ESF TOXICITY

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ECOLOGICAL KEY FACTOR TOXICITY

Part 5

Background document on effect-based trigger values for environmental water quality

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Abstract STOWA developed the conceptual framework of the Ecological Key Factors for the ecological assessment of water quality issues. The key factors describe preconditions for good water quality. The key factors help to structure the available information of water quality and make it possible to pinpoint dominant processes in water system functioning. Understanding of the water quality functioning enables identification of effective restoration measures. Toxicity has been identified as one of the Ecological Key Factors. As part of water quality assessment with EKFs an evaluation should be made to assess whether the water system complies with the key factor toxicity. In a serie of five reports the methodology to assess whether the water quality complies with the ecological key factor toxicity has been described. The methodology gives insight in the effect of chemical compounds on the biology. This report is part 5 and is a background document on effect-based trigger values (EBT's) for the assessment of the ecological risks of (a combination of) compounds. The EBT's are used in the SIMONI model which can be applied to assess the chemical waterquality.

Keywords Ecological Key Factors, watersystemanalysis, toxicity, ecological impact assessment, bioassays, effect based trigger values, SIMONI

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SUMMARY

STOWA developed the conceptual framework of the Ecological Key Factors for the ecological assessment of water quality issues. The key factors describe preconditions for good water quality. The key factors help to structure the available information of water quality and make it possible to pinpoint dominant processes in water system functioning. Understanding of the water quality functioning enables identification of effective restoration measures. Toxicity has been identified as one of the Ecological Key Factors.

There are key factors for stagnant and streaming waterbodies. The Ecological Key Factor toxicity is applicable for both types.

In a serie of five reports the Ecological Key Factor toxicity is elaborated. The serie contains a main report and 4 attachments.

This report is part 5 and is a background document on effect-based trigger values for the assessment of the ecological risks of (a combination of) chemicals. The concept is part of the toxicology track described in part 1. Part 4 describes the procedures for monitoring.

Aquatic life is subjected to stress due to the release of thousands of chemicals in the water, but it remains hard to determine the ecological actual risks. A paradigm shift in the field of water quality assessment from a single-chemical approach to an effect-based approach would overcome the limitations connected with the current monitoring strategies. Chemical analyses can be conducted only on a limited set of known chemicals and it is virtually impossible to assess mixture toxicity of such complex mixtures. Bioanalytical tools, in combination with chemical analyses, can be a valid alternative to classic monitoring programs. Such an integrated approach would provide information regarding the overall impact of co-exposure to multiple chemicals (known and unknown) on different levels of biological organization.

This study aimed to design environmental effect-based trigger values (EBT) for a selection of bioassays. The aim of these EBTs is that they should provide initial hazard identification of organic micropollutants for the aquatic organisms. The EBTs will be included in a model called “SIMONI” (Smart Integrated MONItoring) that can be used to discriminate between ‘low risk’ sites, where no further analyses are needed, and ‘potential risk’ sites, where an additional risk assessment has to be conducted. The goal is to reduce monitoring costs, and meanwhile generate a more complete analysis of the chemical water quality by using a battery of bioassays covering the most relevant modes of toxicant action.

A three-step approach was used to design effect-based trigger values (EBT). A selection of compounds was made that have a known response in the bioassay, with relative effect potencies (REPs) close to the reference compound for that assay. The first step was a literature search for toxicity data on these selected compounds, and conversion to their TEQ values (toxic equivalents of the respective reference compounds). Lowest TEQs of all toxic effects found (divided by an assessment factor) will be used as ‘save TEQ’. The second step was a species sensitivity distribution of all TEQ values in order to estimate the TEQ level that may cause an adverse effect to 5% of the species (HC5 TEQ). The HC5 TEQ should preferably be higher than or equal to the proposed low-risk effect-based trigger value (EBT). The final step was a benchmark with Waternet field data. The average bioassay responses at eight ecologically clean sites were considered as ‘clean TEQ’. A realistic EBT was derived that should be higher than the average effect observed at eight reference sites with a good ecological status. In order to get a good discrimination between sites, the EBT should be exceeded only at a limited number of seriously polluted sites. Therefore, further validation studies will be needed to optimize the proposed trigger values in the near future.

Effect-based trigger values were derived for:

- estrogenic activity (Era CALUX): 0.5 ng EEQ/L;
- anti-androgenic activity (anti-AR CALUX): 25 µg F1EQ/L;
- glucocorticoid activity (GR CALUX): 100 ng DEQ/L;
- dioxin-like activity (DR CALUX): 50 pg TEQ/L;
- PPARγ receptor activity (PPARγ CALUX): 10 ng REQ/L;
- toxic PAHs activity (PAH CALUX): 150 ng BEQ/L;
- oxidative stress (Nrf2 CALUX): 10 µg CEQ/L;
- pregnane X receptor activity (PRX CALUX): 3 µg N1EQ/L;
- five classes of antibiotics activity (RIKILT WaterSCAN):
    - aminoglycosides activity: 500 ng N2EQ/L;
    - macrolides & β lactams activity: 50 ng PEQ/L;
    - sulphonamides activity: 100 ng SEQ/L;
    - tetracyclines activity: 250 ng OEQ/L;
    - quinolones activity: 100 ng F2EQ/L.

It is essential to propose better monitoring strategies in order to preserve the quality of freshwater environment. The introduction of bioassays in monitoring programs can lead to a more sustainable water quality assessment. This study may provide a reference for further measures and implementation of risk assessment of micropollutants in the water cycle.

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1 INTRODUCTION

1.1. ECOLOGICAL KEY FACTORS

STOWA designed the conceptual framework of the Ecological Key Factors for the ecological assessment of water quality issues. The key factors describe preconditions for good water quality. The key factors help to structure the available information of water quality and make it possible to pinpoint dominant processes in water system functioning. Understanding of the water quality functioning enables identification of effective restoration measures. Toxicity has been identified as one of the Ecological Key Factors.

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1.2. EFFECTS OF CHEMICALS

Since the beginning of the industrialized era a constantly increasing number of anthropogenic chemicals have been released in the environment. The thousands of substances that reach the water cycle such as pharmaceuticals, pesticides, reproductive hormones, steroids, detergents, disinfectants, insect repellants and fire retardants (Erickson, 2002), may cause deterioration of the water quality and pose a threat to the aquatic ecosystems. In 2000, the European Parliament approved the Water Framework Directive (WFD, 2000/60/EC), in order to develop good monitoring programs and to classify the water bodies based on their chemical and ecological quality. The WFD represents a milestone in the field of water monitoring and management, but it is far from conclusive (Dworak et al., 2005). According to the directive, chemical quality of the water should be investigated trough chemical analysis of selected priority compounds, whose concentrations should not exceed established Environmental Quality Standards or EQSs (Environmental Quality Standards Directive, 2008/105/EC). However, this single-chemical approach has been proven insufficient and can lead to an underestimation of the potential toxic hazard caused by thousands of compounds present in the water, since “as any analytical chemist knows, what you see depends on what you look for” (Lynn Roberts, Johns Hopkins University). Additionally, new chemicals are continuously developed to replace the current ones, and, as a consequence, the list of priority substances should be constantly updated. Moreover, chemicals that are present under detection limits can still cause significant mixture toxicity or create toxic metabolites and secondary products. Several authors (Altenburger et al., 2015; Escher and Leusch, 2012) highlight the need to development new monitoring methods that will allow a more realistic overview of the risk connected with the presence of chemicals in the water phase.

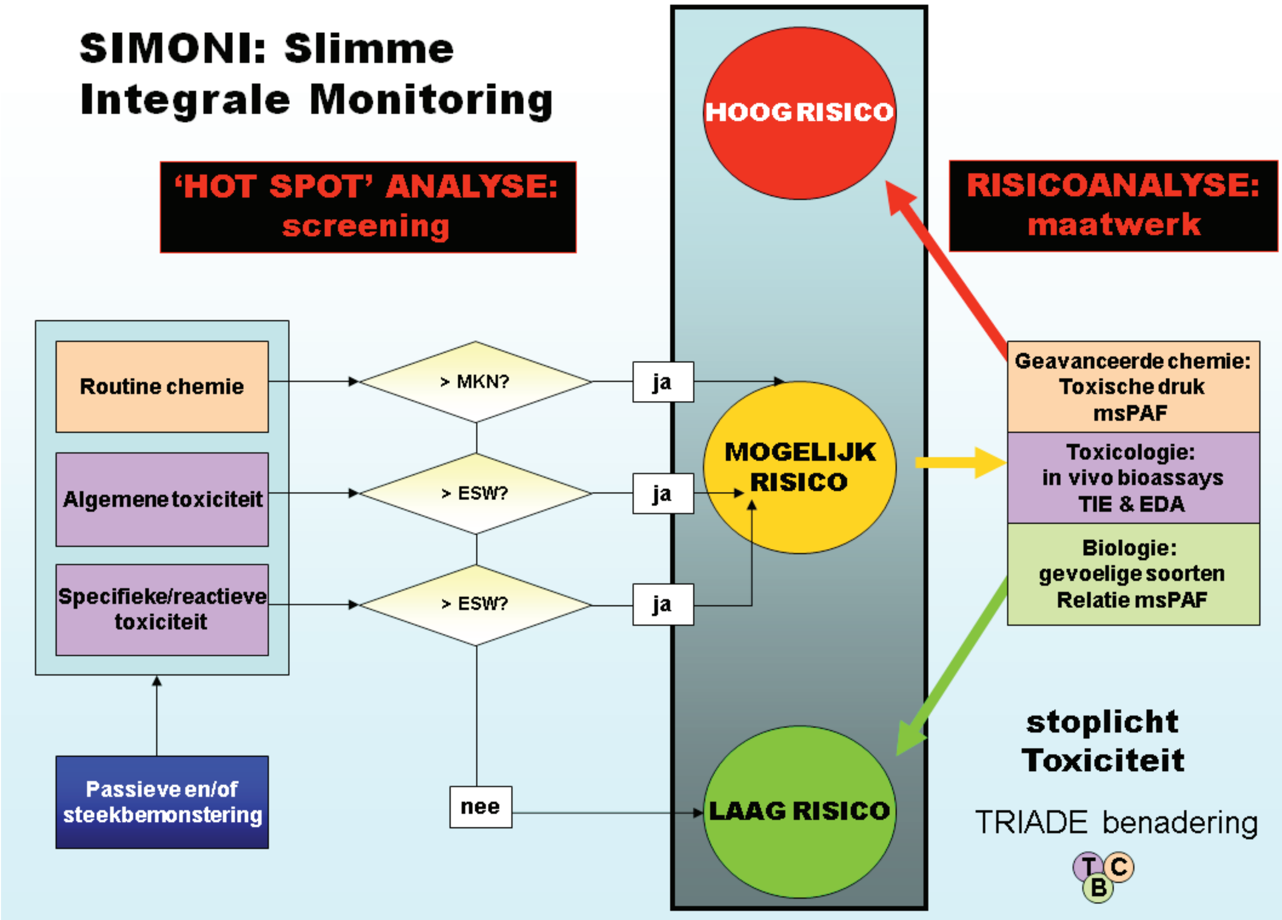
A paradigm shift in the field of water quality assessment from a single-chemical approach to an effect-based approach would overcome the present limitations (Poulsen et al., 2011; Maas et al., 2004). As previously stated, only a small fraction of the compounds that could be present in the water are monitored with current programs. The introduction of effect-based techniques will lead to a more holistic and qualitative environmental risk assessment. As a matter of fact, this shift will allow us to detect toxicity of mixtures of (un)known bioavailable chemicals and to better link the cause (presence of chemicals) to the effect (toxicity for the aquatic communities). The first step of a risk assessment is a hazard identification to establish if a certain situation is of concern or not. The combination of bioassays with chemical analysis in water assessment appears to be a more suitable tool than only chemical analysis, which was demonstrated in several studies investigating the reliability of an effect-based methodology. Among others, Chapman et al. (2011) investigated water samples from nine water reclamation plants in Australia with a combination of chemical analysis and bioassays in order to characterize human and environmental risks. One of the main conclusion of this investigation was that bioassays and chemical analysis were complementary and in agreement. Additionally, bioassays were able to provide a more complete analysis of the water quality, since they detected activity at concentrations below the detection limit of chemical analyses. Maas and co-workers (2004) showed that bioassays are sensitive enough to evaluate the effects of all WFD priority pollutants, in particular PAHs, herbicides and insecticides.

Effect-based tools or bioassays are techniques that investigate the toxicity of samples, using biological systems. They can be classified in two categories based on the level of organization of the biological system: in vivo bioassays (conducted on organisms, population, or ecosystem level) and *in vitro* bioassays (conducted on isolated cells or tissues). The biggest limitation of the effect-based techniques is their inability to determine the identity of the compounds causing the observed toxic effects. Certain *in vitro* bioassays, however, allow the identification of groups of chemicals with a similar mode of toxicant action (MOA). Generally, *in vivo* bioassays assess non-specific toxicity while in vitro bioassays will measure specific or reactive toxicity. Several types of *in vitro* bioassays are available to detect a variety of toxic activities, such as estrogenic, androgenic, dioxin-like effects, genotoxicity and neurotoxicity (Escher and Leusch, 2012). A battery test is defined as a selection of bioassays targeting different toxic endpoints. The endpoint selection is based on the protection goal or the chemical activity that need to be targeted. A battery test selected for water quality assessment should cover all relevant MOAs, since the goal is to get a wide comprehensive picture of the toxic potency of the available micropollutants. Since in vitro bioassays are able to detect specific toxic activity of groups of chemicals, a broad selection of toxic endpoints will gain a more complete picture of chemical risks, including the effects of unexpected or unknown toxic substances (Escher and Leusch, 2012).

Several countries are already using bioassays to monitor the microchemical water quality (see de Zwart, 1995 and Wernersson et al., 2014 for an overview). Battery tests have also been used for water quality assessment, e.g., to investigate the efficiency of sewage treatment plants and the chemical quality of drinking water (Kienle et al., 2011; Macova et al., 2010; Pablos et al., 2009; Macova et al., 2011; Zěgura et al., 2009). In the Netherlands, bioassays have been applied for many years in surveillance monitoring of the Meuse, Scheldt and Rhine river basin. The use of bioassays, however, is restricted to research programs since there are no official guidelines to incorporate effect-based tools in regulatory monitoring programs. One of the main reasons for this is the lack of tools for a clear interpretation of bioassay results, such as effect-based triggers values (ETVs). The definition of EBTs will help water managers to define the bioassay responses that indicate that levels of micropollutants can be considered a “low risk” or a “potential risk” for the ecosystem. Several international projects like DEMEAU (http://demeau-fp7.eu) and SOLUTIONS (http://www.solutions-project.eu), investigate and promote implementation of effect-based tools in current regulations for water quality assessment. In 2010, Waternet started a project called “Smart monitoring”. The main goal of this project is to combine traditional chemical analysis with effect-based tools in a tiered screening approach, in order to obtain a more efficient and cost-effective environmental risk assessment (Van der Oost et al., in prep). Bioassays will represent a powerful screening tool that will allow the classification of sites by a model called “SIMONI” (Smart Integrated Monitoring toxicity traffic light, Figure 1). According to the model, sites will be classified as low risk (green), potential risk (orange) and high risk (red), based on the responses of a battery of selected bioassays and target chemical analyses. Only when a potential risk is indicated an investigation with chemical analysis will be needed, in order to identify the chemicals causing the observed toxic effects.

FIGURE 1

Schematic representation of the SIMONI model (Van der Oost, in preparation a). Sites will be classified as low risk (green) or potential risk (orange) based on the responses of a bioassay battery. Advanced chemical analyses will only be needed at potential risk, to identify if the chemicals causing the toxic effects are a high ecological risk (red).



1.3. IN VITRO BIOASSAY BATTERY

The present study focusses on EBT for *in vitro* bioassays for specific and reactive effects, and bioassays for the determination of antibiotics activities. As stated above, *in vitro* bioassays are able to detect specific activities caused by unknown mixtures of compounds with the same MOAs (Sonneveld et al., 2005). The specific activity is expressed in toxic equivalents (TEQ), i.e., the amount of a reference compound (see Table 1) that would cause the same effect as all compounds of the unknown mixture the bioassay is exposed to. CALUX (Chemical Activated LUciferase gene eXpression) techniques are *in vitro* bioassays performed with modified cell lines that contain luciferase reporter genes and specific receptor sites. The binding of chemicals to a specific receptor will induce luciferase gene expression. After addition of the luciferine substrate, the intensity of the luciferase induction can be measured as an increased luminescence, which is a measure of the activity of all micropollutants with this specific MOA. Detection of antibiotics activities was performed with the Water SCAN bioassay, developed by RIKILT (Netherlands). This bioassay uses agar plates inoculated with five species of microorganisms that are sensitive to different classes of antibiotics with the same MOAs. After exposure to a sample, the growth inhibition of the microorganisms is measured as a clear area in the agar. The surface area of the clear spot, which is proportional to the total activity of specific antibiotics in the sample, was used to quantify the response. Different versions and improvements of the bioassay have been suggested and detailed information can be found in Pikkemaat et al. (2008).

ER CALUX

Estrogen receptors (ER) are a group of proteins found inside cells that are activated by the hormone estrogen (17 -estradiol). Once activated by estrogen, the ER is able to translocate into the nucleus and bind to DNA to regulate the activity of different genes (i.e. it is a DNA-binding transcription factor). Estrogen is the primary female sex hormone that is responsible for the development and regulation of the female reproductive system and secondary sex characteristics. Estrogen may also refer to any substance, natural or synthetic that mimics the effects of the natural hormone.

Anti-AR CALUX

The androgen receptor (AR) is a nuclear receptor that is activated by binding the androgenic hormones, testosterone or dihydrotestosterone in the cytoplasm and then translocating into the nucleus. The androgen receptor is most closely related to the progesterone receptor, and progestins in higher dosages can block the androgen receptor. The main function of the androgen receptor is as a DNA-binding transcription factor that regulates gene expression. Androgen regulated genes are critical for the development and maintenance of the male sexual phenotype.

DR CALUX

Dioxin Responsive bioassays, such as DR CALUX, are used to detect dioxins and dioxin-like compounds. It is based on the mechanisms of the arylhydrocarbon receptor (AhR) pathway (Murk et al., 1996). Chronic activation of the AhR-pathway by these compounds has been shown to cause cancer in the predominantly the liver and can cause developmental defects in vertebrates. DR CALUX is also used to screen food for dioxins and dioxin-like compounds in order to guarantee food safety. Dioxins are considered to be the most toxic man-made chemicals.

GR CALUX

The glucocorticoid receptor (GR) is the receptor to which cortisol and other glucocorticoids bind. The primary mechanism of GR action is the regulation of gene transcription. After the receptor is bound to glucocorticoids, the receptor-glucorticoid complex can take either of two paths (Rhen and Cidlowski, 2005). The activated GR complex up-regulates the expression of anti-inflammatory proteins in the nucleus or represses the expression of pro-inflammatory proteins in the cytosol (preventing the translocation of other transcription factors from the cytosol into the nucleus).

NRF2 CALUX

Oxidative stress reflects the imbalance between the manifestation of reactive oxygen species and the biological ability to detoxify the reactive intermediates or to repair the resulting damage (Sies, 1985). Disturbances in the normal redox state of cells can cause toxic effects through the production of peroxides and free radicals that damage all components of the cell, including proteins, lipids, and DNA. Base damage is mostly indirect and caused by reactive oxygen species (ROS) generated, e.g. superoxide radical, hydroxyl radical and hydrogen peroxide. The detection of oxidative stress with the *in vitro* Nrf2 CALUX ('Nuclear-factor-E2-related factor') is based on the activation of the Nrf2 pathway, which regulates cytoprotective enzymes in response to oxidants and electrophilic compounds through binding to the antioxidant response element (ARE) (Nguyen et al., 2009).

PAH CALUX

Polycyclic aromatic hydrocarbons (PAHs) are one of the most widespread organic pollutants. The toxicity of PAHs is structure-dependent. Isomers (PAHs with the same formula and number of rings) can vary from being nontoxic to extremely toxic. One PAH compound, benzo[a]pyrene (BaP), is notable for being the first chemical carcinogen to be discovered. Certain PAHs are well known for their carcinogenic, mutagenic, and teratogenic properties. The PAH CALUX is designed for the detection of the activity of the most toxic PAHs, like BaP.

PPARg CALUX

The peroxisome proliferator-activated receptor gamma (PPARγ) regulates fatty acid storage and glucose metabolism. The genes activated by PPARγ stimulate lipid uptake and adipogenesis by fat cells. PPARγ knockout mice fail to generate adipose tissue when fed a high-fat diet (Jones et al., 2005). Many naturally occurring agents directly bind with and activate PPARγ.

PXR CALUX

PXR is a nuclear receptor whose primary function is to sense the presence of foreign toxic substances and in response up regulate the expression of proteins involved in the detoxification and clearance of these substances from the body (Kliewer et al., 2002). Receptors such as PXR recognize such xenobiotics and to control the expression of a large series of phase I, phase II, and phase III metabolizing enzymes and transporters. The encoded protein is a transcriptional regulator of the cytochrome P450 gene CYP3A4, binding to the response element of the CYP3A4 promoter as a heterodimer with the retinoic acid receptor (RAR). PXR is activated by a range of compounds that induce CYP3A4, including dexamethasone and rifampicin (Bertilsson et al., 1998).

ANTIBIOTICS ACTIVITIES

Aminoglycosides

Aminoglycosides bind irreversibly to different subunits of bacterial ribosomes and therefore interfere with protein synthesis (Brain et al., 2004). Streptomycin is one of the most commonly used aminoglycosides and, apart from binding to the 30S ribosomal subunit of bacteria, slows down the already initiated protein synthesis and produces misreading of mRNA (Van der Grinten et al., 2010).

Macrolydes & β-lactams

Within the macrolides and β-lactams antibiotics, an important number of compounds have been tested on different organisms. Macrolides bind to the bacterial 50S subunit of the ribosome, inhibiting translocation of tRNA during translation (Van der Grinten et al., 2010). β-Lactams are another group of compounds, which often appear classified together with macrolides. They inhibit the synthesis of cell wall in bacteria by targeting the transpeptidase enzymes of these organisms (Wilke et al., 2005). Additionally, other compounds such as carbacephems (for example, cephalexin), pose a similar mode of action as β-lactams, inhibiting the synthesis of bacterial cell walls (Brain et al., 2004).

Sulfonamides

Sulfonamides are synthetic compounds which act as folate antagonists, avoiding the production of coenzyme dihydrofolic acid by blocking the conversion of paminobenzoic acid in microorganisms (Brain et al., 2004). They pose a broad spectrum of action against bacteria and coccidian and their presence in the environment is mainly due to the excretion of active forms and the transformation of their inactive metabolites back into the active form by bacteria, which explains their persistency and resistance in the environment (De Liguoro et al., 2009). Diaminopyrimidines are a group of antibiotic commonly presented together with sulfonamides because of their synergistic effect. The most common diaminopyrimidine is trimethoprim, which inhibits the enzyme dihydrofolate reductase by reversible binding, therefore interfering with the synthesis of folate (Van der Grinten et al., 2010).

Tetracyclines

Tetracyclines bind irreversibly to the 30S ribosomal subunit, inhibiting the protein synthesis by blocking the binding of aminoacyl transfer to DNA (Brain et al., 2004). This group of antibiotic is most commonly used in veterinary applications. Oxytetracycline, one of the most commonly used tetracylines, inhibits the protein synthesis by avoiding the interaction between aminoacyl-tRNA and the bacterial ribosome (Kołodziejska et al., 2013; Van der Grinten et al., 2010). Florphenicol and derivates from thiamphenicol act on protein synthesis of Gram-negative and Gram-positive bacteria by inhibiting transpeptidation (Christensen et al., 2006; Kołodziejska et al., 2013).

Quinolones

Quinolones are DNA gyrase and topoisomerase IV inhibitors, which present higher affinities for the bacterial enzyme than for the vertebrates' enzyme (Brain et al., 2004; Carlsson et al., 2009). These antibiotics have evolved from the first generation of quinolones, such as oxolinic acid, to the second and third generation, the fluoroquinolones. In these last ones, a fluorine atom was added to the structure, which improved the efficiency of these compounds (Robinson et al., 2005). One of the most commonly used quinolones is enrofloxacin, from which 11% is estimated to be transformed into its metabolite, ciprofloxacin (Rico et al., 2014a). Therefore, these compounds are sometimes estimated or tested for toxicity together.

1.4 AIM OF THE STUDY

As part of the 'Smart monitoring' (Waternet) and 'Ecological Key Factor Toxicity' (STOWA) projects, the present study aims to derive "low risk" effect-based trigger values (EBTs) for eight bioassays, targeting estrogenic activity, anti-androgenic activity, glucocorticoid activity, PAH- and dioxin-like activity, lipid metabolism (PPARγ), oxidative stress, pregnane X receptor (PXR) activity and five antibiotics activities. The selected endpoints and the corresponding bioassays are presented in

TABLE 1

Target activities and in vitro bioassays selected for environmental hazard identification, with reference compounds for each bioassay.

