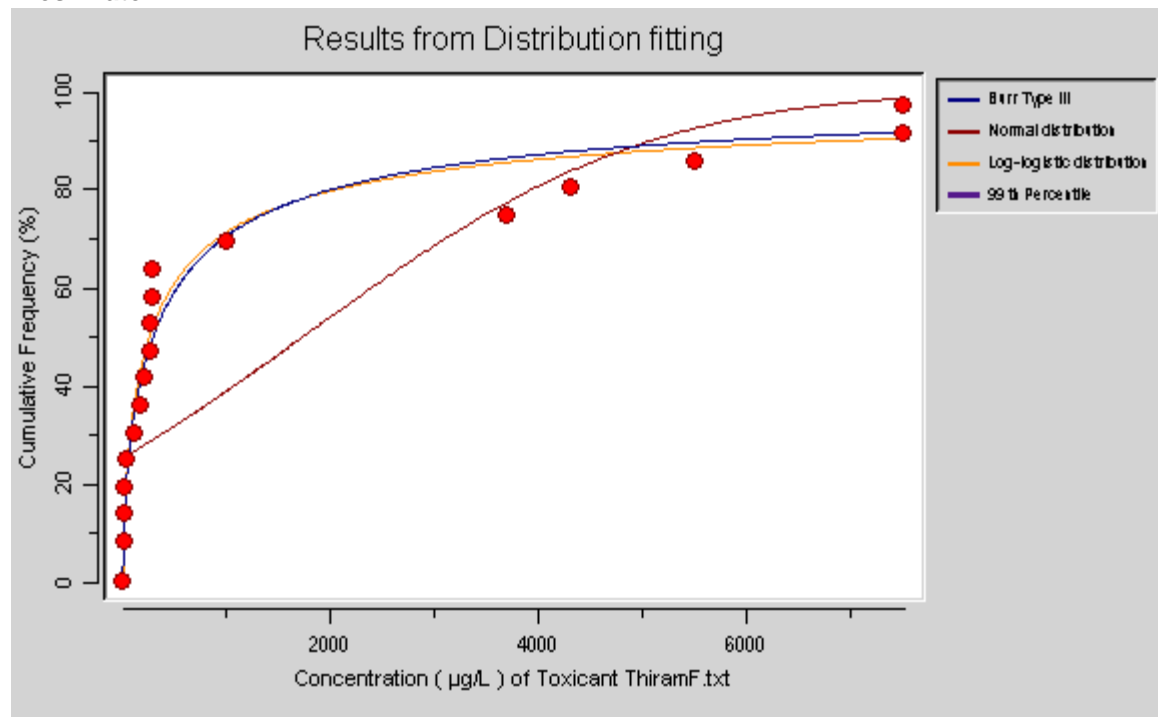
Thiobencarb

Freshwater



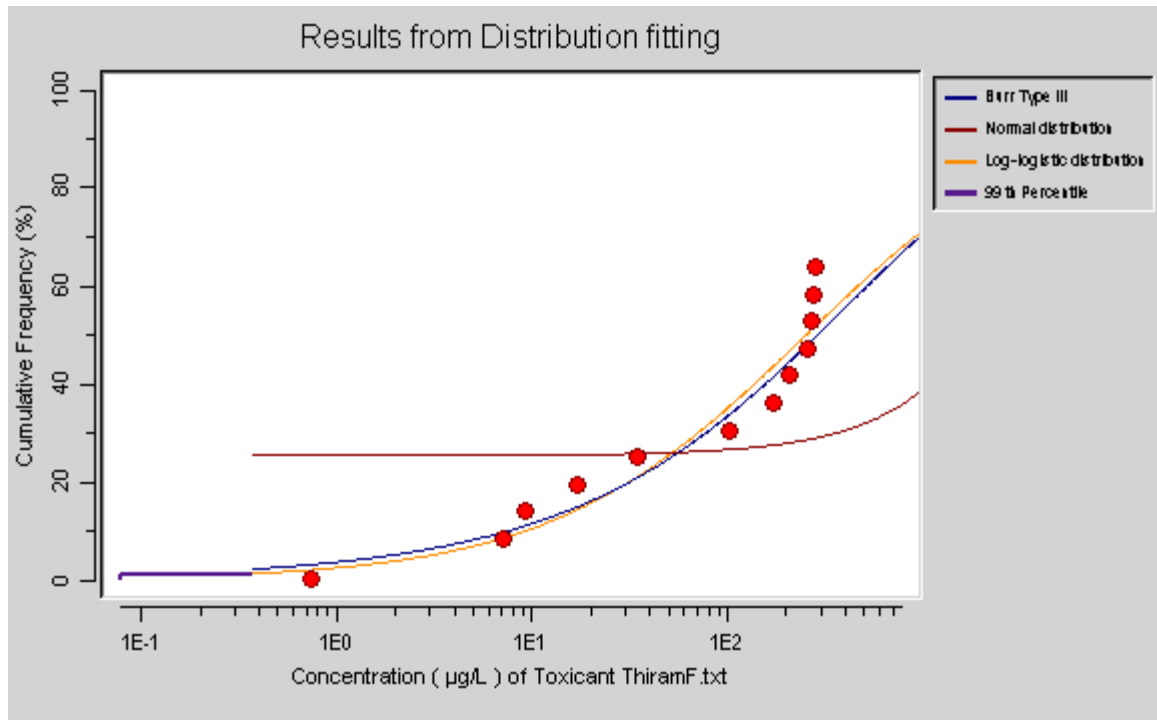
Thiram

Freshwater



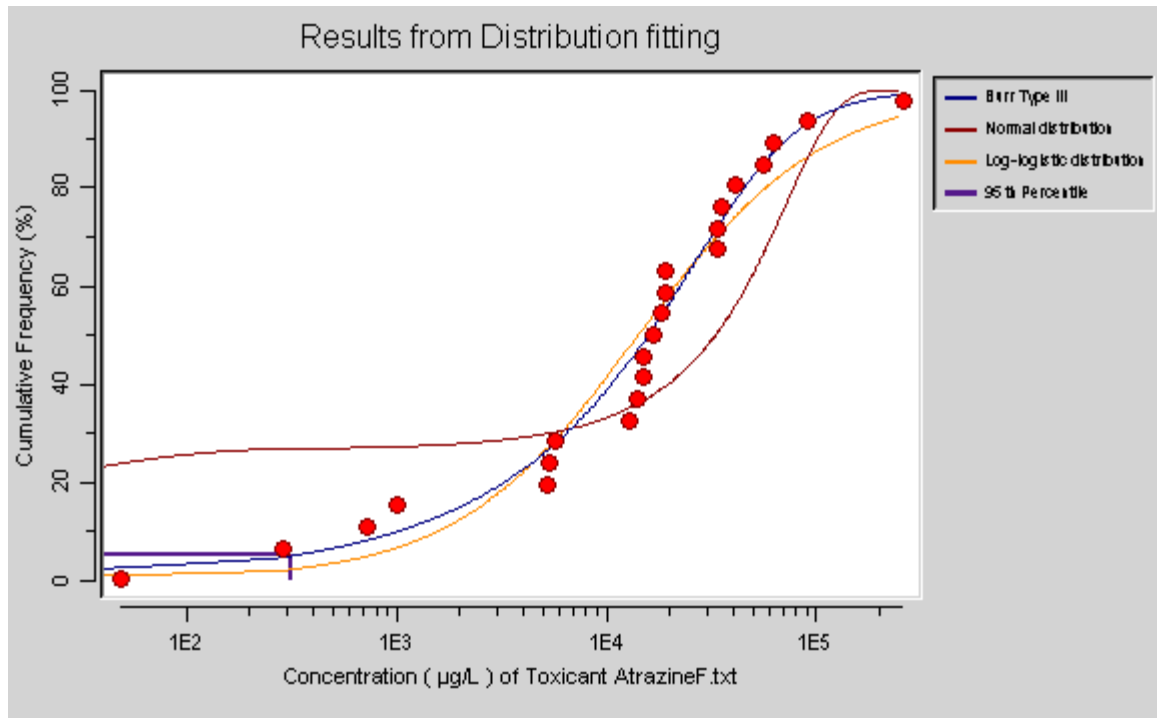
Thiram

Freshwater



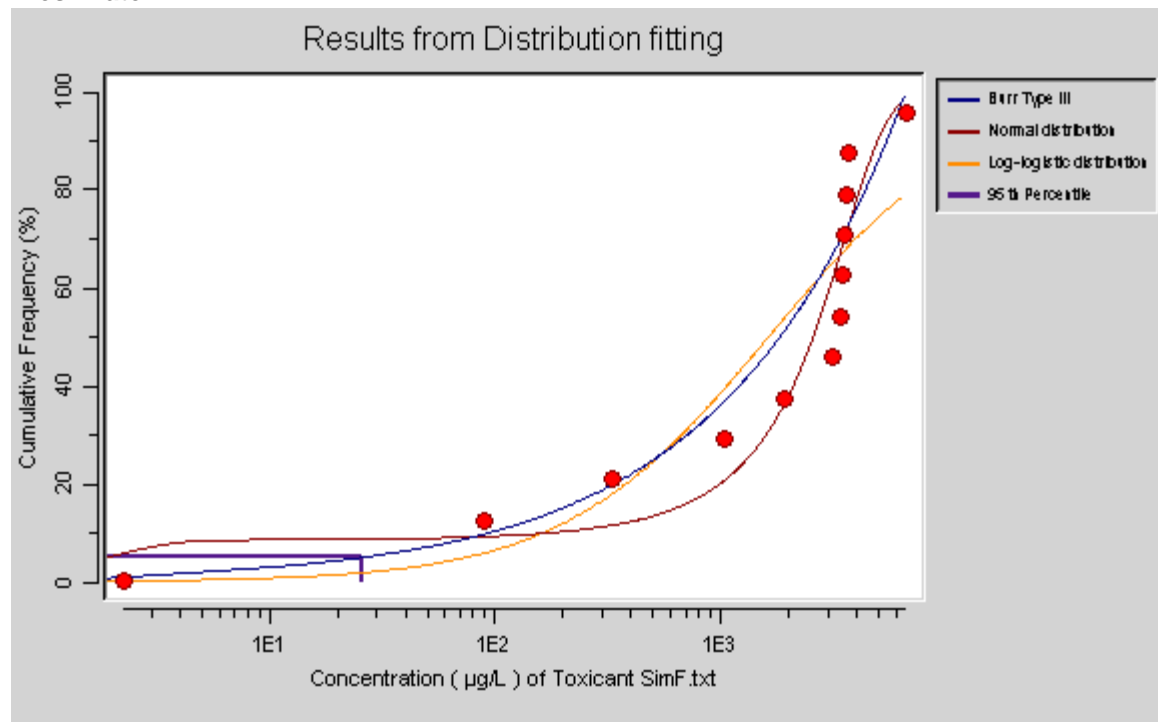