Activity detected	Bioassay	Reference Compound	(CAS)
Estrogenic	ERa CALUX	17-β estradiol	50-28-2
Anti-androgenic	antiAR CALUX	Flutamide	13311-84-7
Dioxin and dioxin-like	DR CALUX	2,3,7,8-TCDD	1746-01-6
Glucocorticoid	GR CALUX	Dexamethasone	50-02-2
PPARγ receptor	PPARγ CALUX	Rosiglitazone	122320-73-4
Toxic PAHs	PAH CALUX	Benzo[a]pyrene	50-32-8
Oxidative stress	Nrf2 CALUX	Curcumin	458-37-7
Pregnane X receptor	PXR CALUX	Nicardipine	54527-84-3
Antibiotics activities	Aminoglycosides	Neomycin	1404-04-2
	Macrolides & β-Lactam	Penicillin	61-33-6
RIKILT WaterSCAN	Sulphonamides	Sulfamethoxazole	723-46-6
	Tetracyclines	Oxytetracycline	79-57-2
	Quinolones	Flumequine	42835-25-6

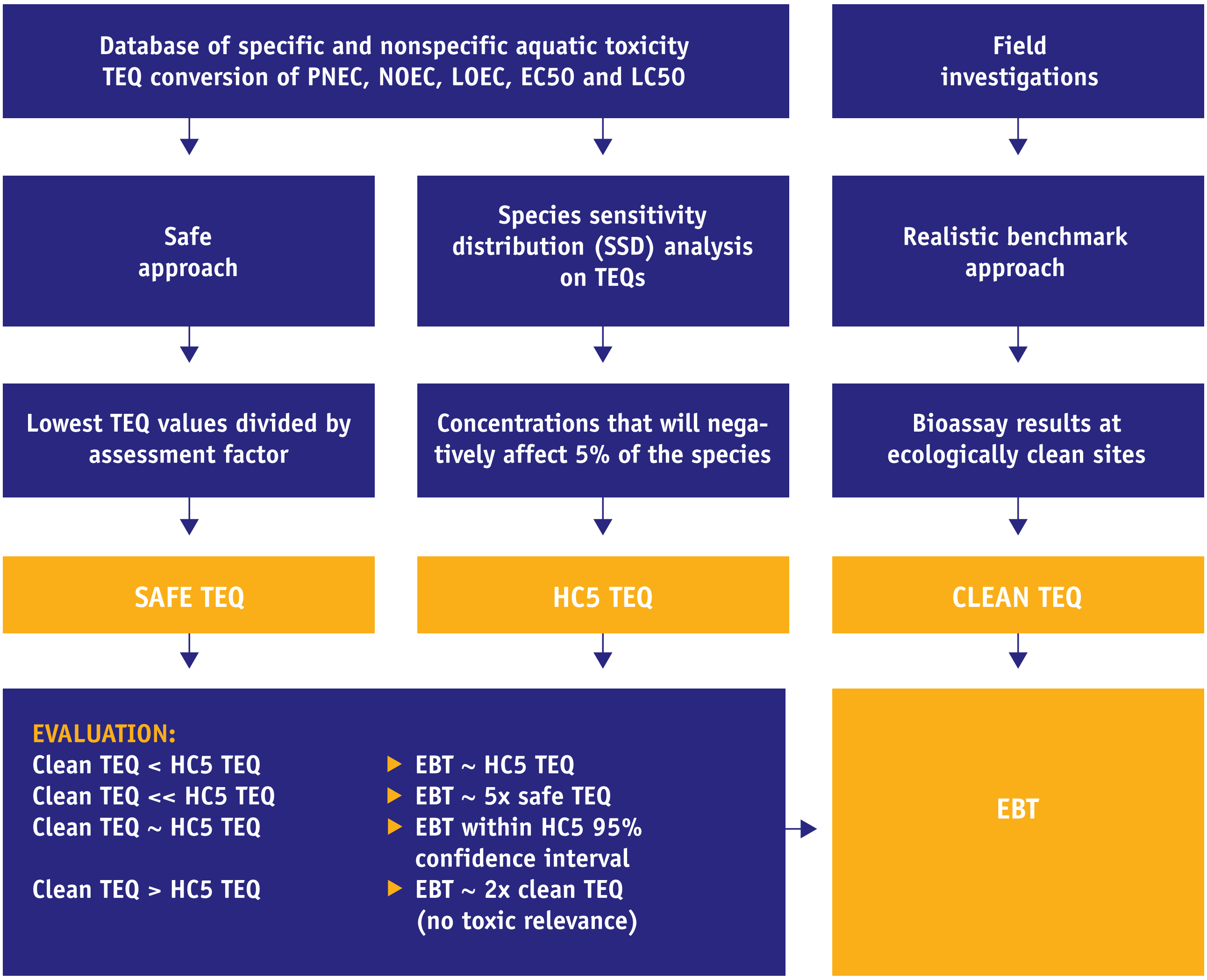
The EBTs developed in the present study will be incorporated in a model called "SIMONI", which will be used to investigate the micro-chemical quality of the water (Figure 1). Within this model, the hazard identification (left site of the schedule in Figure 1) will be based on the responses of a battery of selected bioassays. The comparison between the bioassay responses and the EBTs will allow the classification of the investigated sites in low risk or potential risk for adverse ecological effects. Additional investigations will be conducted only on sites for which the bioassay responses indicate a potential ecological risk, and will be directed towards the identification of the toxic compounds in the samples through chemical analysis (van der Oost, in preparation a).

2 METHODS

The derivation of EBTs for the selected CALUX bioassays and antibiotic activities will be based on a three-step approach. The first step is a selection of compounds that are known to trigger a response in the bioassay, with relative effect potencies (REPs) close to the reference compound, a literature search for toxicity data on these selected compounds, and conversion to their TEQ values of the respective reference compounds. Lowest TEQs of the toxic effects found (divided by an assessment factor) will be used as save toxic equivalents concentration (safe TEQ). The second step was a species sensitivity distribution of all TEQ values in order to estimate the TEQ level that may cause an adverse effect to 5% of the species (HC5 TEQ). The HC5 TEQ should preferably be higher than or equal to the proposed low-risk effect-based trigger value (EBT). The last step was a benchmark with Waternet field data. A realistic EBT should be higher than the average effect observed at eight reference sites with a good ecological status (clean TEQ). In order to get a good discrimination between sites, the EBT should be exceeded only at a limited number of polluted sites. The steps that were followed for the definition of EBTs are summarized in Figure 2, and described in detail in the following paragraphs.

FIGURE 2

Schematic representation of the steps taken for the design of environmental EBTs.



2.1 TOXICOLOGICAL DATABASE

A collection of available toxicological data is the first and necessary step on which every method that aims to set quality standards is based. In a classical single-chemical approach, data are collected for the compound under study. However, due to the nature of the bioassays, it was necessary to follow a different approach. Since bioassays are effect-based tools that measure activities caused by a mixture of available compounds in a sample, the nature of the compounds that cause the observed effect remains unknown. The measured activity is express as *toxic equivalent* (TEQ) concentration to a reference compound, i.e. the equivalent concentration of a reference compound that would cause the same observed effect as the (un)known mixture of compounds present in the investigated sample. The reference compound is a chosen representative of a certain activity and is specific for each bioassay (see Table 1 for reference compounds of all selected bioassays). Additionally, different substances can be more or less potent in triggering a response than the corresponding reference compound. The concept of *relative effect potencies* (REPs) is used to account for these differences. REPs can be calculated by dividing the effect concentration of the reference compound by the concentration of another compound that is required to produce a similar effect. The TEQ concentration of a compound can thus be calculated by multiplying the actual concentration by its REP value.

Since a search of toxicological data for only the reference compounds is unreliable to set relevant EBTs, we included a selection of other compounds that are able to trigger a response in each bioassays. The compounds were selected based on their REPs. A complete list of the selected compounds and their REPs is presented in Appendix I. For all toxicological endpoints a search in scientific literature and toxicological databases was conducted to establish toxicity data of all selected compounds in water organisms at different trophic levels. Toxicity data were classified in five groups, i.e. PNEC (Predicted No-effect Concentration), NOEC (No Observed Effect Concentration), LOEC (Lowest Observed Effect Concentration), EC50 (50% Effect concentrations) and LC50 (concentrations lethal to 50% of the test organisms). The complete dataset of all toxicity data that were used for this study is presented in Appendix II. All toxicity data were converted to TEQ concentrations of the respective reference compounds by multiplication with the REPs. According to the precautionary principle, chronic toxicity was considered the most relevant for environmental risk assessment. In order to compare chronic with acute data some data conversion was needed.

Assumption 1: the focus of the trigger value design will be on chronic toxicity; in order to compare all toxicity data, acute data were converted in chronic data by dividing them by an assumed acute-to-chronic ratio of 10 (Durand et al., 2009). Since there are no strict definitions for acute and chronic exposure times, an assumption of the criteria for chronic exposure for different taxa had to be estimated.

Assumption 2: the estimated durations of chronic experiments for different groups of organisms are listed in Table 2; toxicity data of experiments with shorter exposure times are divided by a safety factor of 10 (i.e., assumption 1: acute-to-chronic concentration ratio).

Assumption 3: since chemicals with very low relative effect potencies (REPs) will give extremely low TEQ values, a certain restriction was needed for a realistic hazard identification; in order to compare the REP impact, all calculations for each EBT were performed on two chemical selections: the REP1 group included compounds with REPs > 0.1, while the REP2 group included compounds with REPs > 0.001.

The REPs for the CALUX bioassays were provided by BDS (BioDetection Systems, Amsterdam, The Netherlands), calculated from EC10 results of the different compounds. The REPs for the detection of antibiotic activity were estimated from the detection limits of the selected compounds. The RIKILT WaterScan and similar methods, such as RIKILT MeatScan or NDKT (New Dutch kidney test), are based on the growth inhibition of certain microorganisms after exposure to the samples. It was assumed that the detection limits of the antibiotics, i.e. the minimum concentrations that cause a detectable growth inhibition, corresponded to their potencies. Therefore, the REPs were estimated by dividing the detection limit of the reference compound by the detection limit of the considered compound. REPs were calculated from the detection limits of the RIKILT WaterScan method or those reported by Pikkemaat et al. (2008) for RIKILT MeatScan or NDKT. All REPs for each bioassay that were used for the present study are presented in APPENDIX I.

TABLE 2

Criteria applied in the present study to estimate chronic exposure.

Organism	Chronic exposure (days)
Protozoa Bacteria Fungus	≥ 1
Polyp Algae Rotifer Crustacean Insect Mollusca Worm	≥ 4
Plant Amphibian Fish	≥ 7

2.2 SAFE APPROACH (SAFE TEQ)

According to the precautionary principle it is relevant to define “safe” TEQs that indicate no risk levels of active compounds to the ecosystem. The lowest TEQs concentrations for each toxicological endpoint (PNEC, NOEC, LOEC, EC50 and LC50) were selected and divided by an assessment or safety factor (AF), which ranged for 1 to 100 according to the toxic endpoint considered (see Assumption 4: Table 3).

Assumption 4: assessment factors to estimate save biological activities by extrapolation of five different toxic endpoints are listed in Table 3.

TABLE 3

Assessment factors (AFs) applied in the present study to convert toxicity data to assumed save levels.

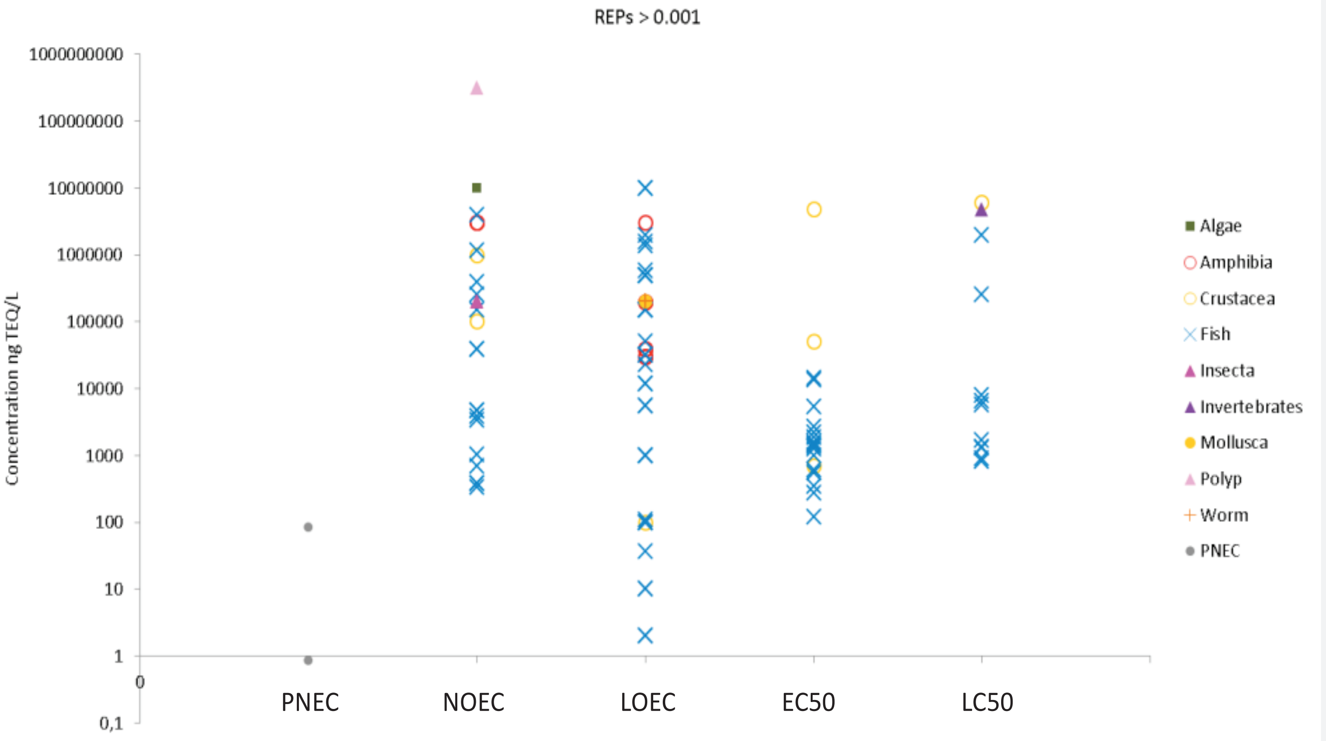
Endpoint	AF
PNEC	1
NOEC	1
LOEC	5
EC50	10
LC50	100

The lowest of all chronic toxicity values found in the literature, divided by their respective AFs, was considered as a safe value for water organisms and defined as the “safe” toxic equivalents concentration (safe TEQ). As an illustration of the ‘save approach’, all collected toxicity data for dioxin-like compounds of the REP2 group are presented in Figure 3. The lowest LOEC (divided by assessment factor 5) was used as the safe TEQ. Since these “no risk” safe TEQs will be exceeded at most moderately polluted sites, a more realistic approach was followed in order to define a “low risk” effect-based trigger value (EBT). This approach will be described in the next paragraphs.

Graphic representations of all collected toxicity data that were used for the EBT design for all bioassays (both REP1 and REP2 groups) are presented in Appendix IV.

FIGURE 3

Toxicity dataset for dioxin-like compounds with REPs > 0.001.



2.3 SPECIES SENSITIVITY DISTRIBUTION ANALYSIS (HC5 TEQ)

A more realistic trigger value approach ('low risk' instead of 'no risk') was based upon a Species Sensitivity Distribution (SSD) analysis (Posthuma et al., 2002). SSD curves are usually generated by fitting the distribution of log-transformed toxicological data (usually NOEC, EC50 or LC50) of several species for a single compound. When more data are available for the same compound in the same species, an average toxic concentration is used for the SSD. The output of the SSD distribution can be used to determine the 5th percentile hazard concentration (HC5 TEQ), which represents the concentration of the investigated compound that will negatively affect 5% of the species.

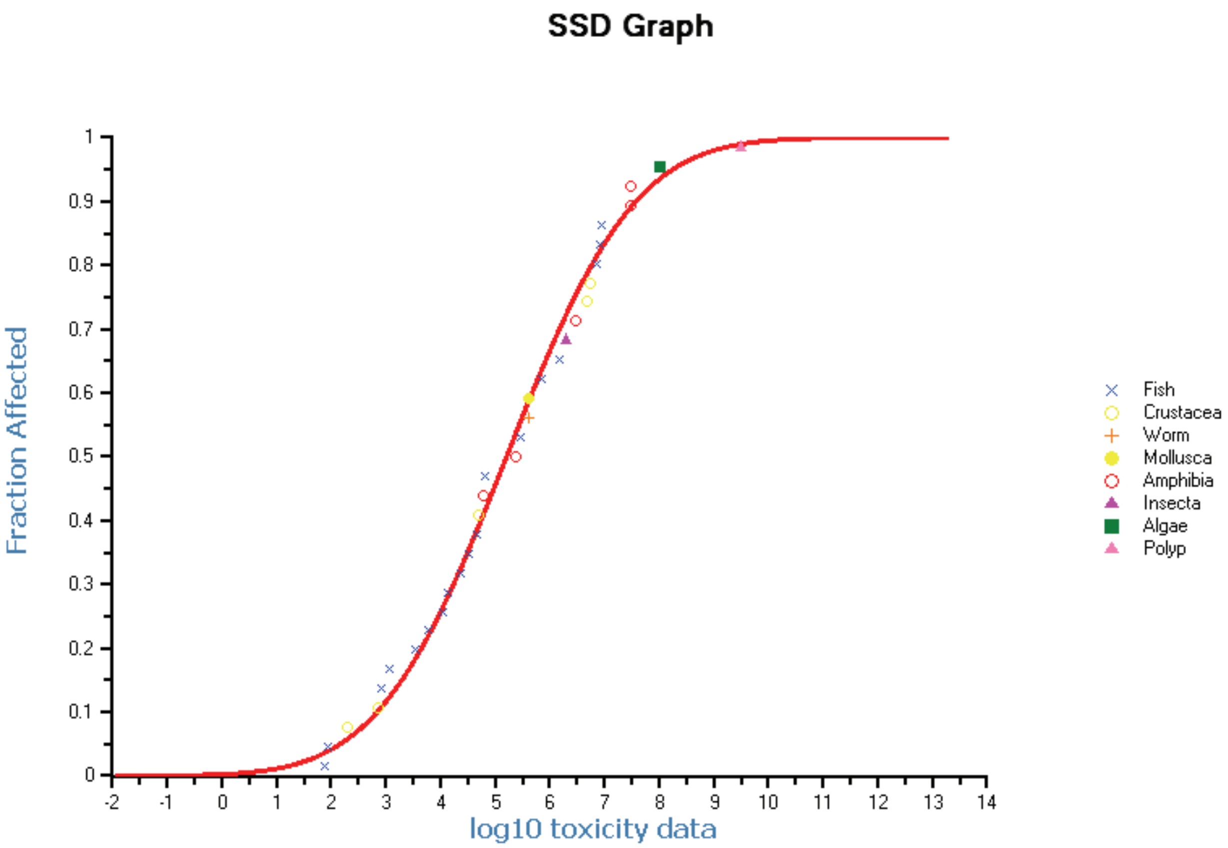
In the present study an unusual SSD approach was applied, since toxicological data of various compounds that trigger a response in the same bioassay had to be included. Since it is impossible to generate SSD curves with data of different substances, we converted all toxicological data to TEQ concentrations of the reference compounds of the bioassay. This conversion allowed us to generated SSD curves with the collected toxicity data for all species and for each original compound. Average TEQ values were used if different toxicity values were available for the same compound in the same species. The SSD curves were preferably generated from EC50 TEQ values with the statistical software ETX 2.0 (Vlaardingen et al., 2004).

For the DR CALUX and GR CALUX, the amount of available EC50 values was insufficient to run the SSD analysis. As a consequence, a combination of NOEC, LOEC and EC50 TEQ values were used. Prior to the analysis, NOEC and LOEC values were multiplied by 10 and 2 respectively, in order to get an AFs of 10 like the EC50 (assumption 4, Table 3), to account for the differences between these toxicological endpoints. The HC5 TEQ-values that were determined by this approach were mend to be used as upper limits of the low-risk effect-based trigger values. In some cases, however, an EBT above the HC5 TEQ had to be defined, due to higher benchmark data at sites with a good ecological status.

As an illustration of the SSD approach, the SSD curve with collected toxicity data (pg TEQ/L) for dioxin-like compounds of the REP2 group are presented in Figure 4. The TEQ-level that is hazardous to 5% of the organisms can be estimated with the SSD curve (affected fraction 0.05). SSD curves of all collected toxicity data that were used for the EBT design for all bioassays (both REP1 and REP2 groups) are presented in Appendix V.

FIGURE 4

Species sensitivity distribution (SSD) for dioxin-like compounds with REPs > 0.001.



2.4 BENCHMARK APPROACH BIOASSAYS (CLEAN TEQ)

Another approach to obtain more realistic “low risk” EBTs was a benchmark with field data. This benchmark approach was primarily carried out with the results of bioassay monitoring at eight reference sites with a good ecological status. The rationale behind this approach was that the bioassay responses that were observed at sites with a good ecological status were not considered crucial for realistic overall risk estimations and should not indicate potential ecological hazards. Therefore the benchmark data were used to indicate the lower limits for the EBTs, the “clean TEQ”.

2.5 DERIVATION OF EBT

In the ideal case, the clean TEQ would be somewhere in between the safe TEQ and the HC5-TEQ, determined with SSD. Further refinement of EBT derivation was based upon evaluation of the safe, HC5 and claen TEQs accoding to following algorithms. If the clean TEQ was lower than the HC5 TEQ of the bioassay, than an EBT around the HC5 TEQ value was proposed. If the clean TEQ was much lower than the HC5 TEQ of the bioassay, than an EBT of approximately 5 times the safe TEQ was proposed. This factor ranges between 2 and 10, depending upon the strength of the dataset (data for many substances and many species) used to determine safe and HC5 TEQs. If the clean TEQ was close to the HC5 TEQ, than a value within the 95% confidence interval of HC5 TEQ was proposed as EBT. If the clean TEQ was much higher than the HC5 TEQ, than an EBT of approximately 2 times the clean TEQ was proposed, depending upon the strength of the dataset. This latter situation was typical for bioassays that are responsive to a wide array of chemicals, such as anti-AR, oxidative stress and PXR responses. EBT derived for these assays are not considered toxicologically relevant, but are used as indicators for overall chemical stress.

The bioassay analyses for the benchmark approach were performed according to validated standard protocols, as described by Van der Oost et al. (in preparation b). The modes of action (MOA) and toxicological relevance of the various bioassays are described in the introduction.

3 RESULTS

The complete dataset of the collected toxicity data is presented in Appendix II. The lowest toxic concentrations found for five endpoints (PNEC, NOEC, LOEC, EC50 and LC50) are summarized for each bioassay in Appendix III.

3.1 ESTROGENIC ACTIVITY

Release of endocrine disrupting compounds (EDC) in the water received much attention in the last decades, due to their ability to negatively affect aquatic populations. It was possible to find numerous studies in literature investigating the toxicity of estrogenic compounds, including biomarker endpoints (e.g. production of vitellogenin and changes in gene expression). The collected toxicity data for substances with estrogenic activity are presented in Appendix II A. The lowest toxic concentrations found for the five endpoints are presented in Appendix III.

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as estradiol equivalents per liter water (EEQ). In the REP1 group, the lowest value found was a PNEC of 0.035 ng/L for 17a-Ethinyl estradiol (James et al., 2014). However, 17a-Ethinyl estradiol presents a relative potency of 1.56, and the PNEC, once transformed in EEQ, was equal to 0.055 ng EEQ/L. The lowest LOEC found was 0.5 ng/L of 17a-Ethinyl estradiol for zebrafish (Danio rerio) after acute exposure (Colman et al., 2009). This value was multiplied by the acute to chronic ratio of 0.1 and transformed in EEQ. This resulted in a final value of 0.078 ng EEQ/L. After application of a safety factor of 5, a safe TEQ of 0.016 ng EEQ/L was proposed. In the REP2 group the safe TEQ was based on the lowest LOEC of 3.3 ng/L for rainbow trout (*Oncorhynchus mykiss*) after chronic exposure to estrone (Thorpe et al., 2003) with a REP of 0.01. This resulted in a TEQ value of 0.033 ng EEQ/L that was divided by a safety factor of 5, which lead to a proposed safe TEQ value of 0.007 ng EEQ/L.

SSD

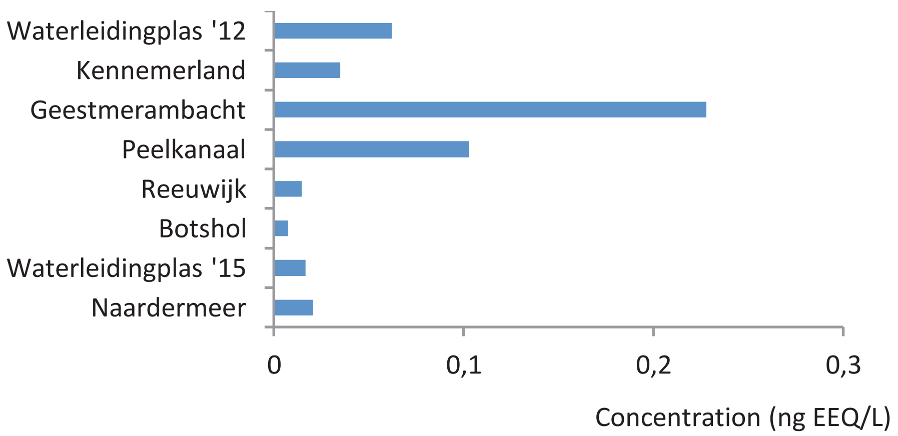
The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 0.47 ng EEQ/L (95% confidence interval from 0.009 to 6.2 ng EEQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 0.52 ng EEQ/L (95% confidence interval from 0.019 to 5.4 ng EEQ/L).

Benchmark approach

The ER CALUX responses for estrogenic activity at 8 sites with good ecological status are presented in Figure 5. The clean TEQ was 0.06 ng EEQ/L.

FIGURE 5

Bioassay responses for estrogenic activity (ng EEQ/L) at eight sites with good ecological status.



Based on the benchmark values and after evaluation of bioassays responses at clean, moderately polluted and heavily polluted sites (Table 4B), we propose a low risk EBT for overall estrogenic activity of 0.5 ng EEQ/L that resembles the HC5 TEQ values of both REP groups. This trigger value is exceeded at sites affected by effluents from waste water treatment plants (wwtp), two moderately polluted and eleven heavily polluted sites.

3.2 ANTI-ANDROGENIC ACTIVITY

The complete set of collected toxicity data of anti-androgenic substances is presented in Appendix II B. The lowest toxic concentrations found for the five endpoints are presented in Appendix III. The group of compounds that can inhibit the human androgen receptor and block its action (anti-androgenic response) is very heterogeneous (see Appendix I). It includes estrogenic compounds (e.g. 17α-ethinylestradiol and estradiol), pesticides (e.g. alachlor, triclosan, vinclozolin), synthetic materials (e.g. bisphenol A and phthalates) and non-ionic surfactants (alkylphenoles).