Atrazine

Freshwater



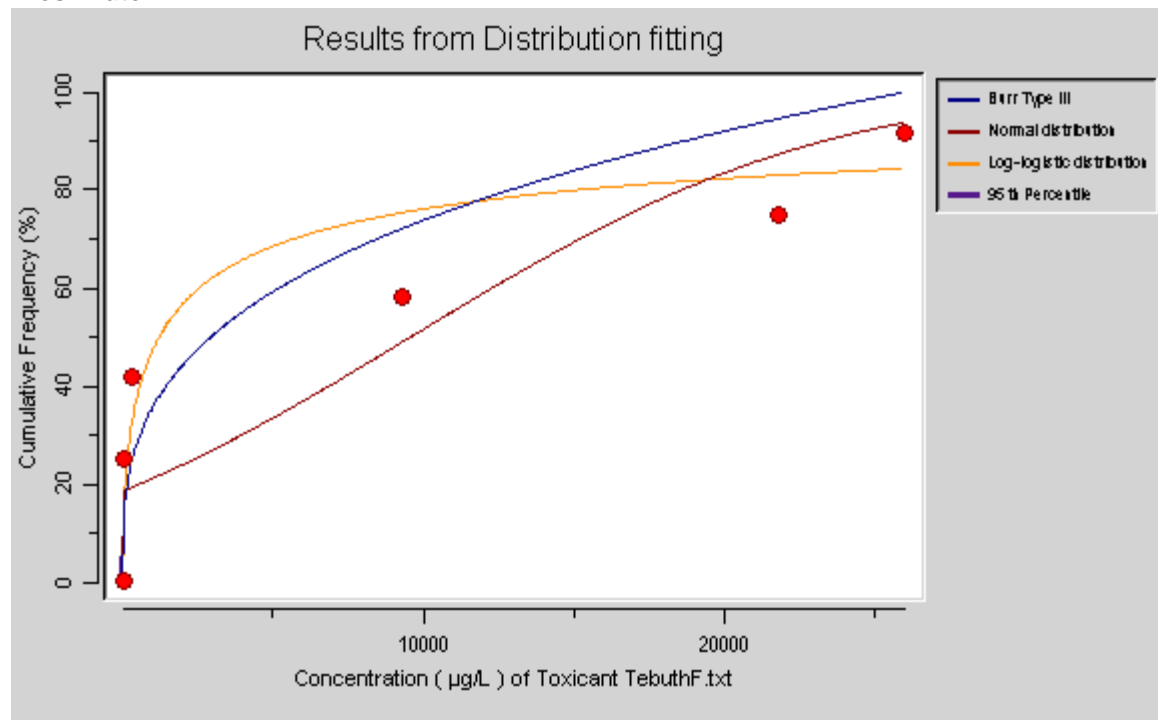
Simazine

Freshwater



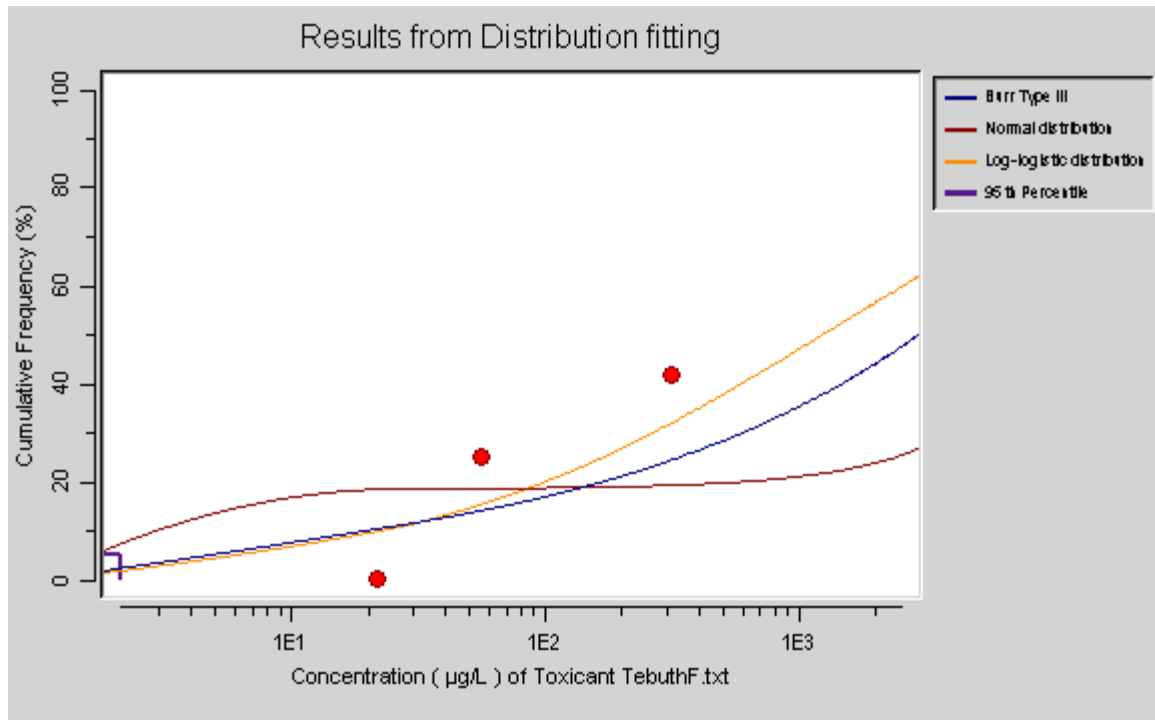
Tebuthiuron

Freshwater



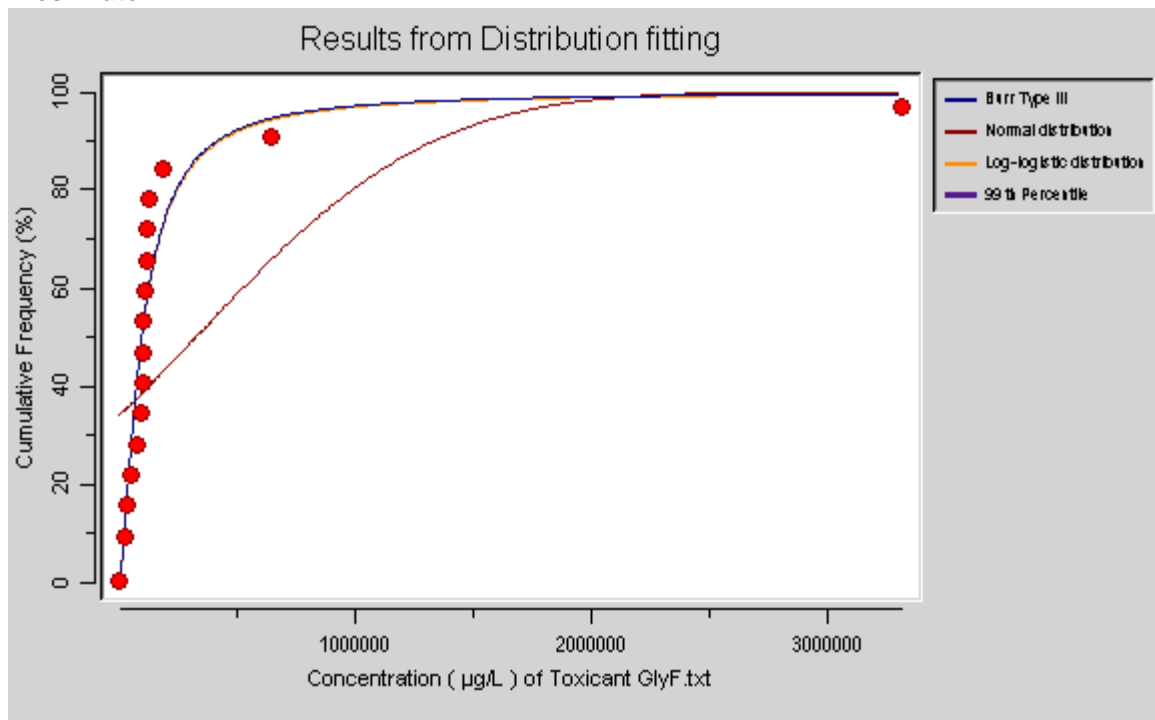
Tebuthiuron