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as flutamide equivalents per liter (F1EQ/L). The values used for the definition of a safe TEQ did not differ in the REP1 and REP2 groups. The lowest value found in literature was a PNEC for benzo[a]pyrene equal to 0.0017 µg/L (OSPAR Agreement, 2014-05). Since benzo[a]pyrene has a REP of 1 in the antiAR CALUX, this PNEC is equal to 0.0017 µg FEQ/L. However, the safe TEQ was set based on the lowest LC50 of 0.016 µg/L for endosulfan for the copepod *Mesocyclops longisetus* after acute exposure (Gutierrez et al., 2013). The transformed chronic value was equal to 0.005 µg F1EQ/L. Assuming a safety factor of 100 for the LC50 endpoint, the final proposed safe TEQ is equal to 0.05 ng F1EQ/L.

SSD

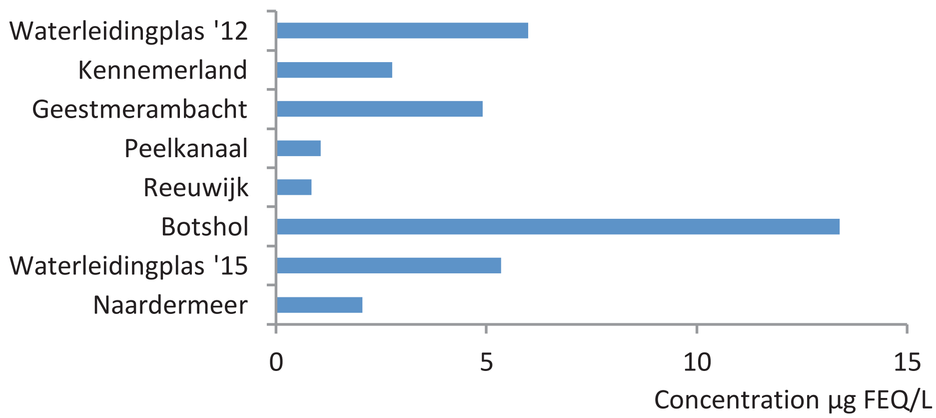
The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 0.29 µg F1EQ/L (95% confidence interval from 0.1 to 0.6 µg F1EQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 0.13 µg F1EQ/L (95% confidence interval from 0.05 to 0.27 µg F1EQ/L).

Benchmark approach

The anti-AR CALUX responses for estrogenic activity at 8 sites with good ecological status are presented in Figure 6. The mean anti-AR response was equal to 4.55 µg F1EQ/L.

FIGURE 6

Bioassay responses for anti-androgenic activity (µg FEQ/L) at eight sites with good ecological status.



The range of toxic concentrations collected for compounds that exhibit anti-androgenic activity was very broad, reflecting the different nature of the substances taken into consideration. In this contest, the benchmark approach was considered even more important, since an approach based on the HC5 TEQ value of the SSD analysis would lead to an insufficient discrimination between sites (EBT would be exceeded at all sites). Based on the reference benchmark values and after evaluation of Waternet bioassays responses at polluted sites (Table 4B), we propose a low risk EBT for overall anti-androgenic activity of 25 µg F1EQ/L, which is much higher than the predicted HC5 TEQ and the proposed safe TEQ. This trigger value was exceeded at one of the reference sites, four moderately polluted sites and five heavily polluted sites.

3.3 DIOXIN AND DIOXIN-LIKE ACTIVITY

A complete set of collected toxicity data od substances with dioxin-like activity is presented in Appendix II C. The lowest toxic concentrations found for the five endpoints are presented in Appendix III. Dioxin and dioxin-like compounds are poorly water-soluble. They tend to accumulate in organism due to bioaccumulation or biomagnification. Most of the studies reported nominal concentrations of exposure, which may lead to an underestimation of the risk connected to the exposure of aquatic organisms to this group of compounds.

Safe approach

Graphic representations of the collected toxicity values for compounds in the REP1 and REP2 groups are presented in Appendix IV as 2,3,7,8-tetrachloro dibenzodioxin (TCDD) equivalent per liter (TEQ/L). In both REP1 and REP2 group, the lowest value found was a LOEC of 2 pg/L for rare minnow (Gobiocypris rarus) after chronic exposure to 2,3,7,8-TCDD (Wu et al., 2001), which is equal to the TEQ concentration, since 2,3,7,8-TCDD is the reference compound for the DR CALUX. A safety factor of 5 for LOEC was applied to this value, so the proposed safe TEQ is equal to 0.4 pg TEQ/L.

SSD

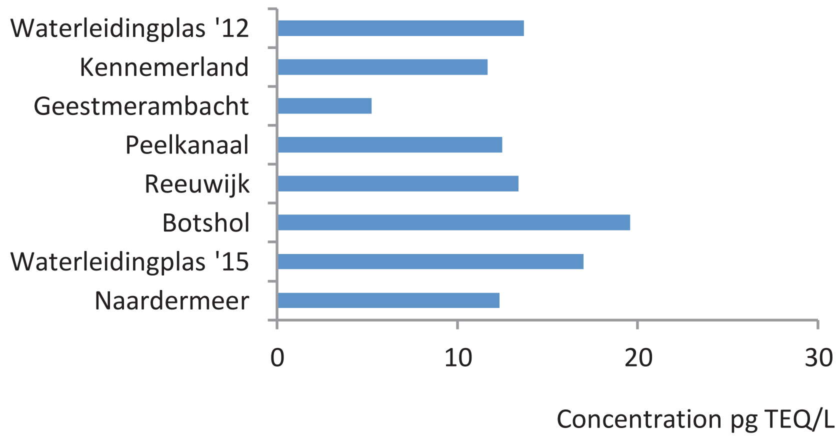
The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 equal to 36 pg TEQ/L (95% confidence interval from 1.7 to 308 pg TEQ/L). The SSD analysis for the REP2 group resulted in a HC5 equal to 137 pg TEQ/L (95% confidence interval from 15 to 736 pg TEQ/L).

Benchmark approach

The DR CALUX responses for dioxin and dioxin-like activity at 8 sites with good ecological status are presented in Figure 7. The clean TEQ was equal to 13.2 pg TEQ/L.

FIGURE 7

Bioassay responses for dioxin and dioxin-like activity (pg TEQ/L) at eight sites with good ecological status.



Based on this values and after evaluation of Waternet bioassays responses at polluted sites (Table 4C), we propose a low risk EBT for overall dioxin-like activity of 50 pg TEQ/L, which is slightly higher than the HC5 TEQ of the REP1 group, but lower than the HC5 TEQ of the REP2 group. This trigger value is exceeded at seven polluted sites, six of which were considered to be moderately polluted.

3.4 GLUCOCORTICOID ACTIVITY

A complete set of collected toxicity data of compounds with glucocorticoid activity is presented in Appendix II D. The lowest toxic concentrations found for the five endpoints are presented in Appendix III. The toxic effects of glucocorticoids for the aquatic community have been poorly investigated. The dataset for both the REP1 and REP2 groups is limited if compared to others activities investigated in the present study. Most studies were conducted on fish, while information for other trophic levels is scarce or inexistent.

Safe approach

Graphic representations of the collected toxicity values for compounds in the REP1 and REP2 groups are presented in Appendix IV as dexamethasone equivalents per liter (DEQ/L). In both REP1 and REP2 group, the lowest value found was a LOEC of 100 ng/L for fathead minnow (*Pimephales promelas*) after chronic exposure to dexamethasone (Lalone et al., 2012), which is equal to the TEQ concentration, since dexamethasone is the reference compound for the GR CALUX. A safety factor of 5 for LOEC was applied to this value, so the proposed safe TEQ is equal to 20 ng DEQ/L. This safe TEQ is 3 orders of magnitude lower than the only PNEC found in literature for prednisone of 27,800 ng DEQ/L (Escher et al., 2011).

SSD

The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 3236 ng DEQ/L (95% confidence interval from 80 to 29965 ng DEQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 2145 ng DEQ/L (95% confidence interval from 116 to 14311 pg TEQ/L).

Benchmark approach

The GR CALUX at eight sites with good ecological status did not show any glucocorticoid activity above the detection limit of 1.2 ng DEQ/L.

Since no GR activity was observed at the clean reference sites, the bioassays responses at polluted sites (Table 4) were leading for the benchmark. We propose low risk EBT for overall glucocorticoid activity of 100 ng DEQ/L, which is five times higher than the safe TEQ of 20 ng DEQ/L. This EBT is only exceeded at three sites heavily affected by wwtp effluents.

3.5 OXIDATIVE STRESS

It was not possible to find any toxicity data for aquatic community for the reference compound of this bioassay (i.e. curcumin). However, information was available on the many other compounds that cause oxidative stress to cells and trigger a response in Nrf2 CALUX. The complete set of collected toxicity data of compounds causing oxidative stress is presented in Appendix II E. The lowest toxic concentrations found for the five endpoints are presented in Appendix III.

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as curcumin equivalent per liter water (CEQ/L). In the REP1 group, the safe TEQ was based on the lowest EC50 of 0.42 μg/L for zebrafish (*Danio rerio*), after acute exposure to retinoic acid (Selderslaghs et al., 2012). This value was multiplied for an acute to chronic ratio of 0.1 and multiplied by the corresponding REP. The final TEQ value was equal to 0.007 μg CEQ/L. This value was divided by a safety factor of 10 for EC50, which resulted in a proposed safe TEQ of 0.0007 μg CEQ/L. This safe TEQ is one order of magnitude lower that the lowest PNEC of 0.023 μg CEQ/L for carbenzadim (Oekotoxzentrum website, EAWAG).

The lowest values found for all the toxic endpoints in the REP2 group were for estradiol, due to the fact that this compound has a relative potency of 0.06. The proposed safe TEQ of 0.006 ng CEQ/L was based on the lowest NOEC of 0.001 µg/L for Oryzias latipes (*Japanese Medaka*) after acute exposure to estradiol (Lee et al., 2012).

SSD

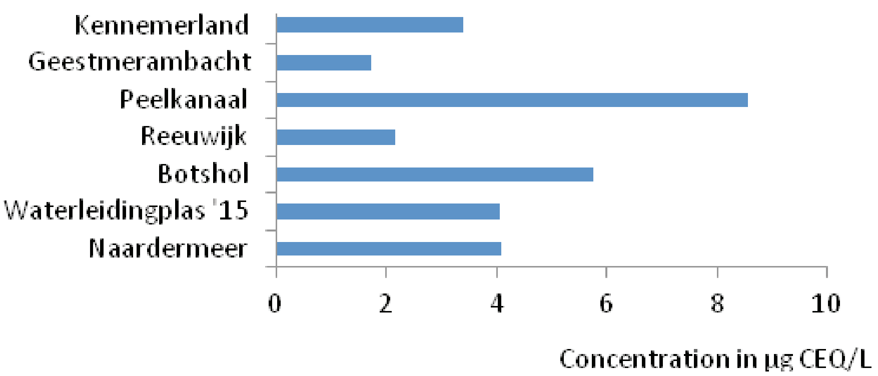
The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 0.7 µg CEQ/L (95% confidence interval from 0.2 to 2.2 µg CEQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 0.034 µg CEQ/L (95% confidence interval from 0.008 to 0.11 µg CEQ/L).

Benchmark approach

The Nrf2 CALUX responses for oxidative stress at 7 sites with good ecological status are presented in Figure 8. The clean TEQ was equal to 4.25 µg CEQ/L.

FIGURE 8

Bioassay responses for Nrf2 oxidative stress (µg CEQ/L) at seven sites with good ecological status.



The range of toxic concentrations collected for compounds that cause oxidative stress was (like anti-AR compounds) very broad, reflecting a different nature and toxicity. The low HC5 TEQ value that was found was not usefull for designing a realistic EBT, because it would be exceeded at all unpolluted sites. Based upon the mean benchmark value at the reference sites, we propose a low risk EBT for overall oxidative stress activity of 10 µg CEQ/L, which is much higher than the predicted HC5 TEQ values. This EBT was not yet performed at many polluted sites, and no exceedances have been observed thus far (Table 4C).

3.6 TOXIC PAHS

The complete set of collected toxicity data of toxic PAHs is presented in Appendix II F. The lowest toxic concentrations found for the five endpoints are presented in Appendix III. As in the case of dioxin and dioxin-like compounds, PAHs are lipophilic compounds that tend to accumulate in soil, organic particulate and tissues rather than in water. For this reason, the concentration of this class of pollutants should be measured during and/or at the end of the exposure period. However, the majority of the reviewed studies reported nominal concentrations of exposure, which may lead to an underestimation of the risks.

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as benzo[a]pyrene equivalents per liter water (BEQ/L). In the REP1 group the lowest value found was a PNEC of 0.17 ng/L for benzo[a]pyrene (OSPAR Agreement, 2014-05). This value was used to set a safe TEQ of 0.17 ng BEQ/L. In the REP2 group the lowest value found was a LOEC of 0.02 ng/L for Gobiocypris rarus (Rare minnow) after chronic exposure to benzo[a]pyrene (Wu et al., 2001). This value was divided by a safety factor of 5 for LOEC, which resulted in a proposed safe TEQ of 0.008 ng BEQ/L.

SSD

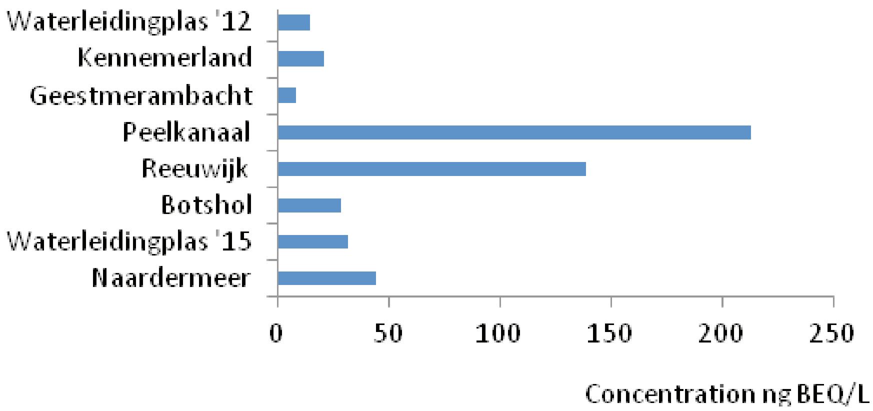
The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 47 ng BEQ/L (95% confidence interval from 2 to 368 ng BEQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 41 ng BEQ/L (95% confidence interval from 2.5 to 254 ng BEQ/L).

Benchmark approach

The PAH CALUX responses at 8 sites with good ecological status are presented in Figure 9. The clean TEQ was equal to 62.7 ng BEQ/L.

FIGURE 9

Bioassay responses for toxic PAHs (ng BEQ/L) at eight sites with good ecological status.



Based on the clean TEQ value and after evaluation of Waternet bioassays responses at polluted sites (Table 4C), we propose a low risk EBT for overall PAH activity of 150 ng BEQ/L. This EBT was above the estimated HC5 TEQ values, but falls within the HC5 95% confidence intervals. The EBT was exceeded at four moderately polluted sites, while not many measurements were performed at heavily polluted sites.

3.7 PPARγ RECEPTOR

The complete set of collected toxicity data of PPARg inducing compounds is presented in Appendix II. The lowest toxic concentrations found for the five endpoints are presented in Appendix III. The *in vitro* PPARγ CALUX is able to detect compounds that activate the PPAR gamma receptor, including several classes of aquatic contaminants, such as organotins and perfluorinated compounds.

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as rosiglitazone equivalent per liter water (REQ/L). For the REP1 group the safe TEQ was based on the lowest EC50 found of 424 ng/L for zebrafish (*Danio rerio*) after acute exposure to retinoic acid (Selderslaghs et al., 2012). This value was multiplied by an acute to chronic ratio of 0.1 and transformed to a TEQ value equal to 13.4 ng REQ/L. This value was than divided by a safety factor of 10, which resulted in a safe TEQ of 1.34 ng REQ/L. In the REP2 approach the safe TEQ was based on the lowest PNEC of 0.14 ng/L for dibenzo[a,h] anthrecene (OSPAR Agreement, 2014-05). After TEQ transformation a value of 0.00014 ng REQ/L was defined as the safe TEQ.

SSD

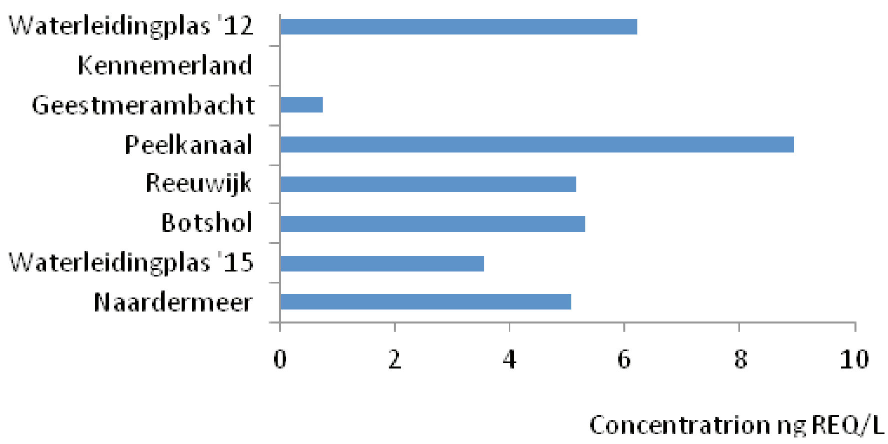
The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 45 ng REQ/L (95% confidence interval from 0.8 to 371 ng REQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 0.3 ng REQ/L (95% confidence interval from 0.002 to 6.9 ng REQ/L).

Benchmark approach

The PPARγ CALUX responses for at 8 sites with good ecological status are presented in Figure 10. The clean TEQ was equal to 4.37 ng REQ/L.

FIGURE 10

Bioassay esponses of PPARγ lipid metabolism (ng REQ/L) at eight sites with good ecological status.



Based upon the benchmark of unpolluted reference sites and after evaluation of Waternet bioassays responses at polluted sites (Table 4C), we propose a low risk EBT for peroxisome proliferation of 10 ng REQ/L. This value is higher than the HC5 TEQ of the REP2 group, but lower than the HC5 TEQ calculated with REP1 compounds. The ETB was exceeded at two moderately polluted sites and seven heavily polluted sites.

3.8 PREGNANE X RECEPTOR

The complete set of collected toxicity data of PXR inducing compounds is presented in Appendix II H. The lowest toxic concentrations found for the five endpoints are presented in Appendix III. The PXR CALUX is able to detect many WFD priority compounds, including pesticides, PAHs and alkyl phenols.

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as nicarpidine equivalent per liter water (NEQ/L). In both REP1 and REP2 groups the safe TEQ was based on the lowest LOEC found of 1 ng/L for *Daphnia magna* after acute exposure to chlorpyrifos-ethyl (Ha and Choi, 2009). This value was multiplied by an acute to chronic ratio of 0.1 and transformed to a TEQ value equal to 0.020 ng NEQ/L. This value was than divided by a safety factor of 5 for LOEC, which resulted in a safe TEQ of 0.004 ng NEQ/L. The safe TEQ is 1 order of magnitude lower than the lowest PNEC found for benzo(k)fluoranthene, equal to 0.03 ng NEQ/L (OSPAR Agreement, 2014-05).

SSD

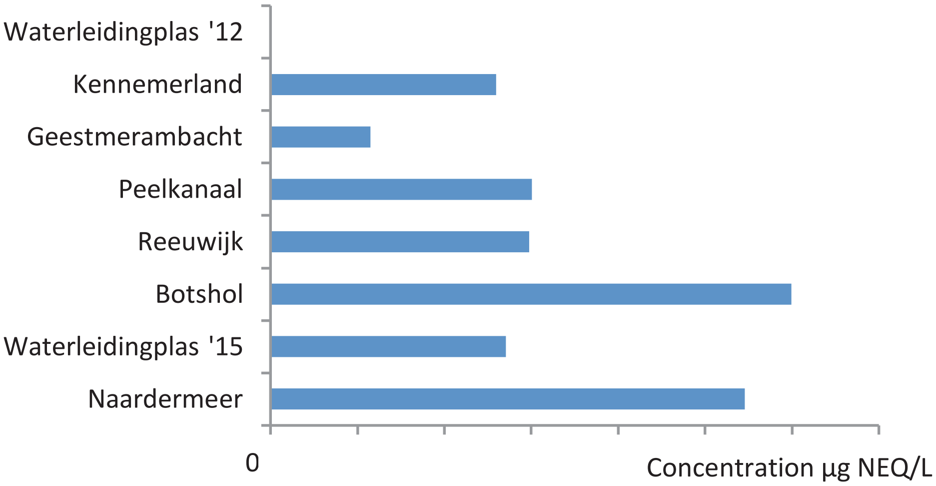
The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 7 ng NEQ/L (95% confidence interval from 1 to 30 ng NEQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 8 ng NEQ/L (95% confidence interval from 2 to 24 ng NEQ/L).

Benchmark approach

The PXR CALUX responses for biotransformation activity at 7 sites with good ecological status are presented in Figure 11. The clean TEQ was equal to 1.71 µg NEQ/L.

FIGURE 11

Bioassay responses of PXR biotransformation activity (µg NEQ/L) at seven sites with good ecological status.



The range of toxic concentrations collected for compounds that cause elevated PXR biotransformation was (like for anti-AR and oxidative stress endpoints) very broad, reflecting a different nature and toxicity. The low HC5 TEQ value that was found was not usefull for designing a realistic EBT, because it would be exceeded at all unpolluted sites. Based upon the mean benchmark value at the reference sites, we propose a low risk EBT for overall PXR activity of 3 µg CEQ/L, which is much higher than the predicted HC5 TEQ values. This bioassay was not yet performed at many polluted sites, and only three exceedances have been observed thus far (Table 4C).

3.9 ANTIBIOTICS ACTIVITIES

According to their mode of action (MOA) antibiotics are generally divided into five classes: amidoglycosides, macrolides & β-lactams, sulfonamides, tetracyclines and quinolones. Since the bioassay determines the activities of all classes of antibiotics five separate ETVs were developed.

3.9.1 Aminoglycosides

The complete set of collected toxicity data for compounds with aminoglycosides activity is presented in Appendix II I.1. The lowest toxic concentrations found for the five endpoints are presented in Appendix III.

Safe approach

There were no compounds within this group of antibiotics with REPs lower than 0.1. Graphic representation of the collected toxicity values for the REP1 group is presented in Appendix IV as neomycin equivalents per liter water (NEQ/L). The safe TEQ was based on the lowest PNEC found of 300 ng/L for neomycin (Park and Choi, 2008). Neomycin is the reference compound for this group of antibiotic. As a consequence, the TEQ value was also equal to 300 ng NEQ/L. This PNEC was calculated applying an assessment factor of 100 on the neomycin chronic NOEC for Daphnia magna (0.03 mg/L) (Park and Choi, 2008). This value is therefore the proposed safe TEQ for aminoglycosides group.

SSD

The SSD curve for the REP1 group is presented in Appendix V. The SSD analysis resulted in a very high HC5 TEQ equal to 33222 ng NEQ/L (95% confidence interval from 1546 to 219614 ng NEQ/L).

Benchmark approach

No detectable aminoglycosides activity (>90 ng NEQ/L) was found at the eighth clean reference sites. Moreover, most of the aminoglycosides activities found in the environment by Waternet in the years 2010-2014 were below detectable levels, apart from some sites that were affected by wwtp effluents (Table 4B).

Mainly based upon the benchmark, we propose a low-risk EBT of 500 ng NEQ/L, which is twice the safe TEQ of 300 ng NEQ/L. The EBT was only exceeded at two sites with a significant wwtp influence (Table 4B).

3.9.2 Macrolides and β-Lactams

The complete dataset of collected toxicity values of compounds with macrolides activity is presented in Appendix II I.2. The lowest toxic concentrations found for the five endpoints are presented in Appendix III.

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as penicillin equivalents per liter water (PEQ/L). In the REP1 group the safe TEQ was based upon the lowest PNEC found of 3.7 ng/L for amoxicillin (Jones et al., 2002). The safe TEQ for this group of antibiotics was derived after transformation to a TEQ value of 2.22 ng PEQ/L. In the REP2 group, the safe TEQ was equal to 1.8 ng PEG/L, calculated from the lowest EC50 for *Microcystis aeruginosa* after chronic exposure to 18 ng/L tiamulin (Halling-Sorensen, 2000).

SSD

The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 2615 ng PEQ/L (95% confidence interval from 96 to 23135 ng PEQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 98 ng PEQ/L (95% confidence interval from 12.9 to 470 ng PEQ/L).

Benchmark approach

No detectable activities of macrolides and β-lactams (>1.4 PEQ/L) were found at the eight clean reference sites. The concentrations of macrolides and β-lactams antibiotics (e.g. penicillin) collected by Waternet passive sampling demonstrate that this group of antibiotics is the most commonly found in Dutch waters (Table 4B), with detectable concentrations especially at sites influenced by wwtp effluents.

Considering these data and the low safe TEQ, a low risk EBT of 50 ng/L is proposed. The proposed EBT is lower than both HC5 TEQ estimations, but the lower limit of the HC5 95% conficence interval for the REP2 group is below this EBT. The EBT was exceeded at four sites with a significant wwtp influence (Table 4B).

3.9.3 Sulfonamides

The complete dataset of collected toxicity values of compounds with sulfonamides activity is presented in Appendix II I.3. The lowest toxic concentrations found for the five endpoints are presented in Appendix III.

Safe approach

There were no compounds considered for this bioassay with REPs lower than 0.1. Graphic representation of the collected toxicity values for the REP1 group is presented in Appendix IV as sulfamethoxazole equivalents per liter water (SEQ/L). The safe TEQ was based on the lowest LOEC found of 1000 ng/L for zebra fish (*Danio rerio*) after acute exposure to sulfadiazine (Lin et al., in press). The TEQ value was equal to 50 ng SEQ/L. After application of a safety factor of 5 for LOEC, the proposed safe TEQ for this group of antibiotics is equal to 10 ng SEQ/L.