Freshwater



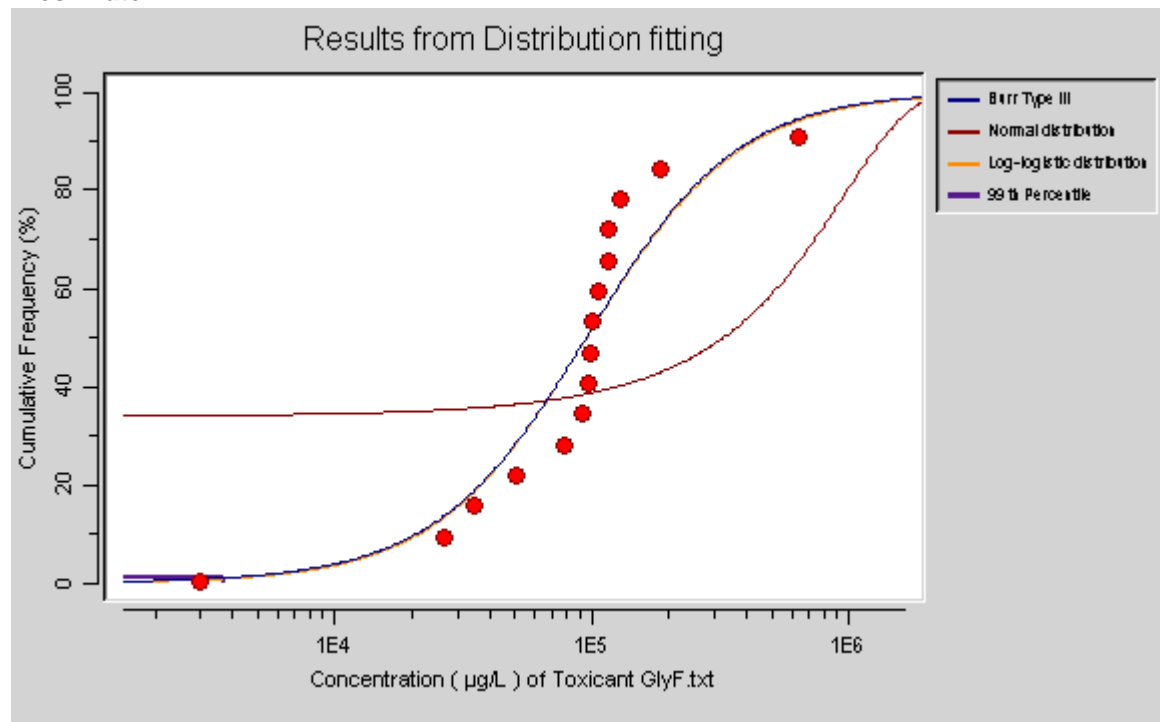
Glyphosate

Freshwater



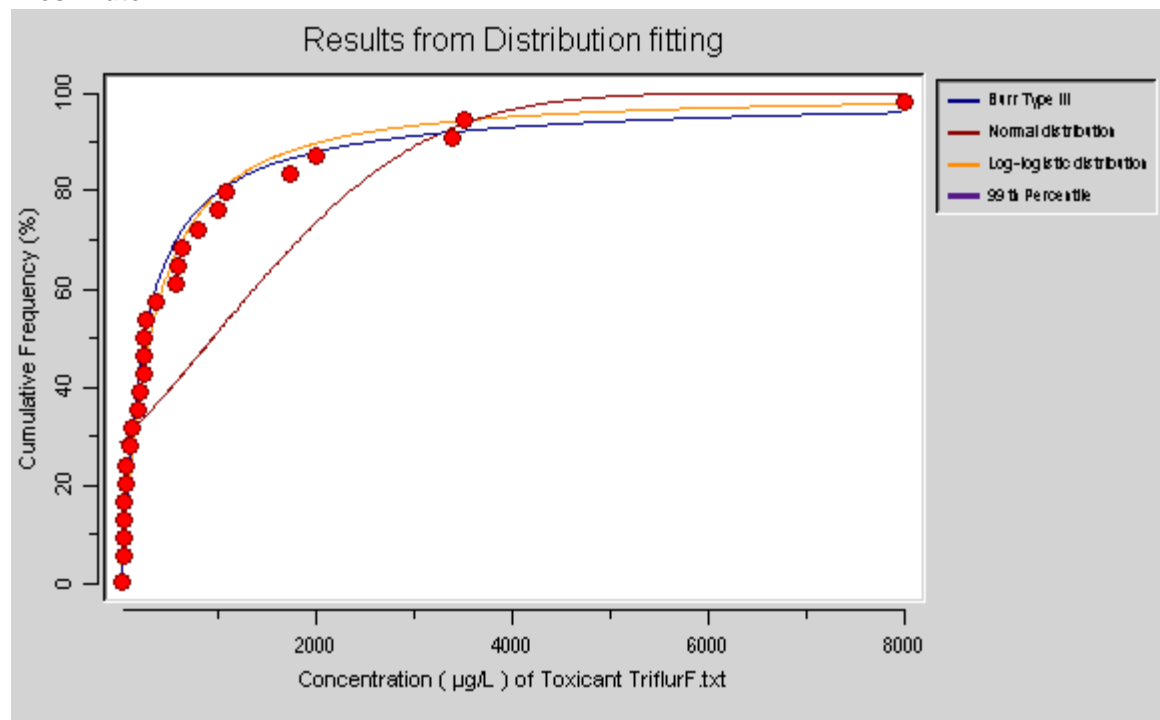
Glyphosate

Freshwater



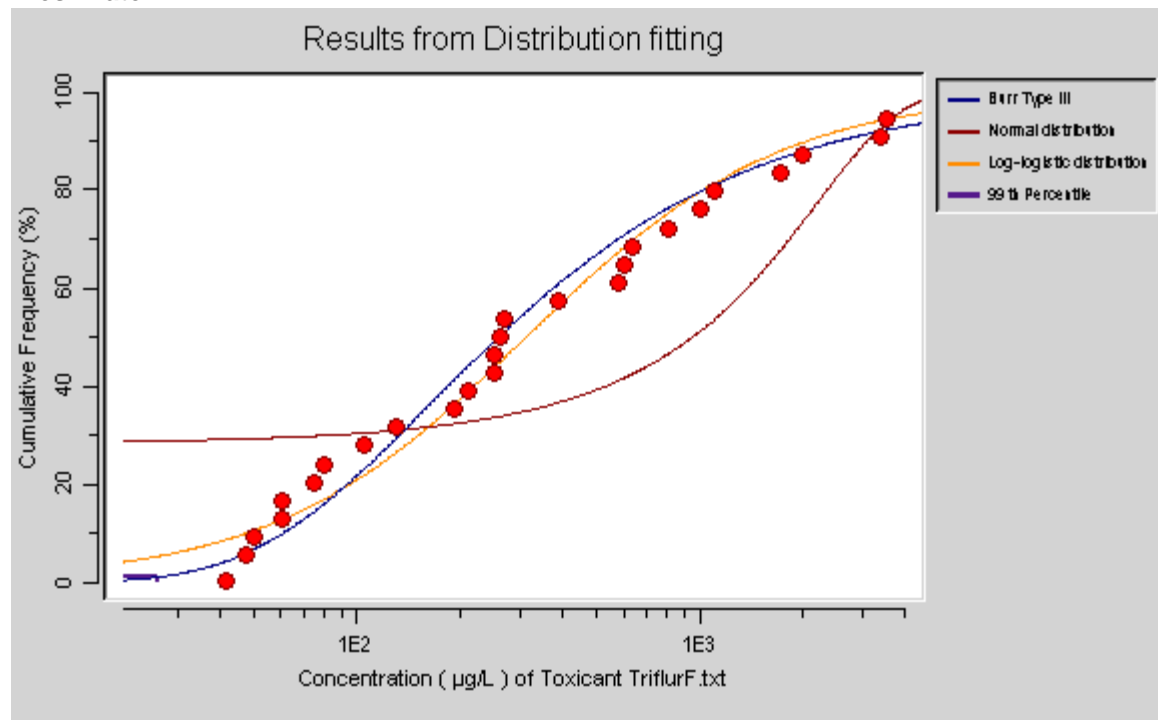
Trifluralin

Freshwater