SSD

The SSD curve for the REP1 group is presented in Appendix V. The SSD analysis resulted in a HC5 TEQ equal to 67037 ng SEQ/L (95% confidence interval from 24675 to 148222 ng SEQ/L).

Benchmark approach

A sulfonamide activity of 37 ng SEQ/L was found in one of the reference sites, while activities at the other seven clean sites were all below the detection limit of 2 ng SEQ/L. The clean TEQ was equal to 4.6 SEQ/L.
Considering the high HC5 TEQ values, we popose a low risk EBT of 100 ng SEQ/L, which is ten times the safe TEQ. The EBT was exceeded at seven sites with a significant wwtp influence (Table 4B).

3.9.4 Tetracyclines

The complete dataset of collected toxicity values of compounds with tetracycline activity is presented in Appendix II I.4. The lowest toxic concentrations found for the five endpoints are presented in Appendix III.

Safe approach

Graphic representations of the collected toxicity values for the REP1 and REP2 groups are presented in Appendix IV as oxytetracyline equivalents per liter water (OEQ/L). In both REP1 and REP2 groups the safe TEQ was based upon the lowest PNEC found of 170 ng/L for oxytetracyline (Park and Choi, 2008). As for sulfonamides, these authors used the lowest value they could find, in this case the acute LC50 of 0.17 mg/L for the algae *Selenastrum capricornutum* after 3 days of exposure, reported by Nunes et al. (2005), and applied a safety factor of 1000 to calculate the resulting PNEC. The corresponding TEQ value and proposed safe TEQ for this group of antibiotics is thus equal to 170 ng OEQ/L.

SSD

The SSD curves for the REP1 and REP2 groups are presented in Appendix V. The SSD analysis for the REP1 group resulted in a HC5 TEQ equal to 32931 ng OEQ/L (95% confidence interval from 9837 to 83368 ng OEQ/L). The SSD analysis for the REP2 group resulted in a HC5 TEQ equal to 27275 ng OEQ/L (95% confidence interval from 8292 to 68544 ng OEQ/L).

Benchmark approach

No detectable tetracycline activity (>22 ng OEQ/L) was found at the eighth clean reference sites. Tetracyclines-like environmental activities were above detection limit in four Waternet samples, with a maximum of 104 ng OEQ/L close to a wwtp discharge (Table 4B). We propose a low risk EBT for tetracyclines activity of 250 ng OEQ/L, which is about twice the safe TEQ. Tetracycline activities above the detection limit were only observed at five sites, all below the proposed EBT (Table 4B).

3.9.5 Quinolones

The complete dataset of collected toxicity values of compounds with quinolone activity is presented in Appendix II I.5.

The lowest toxic concentrations found for the five endpoints are presented in Appendix III. Although it is not used as an antibiotic, triclosan data are also included because this substance induces a clear response in the quinolones bioassay. Triclosan is an antibacterial and antifungal substance often used in personal care products like soaps (Riva et al., 2012).

Safe approach

There were no compounds within this group with REPs lower than 0.1. Graphic representation of the collected toxicity values for the REP1 group is presented in Appendix IV as flumequine equivalents per liter water (FEQ/L). The safe TEQ was based on the lowest EC50 found of 530 ng/L for the algae *Selenastrum capricornutum* after acute exposure to triclosan (Yang et al., 2008). The corresponding TEQ value was equal to 5.3 ng FEQ/L. The safe TEQ was established as 0.53 ng SEQ/L after application of a safety factor of 10 for EC50.

SSD

The SSD curve for the REP1 group is presented in Appendix V. The SSD analysis resulted in a HC5 TEQ equal to 8759 ng FEQ/L (95% confidence interval from 2197 to 26050 ng FEQ/L).

Benchmark approach

No detectable quinolones activity (>44 ng FEQ/L) was found at any of the eighth clean reference sites. Considering the high HC5 TEQ and the low safe TEQ due to triclosan, a low risk EBT of 100 ng/L (i.e. 200x the safe TEQ value) is proposed for this group of antibiotics. Quinolones activity below the EBT was only detected three Waternet sites thus far (Table 4B), and the EBT was never exceeded.

3.10 Overview and evaluation of ebt development

The effects measured in passive sampler extracts were converted to estimated water effect by a method proposed in Van der Oost et al. (in preparation b). Water TU or TEQ levels were divided by the proposed low-risk trigger values (EBT). It is demonstrated that EBTs are only exceeded at the clean reference sites, and that most EBT exceedance is observed at sites that were polluted by pesticides (Legmeerpolders) or in raw wwtp effluents (Amstelveen and Hilversum). The results of the benchmark studies at sites that were classified as clean, moderately polluted and heavily polluted, carried out by Waternet and STOWA, are presented in Table 4. This table is divided into three separate sections for A. bioassays for general toxicity (for which the EBT were not determined in this study), B. specific bioassays that were applied on the polar extracts of POCIS passive samplers, and C. specific bioassays that were applied on the non-polar extracts of silicon rubber passive samplers. All benchmark results are summarized in the heatmap of Table 5, and compared to the SIMONI scores that were calculated with the entire bioassay battery. A SIMONI score above 1 indicates a potential risk of the ecosystem due to micropollutant exposure.

The benchmark studies, together with the SSD analyses, were used to define low-risk trigger values that will be used for the environmental hazard identification of micropollutants. All relevant results for the determination of the proposed EBTs, using the compounds selected for both REP groups 1 (>0.1) and 2 (>0.001), are summarized in Table 6.

TABLE 4A

Benchmark results of relative bioassay responses (response/EBT) for general toxicity; orange = response above EBT, dark green = response below EBT; light green = no response; white = not measured.

Sites	year	field	bacteria	algae	daphnids	cytotox
		General toxicity				
	polar	%/EBT	TU/EBT	TU/EBT	TU/EBT	TU/EBT
	non-polar					
Effect-Based Triggervalue (LR-EBT)		**20**	**0,05**	**0,05**	**0,05**	**0,05**
clean						
Waterleidingplas '12	2012	0,00	0,15	0,00	0,00	0,00
Naardermeer	2015	0,00	0,04	0,00	0,00	0,00
Waterleidingplas '15	2015	0,50	0,00	0,00	0,00	0,00
Botshol	2015	0,25	0,06	0,00	0,00	0,00
Reeuwijk	2015	0,00	0,09	0,00	0,00	0,00
Peelkanaal	2015	1,50	0,10	0,00	0,00	0,00
Geestmerambacht	2015	0,00	0,03	0,00	0,00	0,00
Kennemerland	2015	0,00	0,06	0,00	0,00	0,00
LR-EBT exceedance		**12,5%**	**0,0%**	**0,0%**	**0,0%**	**0,0%**
moderately polluted						
Amstelveen A1-1	2010		0,00	0,00	0,00	0,00
Amstelveen A2-1	2010		0,00	0,00	0,00	0,00
Amstelveen A1-2	2011		0,90	0,58	0,00	0,00
Amstelveen A2-2	2011		0,74	0,00	0,00	0,00
KRW spagaat Zodden	2011		0,00	0,00	0,00	0,00
KRW spagaat Strook	2011		0,00	0,00	0,00	0,00
KRW spagaat Vecht	2011		0,00	0,59	0,00	0,00
KRW spagaat WL kanaal	2011		0,00	0,00	0,00	0,00
KRW spagaat Zodden	2011		0,07	0,13	0,04	0,00
KRW spagaat Strook	2011		0,02	0,04	0,02	0,00
KRW spagaat Vecht	2011		0,06	0,05	0,04	0,00
KRW spagaat WL kanaal	2011			0,05	0,02	0,00
Amstel voor Uithoorn	2012-1	1,50				
Amstel na Uithoorn	2012-1	0,00				
Amstel voor Uithoorn	2012-2	1,50	0,08	0,04	0,15	0,00
Amstel na Uithoorn	2012-2	0,00	0,18	0,07	0,45	0,00
Vecht Utrecht	2012	0,00	0,06	0,03	0,31	0,00
Vecht Loenen	2012	0,00	0,24	0,04	0,24	0,00
Weesp near Solvay	2012	0,00	0,13	0,02	0,02	0,00
Zevenhoven	2013-1	0,00	0,14	0,10	0,00	0,00
Zevenhoven	2013-2	0,75	0,34	0,00	0,53	0,00
Horstermeer	2014	1,25	0,03	0,02	0,05	0,01
Uithoorn	2014	0,00	0,00	0,00	0,07	0,00
Ronde Venen	2014	0,00	0,00	0,02	0,07	0,01
Amstelveen	2014	0,00	0,02	0,02	0,05	0,00
Amstelveen '15	2015	0,00	0,02	0,02	0,17	0,00
Ronde Venen '15	2015	0,00	0,03	0,00	0,10	0,00
Eemmeer	2015	0,50	0,03	0,00	0,07	0,00
LR-EBT exceedance		**23,1%**	**0,0%**	**0,0%**	**0,0%**	**0,0%**
heavily polluted						
wwtp Amstelveen A3-1	2010		0,00	0,00	0,00	0,00
wwtp Amstelveen A3-2	2011		0,75	0,97	0,00	0,00
Zuider Legmeerpolder	2012-1	5,00				
Noorder Legmeerpolder	2012-1	0,50				
Zuider Legmeerpolder	2012-2	0,25	0,26	0,08	7,63	0,00
Noorder Legmeerpolder	2012-2	3,50	0,19	0,07	1,17	0,00
Zuider Legmeerpolder 1	2013-1	3,00	0,19	0,06	0,85	0,00
Zuider Legmeerpolder 2	2013-1	2,25	0,45	0,07	0,15	0,00
Zuider Legmeerpolder 3	2013-1	3,50	0,09	0,02	0,22	0,00
Zuider Legmeerpolder 4	2013-1	3,00	0,24	0,26	1,14	0,00
Zuider Legmeerpolder 5	2013-1	0,00	0,05	0,02	0,07	0,00
Noorder Legmeerpolder 1	2013-1	2,75	0,02	0,00	0,04	0,00
Noorder Legmeerpolder 2	2013-1	1,25	0,07	0,00	0,09	0,00
Zuider Legmeerpolder 1	2013-2	1,25	0,07	0,04	0,24	0,00
Zuider Legmeerpolder 2	2013-2	2,50	0,26	0,08	0,00	0,00
Zuider Legmeerpolder 3	2013-2	0,50	0,26	0,00	1,10	0,00
Zuider Legmeerpolder 4	2013-2	5,00	0,15	0,00	0,74	0,00
Zuider Legmeerpolder 5	2013-2	0,00	0,13	0,05	0,59	0,00
Noorder Legmeerpolder 1	2013-2	2,75	0,37	0,00	0,00	0,00
Noorder Legmeerpolder 2	2013-2	0,25	0,37	0,00	0,00	0,00
wwtp Hilversum	2014	1,00	0,03	0,02	0,06	0,01
Hilversum '15	2015	1,75	0,02	0,00	0,02	0,00
Blaricum	2015	1,00	0,02	0,00	0,08	0,01
LR-EBT exceedance		**78,9%**	**0,0%**	**0,0%**	**19,0%**	**0,0%**

TABLE 4B

Benchmark results of relative bioassay responses (response/EBT) for specific toxicity in polar PS extracts; orange = response above EBT, dark green = response below EBT; light green = no response; white = not measured.

Specific toxicity & antibiotics in polar PS extracts									
Sites	**year**	**ER**	**anti-AR**	**GR**	**amino**	**macro**	**sulfon**	**tetra**	**quino**
	polar	eq/EBT	eq/EBT	eq/EBT	eq/EBT	eq/EBT	eq/EBT	eq/EBT	eq/EBT
Effect-Based Triggervalue (LR-EBT)		**0,5**	**25**	**100**	**500**	**50**	**100**	**250**	**100**
clean									
Maarsseveense plassen	2010				0,00	0,50	0,00	0,00	0,00
Waterleidingplas '12	2012	0,02	0,18	0,00	0,00	0,00	0,00	0,00	0,00
Naardermeer	2015	0,04	0,08	0,00	0,00	0,00	0,00	0,00	0,00
Waterleidingplas '15	2015	0,03	0,21	0,00	0,00	0,00	0,37	0,00	0,00
Botshol	2015	0,02	0,54	0,00	0,00	0,00	0,00	0,00	0,00
Reeuwijk	2015	0,03	0,03	0,00	0,00	0,00	0,00	0,00	0,00
Peelkanaal	2015	0,21	0,04	0,00	0,00	0,00	0,00	0,00	0,00
Geestmerambacht	2015	0,55	2,36	0,00	0,00	0,00	0,00	0,00	0,00
Kennemerland	2015	0,07	0,11	0,00	0,00	0,00	0,00	0,00	0,00
LR-EBT exceedance		**0,0%**	**12,5%**	**0,0%**	**0,0%**	**0,0%**	**0,0%**	**0,0%**	**0,0%**
moderately polluted									
Amstelveen A1-1	2010	0,48		0,00	0,00	0,00	0,00	0,00	0,00
Amstelveen A2-1	2010	0,38		0,00	0,00	0,00	0,00	0,00	0,00
Vecht 1	2010				0,00	0,00	0,00	0,00	0,00
Vecht 2	2010				0,00	0,31	0,00	0,00	0,00
Vecht 3	2010				0,00	0,00	0,00	0,00	0,00
Vecht 4	2010				0,00	0,00	0,00	0,00	0,00
Vecht 5	2010				0,00	0,00	0,00	0,00	0,00
Vecht 6	2010				0,00	0,31	0,00	0,00	0,00
Amstelveen A1-2	2011	0,63	1,02	0,00	0,00	0,00	0,00	0,00	0,00
Amstelveen A2-2	2011	0,38	1,36	0,00	0,00	0,00	0,00	0,00	0,00
KRW spagaat Zodden	2011	0,09	0,40	0,00	0,00	0,00	0,00	0,00	0,00
KRW spagaat Strook	2011	0,00	1,31	0,00	0,00	0,00	0,00	0,00	0,00
KRW spagaat Vecht	2011	0,81	0,47	0,00	0,00	0,00	0,00	0,00	0,00
KRW spagaat WL kanaal	2011	0,87	0,23	0,00	0,00	0,00	0,00	0,00	0,00
Amstel voor Uithoorn	2012	0,07	0,63	0,00	0,00	0,00	0,00	0,00	0,00
Amstel na Uithoorn	2012	0,14	1,21	0,00	0,00	0,08	0,00	0,00	0,00
Vecht Utrecht	2012	0,35	0,67	0,04	0,25	0,23	0,00	0,00	0,00
Vecht Loenen	2012	0,11	0,30	0,00	0,00	0,00	0,00	0,00	0,00
Weesp nabij Solvay	2012	0,27	0,48	0,00	0,00	0,00	0,00	0,00	0,00
Zevenhoven	2013	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Horstermeer	2014	1,21	0,70	0,00	0,00	1,40	0,24	0,06	0,00
Uithoorn	2014	0,79	0,29	0,29	1,09	1,68	1,36	0,00	0,00
Ronde Venen	2014	0,43	0,75	0,05	0,00	0,63	0,00	0,00	0,00
Amstelveen	2014	0,38	0,69	0,02	0,26	0,22	0,33	0,00	0,00
Amstelveen '15	2015	0,67	0,47	0,13	0,46	0,18	0,42	0,00	0,00
Ronde Venen '15	2015	0,36	0,26	0,10	0,40	0,11	0,30	0,00	0,49
Eemmeer	2015	3,29	0,46	0,73	0,16	0,27	1,40	0,09	0,00
LR-EBT exceedance		**9,5%**	**21,1%**	**0,0%**	**3,7%**	**7,4%**	**7,4%**	**0,0%**	**0,0%**
heavily polluted									
Amstelveen A3-1	2010	1,00		0,43	0,11	1,06	2,39	0,00	0,00
Amstelveen A3-2	2011	3,62	0,87	0,00	0,13	0,56	1,17	0,00	0,00
Zuider Legmeerpolder	2012	0,17	1,44	0,00	0,00	0,00	0,63	0,00	0,00
Noorder Legmeerpolder	2012	0,23	2,66	0,00	0,00	0,00	0,35	0,00	0,00
Zuider Legmeerpolder 1	2013-1	1,21	0,92	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 2	2013-1	1,60	0,95	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 3	2013-1	1,26	1,02	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 4	2013-1	0,45	0,50	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 5	2013-1	1,26	0,54	0,00	0,00	0,00	0,00	0,00	0,00
Noorder Legmeerpolder 1	2013-1	0,45	0,91	0,00	0,00	0,00	0,00	0,00	0,00
Noorder Legmeerpolder 2	2013-1	0,50	0,47	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 1	2013-2	1,36	0,56	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 2	2013-2	0,29	0,63	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 3	2013-2	0,98	0,51	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 4	2013-2	0,31	0,38	0,00	0,00	0,00	0,00	0,00	0,00
Zuider Legmeerpolder 5	2013-2	0,40	1,05	0,00	0,00	0,00	0,00	0,00	0,00
Noorder Legmeerpolder 1	2013-2	0,45	0,60	0,00	0,00	0,00	0,00	0,00	0,00
Noorder Legmeerpolder 2	2013-2	1,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Hilversum	2014	5,52	1,73	2,70	1,83	2,29	2,29	0,42	0,00
Hilversum '15	2015	5,24	0,39	2,26	0,20	0,38	3,49	0,19	0,73
Blaricum	2015	7,80	0,54	1,83	0,10	0,37	1,40	0,14	0,24
LR-EBT exceedance		**52,4%**	**25,0%**	**14,3%**	**4,8%**	**9,5%**	**23,8%**	**0,0%**	**0,0%**

TABLE 4C

Benchmark results of relative bioassay responses (response/EBT) for specific toxicity in non-polar PS extracts; orange = response above EBT, dark green = response below EBT; light green = no response; white = not measured.

Specific toxicity in non-polar PS extracts								
	year	DR	PPARg	PAH	Nrf2	PXR	p53-	p53+
	non-polar	eq/EBT	eq/EBT	eq/EBT	eq/EBT	eq/EBT	TU/EBT	TU/EBT
Effect-based trigger value (LR-EBT)		**50**	**10**	**150**	**10**	**3**	**0,005**	**0,005**
clean								
Waterleidingplas '12	2012	0,24	0,28	0,09			0,00	
Naardermeer	2015	0,25	0,25	0,30	0,41	0,91	0,00	1,30
Waterleidingplas '15	2015	0,34	0,18	0,21	0,41	0,45	0,00	0,00
Botshol	2015	0,39	0,26	0,19	0,58	1,00	0,00	0,00
Reeuwijk	2015	0,27	0,26	0,93	0,22	0,50	0,00	0,00
Peelkanaal	2015	0,25	0,45	1,42	0,86	0,50	0,00	0,00
Geestmerambacht	2015	0,10	0,04	0,05	0,17	0,19	0,00	0,00
Kennemerland	2015	0,23	0,00	0,14	0,34	0,43	0,00	0,00
LR-EBT exceedance		**0,0%**	**0,0%**	**12,5%**	**0,0%**	**0,0%**	**0,0%**	**14,3%**
moderately polluted								
Amstelveen A1-1	2010	0,01		0,06			0,00	
Amstelveen A2-1	2010	0,00		0,02			0,16	
Amstelveen A1-2	2011	0,00	0,05	0,38			0,00	
Amstelveen A2-2	2011	0,00	0,00	0,81			0,00	
KRW spagaat Zodden	2011	0,00	0,10	0,23			0,00	
KRW spagaat Strook	2011	0,00	0,30	0,15			0,10	
KRW spagaat Vecht	2011	0,00	0,04	0,50			0,12	
KRW spagaat WL kanaal	2011	0,00	0,05	0,14			0,14	
Amstel voor Uithoorn	2012	0,60	0,14	1,37			0,00	
Amstel na Uithoorn	2012	0,64	0,32	1,93			0,00	
Vecht Utrecht	2012	0,39	0,17	0,94			0,00	
Vecht Loenen	2012	0,36	0,22	1,09			0,00	
Weesp nabij Solvay	2012	0,17	0,18	0,35			0,00	
Zevenhoven	2013-1	0,15	2,59				0,00	
Zevenhoven	2013-2	0,24	0,90				0,00	
Horstermeer	2014	0,38	0,00		0,31		0,28	
Uithoorn	2014	1,01	0,00		0,15		0,40	
Ronde Venen '14	2014	1,10	0,00		0,29		0,36	
Amstelveen '14	2014	0,45	0,00		0,11		0,00	
De Sniep	2015	0,92		0,44				
Vecht bij Utrecht	2015	0,82		0,54				
Vecht bij Oud-Zuilen	2015	1,14		0,62				
Vecht bij Loenen	2015	5,44		2,04				
Vecht bij Nederhorst	2015	0,95		0,58				
Vecht bij Nigtevecht	2015	1,35		0,65				
Vecht bij Uitermeer	2015	1,06		0,30				
Amstelveen '15	2015	0,74	0,29		0,15	1,23	0,00	
Ronde Venen '15	2015	1,24	0,20		0,47	1,28	0,00	
Eemmeer	2015	0,68	0,46		0,43	0,45	0,28	
LR-EBT exceedance		**24,1%**	**5,0%**	**20,0%**	**0,0%**	**66,7%**	**0,0%**	
heavily polluted								
rwzi Amstelveen A3-1	2010	0,02		0,11			0,00	
rwzi Amstelveen A3-2	2011	0,00	0,07	0,14			0,00	
Zuider Legmeerpolder	2012	0,34	0,26	0,28			6,34	
Noorder Legmeerpolder	2012	0,27	0,14	0,41			0,00	
Zuider Legmeerpolder 1	2013-1	0,53	0,00				0,00	
Zuider Legmeerpolder 2	2013-1	0,30	0,79				1,06	
Zuider Legmeerpolder 3	2013-1	0,19	0,34				0,00	
Zuider Legmeerpolder 4	2013-1	0,54	1,17				2,86	
Zuider Legmeerpolder 5	2013-1	0,17	0,16				0,00	
Noorder Legmeerpolder 1	2013-1	0,31	0,42				0,00	
Noorder Legmeerpolder 2	2013-1	0,42	0,00				0,00	
Zuider Legmeerpolder 1	2013-2	0,42	0,33				0,00	
Zuider Legmeerpolder 2	2013-2	0,46	0,85				0,00	
Zuider Legmeerpolder 3	2013-2	1,09	1,76				0,00	
Zuider Legmeerpolder 4	2013-2	0,39	1,88				0,00	
Zuider Legmeerpolder 5	2013-2	0,44	1,52				0,00	
Noorder Legmeerpolder 1	2013-2	0,41	0,56				0,00	
Noorder Legmeerpolder 2	2013-2	0,84	0,00				0,00	
rwzi Hilversum	2014	0,54	0,00		0,21		0,24	
Hilversum '15	2015	0,83	0,34		0,43	1,47	0,44	
Blaricum	2015	0,70	0,54		0,39	0,80	0,00	
LR-EBT exceedance		**4,8%**	**20,0%**	**0,0%**	**0,0%**	**50,0%**	**14,3%**	**0,0%**

TABLE 5

Heatmap of all benchmark results of relative bioassay responses (response/EBT) and SIMONI 1.2 scores for overall ecological risks; orange = response above EBT, dark green = response below EBT; light green = no response; white = not measured, red: SIMONI score > 1, indication of potential environmental risks due to micropollutants.

Sites	year	General toxicity					Specific toxicity										Antibiotics					TOTAL
		field	bact	algae	daphnid	cytotox	ER	anti-AR	GR	DR	PPARg	PAH	Nrf2	PXR	p53-	p53+	amino	macro	sulfon	tetra	quino	
Effect-based trigger value			0,05	0,05	0,05	0,05	0,5	25	100	50	10	150	10	3	0,005	0,005	500	50	100	250	100	SIMONI 1.2
Clean																						
Waterleidingplas '12	2012																					0,2
Naardermeer	2015																					0,3
Waterleidingplas '15	2015																					0,3
Botshol	2015																					0,4
Reeuwijk	2015																					0,2
Peelkanaal	2015																					0,6
Geestmerambacht	2015																					0,4
Kennemerland	2015																					0,1
Moderately polluted																						
KRW spagaat Zodden	2011																					0,2
KRW spagaat Strook	2011																					0,3
KRW spagaat Vecht	2011																					0,3
KRW spagaat WL kanaal	2011																					0,3
Amstel voor Uithoorn	2012																					0,8
Amstel na Uithoorn	2012																					0,6
Vecht Utrecht	2012																					0,4
Vecht Loenen	2012																					0,3
Weesp nabij Solvay	2012																					0,2
Zevenhoven	2013																					1,0
Zevenhoven	2013																					0,9
Horstermeer	2014																					0,6
Uithoorn	2014																					0,4
Ronde Venen '14	2014																					0,4
Amstelveen '14	2014																					0,6
De Sniep	2015																					-
Vecht bij Utrecht	2015																					-
Vecht bij Oud-Zuilen	2015																					-
Vecht bij Loenen	2015																					-
Vecht bij Nederhorst	2015																					-
Vecht bij Nigtevecht	2015																					-
Vecht bij Uitermeer	2015																					-
Amstelveen '15	2015																					0,5
Ronde Venen '15	2015																					0,4
Eemmeer	2015																					0,8
Heavily polluted																						
Zuider Legmeerpolder	2012																					3,1
Noorder Legmeerpolder	2012																					1,5
Zuider Legmeerpolder	2013-1																					1,4
Zuider Legmeerpolder	2013-1																					1,4
Zuider Legmeerpolder	2013-1																					1,4
Zuider Legmeerpolder	2013-1																					2,0
Zuider Legmeerpolder	2013-1																					0,3
Noorder Legmeerpolder	2013-1																					1,0
Noorder Legmeerpolder	2013-1																					0,5
Zuider Legmeerpolder	2013-2																					0,8
Zuider Legmeerpolder	2013-2																					1,1
Zuider Legmeerpolder	2013-2																					1,2
Zuider Legmeerpolder	2013-2																					2,1
Zuider Legmeerpolder	2013-2																					0,8
Noorder Legmeerpolder	2013-2																					1,2
Noorder Legmeerpolder	2013-2																					0,5
Hilversum '14	2014																					1,6
Hilversum '15	2015																					1,6
Blaricum	2015																					1,5
EBT exceedances		19	0	0	4	0	13	11	3	7	9	5	0	3	3	1	2	4	4	0	0	

TABLE 6

Summary of the most relevant information for the EBT derivation for in vitro bioassays.