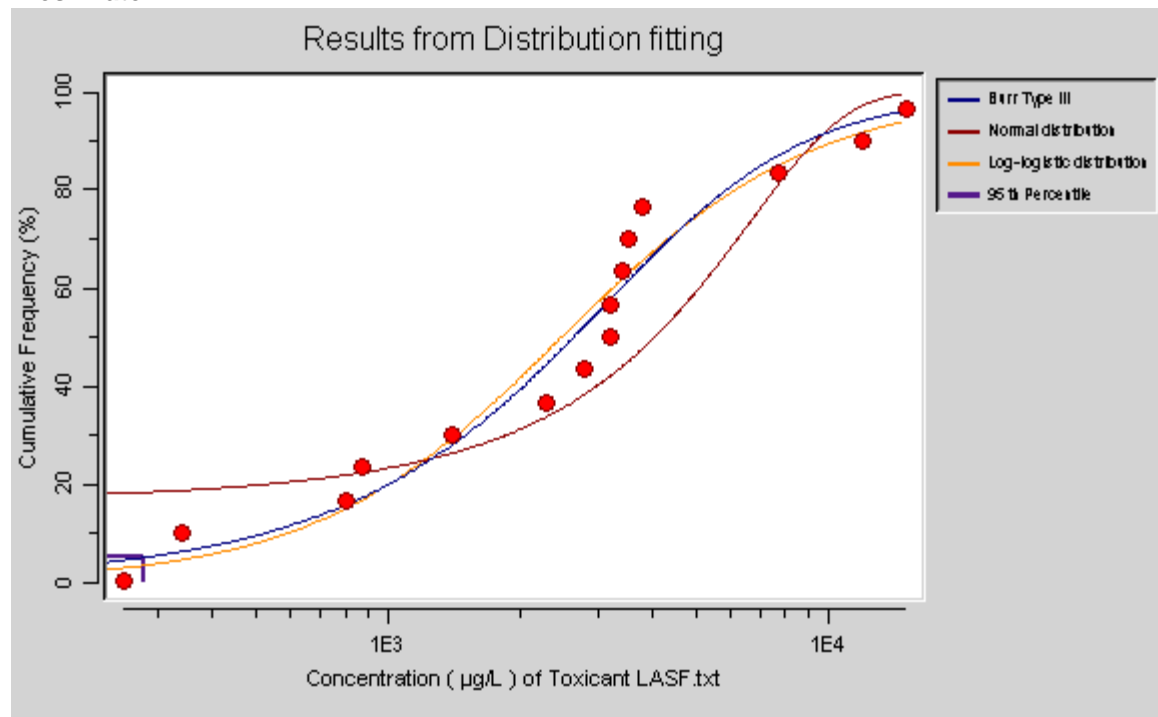
Trifluralin

Freshwater



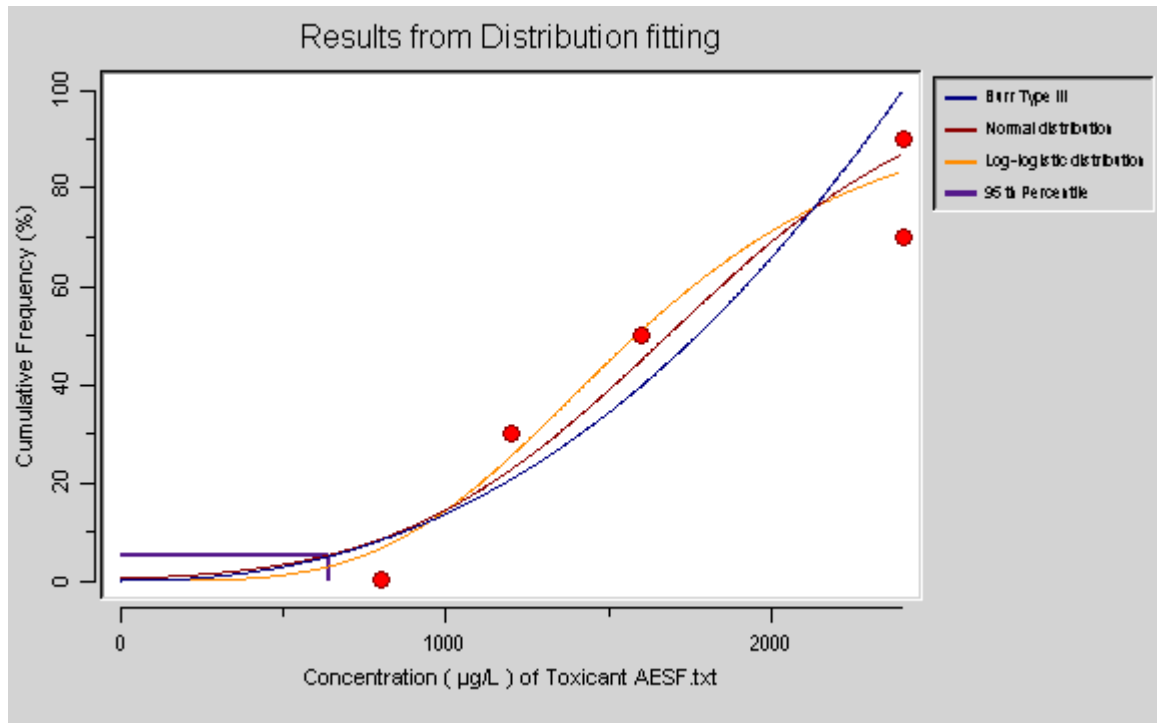
LAS