SIMONI 1.2: Derivation of Environmental Effect-Based Trigger Values (EBT) for *in vitro* bioassays

Endpoint*	REP2 > 0.001		REP1 > 0.1			EBT
	Safe TEQ	HC5 TEQ (range)	Safe TEQ	HC5 TEQ (range)	Clean TEQ	TEQ
Estrogenic activity	0.0066	0.52	0.016	0.47	0.06	**0.5**
ER CALUX [ng EEQ/L]	LOEC/estrone	(0.019-5.4)	LOEC/17a-ethinyl estradiol	(0.009-6.2)		
Anti-androgenic	0.00005	0.13	0.00005	0.29	4.6	**25**
antiAR CALUX [µg F1EQ/L]	LC50/endosulfan	(0.05-0.27)	LC50/endosulfan	(0.1-0.6)		
Dioxin and dioxin-like	0.4	137	0.4	36	13.2	**50**
DR CALUX [pg TEQ/L]	LOEC/2,3,7,8-TCDD	(15-736)	LOEC/TCDD	(1.7-308)		
Glucocorticoid	20	2145	20	3236	<LOD	**100**
GR CALUX [ng DEQ/L]	LOEC/dexamethasone	(116-14311)	LOEC/dexamethasone	(80-29965)		
PPARγ receptor	0.00014	0.3	1.34	45	4.4	**10**
PPARg CALUX[ng REQ/L]	PNEC/dibenzo[a.h]anthracene	(0.002-6.9)	EC50/retinoic acid	(0.8-371)		
Toxic PAHs	0.04	41	0.17	47	63	**150**
PAH CALUX [ng BEQ/L]	LOEC/2,3,7,8-TCDD	(2.5-254)	PNEC/benzo[a]pyrene	(2-368)		
Oxidative stress	0.000006	0.034	0.0007	0.7	4.3	**10**
Nrf2 CALUX [µg CEQ/L]	NOEC/estradiol	(0.008-0.11)	EC50/retinoic acid	(0.2-2.2)		
Pregnane X receptor	0.000004	0.008	0.000004	0.007	1.5	**3**
PRX CALUX [µg N1EQ/L]	LOEC/chlorpyrifos-ethyl	(0.002-0.024)	LOEC/chlorpyrifos-ethyl	(0.001-0.030)		
Antibiotics activities (RIKILT WaterSCAN):						
- Aminoglycosides	300	33222	300	33222	<LOD	**500**
[ng N2EQ/L]	PNEC/neomycin	(1546-219614)	PNEC/neomycin	(1546-219614)		
- Macrolides & β-lactams	1.8	98	2.22	2615	<LOD	**50**
[ng PEQ/L]	EC50/tiamulin	(13-470)	PNEC/amoxicillin	(96-23135)		
- Sulphonamides	10	67037	10	67037	4.6	**100**
[ng SEQ/L]	LOEC/sulfadiazine	(24675-148222)	LOEC/sulfadiazine	(24675-148222)		
- Tetracyclines	170	27275	170	32931	<LOD	**250**
[ng OEQ/L]	PNEC/oxytetracycline	(8292-68544)	PNEC/oxytetracycline	(9837-83368)		
- Quinolones	5.3	8759	5.3	8759	<LOD	**100**
[ng F2EQ/L]	EC50/triclosan	(2197-26050)	EC50/triclosan	(2197-26050)		
		Grey: EBT > HC5 TEQ		Grey: EBT > HC5 TEQ		

*: expressed as equivalents of the reference compounds: EEQ = estradiol; F1EQ = flutamide; TEQ = 2378-TCDD; DEQ = dexamethasone; REQ = rosiglitazone; BEQ = benzo[a]pyrene; CEQ = curcumine; N1EQ = nicardipine; N2EQ = neomycine; PEQ = penicillin; SEQ = sulfamethoxazole; OEQ = oxytetracyclin; F2EQ = flumequine.
<LOD = all below limit of detection

4 DISCUSSION

Protection and restoration of chemical water quality is a primary goal to achieve, considering the fundamental ecological processes that take part in this environmental compartment. In order to improve the water quality by the most relevant measures, a more holistic and reliable monitoring of the water quality is needed. Many authors stressed out the necessity to improve the current monitoring programs using chemical analyses of selected target compounds, and highlight that bioanalytical tools can be applied to achieve this (Sanchez and Porcher, 2009; Allan et al., 2006; Cairns and van der Schalie, 1980; Connon et al., 2012; Poulsen et al., 2011; Greenwood et al., 2007). Several studies demonstrated the added value of bioassays to investigate the chemical quality of wastewater, surface water and drinking water (Kienle et al., 2011, Wolska et al., 2007, Macova et al., 2011, Zegura et al., 2009). Despite many advantages, bioanalytical tools are hardly used in regular monitoring programs, because there are no generally accepted methods for the interpretation of the data that are generated by effect measurements (biomarkers and bioassays). Hazard identification with bioanalytical tools could be applied as an initial screening to assess the microchemical water quality, provided that the effects could be classified. Effect-based trigger values that are able to discriminate between low risk and potential microchemical risks are needed for such a classification. The present study aims to be a first step towards the integration of bioassays in regulatory environmental processes. The primary objective of this study is to establish EBTs for a selection of inexpensive bioassays, targeting specific and reactive chemical activities in the water. The EBTs will be used to discriminate sites where chemical pollution poses a minor risk to aquatic community from sites where ecological risks may occur. Only the latter sites need to be further analyzed by more advanced chemical and toxicological analyses.

Routine monitoring with bioassays is still hampered by the lack of reliable interpretation guidelines. A challenge for scientists now is to provide effect-based trigger values (EBT) that allow regulators to link the test results to possible adverse effects on environmental or human health (Escher and Leusch, 2012). The fact that in many studies only a small percentage of the effect observed in a bioassay can be explained by known (chemically determined) substances makes it imperative to derive such EBT (Tang et al., 2013; Escher et al., 2013). A very limited amount of effect-based trigger values for water quality assessment can be found in literature.

Brand et al., (2013) derived some human health EBT for hormonal activity in drinking water. These EBT were derived to interpret in vitro CALUX bioassay results on estrogenic, androgenic, progestagenic and glucocorticoid activities. As a protocol to derive these EBT, the researchers used the reported ADI (acceptable daily intake), toxicokinetics information on bioavailability (protein binding), relative endocrine potencies and drinking water allocation factors of selected hormonal active compounds of interest.

Another approach for EBT derivation was followed by Tang et al. (2013) for an apical endpoint, the cytotoxicity measured by the bioluminescence inhibition in Vibrio fischeri. They proposed an algorithm for the derivation of effect-based water quality trigger values that was based on combined effects of mixtures of regulated chemicals, according to the concentration addition model. They used a QSAR approach to estimate the 50% effect concentrations (EC50) of the nonspecific mode of action of baseline toxicity. The effect-based water quality trigger value, EBT-EC50, was calculated with predicted mixture effect of all chemicals in a given guideline, divided by an extrapolation factor. The derived 'human health' EBT for drinking water was expressed as a relative enrichment factor (REF) of 3 to measure an EC50 (which is equal to 0.33 TU), which is less conservative than the 'environmental' EBT at REF 20 and 0.05 TU, proposed by Durand et al. (2009). The authors stated that the cytotoxicity based trigger value should not be used in isolation, but must be applied in conjunction with EBT targeting critical specific modes of action. Escher et al. (2013) used a similar strategy to derive an EBT for the oxidative stress response pathway with the AREc32 cell line. They derived an EBT that corresponded to a REF of 6 to measure an induction ratio of 1.5 (ECIR1.5), which means a 50% higher response that the blank control.

Hamers et al. (2010) obtained toxicity pathway profiles as toxicological 'fingerprints' for environmental samples, using a bioassay battery with different modes of action. They used bioassays for genotoxicity, (anti)-estrogenic activity, thyroid activity, dioxin-like activity and nonspecific cell toxicity for hazard profiling and quality assessment of surface water sediments. Three potential approaches were described. In the first approach, toxicity profiles were translated into hazard profiles, indicating the relative distance to the desired or acceptable sediment quality status for each toxic mode of action. In the second approach, toxicity profiles were translated into ecological risk profiles indicating the ratio between the measured bioassay responses and the responses considered safe for environmental health. In the third approach, toxicity and hazard profiles were used to select samples with unusually high bioassay responses for further in-depth effect-directed analysis (EDA). A combination of the second and third of these approaches is most similar to the strategy that is proposed in the present paper (Figure 1). The main difference is that for our strategy a suite of effect-based trigger values are derived for 'low environmental risks' (confirmed at sites with good ecological status), instead of a limited number of known responses that indicate 'save for environmental health'.

A similar bioanalytical strategy as proposed in the present study for water quality monitoring, is already in use for determination of food quality in Europe. Bioassays are being used for high-throughput screening of large amounts of samples, and chemical analyses are only performed in samples were the bioassay responses indicate a potential risk. An EU working group derived a decision limit for bioanalyses of dioxins, on the basis of a GC/MS confirmation method and the condition that the chance of false negatives should be less than 5%. This bioanalytical procedure is now laid down in EU legislation (European Union, 2012). For other groups of substances (hormones, antibiotics), there are also established methods to regularly apply bioassays in food quality control (e.g., Bovee et al., 2006; Gizzi et al., 2005).

The in vitro bioassay panel that is proposed for hazard identification (Table 1), together with bioassays for non-specific toxicity, should be able to distinguish microchemical quality of sites for low or potential risks for adverse ecological health effects. The authors realize that it is 'scientifically impossible' to derive solid and realistic trigger values for bioassays that distinguish between 'good' and 'bad' chemical status, if the identity of compounds that cause the bioassay responses is unknown. Since the identity of the compounds that cause a bioassay effect is unknown, both over- and underestimations of the overall toxic impact of the mixture can be made with the TEQ concept. Moreover, it is hard to predict adverse in vivo effects with in vitro responses (Escher and Leusch, 2012). Nevertheless, an approach is suggested to make an initial screening for potential environmental risks with in vivo as well as in vitro bioassay responses. It is again emphasized that we do not claim to make a sharp division between good and bad, but we suggest a toxicity screening to distinguish between low and potential microchemical risks for the environment. Potential risks have to be verified in a second phase risk assessment with a combination of advanced chemical and toxicological tools (Figure 1). The discriminative power of the first phase should be able to indicate potential hazards, but not all of the investigated sites should be classified as being a potential risk. This means that the precautionary principle and the use of high safety factors are not consequently adapted. Instead, this approach tries applied low safety factors to derive safe TEQ. In addition, the design of low risk EBT is based on more realistic environmental estimations, comparison with a species sensitivity distribution and a benchmark with known chemical and biological data (e.g., good ecological status of sites). The trigger values that were developed with this approach are listed in Table 6. The EBTs proposed in this report are most probably not the definite values, since they could be subject to refinement when additional information becomes available.

Jarosova et al. (2014) derived safe environmental concentrations of estrogenic equivalents (EEQ-SSE) in municipal wwtp effluents, based on simplified assumption that only steroid estrogens are responsible for in vitro estrogenicity. EEQ-SSE were derived using the estrogenic REP in bioassays, the in vivo PNECs of the compounds, and their relative contributions to the overall estrogenicity of wwtp effluents. The EEQ-SSEs for ER-CALUX varied from 0.2 to 0.4 ng EEQ/L for long-term exposure and from 0.6 to 2.0 for short-term exposure. Kunz et al. (2015) proposed to use the annual average environmental quality standard (AA-EQS) of 17 -estradiol (E2) of 0.4 ng/L as a trigger value for overall estrogenic activity, among others because using the 0.035 ng/L AA-EQS of ethinyl-estradiol, would overestimate the risks in most cases. The EBT of 0.5 ng EEQ/L we proposed for ERa CALUX was close to the trigger values proposed by Jarosova and Kunz. Johnson et al. (2007) suggested a PNEC for combined estrogenic activity of 1 ng EEQ/L, but this was based upon an outdated PNEC value for estradiol.

Of course there are several limitations and assumptions connected to the present study that need to be considered and validated in future research. Four assumptions had to be made in the EBT design, regarding i) ratio of 10 used to convert acute to chronic toxicity, ii) estimated duration of chronic toxicity studies, iii) assessment factors to convert concentrations of toxicity endpoints (LOEC, EC50 and LC50) to safe values, and iv) the selection of compounds was restricted to their relative effect potencies (REP) in the bioassay. There are also limitations regarding toxicological data from which the EBTs were derived. Only chemicals with a known REP in the bioassay could be considered due to the toxic equivalents (TEQ) approach. Reliable REP values are essential for a good conversion of substance concentrations to TEQ, but it was not always possible to assess REPs with EC50 data due to cytotoxicity in the bioassay at higher concentrations. The CALUX REPs that were estimated with EC10 values may not be 100% accurate if the slopes of the dose-response curves differ from that of the reference compound.

For several compounds that met the REP requirements it was hard or impossible to find aquatic toxicity data. This resulted in a limited dataset for some of the bioassays considered in the present study (e.g. DR CALUX and GR CALUX). Toxicity studies with antibiotics are mainly focused on invertebrate species, although some data are available for fish. No data, however, could be found for reptiles or mammals and only one study reported acute effects of antibiotics on an amphibian species. Since the EBT values will be used to assess the water quality, all toxicity data had to be water concentrations that indicate a certain effect (PNEC, NOEC, LOEC, EC50 or LC50) to aquatic organisms. Laboratory exposures investigate the toxic effects of single compounds to single species under controlled conditions. Toxic effects of substances in the natural environment can be enhanced or decreased by different physico-chemical conditions, such as pH, temperature and light exposure. This can lead to an under- or over-estimation of the risk connected to the concentrations of chemicals in the environment. In addition, the majority of the studies investigating the toxicity of highly hydrophobic compounds only reported nominal concentrations, as a result of which the toxicity can be underestimated. Therefore, future research should focus the actual concentrations of these compounds causing the reported negative effects.

Despite its limitations and uncertainties, the approach proposed in this study constitutes a better alternative to the current EU WFD monitoring that chemically analyses a limited amount of priority compounds in grab samples. Grab samples are only snapshots of the varying water contamination that does not consider the bioavailability of the compounds, while passive sampling assesses a time-weight average concentration of bioavailable compounds. The highest uncertainty, however, is to analyze only 45 priority compounds in order to assess the overall risk of micropollutants in the water, while the potential impact of more than 100,000 unknown compounds remains unknown. Therefore, reliable alternatives are needed to provide a more realistic hazard identification and risk assessment of the chemical pollution of surface waters. The strategy proposed in this paper represents one of the first attempts to connect bioassays responses with potential negative effects for aquatic population. This hazard assessment approach, combined with chemical analysis, is more reliable and realistic than the current monitoring conducted with chemical analyses only.

Nowadays, it is fundamental to propose better monitoring strategies in order to preserve the quality of freshwater environment, since availability of water supplies and his capacity to sustain human life and economy as we know it is becoming an issue due to the constant increase of human population. As pointed out by Stikker (1998) “the availability of clean water is one of the basic conditions for achieving sustainable development in the 21st century. Sustainable development implies that future generations should have the same opportunities of enjoying a decent quality of life as does the present generation” since “where there is no water, there is no food, no consumer and no business activity”. The introduction of bioassays can lead to a more sustainable water quality monitoring, as they meet the sustainability criteria better than the classical strategies (Gagnon et al., 2007).

Further refinement of EBT derivation should be based upon expert judgment and future validation studies. Together, the two types of triggers (safe TEQ and low risk EBT) should make a distinction between sites with negligible microchemical risks, low risks or potential risks for the ecosystem health. EAWAG Switserland uses a similar approach with 3 categories: i) good (<safe TEQ), ii) in range of quality criterion (<low risk EBT) or iii) poor (>EBT) (Cornelia Kienle [EAWAG], personal communication). The outcome of the SIMONI model indicates which sites are hot-spots, relevant for additional chemical-toxicological research. Moreover, if specific or reactive activities are above EBT, the model will indicate which class of chemicals may cause the main problem for aquatic organisms. If the information from the SIMONI hazard assessment is combined with the available knowledge of various aspects of the water system (such as influences of other ecological key factors), a tailor-made plan can be designed for further ecological risk assessment. This assessment should be able to identify the main causes of an impaired ecological status, so that the most cost-effective and efficient measures can be taken to improve the water quality. The next steps to make the proposed concept attractive for risk assessors would be to gain experience upon the applicability to case studies and to evaluate its robustness for practical use. Field validation studies with this strategy will be described in the second paper of the “SIMONI as a novel bioanalytical strategy for water quality assessment” series (Van der Oost et al., in progress). Due to its low costs and high relevance, this SIMONI model has the potential to become the first bioanalytical strategy to be applied in regular monitoring of surface water quality. Most Dutch water authorities will start feasibility studies with the SIMONI strategy in 2016.

5 CONCLUSIONS

This study aimed to derive EBTs for a selection of bioassays (see Table 7). These trigger values were derived by an extensive review of the available literature on aquatic toxicity of compounds that had a significant response in the bioassays, an SSD analysis on TEQ values and benchmarking with environmental field investigations conducted by Waternet. In only a small percentage of the field samples activities were found above the proposed low-risk effect-based trigger values. However, since these draft EBTs have been derived with some assumptions and simplifications, they may be adjusted when new information becomes available. Nevertheless, if the primary aim of a monitoring program is to assess the chemical water quality, bioassays will be powerful holistic tools to detect situations at risk where additional risk assessment is needed. This project may provide a new standard for the interpretation of bioassay data, and implementation in regular monitoring programs. The alternative monitoring strategy presented in this study has the potential to reduce monitoring costs if advanced chemical analyses only have to be applied at sites were EBTs are exceeded. In addition, costs on expensive measures to improve the water quality can be reduced since the chemical risks can be better assessed with the SIMONI strategy.

TABLE 7

Summary of all safe and low-risk EBTs for the initial selection of in vitro bioassays.

Activity		Units	Safe EBT	Low risk EBT
Estrogenic		ng EEQ/L	0.0066	0.5
Anti-androgenic		µg F1EQ/L	0.00005	25
Dioxin and dioxin-like		pg TEQ/L	0.4	50
Glucocorticoid		ng DEQ/L	20	100
PPARγ receptor		ng REQ/L	0.00014	10
Toxic PAHs		ng BEQ/L	0.04	150
Oxidative stress		µg CEQ/L	0.000006	10
Pregnane X receptor		µg N1EQ/L	0.000004	3
Antibiotics:	Aminoglycosides	ng N2EQ/L	300	500
	Macrolides & β-Lactam	ng PEQ/L	1.8	50
	Sulphonamides	ng SEQ/L	10	100
	Tetracyclines	ng OEQ/L	170	250
	Quinolones	ng F2EQ/L	5.3	100

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APPENDIX SI-I

Relative effect potencies (REP) of all compounds investigated FOR EBT development in all bioassays

For antibiotics, the REPs were calculated using detection limits of RIKILT WaterScan method, except for *: RIKILT MeatScan method; and **: NDKT method.

For antibiotics, the REPs were calculated using detection limits of RIKILT WaterScan method, except for *: RIKILT MeatScan method; and **: NDKT method.

CAS number	Compound	ERa CALUX	antiAR CALUX	GR CALUX	DR CALUX	PPARγ CALUX	PAH CALUX	Nrf2 CALUX	PXR CALUX	Antibiotic activity				
										Aminoglysides	Macrolides & β-Lactams	Quinolones	Sulfonamides	Tetracyclines
57-63-6	17a-Ethinyl estradiol	1.560	50.119											
50-28-2	17β-estradiol	1.000	31.623					0.063						
1689-82-3	4-hydroxyazobenzene		0.631											
14938-35-3	4-n-amylphenol	0.010	501.187											
1806-26-4	4-n-octylphenol		0.200						0.160					
140-66-9	4-tert-octylphenol		0.794											
15972-60-8	Alachlor		0.158						0.101					
52-39-1	Aldosterone			0.008										
1263-89-4	Aminosidine									1*				
26787-78-0	Amoxicillin										0.6			
69-53-4	Ampicillin										0.6			
120-12-7	Anthracene								0.064					
1912-24-9	Atrazine		0.010											
1405-87-4	Bacitracin										0.0375			
25057-89-0	Bentazon								0.001					
71-43-2	Benzene		0.200						0.101					
50-32-8	Benzo(a)pyrene		1.000				1.000							
207-08-9	Benzo(k)fluoranthene		3.162		0.005				0.202					
61-33-6	Benzylpenicillin										0.6			
80-05-7	Bisphenol-A		1.995											
85-68-7	Butyl benzyl phthalate		0.126											
10108-64-2	Cadmium chloride							1.259						
133-06-2	Captan		0.316					1.585						
63-25-2	Carbaryl		0.316											
10605-21-7	Carbendazim		0.002					0.398						
56-75-7	Chloramphenicol													0.1
2921-88-2	Chlorpyrifos-ethyl								0.202					
57-62-5	Chlortetracycline													4
85721-33-1	Ciprofloxacin											5*		
50-22-6	Corticosterone		1.259											
2242-98-0	Cortisol			0.070										
6055-19-2	Cyclophosphamide						0.002							
50-02-2	Dexamethasone			1.000	0.001		0.020							
53-70-3	Dibenzo[a,h]anthracene					0.001	1.995							
84-74-2	Dibutylphthalate		0.100											
683-18-1	Dibutyltindichloride		5.012			0.032		39.811						
115-32-2	Dicofol		0.501						0.013					
56-53-1	Diethylstilbestrol	0.160	0.794					1.000						
128-46-1	Dihydrostreptomycin									2				
330-54-1	Diuron		0.794											
564-25-0	Doxycycline													4
115-29-7	Endosulfan		3.162											
93106-60-6	Enrofloxacin											4		
114-07-8	Erythromycin										0.3			
50-27-1	Estriol	0.320												
53-16-7	Estrone	0.010												

CAS number	Compound	ERa CALUX	antiAR CALUX	GR CALUX	DR CALUX	PPARγ CALUX	PAH CALUX	Nrf2 CALUX	PXR CALUX	Antibiotic activity				
										Aminoglysides	Macrolides & β-Lactams	Quinolones	Sulfonamides	Tetracyclines
42835-25-6	Flumequine											1		
206-44-0	Fluoranthene								0.008					
13311-84-7	Flutamide		1.000											
118-74-1	Hexachlorobenzene		0.316											
65277-42-1	Ketoconazole		0.100											
154-21-2	Lincomycin										0.075			
330-55-2	Linuron		0.631											
121-75-5	Malathion							0.631						
7487-94-7	Mercuric chloride							1.995						
115-09-3	Methylmercury(II) chloride							25.119						
84371-65-3	Mifepristone (Ru486)		31.623			0.032		0.200						
91-20-3	Naphtalene								0.202					
1404-04-2	Neomycin									1				
7718-54-9	Nickel (II) chloride							0.100						
104-40-5	Nonylphenol		1.000											
84852-15-3	Nonylphenol tech mix		0.501						0.320					
68-22-4	Norethindrone	0.010												
70458-96-7	Norfloxacin											2		
303-81-1	Novobiocin										0.019			
14698-29-4	Oxolinic Acid											2		
79-57-2	Oxytetracycline													1
298-00-0	Parathion-methyl		1.000											
57465-28-8	PCB126		1.000		0.316		3.162							
61-33-6	Penicillin										1			
87-08-1	Phenoxymethylpenicillin										0.3**			
2310-17-0	Phosalone		0.501					1.585						
50-24-8	Prednisolone			0.200										
114-26-1	Propoxur (BAYGON)		0.032					0.020						
302-79-4	Retinoic acid		1.000			0.316		0.158						
122320-73-4	Rosiglitasone		0.032			1.000								
98105-99-8	Sarafloxacin											2*		
122-34-9	Simazine								0.202					
8025-81-8	Spiramycin										0.05			
57-92-1	Streptomycin									8				
80-32-0	Sulfachlorpyridazine												0.5	
68-35-9	Sulfadiazine												0.5	
122-11-2	Sulfadimethoxine												1*	
57-68-1	Sulfamethazine												0.5	
723-46-6	Sulfamethoxazole												1	
144-83-2	Sulfapyridine												0.8	
72-14-0	Sulfathiazole												0.25	
1948-33-0	tBHQ							1.995						
1746-01-6	TCDD				1.000		199.526							
60-54-8	Tetracycline													1
15318-45-3	Thiamphenicol													0.025
55297-95-5	Tiamulin										0.003**			
688-73-3	Tributyltin hydride		1.000			0.794								
56-36-0	Tributyltinacetate					3.162		19.953						
1461-22-9	Tributyltinchloride					3.162		100.000						
3380-34-5	Triclosan		3.162									0.1		
738-70-5	Trimethoprim												5	
1401-69-0	Tylosin										0.038			
50471-44-8	Vinclozolin		3.162					0.158						