Freshwater



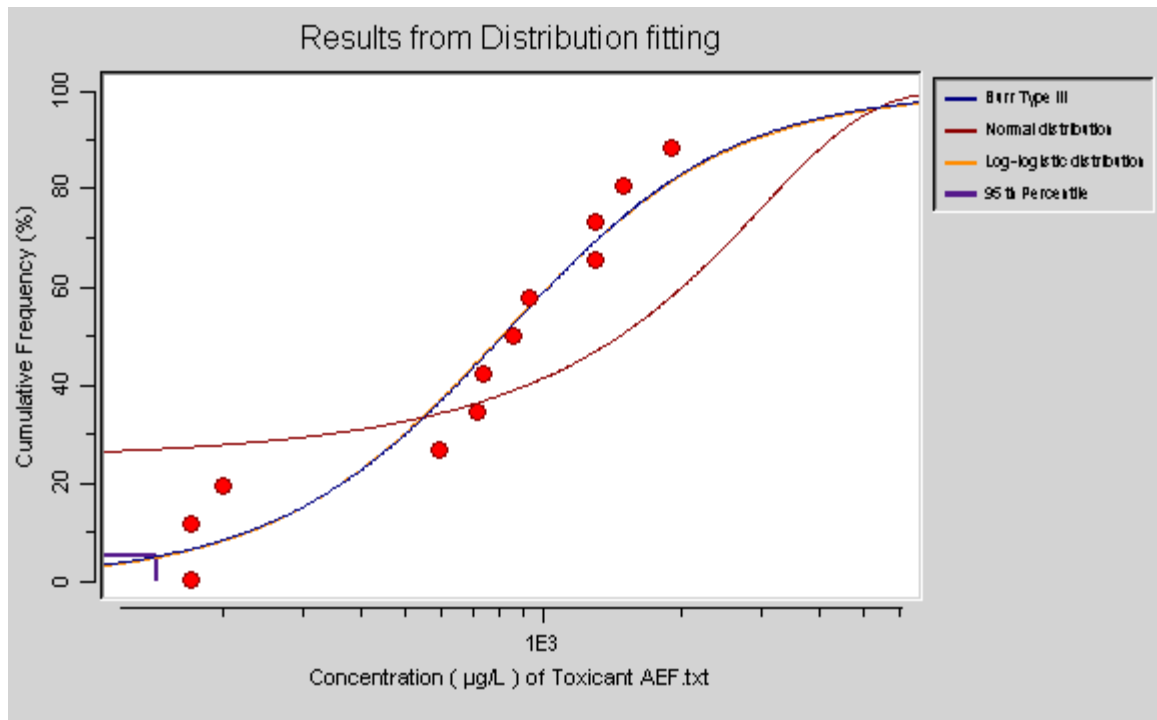
AES

Freshwater



AE

Freshwater



Corexit 9527

Marine