APPENDIX SI-II

Toxicological data considered for EBT design of bioassays

A: ER CALUX

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Algae	*Scenedesmus subspicatus*	EC50	840000	131323	3	Kopf, 1997
		Amphibia	*Lithobates clamitans ssp. Clamitans*	NOEC	5.80	9.07	119	Park, 2003
					5.80	9.07	119	Park, 2003
					6.10	9.54	25	Park, 2003
					6.10	9.54	105	Park and Kidd, 2005
					6.10	9.54	105	Park and Kidd, 2005
					6.10	9.54	105	Park and Kidd, 2005
					10.03	15.68	189	Park, 2003
					1000	1563	189	Park, 2003
				LOEC	5.80	9.07	119	Park, 2003
					6.10	9.54	105	Park and Kidd, 2005
					6.10	9.54	105	Park and Kidd, 2005
					82.50	129	189	Park, 2003
			Lithobates septentrionalis	NOEC	5.00	7.82	119	Park and Kidd, 2005
					5.00	7.82	119	Park and Kidd, 2005
					5.00	7.82	119	Park and Kidd, 2005
					5.00	7.82	119	Park and Kidd, 2005
			Rana temporaria	NOEC	115	180	124	Brande-Lavridsen et al., (2010)
					115	180	124	Brande-Lavridsen et al., (2010)
					115	180	124	Brande-Lavridsen et al., (2010)
					115	180	124	Brande-Lavridsen et al., (2010)
					115	180	124	Brande-Lavridsen et al., (2010)
				LOEC	6.00	9.38	124	Brande-Lavridsen et al., (2010)
					6.00	9.38	124	Brande-Lavridsen et al., (2010)
			Xenopus tropicalis	NOEC	1.65	2.58	61	Gyllenhammar et al., 2009
					1.65	2.58	61	Gyllenhammar et al., 2009
					17.50	27.36	61	Gyllenhammar et al., 2009
					180	281	61	Gyllenhammar et al., 2009
					180	281	61	Gyllenhammar et al., 2009
					180	281	61	Gyllenhammar et al., 2009
				LOEC	1.65	2.58	61	Gyllenhammar et al., 2009
					1.65	2.58	61	Gyllenhammar et al., 2009
					1.80	2.81	61	Gyllenhammar et al., 2009
					180	281	61	Gyllenhammar et al., 2009
		Crustacea	*Ceriodaphnia dubia*	NOEC	500000	781684	7	Jukosky et al., 2008a
					500000	781684	7	Jukosky et al., 2008a
				EC50	935500	1462530	7	Cho, 2005
			Daphnia magna	NOEC	0.10	0.16	7	Dietrich et al., 2010
					0.10	0.16	7	Dietrich et al., 2010
					10000	15634	21	Kopf, 1997
					500000	781684	21	Clubbs and Brooks, 2007
					500000	781684	21	Clubbs and Brooks, 2007
					1000000	1563367	21	Clubbs and Brooks, 2007
					1000000	1563367	21	Clubbs and Brooks, 2007
					1000000	1563367	21	Clubbs and Brooks, 2007
					1000000	1563367	21	Clubbs and Brooks, 2007
				LOEC	0.10	0.16	7	Dietrich et al., 2010
					0.10	0.16	7	Dietrich et al., 2010
					62500	97710	21	Clubbs and Brooks, 2007
					1000000	1563367	21	Clubbs and Brooks, 2007
					1000000	1563367	21	Clubbs and Brooks, 2007
				EC50	105000	164154	21	Kopf, 1997
					2590400	4049746	4	Clubbs and Brooks, 2007
					5700000	891119	1	Kopf, 1997
			Hyalella azteca	NOEC	70000	109436	63	Dussault et al., 2008b
					70000	109436	63	Dussault et al., 2008b
					70000	109436	63	Dussault et al., 2008b
					70000	109436	63	Dussault et al., 2008b
					740000	1156892	63	Dussault et al., 2008b
					910000	1422664	21	Dussault et al., 2009
				LOEC	740000	1156892	63	Dussault et al., 2008b
					740000	1156892	63	Dussault et al., 2008b
					740000	1156892	63	Dussault et al., 2008b
					740000	1156892	63	Dussault et al., 2008b
				EC50	360000	562812	63	Dussault et al., 2008b
					770000	1203793	63	Dussault et al., 2008b
					1300000	2032377	10	Dussault et al., 2008a
				LC50	1100000	1719704	10	Dussault et al., 2008a
		Fish	*Catostomus commersoni*	NOEC	5.45	8.52	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
				LOEC	5.45	8.52	1095	Palace et al., 2009
					5.45	8.52	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
			Clarias gariepinus	NOEC	1000	1563	21	Swapna and Senthilkumaran, 2009
				LOEC	0.65	1.02	7	Braathen et al., 2009
					1000	1563	21	Swapna and Senthilkumaran, 2009
					1000	1563	21	Swapna and Senthilkumaran, 2009
					1000	1563	21	Swapna and Senthilkumaran, 2009
			Cyprinus carpio	NOEC	1.00	1.56	10	Purdom et al., 1994
					3.00	4.69	7	Lange et al., 2012
					9.30	14.54	7	Lange et al., 2012

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Cyprinus carpio*	LOEC	1.70	2.66	7	Lange et al., 2012
					10.00	15.63	10	Purdom et al., 1994
					5000	7817	30	Ebrahimi, 2007
			Danio rerio	NOEC	0.050	0.078	56	Schulz et al., 2007
					0.075	0.12	322	Wenzel et al., 2001
					0.30	0.47	322	Wenzel et al., 2001
					0.30	0.47	322	Wenzel et al., 2001
					0.40	0.63	88	Xu et al., 2008
					0.40	0.63	88	Xu et al., 2008
					0.40	0.63	88	Xu et al., 2008
					0.50	0.078	2	Colman et al., 2009
					0.50	0.78	56	Schulz et al., 2007
					0.50	0.78	56	Schulz et al., 2007
					0.50	0.78	56	Schulz et al., 2007
					1.55	2.42	322	Wenzel et al., 2001
					1.55	2.42	322	Wenzel et al., 2001
					1.90	2.97	7	Lange et al., 2012
					2.00	3.13	88	Xu et al., 2008
					2.90	4.53	7	Lange et al., 2012
					5.00	7.82	14	Reyhanian et al., 2011
					5.00	7.82	56	Schulz et al., 2007
					5.00	7.82	56	Schulz et al., 2007
					5.58	8.72	122	Larsen et al., 2009
					5.80	0.91	2	Colman et al., 2009
					8.36	13.07	14	Coe et al., 2009
					8.36	13.07	14	Coe et al., 2009
					10.00	15.63	7	Lister et al., 2009
					10.00	15.63	7	Lister et al., 2009
					10.00	15.63	7	Lister et al., 2009
					10.00	15.63	7	Lister et al., 2009
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	322	Wenzel et al., 2001
					10.00	15.63	322	Wenzel et al., 2001
					10.60	16.57	17	Coe et al., 2009
					10.60	16.57	17	Coe et al., 2009
					25.00	39.08	14	Reyhanian et al., 2011
					25.00	39.08	14	Reyhanian et al., 2011
					47.30	7.39	2	Colman et al., 2009
					47.30	7.39	2	Colman et al., 2009
					100	156	14	Stromqvist et al., 2010
				LOEC	0.050	0.078	56	Schulz et al., 2007
					0.30	0.47	322	Wenzel et al., 2001
					0.50	0.078	2	Colman et al., 2009
					0.50	0.78	56	Schulz et al., 2007
					1.10	1.72	322	Wenzel et al., 2001
					1.55	2.42	322	Wenzel et al., 2001
					1.55	2.42	322	Wenzel et al., 2001
					2.00	3.13	88	Xu et al., 2008
					2.00	3.13	88	Xu et al., 2008
					2.00	3.13	88	Xu et al., 2008
					3.85	6.02	122	Micael et al., 2007
					5.00	7.82	14	Reyhanian et al., 2011
					5.00	7.82	14	Reyhanian et al., 2011
					5.00	7.82	14	Reyhanian et al., 2011
					5.00	7.82	56	Schulz et al., 2007
					5.00	7.82	56	Schulz et al., 2007
					5.00	7.82	56	Schulz et al., 2007
					5.58	8.72	122	Larsen et al., 2009
					5.58	8.72	122	Larsen et al., 2009
					5.80	0.91	2	Colman et al., 2009
					8.36	13.07	14	Coe et al., 2009
					9.20	14.38	7	Lange et al., 2012
					10.00	15.63	7	Lister et al., 2009
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	10	Filby et al., 2012
					10.00	15.63	21	Martyniuk et al., 2007
					10.00	15.63	88	Xu et al., 2008
					10.00	15.63	322	Wenzel et al., 2001
					10.60	16.57	17	Coe et al., 2009
					25.00	39.08	14	Reyhanian et al., 2011
					30.00	4.69	2	Biales et al., 2007
					100	156	14	Stromqvist et al., 2010
				EC50	1.10	1.72	322	Wenzel et al., 2001
					6.22	9.73	21	Van den Belt et al., 2004
					8.00	12.51	21	Van den Belt et al., 2004
				LC50	100	156	28	Wenzel et al., 2001
					1700000	265772	4	Wenzel et al., 2001
			Fundulus heteroclitus	NOEC	67.90	106	14	Hogan et al., 2010
					248	388	14	Hogan et al., 2010
					248	388	14	Hogan et al., 2010
					248	388	14	Hogan et al., 2010
				LOEC	67.90	106	14	Hogan et al., 2010
					248	388	14	Hogan et al., 2010
			Gasterosteus aculeatus	NOEC	1.75	2.74	28	Maunder et al., 2007

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Gasterosteus aculeatus*	NOEC	1.75	2.74	28	Maunder et al., 2007
					1.75	2.74	28	Maunder et al., 2007
					1.75	2.74	28	Maunder et al., 2007
					1.80	2.81	7	Lange et al., 2012
					2.40	3.75	21	Katsiadaki et al., 2010
					3.00	4.69	7	Lange et al., 2012
					6.35	0.99	4	Katsiadaki et al., 2010
					7.30	11.41	58	Hahlbeck et al., 2004b
					7.30	11.41	58	Hahlbeck et al., 2004b
					7.30	11.41	58	Hahlbeck et al., 2004b
					10.00	15.63	58	Hahlbeck, 2004
					10.00	15.63	58	Hahlbeck, 2004
					10.15	15.87	28	Bjorkblom et al., 2009
					10.15	15.87	28	Bjorkblom et al., 2009
					10.15	15.87	28	Bjorkblom et al., 2009
					10.15	15.87	28	Bjorkblom et al., 2009
					10.15	15.87	28	Bjorkblom et al., 2009
					15.00	2.35	3	Dzieweczynski, 2011
					15.00	2.35	3	Dzieweczynski, 2011
					15.00	2.35	3	Dzieweczynski, 2011
					27.70	43.31	28	Maunder et al., 2007
					27.70	43.31	28	Maunder et al., 2007
					50.00	78.17	42	Le Mer et al., 2013
					50.00	78.17	58	Hahlbeck et al., 2004a
					50.00	78.17	58	Hahlbeck, 2004
					78.90	12.33	4	Katsiadaki et al., 2010
					100	156	58	Hahlbeck, 2004
				LOEC	1.01	0.16	4	Katsiadaki et al., 2010
					1.75	2.74	28	Maunder et al., 2007
					1.75	2.74	28	Maunder et al., 2007
					4.00	6.25	58	Hahlbeck, 2004
					4.10	6.41	21	Katsiadaki et al., 2010
					7.30	11.41	58	Hahlbeck et al., 2004b
					7.30	11.41	58	Hahlbeck et al., 2004b
					9.50	14.85	7	Lange et al., 2012
					10.15	15.87	28	Bjorkblom et al., 2009
					10.15	15.87	28	Bjorkblom et al., 2009
					15.00	2.35	3	Dzieweczynski, 2011
					15.00	2.35	3	Dzieweczynski, 2011
					15.00	2.35	3	Dzieweczynski, 2011
					15.00	2.35	3	Dzieweczynski, 2011
					15.00	2.35	3	Dzieweczynski, 2011
					17.65	2.76	4	Katsiadaki et al., 2010
					27.70	43.31	28	Maunder et al., 2007
					27.70	43.31	28	Maunder et al., 2007
					27.70	43.31	28	Maunder et al., 2007
					27.70	43.31	28	Maunder et al., 2007
					50.00	78.17	42	Le Mer et al., 2013
					50.00	78.17	58	Hahlbeck et al., 2004a
					50.00	78.17	58	Hahlbeck et al., 2004a
					50.00	78.17	58	Hahlbeck, 2004
					100	156	58	Hahlbeck, 2004
			Gobiocypris rarus	NOEC	100	156	21	Ma et al., 2007
				LOEC	0.20	0.31	21	Ma et al., 2007
					0.20	0.31	21	Ma et al., 2007
			Oncorhynchus mykiss	NOEC	0.21	0.33	14	Thorpe et al., 2003
					0.78	1.22	7	Lange et al., 2012
					1.00	1.56	10	Purdom et al., 1994
					1.10	1.72	14	Thorpe et al., 2003
					7.85	12.27	56	Brown et al., 2007
					10.00	15.63	14	Albertsson et al., (2007)
					26.00	40.65	14	Thorpe et al., 2003
					37.00	57.84	7	Hook et al., 2006
					59.65	93.25	56	Brown et al., 2007
					59.65	93.25	56	Brown et al., 2007
				LOEC	0.10	0.16	10	Purdom et al., 1994
					1.00	1.56	14	Thorpe et al., 2003
					2.50	0.39	1	Biales et al., 2007
					3.00	4.69	7	Lange et al., 2012
					7.60	11.88	14	Thorpe et al., 2003
					10.00	15.63	10	Purdom et al., 1994
					12.50	19.54	50	Brown et al., 2008
					59.65	93.25	56	Brown et al., 2007
			Oryzias latipes	NOEC	0.20	0.31	14	Thompson, 2000
					0.20	0.31	14	Tilton et al., 2005
					0.20	0.31	14	Tilton et al., 2005
					0.20	0.31	21	Ma et al., 2007
					0.20	0.31	21	Ma et al., 2007
					1.90	2.97	7	Lange et al., 2012
					5.00	7.82	7	Zhang et al., 2008
					5.00	7.82	14	Tilton et al., 2005
					5.00	7.82	14	Tilton et al., 2005
					5.00	7.82	14	Tilton et al., 2005
					5.00	7.82	14	Tilton et al., 2005
					10.00	1.56	1	Biales et al., 2007
					20.00	31.27	21	Ma et al., 2007
					50.00	78.17	7	Park et al., 2009
					50.00	78.17	7	Zhang et al., 2008
					50.00	78.17	7	Zhang et al., 2008

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Oryzias latipes*	NOEC	94.80	148	28	Hano et al., 2007
					94.80	148	28	Hano et al., 2007
					94.80	148	28	Hano et al., 2007
					94.80	148	28	Hano et al., 2007
					100	156	21	Ma et al., 2007
					216	338	28	Hano et al., 2007
					216	338	28	Hano et al., 2007
					216	338	28	Hano et al., 2007
					480	750	21	Hashimoto et al., 2009
					480	750	21	Hashimoto et al., 2009
					500	782	7	Park et al., 2009
					500	782	7	Park et al., 2009
					500	782	7	Park et al., 2009
					500	782	7	Park et al., 2009
					500	782	7	Zhang et al., 2008
					500	782	7	Zhang et al., 2008
					500	782	7	Zhang et al., 2008
					500	782	7	Zhang et al., 2008
					500	782	14	Thompson, 2000
					500	782	14	Tilton et al., 2005
					500	782	14	Tilton et al., 2005
					522	816	28	Hano et al., 2007
				LOEC	0.20	0.31	14	Tilton et al., 2005
					2.00	3.13	21	Ma et al., 2007
					2.00	3.13	21	Ma et al., 2007
					5.00	7.82	7	Park et al., 2009
					5.00	7.82	7	Park et al., 2009
					5.00	7.82	7	Zhang et al., 2008
					5.00	7.82	14	Thompson, 2000
					5.00	7.82	14	Tilton et al., 2005
					5.00	7.82	14	Tilton et al., 2005
					9.20	14.38	7	Lange et al., 2012
					50.00	78.17	7	Zhang et al., 2008
					50.00	78.17	21	Ma et al., 2007
					60.00	93.80	21	Hashimoto et al., 2009
					100	15.63	1	Biales et al., 2007
					216	338	28	Hano et al., 2007
					216	338	28	Hano et al., 2007
					216	338	28	Hano et al., 2007
					500	782	7	Park et al., 2009
					500	782	7	Zhang et al., 2008
					500	782	14	Tilton et al., 2005
					500	782	14	Tilton et al., 2005
					500	782	14	Tilton et al., 2005
					500	782	14	Tilton et al., 2005
					522	816	28	Hano et al., 2007
					522	816	28	Hano et al., 2007
					522	816	28	Hano et al., 2007
					522	816	28	Hano et al., 2007
			Pimephales promelas	NOEC	0.98	1.53	7	Lange et al., 2012
					1.60	2.50	14	Ankley et al., 2010
					5.40	0.84	2	Martyniuk et al., 2010
					5.40	0.84	2	Martyniuk et al., 2010
					5.45	8.52	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					7.00	10.94	8	Ekman et al., 2008
					7.00	10.94	8	Ekman et al., 2008
					7.80	12.19	14	Ankley et al., 2010
					10.00	15.63	17	McGee et al., 2009
					10.00	15.63	21	Filby and Tyler, 2007
					10.00	15.63	21	Panter et al., 2004
					10.00	15.63	21	Panter et al., 2004
					10.00	15.63	21	Salierno and Kane, 2009
					10.00	15.63	21	Salierno and Kane, 2009
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					20.00	31.27	21	Salierno and Kane, 2009
					20.00	31.27	21	Salierno and Kane, 2009
					40.00	62.53	21	Salierno and Kane, 2009
					40.00	62.53	21	Salierno and Kane, 2009
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					83.00	130	8	Ekman et al., 2008
					83.00	130	8	Ekman et al., 2008
					100	156	30	Warner, 2006
					100000	156337	30	Warner, 2006
				LOEC	1.60	2.50	14	Ankley et al., 2010

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Pimephales promelas*	LOEC	2.90	4.53	7	Lange et al., 2012
					5.40	0.84	2	Martyniuk et al., 2010
					5.40	0.84	2	Martyniuk et al., 2010
					5.40	0.84	2	Martyniuk et al., 2010
					5.45	8.52	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					7.00	10.94	8	Ekman et al., 2008
					7.80	12.19	14	Ankley et al., 2010
					10.00	15.63	21	Filby and Tyler, 2007
					10.00	15.63	21	Panter et al., 2004
					10.00	15.63	21	Salierno and Kane, 2009
					10.00	15.63	21	Salierno and Kane, 2009
					10.00	15.63	21	Salierno and Kane, 2009
					10.00	15.63	21	Salierno and Kane, 2009
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					10.60	16.57	21	Filby et al., 2007
					20.00	31.27	21	Salierno and Kane, 2009
					40.00	62.53	21	Salierno and Kane, 2009
					40.00	62.53	21	Salierno and Kane, 2009
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					50.00	78.17	15	Weisbrod et al., 2007
					83.00	130	8	Ekman et al., 2008
					83.00	130	8	Ekman et al., 2008
					100	156	30	Warner, 2006
					1000	1563	30	Warner, 2006
			Poecilia reticulata	NOEC	10.00	15.63	14	Hallgren and Olsen, 2010
					10.00	15.63	14	Hallgren and Olsen, 2010
					10.00	15.63	14	Hallgren and Olsen, 2010
					2000	3127	112	Shenoy, 2012
					2000	3127	112	Shenoy, 2012
					50000	78168	14	Hallgren and Olsen, 2010
				LOEC	10.00	15.63	14	Hallgren and Olsen, 2010
					2000	3127	112	Shenoy, 2012
					2000	3127	112	Shenoy, 2012
					50000	78168	14	Hallgren and Olsen, 2010
					50000	78168	14	Hallgren and Olsen, 2010
			Rutilus rutilus	NOEC	0.040	0.063	720	Lange et al., 2009
					0.040	0.063	720	Lange et al., 2009
					0.10	0.16	94	Katsu et al., 2007
					0.30	0.47	94	Katsu et al., 2007
					0.30	0.47	122	Lange et al., 2008
					0.30	0.47	122	Lange et al., 2008
					0.30	0.47	720	Lange et al., 2009
					0.30	0.47	720	Lange et al., 2009
					0.78	1.22	7	Lange et al., 2012
					4.00	6.25	122	Lange et al., 2008
					4.00	6.25	122	Lange et al., 2008
					4.00	6.25	122	Lange et al., 2008
					4.00	6.25	720	Lange et al., 2009
					4.00	6.25	720	Lange et al., 2009
					28.50	44.56	18	Flores-Valverde et al., 2010
					28.50	44.56	18	Flores-Valverde et al., 2010
				LOEC	0.10	0.16	94	Katsu et al., 2007
					0.30	0.47	94	Katsu et al., 2007
					0.30	0.47	122	Lange et al., 2008
					0.30	0.47	720	Lange et al., 2009
					1.10	1.72	18	Flores-Valverde et al., 2010
					3.00	4.69	7	Lange et al., 2012
					4.00	6.25	94	Katsu et al., 2007
					4.00	6.25	122	Lange et al., 2008
					4.00	6.25	122	Lange et al., 2008
					4.00	6.25	720	Lange et al., 2009
			Salmo trutta	NOEC	1.10	1.72	12	Bjerregaard et al., 2008
					2.08	3.25	21	Korner, 2008
					2.08	3.25	21	Korner, 2008
					2.08	3.25	21	Korner, 2008
					2.08	3.25	21	Korner, 2008
					2.08	3.25	21	Korner, 2008
					2.12	3.31	21	Korner, 2008
					2.12	3.31	21	Korner, 2008
					2.12	3.31	21	Korner, 2008
					2.12	3.31	21	Korner, 2008
					2.12	3.31	21	Korner, 2008
					2.40	3.75	21	Korner, 2008
					2.40	3.75	21	Korner, 2008
					2.40	3.75	21	Korner, 2008
					2.40	3.75	21	Korner, 2008
					2.40	3.75	21	Korner, 2008
					12.00	18.76	12	Bjerregaard et al., 2008
				LOEC	1.10	1.72	12	Bjerregaard et al., 2008
					2.08	3.25	21	Korner, 2008

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Salmo trutta*	LOEC	2.12	3.31	21	Korner, 2008
					2.12	3.31	21	Korner, 2008
					2.40	3.75	21	Korner, 2008
					2.40	3.75	21	Korner, 2008
					5.10	7.97	12	Bjerregaard et al., 2008
				EC50	3.70	5.78	12	Bjerregaard et al., 2008
					5.20	8.13	12	Bjerregaard et al., 2008
			Salvelinus namaycush	NOEC	5.45	8.52	1095	Palace et al., 2009
					5.45	8.52	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.30	9.85	365	Werner, 2006.
					6.30	9.85	365	Werner, 2006.
					6.30	9.85	365	Werner, 2006.
					6.30	9.85	365	Werner, 2006.
					15.00	23.45	21	Werner, 2006.
					373	583	21	Werner, 2006.
				LOEC	5.45	8.52	1095	Palace et al., 2009
					5.45	8.52	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					5.55	8.68	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.10	9.54	1095	Palace et al., 2009
					6.30	9.85	365	Werner, 2006.
					6.30	9.85	365	Werner, 2006.
					6.30	9.85	365	Werner, 2006.
					35.00	54.72	21	Werner, 2006.
			Syngnathus scovelli	NOEC	1.00	1.56	10	Partridge et al., 2010
					100	156	10	Partridge et al., 2010
				LOEC	1.00	1.56	10	Partridge et al., 2010
					1.00	1.56	10	Partridge et al., 2010
					100	156	10	Partridge et al., 2010
		Insecta	*Chironomus tentans*	NOEC	20000	31267	47	Dussault et al., 2008b
					70000	109436	47	Dussault et al., 2008b
					550000	859852	47	Dussault et al., 2008b
					550000	859852	47	Dussault et al., 2008b
					560000	875486	21	Dussault et al., 2009
					560000	875486	47	Dussault et al., 2008b
					560000	875486	47	Dussault et al., 2008b
					560000	875486	47	Dussault et al., 2008b
					1000000	156337	2	Cho, 2005
				LOEC	20000	31267	47	Dussault et al., 2008b
					140000	218871	47	Dussault et al., 2008b
					3100000	4846438	21	Dussault et al., 2009
					3100000	4846438	47	Dussault et al., 2008b
					3100000	4846438	47	Dussault et al., 2008b
				EC50	1510000	2360684	47	Dussault et al., 2008b
					1530000	2391952	47	Dussault et al., 2008b
					1550000	2423219	47	Dussault et al., 2008b
					1960000	3064199	47	Dussault et al., 2008b
					6600000	10318222	10	Dussault et al., 2008a
				LC50	2160000	3376873	47	Dussault et al., 2008b
		Mollusca	*Bithynia tentaculata*	NOEC	9.00	14.07	284	Hallgren et al., 2012
					44950	70273	284	Hallgren et al., 2012
					44950	70273	284	Hallgren et al., 2012
					44950	70273	284	Hallgren et al., 2012
					44950	70273	284	Hallgren et al., 2012
				LOEC	9.00	14.07	284	Hallgren et al., 2012
			Potamopyrgus antipodarum	NOEC	25.00	39.08	28	Sieratowicz et al., 2011
					100	156	28	Sieratowicz et al., 2011
				LOEC	50.00	78.17	28	Sieratowicz et al., 2011
			Radix balthica	NOEC	9.00	14.07	153	Hallgren et al., 2012
					5130	8020	153	Hallgren et al., 2012
					5130	8020	153	Hallgren et al., 2012
					5130	8020	153	Hallgren et al., 2012
					44950	70273	153	Hallgren et al., 2012
				LOEC	9.00	14.07	153	Hallgren et al., 2012
			Aquatic community	PNEC	0.035	0.055		James et al., 2014
					0.037	0.058		Oekotoxzentrum, Centre Ecotox
					0.10	0.16		James et al., 2014
					0.10	0.16		James et al., 2014
					0.35	0.55		James et al., 2014
					0.50	0.78		James et al., 2014
					0.57	0.89		Johnson et al., 2007
50-28-2	17β-estradiol	Algae	*Melosira varians*	NOEC	20000	20000	10	Julius et al., 2007
					400000	400000	10	Julius et al., 2007
					800000	800000	10	Julius et al., 2007
				LOEC	80000	80000	10	Julius et al., 2007
					200000	200000	10	Julius et al., 2007
		Amphibia	*Lithobates clamitans ssp. Clamitans*	NOEC	100000	100000	506	Coady et al., 2004
					100000	100000	506	Coady et al., 2004
				LOEC	100000	100000	506	Coady et al., 2004
			Lithobates pipiens	NOEC	100000	100000	124	Mackenzie et al., 2003
					100000	100000	124	Mackenzie et al., 2003
				LOEC	1000	1000	124	Mackenzie et al., 2003
					1000	1000	124	Mackenzie et al., 2003
				LC50	1242098	1242098	14	Hogan et al., 2006

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
50-28-2	17β-estradiol	Amphibia	*Lithobates pipiens*	LC50	1517212	1517212	14	Hogan et al., 2006
			Lithobates sylvaticus	LC50	680975	680975	14	Hogan et al., 2006
			Rhinella arenarum	NOEC	100000	100000	200	Brodeur et al., 2013
				LOEC	100000	100000	200	Brodeur et al., 2013
					100000	100000	200	Brodeur et al., 2013
			Xenopus laevis	NOEC	100000	100000	78	Carr et al., 2003
				LOEC	100000	100000	34	Cong et al., 2006
					100000	100000	34	Cong et al., 2006
					100000	100000	78	Carr et al., 2003
					100000	100000	78	Carr et al., 2003
		Crustacea	*Americamysis bahia*	LC50	890000	890000	4	Hirano et al., 2004
					1690000	169000	2	Hirano et al., 2004
			Ceriodaphnia dubia	NOEC	1000000	1000000	7	Jukosky et al., 2008a
			Daphnia magna	NOEC	200000	200000	21	Brennan et al., 2006
					1000000	1000000	21	Brennan et al., 2006
					1000000	1000000	21	Brennan et al., 2006
				LOEC	400000	400000	21	Brennan et al., 2006
				EC50	1550000	155000	1	Brennan et al., 2006
					2040000	204000	2	Brennan et al., 2006
					2870000	287000	2	Brennan et al., 2006
					2970000	297000	2	Hirano et al., 2004
					3670000	367000	1	Brennan et al., 2006
			Eurytemora affinis	NOEC	6000	6000	10	Forget-Leray et al., 2005
				LOEC	18000	18000	10	Forget-Leray et al., 2005
				LC50	45000	45000	4	Forget-Leray et al., 2005
			Neocaridina denticulata	LOEC	10000	10000	28	Huang et al., 2006
					10000	10000	28	Huang et al., 2006
					10000	10000	28	Huang et al., 2006
					10000	10000	28	Huang et al., 2006
		Fish	*Cyprinus carpio*	NOEC	100	100	90	Gimeno et al., 1998
				LOEC	100	100	90	Gimeno et al., 1998
					1000	1000	90	Gimeno et al., 1998
			Danio rerio	NOEC	12.90	12.90	8	Rose et al., 2002
					24.00	24.00	18	Holbech et al., 2006
					24.00	24.00	18	Holbech et al., 2006
					25.00	2.50	2	Jin et al., 2009
					250	25.00	2	Jin et al., 2009
					250	250	18	Holbech et al., 2006
					2500	250	3	Jin et al., 2010
					12500	1250	3	Jin et al., 2010
				LOEC	21.00	21.00	8	Rose et al., 2002
					25.00	2.50	2	Jin et al., 2009
					54.00	54.00	18	Holbech et al., 2006
					54.00	54.00	18	Holbech et al., 2006
					1000	1000	16	Peute et al., 1985
					12500	1250	3	Jin et al., 2010
				EC50	41.20	41.20	8	Rose et al., 2002
					55.00	55.00	18	Holbech et al., 2006
					175	175	21	Van den Belt et al., 2004
					240	240	21	Van den Belt et al., 2004
			Gambusia affinis	NOEC	1000	1000	8	Huang et al., 2013
					250000	25000	3	Kamata et al., 2011
				LOEC	1000	1000	8	Huang et al., 2012b
					1000	1000	8	Huang et al., 2013
					500000	50000	3	Kamata et al., 2011
			Gambusia holbrooki	NOEC	20.00	20.00	28	Doyle and Lim, 2005
					100	100	84	Rawson et al., 2006
				LOEC	100	100	28	Doyle and Lim, 2005
					500	500	28	Doyle and Lim, 2005
					500	500	84	Rawson et al., 2006
			Gasterosteus aculeatus	NOEC	1.00	1.00	7	Hogan et al., 2008
					10.00	10.00	21	Allen et al., 2008
					10.00	10.00	58	Hahlbeck et al., 2004a
					20.00	20.00	21	Allen et al., 2008
					32.00	32.00	21	Allen et al., 2008
					10000	10000	58	Hahlbeck et al., 2004a
				LOEC	10.00	10.00	7	Hogan et al., 2008
					50.00	50.00	21	Allen et al., 2008
					70.00	70.00	21	Allen et al., 2008
					100	100	21	Allen et al., 2008
					1000	1000	58	Hahlbeck et al., 2004a
			Gobiocypris rarus	NOEC	100	10.00	4	Ma et al., 2009
				LOEC	100	10.00	4	Ma et al., 2009
			Ictalurus punctatus	NOEC	100	100	21	Thompson et al., 2000
				LOEC	1000	1000	21	Thompson et al., 2000
				EC50	170	170	21	Thompson et al., 2000
			Morone saxatalis	NOEC	1000	1000	21	Thompson et al., 2000
				LOEC	10000	10000	21	Thompson et al., 2000
				EC50	1560	1560	21	Thompson et al., 2000
			Oncorhynchus mykiss	NOEC	3.20	3.20	21	Thorpe et al., 2000
					4.80	4.80	14	Thorpe et al., 2003
					9.60	9.60	14	Thorpe et al., 2003
					100	10.00	5	Ward et al., 2006
					100	100	21	Thorpe et al., 2000
					100	100	21	Tremblay and Van der Kraak, 1999
					100	100	21	Tremblay and Van der Kraak, 1999
					247	247	21	Thorpe et al., 2000
					250	250	21	Tremblay and Van der Kraak, 1999
					463	463	14	Thorpe et al., 2003

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
50-28-2	17β-estradiol	Fish	*Oncorhynchus mykiss*	LOEC	8.90	8.90	21	Thorpe et al., 2000
					14.00	14.00	14	Thorpe et al., 2003
					22.00	22.00	14	Thorpe et al., 2003
					100	100	21	Tremblay and Van der Kraak, 1999
					247	247	21	Thorpe et al., 2000
					250	250	21	Tremblay and Van der Kraak, 1999
					250	250	21	Tremblay and Van der Kraak, 1999
				EC50	15.00	15.00	21	Thorpe et al., 2000
			Oncorhynchus tshawytscha	LOEC	400000	400000	8 h immersion	Piferrer and Donaldson, 1992
			Oryzias latipes	NOEC	1.00	0.10		Lee et al., 2012
					1.00	0.10		Lee et al., 2012
					10.00	1.00	5	Kang et al., 2005
					100	100	21	Thompson et al., 2000
					154	154	14	Jukosky et al., 2008b
					227	227	25	Kang et al., 2002
					1000	100		Lee et al., 2012
					2528	2528	14	Jukosky et al., 2008b
					10000	1000	5	Kang,et al., 2006b
				LOEC	5.00	5.00	21	Kashiwada et al., 2002
					10.00	1.00	5	Kang et al., 2005
					10.00	1.00		Lee et al., 2012
					10.00	1.00		Lee et al., 2012
					29.30	29.30	21	Kang et al., 2002
					55.70	55.70	21	Kang et al., 2002
					56.27	56.27	14	Jukosky et al., 2008b
					100	10.00		Lee et al., 2012
					463	463	25	Kang et al., 2002
					1000	1000	21	Thompson et al., 2000
					1000	100		Lee et al., 2012
					1000	100		Lee et al., 2012
					2528	2528	14	Jukosky et al., 2008b
					10000	1000	5	Kang,et al., 2006b
				EC50	200	200	21	Thompson et al., 2000
					225	225	14	Sun et al., 2009
					470000	470000	21	Kashiwada et al., 2002
				LC50	460000	46000	3	Kashiwada et al., 2002
					460000	46000	3	Tabata et al., 2001
					2000000	200000	4	Kang et al., 2002
					3500000	350000	3	Kashiwada et al., 2002
					3500000	350000	3	Tabata et al., 2001
			Pimephales promelas	NOEC	10.00	10.00	14	Thorpe et al., 2007
					27.00	27.00	9	Cline et al., 2003
					28.00	28.00	17	McGee et al., 2009
					30.00	30.00	21	Schultz et al., 2012
					30.00	30.00	21	Schultz et al., 2012
					30.00	30.00	21	Schultz et al., 2012
					30.00	30.00	21	Schultz et al., 2012
					30.00	30.00	21	Schultz et al., 2012
					30.00	30.00	21	Schultz et al., 2012
					100	100	14	Thorpe et al., 2007
					500	500	21	Bringolf et al., 2004
					500	500	21	Bringolf et al., 2004
				LOEC	22.00	22.00	14	Thorpe et al., 2007
					30.00	30.00	21	Schultz et al., 2012
					270	270	9	Cline et al., 2003
					500	500	21	Bringolf et al., 2004
					500	500	21	Bringolf et al., 2004
					500	500	21	Bringolf et al., 2004
				EC50	25.00	25.00	14	Brian et al., 2005
					120	120	19	Kramer et al., 1998
					251	251	19	Kramer et al., 1998
				LC50	1150	1150	19	Kramer et al., 1998
			Poecilia reticulata	NOEC	50.00	50.00	120	Nielsen and Baatrup, 2006
					1000	1000	21	Li and Wang , 2005
				LOEC	1000	1000	21	Li and Wang , 2005
					1000	1000	21	Li and Wang , 2005
			Pomatoschistus minutus	LOEC	7100	7100	243	Robinson et al., 2004
				EC50	87.00	87.00	243	Robinson et al., 2004
					127	127	243	Robinson et al., 2004
					165	165	243	Robinson et al., 2004
			Salmo trutta	NOEC	15.30	15.30	8	Bjerregaard et al., 2008
				LOEC	20.00	20.00	8	Bjerregaard et al., 2008
				EC50	15.10	15.10	8	Bjerregaard et al., 2008
			Thymallus thymallus	LOEC	1.00	1.00	50	Lahnsteiner et al., 2006
					1.00	1.00	50	Lahnsteiner et al., 2006
				LC50	2740000	274000		Nendza and Wenzel, 2006
		Invertebrates	*Brachionus calyciflorus*	LOEC	1.00	1.00	10	Huang et al., 2012a
					100000	100000	10	Huang et al., 2012a
		Mollusca	*Elliptio complanata*	NOEC	100000	10000	0.25	Flynn et al., 2013
				LOEC	100000	10000	0.25	Flynn et al., 2013
			Aquatic community	PNEC	0.40	0.40		Oekotoxzentrum, Centre Ecotox
					1.00	1.00		Gross-Sorokin et al., 2006
					1.00	1.00		Young et al., 2004
					2.00	2.00		Anderson et al., 2012 ; Caldwell et al., 2012
					2.27	2.27		Yuan et al., 2014
14938-35-3	4-n-amylphenol	Algae	*Chlorella pyrenoidosa*	NOEC	980000	980	3	Ramos et al., 1999
				LOEC	2300000	2300	3	Ramos et al., 1999
				EC50	2600000	2600	3	Ramos et al., 1999
		Crustacea	*Daphnia magna*	EC50	1330000	1330	2	Ramos et al., 1998

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
14938-35-3	4-n-amylphenol	Crustacea	*Daphnia magna*	EC50	2040000	2040	1	Ramos et al., 1998
		Fish	*Poecilia reticulata*	LC50	1250000	1250	4	Ramos et al., 1998
					1360000	1360	3	Ramos et al., 1998
					1920000	1920	2	Ramos et al., 1998
					2490000	2490	1	Ramos et al., 1998
		Mollusca	*Lymnaea stagnalis*	LC50	3700000	3700	3	Ramos et al., 1998
					3710000	37100	4	Ramos et al., 1998
					4600000	4600	2	Ramos et al., 1998
					5380000	5380	1	Ramos et al., 1998
56-53-1	Diethylstilbestrol	Amphibia	*Xenopus laevis*	LOEC	2684	44.01	3	Nishimura et al., 1997
					2684	44.01	3	Nishimura et al., 1997
		Crustacea	*Daphnia magna*	NOEC	100000	16401	6	Kashian and Dodson, 2004
					100000	16401	6	Kashian and Dodson, 2004
					100000	16401	21	Brennan et al., 2006
					200000	3280	2	Zou and Fingerman, 1997
					500000	82007	21	Baldwin et al., 1995
					500000	82007	21	Baldwin et al., 1995
					500000	82007	21	Baldwin et al., 1995
					500000	82007	21	Brennan et al., 2006
					500000	82007	21	Brennan et al., 2006
					500000	82007	21	Brennan et al., 2006
					540000	8857	2	Baldwin et al., 1995
					900000	14761	2	Baldwin et al., 1995
				LOEC	100000	16401	6	Kashian and Dodson, 2004
					200000	32803	21	Brennan et al., 2006
					500000	8201	2	Baldwin et al., 1995
					500000	82007	21	Baldwin et al., 1995
					500000	82007	21	Baldwin et al., 1995
					500000	82007	21	Brennan et al., 2006
					500000	8201		Hannas et al., 2011
				EC50	1090000	17878	2	Zou and Fingerman, 1997
					1200000	19682	2	Baldwin et al., 1995
					1550000	25422	2	Brennan et al., 2006
					1870000	30671	2	Brennan et al., 2006
					2030000	33295	1	Brennan et al., 2006
					3710000	60849	1	Brennan et al., 2006
			Nitocra spinipes	NOEC	30000	4920	18	Breitholtz and Bengtsson, 2001
					30000	4920	18	Breitholtz and Bengtsson, 2001
				LOEC	30000	4920	18	Breitholtz and Bengtsson, 2001
				LC50	290000	47564	4	Breitholtz and Bengtsson, 2001
		Fish	*Pimephales promelas*	NOEC	3200	525	21	Panter et al., 2002
				LOEC	3200	525	21	Panter et al., 2002
		Worm	*Dugesia japonica*	LC50	500000	82007	4	Li, 2013
					600000	9841	3	Li, 2013
					700000	11481	2	Li, 2013
					800000	13121	1	Li, 2013
50-27-1	Estriol	Fish	*Danio rerio*	NOEC	300	94.87	20 to 38 dph	Holbech et al., 2006
					6700	2119	20 to 60 dph	Holbech et al., 2006
					21700	6862		Holbech et al., 2006
				LOEC	600	190	20 to 38 dph	Holbech et al., 2006
					21700	6862	20 to 60 dph	Holbech et al., 2006
			Oryzias latipes	NOEC	4.30	1.36	15	Lei et al., 2014
					46.50	14.70	15	Lei et al., 2014
					46.50	14.70	90	Lei et al., 2014
					100	31.62	110	Metcalfe et al., 2001
					462	146	15	Lei et al., 2014
					462	146	90	Lei et al., 2014
					462	146	90	Lei et al., 2014
					462	146	90	Lei et al., 2014
					1000	316	110	Metcalfe et al., 2001
					4517	1428	90	Lei et al., 2014
				LOEC	46.50	14.70	15	Lei et al., 2014
					462	146	15	Lei et al., 2014
					462	146	90	Lei et al., 2014
					1000	316	110	Metcalfe et al., 2001
					4517	1428	15	Lei et al., 2014
					4517	1428	90	Lei et al., 2014
					4517	1428	90	Lei et al., 2014
					4517	1428	90	Lei et al., 2014
		Invertebrates	*Dugesia japonica*	NOEC	100000000	31622800	4	Li, 2013
53-16-7	Estrone	Crustacea	*Neomysis integer*	NOEC	100	1.00	4	Ghekiere et al., 2006
					10000000	100000	4	Ghekiere et al., 2006
				LOEC	10000	100	4	Ghekiere et al., 2006
		Fish	*Danio rerio*	NOEC	35.50	0.36	40	Holbech et al., 2006
					97.70	0.98	40	Holbech et al., 2006
				LOEC	14.00	0.14	18	Holbech et al., 2006
					49.80	0.50	40	Holbech et al., 2006
				EC50	78.00	0.78	18	Holbech et al., 2006
					204	2.04	21	Van den Belt et al., 2004
					465	4.65	21	Van den Belt et al., 2004
			Oncorhynchus mykiss	NOEC	0.74	0.0074	14	Thorpe et al., 2003
					319	3.19	14	Thorpe et al., 2003
				LOEC	3.30	0.033	14	Thorpe et al., 2003
			Oryzias latipes	NOEC	100	1.00	85 to 110	Metcalfe et al., 2001
					1000	10.00	85 to 110	Metcalfe et al., 2001
				LOEC	1000	10.00	85 to 110	Metcalfe et al., 2001
					10000	100	85 to 110	Metcalfe et al., 2001
			Pimephales promelas	NOEC	781	7.81	21	Thorpe et al., 2007
				LOEC	34.00	0.34	21	Thorpe et al., 2007

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
53-16-7	Estrone	Fish	*Pimephales promelas*	LOEC	307	3.07	21	Thorpe et al., 2007
					307	3.07	21	Thorpe et al., 2007
			Salmo trutta	NOEC	63.00	0.63	10	Bjerregaard et al., 2008
					89.00	0.89	10	Bjerregaard et al., 2008
				LOEC	87.00	0.87	10	Bjerregaard et al., 2008
					134	1.34	10	Bjerregaard et al., 2008
				EC50	85.00	0.85	10	Bjerregaard et al., 2008
					88.00	0.88	10	Bjerregaard et al., 2008
			Aquatic community	PNEC	3.00	0.030		Johnson et al., 2007
					3.60	0.036		Oekotoxzentrum, Centre Ecotox
					6.00	0.060		Yuan et al., 2014
68-22-4	Norethindrone	Crustacea	*Daphnia magna*	NOEC	500000000	3155000	25	Goto and Hiromi, 2003
				EC50	6410000	4045	2	Goto and Hiromi, 2003
		Fish	*Ictalurus punctatus*	NOEC	82500	521	7	Nallani et al., 2012
			Pimephales promelas	NOEC	370	2.33	28 days ph	Overturf et al., 2012
					1500	9.47	28 days ph	Overturf et al., 2012
					35400	223	28	Nallani et al., 2012
				LOEC	740	4.67	28 days ph	Overturf et al., 2012
					14800	93.39	28 days ph	Overturf et al., 2012

B: ANTI-AR CALUX

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Algae	*Scenedesmus subspicatus*	EC50	840	4210	3	Kopf, 1997
		Amphibia	*Lithobates clamitans*	NOEC	0.0058	0.29	119	Park, 2003
					0.0058	0.29	119	Park, 2003
					0.0061	0.31	25	Park, 2003
					0.0061	0.31	105	Park and Kidd, 2005
					0.0061	0.31	105	Park and Kidd, 2005
					0.0061	0.31	105	Park and Kidd, 2005
					0.010	0.50	189	Park, 2003
					1.00	50.12	189	Park, 2003
				LOEC	0.0058	0.29	119	Park, 2003
					0.0061	0.31	105	Park and Kidd, 2005
					0.0061	0.31	105	Park and Kidd, 2005
					0.083	4.13	189	Park, 2003
			Lithobates septentrionalis	NOEC	0.0050	0.25	119	Park and Kidd, 2005
					0.0050	0.25	119	Park and Kidd, 2005
					0.0050	0.25	119	Park and Kidd, 2005
					0.0050	0.25	119	Park and Kidd, 2005
			Rana temporaria	NOEC	0.12	5.76	124	Brande-Lavridsen et al., (2010)
					0.12	5.76	124	Brande-Lavridsen et al., (2010)
					0.12	5.76	124	Brande-Lavridsen et al., (2010)
					0.12	5.76	124	Brande-Lavridsen et al., (2010)
					0.12	5.76	124	Brande-Lavridsen et al., (2010)
				LOEC	0.0060	0.30	124	Brande-Lavridsen et al., (2010)
					0.0060	0.30	124	Brande-Lavridsen et al., (2010)
			Xenopus tropicalis	NOEC	0.0017	0.083	61	Gyllenhammar et al., 2009
					0.0017	0.083	61	Gyllenhammar et al., 2009
					0.018	0.88	61	Gyllenhammar et al., 2009
					0.18	9.00	61	Gyllenhammar et al., 2009
					0.18	9.00	61	Gyllenhammar et al., 2009
					0.18	9.00	61	Gyllenhammar et al., 2009
				LOEC	0.0017	0.083	61	Gyllenhammar et al., 2009
					0.0017	0.083	61	Gyllenhammar et al., 2009
					0.0018	0.090	61	Gyllenhammar et al., 2009
					0.18	9.00	61	Gyllenhammar et al., 2009
		Crustacea	*Ceriodaphnia dubia*	NOEC	500	25059	7	Jukosky et al., 2008a
					500	25059	7	Jukosky et al., 2008a
				EC50	936	46886	7	Cho, 2005
			Daphnia magna	NOEC	0.0001	0.0050	7	Dietrich et al., 2010
					0.0001	0.0050	7	Dietrich et al., 2010
					10.00	501	21	Kopf, 1997
					500	25059	21	Clubbs and Brooks, 2007
					500	25059	21	Clubbs and Brooks, 2007
					1000	50119	21	Clubbs and Brooks, 2007
					1000	50119	21	Clubbs and Brooks, 2007
					1000	50119	21	Clubbs and Brooks, 2007
					1000	50119	21	Clubbs and Brooks, 2007
				LOEC	0.0001	0.0050	7	Dietrich et al., 2010
					0.0001	0.0050	7	Dietrich et al., 2010
					62.50	3132	21	Clubbs and Brooks, 2007
					1000	50119	21	Clubbs and Brooks, 2007
					1000	50119	21	Clubbs and Brooks, 2007
				EC50	105	5262	21	Kopf, 1997
					5700	28568	1	Kopf, 1997
					2590	129828	4	Clubbs and Brooks, 2007
			Hyalella azteca	NOEC	70.00	3508	63	Dussault et al., 2008b
					70.00	3508	63	Dussault et al., 2008b
					70.00	3508	63	Dussault et al., 2008b
					70.00	3508	63	Dussault et al., 2008b
					740	37088	63	Dussault et al., 2008b
					910	45608	21	Dussault et al., 2009
				LOEC	740	37088	63	Dussault et al., 2008b
					740	37088	63	Dussault et al., 2008b
					740	37088	63	Dussault et al., 2008b
					740	37088	63	Dussault et al., 2008b
				EC50	360	18043	63	Dussault et al., 2008b
					770	38591	63	Dussault et al., 2008b
					1300	65154	10	Dussault et al., 2008a
				LC50	1100	55131	10	Dussault et al., 2008a
		Fish	*Catostomus commersoni*	NOEC	0.0055	0.27	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
				LOEC	0.0055	0.27	1095	Palace et al., 2009
					0.0055	0.27	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
			Clarias gariepinus	NOEC	1.00	50.12	21	Swapna and Senthilkumaran, 2009
				LOEC	0.0007	0.033	7	Braathen et al., 2009
					1.00	50.12	21	Swapna and Senthilkumaran, 2009
					1.00	50.12	21	Swapna and Senthilkumaran, 2009
					1.00	50.12	21	Swapna and Senthilkumaran, 2009
			Cyprinus carpio	NOEC	0.0010	0.050	10	Purdom et al., 1994
					0.0030	0.15	7	Lange et al., 2012
					0.0093	0.47	7	Lange et al., 2012
				LOEC	0.0017	0.085	7	Lange et al., 2012
					0.010	0.50	10	Purdom et al., 1994
					5.00	251	30	Ebrahimi, 2007
			Danio rerio	NOEC	0.00005	0.0025	56	Schulz et al., 2007
					0.00008	0.0038	322	Wenzel et al., 2001

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Danio rerio*	NOEC	0.0005	0.0025	2	Colman et al., 2009
					0.0003	0.015	322	Wenzel et al., 2001
					0.0003	0.015	322	Wenzel et al., 2001
					0.0004	0.020	88	Xu et al., 2008
					0.0004	0.020	88	Xu et al., 2008
					0.0004	0.020	88	Xu et al., 2008
					0.0005	0.025	56	Schulz et al., 2007
					0.0005	0.025	56	Schulz et al., 2007
					0.0005	0.025	56	Schulz et al., 2007
					0.0058	0.029	2	Colman et al., 2009
					0.0016	0.078	322	Wenzel et al., 2001
					0.0016	0.078	322	Wenzel et al., 2001
					0.0019	0.10	7	Lange et al., 2012
					0.0020	0.10	88	Xu et al., 2008
					0.0029	0.15	7	Lange et al., 2012
					0.047	0.24	2	Colman et al., 2009
					0.047	0.24	2	Colman et al., 2009
					0.0050	0.25	14	Reyhanian et al., 2011
					0.0050	0.25	56	Schulz et al., 2007
					0.0050	0.25	56	Schulz et al., 2007
					0.0056	0.28	122	Larsen et al., 2009
					0.0084	0.42	14	Coe et al., 2009
					0.0084	0.42	14	Coe et al., 2009
					0.010	0.50	7	Lister et al., 2009
					0.010	0.50	7	Lister et al., 2009
					0.010	0.50	7	Lister et al., 2009
					0.010	0.50	7	Lister et al., 2009
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	322	Wenzel et al., 2001
					0.010	0.50	322	Wenzel et al., 2001
					0.011	0.53	17	Coe et al., 2009
					0.011	0.53	17	Coe et al., 2009
					0.025	1.25	14	Reyhanian et al., 2011
					0.025	1.25	14	Reyhanian et al., 2011
					0.10	5.01	14	Stromqvist et al., 2010
				LOEC	0.0005	0.0025	2	Colman et al., 2009
					0.00005	0.0025	56	Schulz et al., 2007
					0.0003	0.015	322	Wenzel et al., 2001
					0.0005	0.025	56	Schulz et al., 2007
					0.0058	0.029	2	Colman et al., 2009
					0.0011	0.055	322	Wenzel et al., 2001
					0.0016	0.078	322	Wenzel et al., 2001
					0.0016	0.078	322	Wenzel et al., 2001
					0.0020	0.10	88	Xu et al., 2008
					0.0020	0.10	88	Xu et al., 2008
					0.0020	0.10	88	Xu et al., 2008
					0.030	0.15	2	Biales et al., 2007
					0.0039	0.19	122	Micael et al., 2007
					0.0050	0.25	14	Reyhanian et al., 2011
					0.0050	0.25	14	Reyhanian et al., 2011
					0.0050	0.25	14	Reyhanian et al., 2011
					0.0050	0.25	56	Schulz et al., 2007
					0.0050	0.25	56	Schulz et al., 2007
					0.0050	0.25	56	Schulz et al., 2007
					0.0056	0.28	122	Larsen et al., 2009
					0.0056	0.28	122	Larsen et al., 2009
					0.0084	0.42	14	Coe et al., 2009
					0.0092	0.46	7	Lange et al., 2012
					0.010	0.50	7	Lister et al., 2009
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	10	Filby et al., 2012
					0.010	0.50	21	Martyniuk et al., 2007
					0.010	0.50	88	Xu et al., 2008
					0.010	0.50	322	Wenzel et al., 2001
					0.011	0.53	17	Coe et al., 2009
					0.025	1.25	14	Reyhanian et al., 2011
					0.10	5.01	14	Stromqvist et al., 2010
				EC50	0.0011	0.055	322	Wenzel et al., 2001
					0.0062	0.31	21	Van den Belt et al., 2004
					0.0080	0.40	21	Van den Belt et al., 2004
				LC50	0.10	5.01	28	Wenzel et al., 2001
					1700	8520	4	Wenzel et al., 2001
			Fundulus heteroclitus	NOEC	0.068	3.40	14	Hogan et al., 2010
					0.25	12.42	14	Hogan et al., 2010
					0.25	12.42	14	Hogan et al., 2010
					0.25	12.42	14	Hogan et al., 2010
				LOEC	0.068	3.40	14	Hogan et al., 2010
					0.25	12.42	14	Hogan et al., 2010
			Gasterosteus aculeatus	NOEC	0.0064	0.032	4	Katsiadaki et al., 2010
					0.015	0.075	3	Dzieweczynski, 2011
					0.0018	0.088	28	Maunder et al., 2007
					0.0018	0.088	28	Maunder et al., 2007
					0.0018	0.088	28	Maunder et al., 2007
					0.0018	0.088	28	Maunder et al., 2007
					0.0018	0.090	7	Lange et al., 2012
					0.0024	0.12	21	Katsiadaki et al., 2010
					0.0030	0.15	7	Lange et al., 2012
					0.0073	0.37	58	Hahlbeck et al., 2004b
					0.0073	0.37	58	Hahlbeck et al., 2004b
					0.0073	0.37	58	Hahlbeck et al., 2004b
					0.010	0.50	58	Hahlbeck, 2004
					0.010	0.50	58	Hahlbeck, 2004
					0.010	0.51	28	Bjorkblom et al., 2009
					0.010	0.51	28	Bjorkblom et al., 2009
					0.010	0.51	28	Bjorkblom et al., 2009
					0.010	0.51	28	Bjorkblom et al., 2009
					0.010	0.51	28	Bjorkblom et al., 2009

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Gasterosteus aculeatus*	NOEC	0.015	0.075	3	Dzieweczynski, 2011
					0.015	0.075	3	Dzieweczynski, 2011
					0.079	0.40	4	Katsiadaki et al., 2010
					0.028	1.39	28	Maunder et al., 2007
					0.028	1.39	28	Maunder et al., 2007
					0.050	2.51	42	Le Mer et al., 2013
					0.050	2.51	58	Hahlbeck et al., 2004a
					0.050	2.51	58	Hahlbeck, 2004
					0.10	5.01	58	Hahlbeck, 2004
				LOEC	0.0010	0.0051	4	Katsiadaki et al., 2010
					0.015	0.075	3	Dzieweczynski, 2011
					0.015	0.075	3	Dzieweczynski, 2011
					0.015	0.075	3	Dzieweczynski, 2011
					0.015	0.075	3	Dzieweczynski, 2011
					0.015	0.075	3	Dzieweczynski, 2011
					0.0018	0.088	28	Maunder et al., 2007
					0.0018	0.088	28	Maunder et al., 2007
					0.018	0.088	4	Katsiadaki et al., 2010
					0.0040	0.20	58	Hahlbeck, 2004
					0.0041	0.21	21	Katsiadaki et al., 2010
					0.0073	0.37	58	Hahlbeck et al., 2004b
					0.0073	0.37	58	Hahlbeck et al., 2004b
					0.010	0.48	7	Lange et al., 2012
					0.010	0.51	28	Bjorkblom et al., 2009
					0.010	0.51	28	Bjorkblom et al., 2009
					0.028	1.39	28	Maunder et al., 2007
					0.028	1.39	28	Maunder et al., 2007
					0.028	1.39	28	Maunder et al., 2007
					0.028	1.39	28	Maunder et al., 2007
					0.050	2.51	42	Le Mer et al., 2013
					0.050	2.51	58	Hahlbeck et al., 2004a
					0.050	2.51	58	Hahlbeck et al., 2004a
					0.050	2.51	58	Hahlbeck, 2004
					0.10	5.01	58	Hahlbeck, 2004
			Gobiocypris rarus	NOEC	0.10	5.01	21	Ma et al., 2007
				LOEC	0.0002	0.010	21	Ma et al., 2007
					0.0002	0.010	21	Ma et al., 2007
			Oncorhynchus mykiss	NOEC	0.0002	0.011	14	Thorpe et al., 2003
					0.0008	0.039	7	Lange et al., 2012
					0.0010	0.050	10	Purdom et al., 1994
					0.0011	0.055	14	Thorpe et al., 2003
					0.0079	0.39	56	Brown et al., 2007
					0.010	0.50	14	Albertsson et al., 2007
					0.026	1.30	14	Thorpe et al., 2003
					0.037	1.85	7	Hook et al., 2006
					0.060	2.99	56	Brown et al., 2007
					0.060	2.99	56	Brown et al., 2007
				LOEC	0.0001	0.0050	10	Purdom et al., 1994
					0.0025	0.013	1	Biales et al., 2007
					0.0010	0.050	14	Thorpe et al., 2003
					0.0030	0.15	7	Lange et al., 2012
					0.0076	0.38	14	Thorpe et al., 2003
					0.010	0.50	10	Purdom et al., 1994
					0.013	0.63	50	Brown et al., 2008
					0.060	2.99	56	Brown et al., 2007
			Oryzias latipes	NOEC	0.0002	0.010	14	Thompson, 2000
					0.0002	0.010	14	Tilton et al., 2005
					0.0002	0.010	14	Tilton et al., 2005
					0.0002	0.010	21	Ma et al., 2007
					0.0002	0.010	21	Ma et al., 2007
					0.010	0.050	1	Biales et al., 2007
					0.0019	0.10	7	Lange et al., 2012
					0.0050	0.25	7	Zhang et al., 2008
					0.0050	0.25	14	Tilton et al., 2005
					0.0050	0.25	14	Tilton et al., 2005
					0.0050	0.25	14	Tilton et al., 2005
					0.0050	0.25	14	Tilton et al., 2005
					0.020	1.00	21	Ma et al., 2007
					0.050	2.51	7	Park et al., 2009
					0.050	2.51	7	Zhang et al., 2008
					0.050	2.51	7	Zhang et al., 2008
					0.095	4.75	28	Hano et al., 2007
					0.095	4.75	28	Hano et al., 2007
					0.095	4.75	28	Hano et al., 2007
					0.095	4.75	28	Hano et al., 2007
					0.10	5.01	21	Ma et al., 2007
					0.22	10.83	28	Hano et al., 2007
					0.22	10.83	28	Hano et al., 2007
					0.22	10.83	28	Hano et al., 2007
					0.48	24.06	21	Hashimoto et al., 2009
					0.48	24.06	21	Hashimoto et al., 2009
					0.50	25.06	7	Park et al., 2009
					0.50	25.06	7	Park et al., 2009
					0.50	25.06	7	Park et al., 2009
					0.50	25.06	7	Park et al., 2009
					0.50	25.06	7	Zhang et al., 2008
					0.50	25.06	7	Zhang et al., 2008
					0.50	25.06	7	Zhang et al., 2008
					0.50	25.06	7	Zhang et al., 2008
					0.50	25.06	14	Thompson, 2000
					0.50	25.06	14	Tilton et al., 2005
					0.50	25.06	14	Tilton et al., 2005
					0.52	26.16	28	Hano et al., 2007
				LOEC	0.0002	0.010	14	Tilton et al., 2005
					0.0020	0.10	21	Ma et al., 2007
					0.0020	0.10	21	Ma et al., 2007
					0.0050	0.25	7	Park et al., 2009
					0.0050	0.25	7	Park et al., 2009
					0.0050	0.25	7	Zhang et al., 2008
					0.0050	0.25	14	Thompson, 2000
					0.0050	0.25	14	Tilton et al., 2005
					0.0050	0.25	14	Tilton et al., 2005

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Oryzias latipes*	LOEC	0.0092	0.46	7	Lange et al., 2012
					0.10	0.50	1	Biales et al., 2007
					0.050	2.51	7	Zhang et al., 2008
					0.050	2.51	21	Ma et al., 2007
					0.060	3.01	21	Hashimoto et al., 2009
					0.22	10.83	28	Hano et al., 2007
					0.22	10.83	28	Hano et al., 2007
					0.22	10.83	28	Hano et al., 2007
					0.50	25.06	7	Park et al., 2009
					0.50	25.06	7	Zhang et al., 2008
					0.50	25.06	14	Tilton et al., 2005
					0.50	25.06	14	Tilton et al., 2005
					0.50	25.06	14	Tilton et al., 2005
					0.50	25.06	14	Tilton et al., 2005
					0.52	26.16	28	Hano et al., 2007
					0.52	26.16	28	Hano et al., 2007
					0.52	26.16	28	Hano et al., 2007
					0.52	26.16	28	Hano et al., 2007
			Pimephales promelas	NOEC	0.0054	0.027	2	Martyniuk et al., 2010
					0.0054	0.027	2	Martyniuk et al., 2010
					0.0010	0.049	7	Lange et al., 2012
					0.0016	0.080	14	Ankley et al., 2010
					0.0055	0.27	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0070	0.35	8	Ekman et al., 2008
					0.0070	0.35	8	Ekman et al., 2008
					0.0078	0.39	14	Ankley et al., 2010
					0.010	0.50	17	McGee et al., 2009
					0.010	0.50	21	Filby and Tyler, 2007
					0.010	0.50	21	Panter et al., 2004
					0.010	0.50	21	Panter et al., 2004
					0.010	0.50	21	Salierno and Kane, 2009
					0.010	0.50	21	Salierno and Kane, 2009
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.020	1.00	21	Salierno and Kane, 2009
					0.020	1.00	21	Salierno and Kane, 2009
					0.040	2.00	21	Salierno and Kane, 2009
					0.040	2.00	21	Salierno and Kane, 2009
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.083	4.16	8	Ekman et al., 2008
					0.083	4.16	8	Ekman et al., 2008
					0.10	5.01	30	Warner, 2006
					1.00	50.12	30	Warner, 2006
				LOEC	0.0054	0.027	2	Martyniuk et al., 2010
					0.0054	0.027	2	Martyniuk et al., 2010
					0.0054	0.027	2	Martyniuk et al., 2010
					0.0016	0.080	14	Ankley et al., 2010
					0.0029	0.15	7	Lange et al., 2012
					0.0055	0.27	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0070	0.35	8	Ekman et al., 2008
					0.0078	0.39	14	Ankley et al., 2010
					0.010	0.50	21	Filby and Tyler, 2007
					0.010	0.50	21	Panter et al., 2004
					0.010	0.50	21	Salierno and Kane, 2009
					0.010	0.50	21	Salierno and Kane, 2009
					0.010	0.50	21	Salierno and Kane, 2009
					0.010	0.50	21	Salierno and Kane, 2009
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.011	0.53	21	Filby et al., 2007
					0.020	1.00	21	Salierno and Kane, 2009
					0.040	2.00	21	Salierno and Kane, 2009
					0.040	2.00	21	Salierno and Kane, 2009
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.050	2.51	15	Weisbrod et al., 2007
					0.083	4.16	8	Ekman et al., 2008
					0.083	4.16	8	Ekman et al., 2008
					0.10	5.01	30	Warner, 2006
					1.00	50.12	30	Warner, 2006
			Poecilia reticulata	NOEC	0.010	0.50	14	Hallgren and Olsen, 2010
					0.010	0.50	14	Hallgren and Olsen, 2010
					0.010	0.50	14	Hallgren and Olsen, 2010
					2.00	100	112	Shenoy, 2012
					2.00	100	112	Shenoy, 2012
					50.00	2506	14	Hallgren and Olsen, 2010
				LOEC	0.010	0.50	14	Hallgren and Olsen, 2010
					2.00	100	112	Shenoy, 2012
					2.00	100	112	Shenoy, 2012
					50.00	2506	14	Hallgren and Olsen, 2010
					50.00	2506	14	Hallgren and Olsen, 2010

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Fish	*Rutilus rutilus*	NOEC	0.00004	0.0020	720	Lange et al., 2009
					0.00004	0.0020	720	Lange et al., 2009
					0.0001	0.0050	94	Katsu et al., 2007
					0.0003	0.015	94	Katsu et al., 2007
					0.0003	0.015	122	Lange et al., 2008
					0.0003	0.015	122	Lange et al., 2008
					0.0003	0.015	720	Lange et al., 2009
					0.0003	0.015	720	Lange et al., 2009
					0.0008	0.039	7	Lange et al., 2012
					0.0040	0.20	122	Lange et al., 2008
					0.0040	0.20	122	Lange et al., 2008
					0.0040	0.20	122	Lange et al., 2008
					0.0040	0.20	720	Lange et al., 2009
					0.0040	0.20	720	Lange et al., 2009
					0.029	1.43	18	Flores-Valverde et al., 2010
					0.029	1.43	18	Flores-Valverde et al., 2010
				LOEC	0.0001	0.0050	94	Katsu et al., 2007
					0.0003	0.015	94	Katsu et al., 2007
					0.0003	0.015	122	Lange et al., 2008
					0.0003	0.015	720	Lange et al., 2009
					0.0011	0.055	18	Flores-Valverde et al., 2010
					0.0030	0.15	7	Lange et al., 2012
					0.0040	0.20	94	Katsu et al., 2007
					0.0040	0.20	122	Lange et al., 2008
					0.0040	0.20	122	Lange et al., 2008
					0.0040	0.20	720	Lange et al., 2009
			Salmo trutta	NOEC	0.0011	0.055	12	Bjerregaard et al., 2008
					0.0021	0.10	21	Korner, 2008
					0.0021	0.10	21	Korner, 2008
					0.0021	0.10	21	Korner, 2008
					0.0021	0.10	21	Korner, 2008
					0.0021	0.10	21	Korner, 2008
					0.0021	0.11	21	Korner, 2008
					0.0021	0.11	21	Korner, 2008
					0.0021	0.11	21	Korner, 2008
					0.0021	0.11	21	Korner, 2008
					0.0021	0.11	21	Korner, 2008
					0.0024	0.12	21	Korner, 2008
					0.0024	0.12	21	Korner, 2008
					0.0024	0.12	21	Korner, 2008
					0.0024	0.12	21	Korner, 2008
					0.0024	0.12	21	Korner, 2008
					0.012	0.60	12	Bjerregaard et al., 2008
				LOEC	0.0011	0.055	12	Bjerregaard et al., 2008
					0.0021	0.10	21	Korner, 2008
					0.0021	0.11	21	Korner, 2008
					0.0021	0.11	21	Korner, 2008
					0.0024	0.12	21	Korner, 2008
					0.0024	0.12	21	Korner, 2008
					0.0051	0.26	12	Bjerregaard et al., 2008
				EC50	0.0037	0.19	12	Bjerregaard et al., 2008
					0.0052	0.26	12	Bjerregaard et al., 2008
			Salvelinus namaycush	NOEC	0.0055	0.27	1095	Palace et al., 2009
					0.0055	0.27	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0063	0.32	365	Werner, 2006.
					0.0063	0.32	365	Werner, 2006.
					0.0063	0.32	365	Werner, 2006.
					0.0063	0.32	365	Werner, 2006.
					0.015	0.75	21	Werner, 2006.
					0.37	18.69	21	Werner, 2006.
				LOEC	0.0055	0.27	1095	Palace et al., 2009
					0.0055	0.27	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0056	0.28	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0061	0.31	1095	Palace et al., 2009
					0.0063	0.32	365	Werner, 2006.
					0.0063	0.32	365	Werner, 2006.
					0.0063	0.32	365	Werner, 2006.
					0.035	1.75	21	Werner, 2006.
			Syngnathus scovelli	NOEC	0.0010	0.050	10	Partridge et al., 2010
					0.10	5.01	10	Partridge et al., 2010
				LOEC	0.0010	0.050	10	Partridge et al., 2010
					0.0010	0.050	10	Partridge et al., 2010
					0.10	5.01	10	Partridge et al., 2010
		Insecta	*Chironomus tentans*	NOEC	20.00	1002	47	Dussault et al., 2008b
					70.00	3508	47	Dussault et al., 2008b
					1000	5012	2	Cho, 2005
					550	27565	47	Dussault et al., 2008b
					550	27565	47	Dussault et al., 2008b
					560	28066	21	Dussault et al., 2009
					560	28066	47	Dussault et al., 2008b
					560	28066	47	Dussault et al., 2008b
					560	28066	47	Dussault et al., 2008b
				LOEC	20.00	1002	47	Dussault et al., 2008b
					140	7017	47	Dussault et al., 2008b
					3100	155368	21	Dussault et al., 2009
					3100	155368	47	Dussault et al., 2008b
					3100	155368	47	Dussault et al., 2008b
				EC50	1510	75679	47	Dussault et al., 2008b
					1530	76682	47	Dussault et al., 2008b
					1550	77684	47	Dussault et al., 2008b
					1960	98233	47	Dussault et al., 2008b
					6600	330784	10	Dussault et al., 2008a
				LC50	2160	108256	47	Dussault et al., 2008b
		Mollusca	*Bithynia tentaculata*	NOEC	0.0090	0.45	284	Hallgren et al., 2012
					44.95	2253	284	Hallgren et al., 2012
					44.95	2253	284	Hallgren et al., 2012

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
57-63-6	17a-Ethinyl estradiol	Mollusca	*Bithynia tentaculata*	NOEC	44.95	2253	284	Hallgren et al., 2012
					44.95	2253	284	Hallgren et al., 2012
				LOEC	0.0090	0.451	284	Hallgren et al., 2012
			Potamopyrgus antipodarum	NOEC	0.025	1.3	28	Sieratowicz et al., 2011
					0.10	5.0	28	Sieratowicz et al., 2011
				LOEC	0.050	2.5	28	Sieratowicz et al., 2011
			Radix balthica	NOEC	0.0090	0.451	153	Hallgren et al., 2012
					5.13	257	153	Hallgren et al., 2012
					5.13	257	153	Hallgren et al., 2012
					5.13	257	153	Hallgren et al., 2012
					44.95	2253	153	Hallgren et al., 2012
				LOEC	0.0090	0.451	153	Hallgren et al., 2012
			Aquatic community	PNEC	0.00004	0.0018		James et al., 2014
					0.00004	0.0019		Oekotoxzentrum, Centre Ecotox
					0.0001	0.0050		James et al., 2014
					0.0001	0.0050		James et al., 2014
					0.0004	0.018		James et al., 2014
					0.0005	0.025		James et al., 2014
					0.0006	0.029		Johnson et al., 2007
50-28-2	17β-estradiol	Algae	*Melosira varians*	NOEC	20.00	632	10	Julius et al., 2007
					400	12649	10	Julius et al., 2007
					800	25298	10	Julius et al., 2007
				LOEC	80	2530	10	Julius et al., 2007
					200	6325	10	Julius et al., 2007
		Amphibia	*Lithobates clamitans*	NOEC	100	3162	506	Coady et al., 2004
					100	3162	506	Coady et al., 2004
				LOEC	100	3162	506	Coady et al., 2004
			Lithobates pipiens	NOEC	100	3162	124	Mackenzie et al., 2003
					100	3162	124	Mackenzie et al., 2003
				LOEC	1.00	31.6	124	Mackenzie et al., 2003
					1.00	31.6	124	Mackenzie et al., 2003
				LC50	1242	39279	14	Hogan et al., 2006
					1517	47978	14	Hogan et al., 2006
			Lithobates sylvaticus	LC50	681	21534	14	Hogan et al., 2006
			Rhinella arenarum	NOEC	100	3162	200	Brodeur et al., 2013
				LOEC	100	3162	200	Brodeur et al., 2013
					100	3162	200	Brodeur et al., 2013
			Xenopus laevis	NOEC	100	3162	78	Carr et al., 2003
				LOEC	100	3162	34	Cong et al., 2006
					100	3162	34	Cong et al., 2006
					100	3162	78	Carr et al., 2003
					100	3162	78	Carr et al., 2003
		Crustacea	*Americamysis bahia*	LC50	1690	5344	2	Hirano et al., 2004
					890	28144	4	Hirano et al., 2004
			Ceriodaphnia dubia	NOEC	1000	31623	7	Jukosky et al., 2008a
			Daphnia magna	NOEC	200	6325	21	Brennan et al., 2006
					1000	31623	21	Brennan et al., 2006
					1000	31623	21	Brennan et al., 2006
				LOEC	400	12649	21	Brennan et al., 2006
				EC50	1550	4902	1	Brennan et al., 2006
					2040	6451	2	Brennan et al., 2006
					2870	9076	2	Brennan et al., 2006
					2970	9392	2	Hirano et al., 2004
					3670	11606	1	Brennan et al., 2006
			Eurytemora affinis	NOEC	6.00	190	10	Forget-Leray et al., 2005
				LOEC	18.00	569	10	Forget-Leray et al., 2005
				LC50	45.00	1423	4	Forget-Leray et al., 2005
			Neocaridina denticulata	LOEC	10.00	316	28	Huang et al., 2006
					10.00	316	28	Huang et al., 2006
					10.00	316	28	Huang et al., 2006
					10.00	316	28	Huang et al., 2006
		Fish	*Cyprinus carpio*	NOEC	0.10	3.2	90	Gimeno et al., 1998
				LOEC	0.10	3.2	90	Gimeno et al., 1998
					1.00	31.6	90	Gimeno et al., 1998
			Danio rerio	NOEC	0.025	0.079	2	Jin et al., 2009
					0.013	0.408	8	Rose et al., 2002
					0.024	0.759	18	Holbech et al., 2006
					0.024	0.759	18	Holbech et al., 2006
					0.25	0.791	2	Jin et al., 2009
					2.50	7.9	3	Jin et al., 2010
					0.25	7.9	18	Holbech et al., 2006
					12.50	39.5	3	Jin et al., 2010
				LOEC	0.025	0.079	2	Jin et al., 2009
					0.021	0.664	8	Rose et al., 2002
					0.054	1.7	18	Holbech et al., 2006
					0.054	1.7	18	Holbech et al., 2006
					1.00	31.6	16	Peute et al., 1985
					12.50	39.5	3	Jin et al., 2010
				EC50	0.041	1.3	8	Rose et al., 2002
					0.055	1.7	18	Holbech et al., 2006
					0.17	5.5	21	Van den Belt et al., 2004
					0.24	7.6	21	Van den Belt et al., 2004
			Gambusia affinis	NOEC	1.00	31.6	8	Huang et al., 2013
					250	791	3	Kamata et al., 2011
				LOEC	1.00	31.6	8	Huang et al., 2012b
					1.00	31.6	8	Huang et al., 2013
					500	1581	3	Kamata et al., 2011
			Gambusia holbrooki	NOEC	0.020	0.632	28	Doyle and Lim, 2005
					0.10	3.2	84	Rawson et al., 2006
				LOEC	0.10	3.2	28	Doyle and Lim, 2005
					0.50	15.8	28	Doyle and Lim, 2005
					0.50	15.8	84	Rawson et al., 2006
			Gasterosteus aculeatus	NOEC	0.0010	0.032	7	Hogan et al., 2008
					0.010	0.316	21	Allen et al., 2008
					0.010	0.316	58	Hahlbeck et al., 2004a
					0.020	0.632	21	Allen et al., 2008
					0.032	1.0	21	Allen et al., 2008
					10.00	316	58	Hahlbeck et al., 2004a
				LOEC	0.010	0.316	7	Hogan et al., 2008
					0.050	1.6	21	Allen et al., 2008
					0.070	2.2	21	Allen et al., 2008
					0.10	3.2	21	Allen et al., 2008

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
50-28-2	17β-estradiol	Fish	*Gasterosteus aculeatus*	LOEC	1.00	31.62	58	Hahlbeck et al., 2004a
			Gobiocypris rarus	NOEC	0.10	0.32	4	Ma et al., 2009
				LOEC	0.10	0.32	4	Ma et al., 2009
			Ictalurus punctatus	NOEC	0.10	3.16	21	Thompson et al., 2000
				LOEC	1.00	31.62	21	Thompson et al., 2000
				EC50	0.17	5.38	21	Thompson et al., 2000
			Morone saxatalis	NOEC	1.00	31.62	21	Thompson et al., 2000
				LOEC	10.00	316	21	Thompson et al., 2000
				EC50	1.56	49.33	21	Thompson et al., 2000
			Oncorhynchus mykiss	NOEC	0.0032	0.10	21	Thorpe et al., 2000
					0.0048	0.15	14	Thorpe et al., 2003
					0.0096	0.30	14	Thorpe et al., 2003
					0.10	0.32	5	Ward et al., 2006
					0.10	3.16	21	Thorpe et al., 2000
					0.10	3.16	21	Tremblay and Van der Kraak, 1999
					0.10	3.16	21	Tremblay and Van der Kraak, 1999
					0.25	7.81	21	Thorpe et al., 2000
					0.25	7.91	21	Tremblay and Van der Kraak, 1999
					0.46	14.64	14	Thorpe et al., 2003
				LOEC	0.0089	0.28	21	Thorpe et al., 2000
					0.014	0.44	14	Thorpe et al., 2003
					0.022	0.70	14	Thorpe et al., 2003
					0.10	3.16	21	Tremblay and Van der Kraak, 1999
					0.25	7.81	21	Thorpe et al., 2000
					0.25	7.91	21	Tremblay and Van der Kraak, 1999
					0.25	7.91	21	Tremblay and Van der Kraak, 1999
				EC50	0.015	0.47	21	Thorpe et al., 2000
			Oncorhynchus tshawytscha	LOEC	400	12649	8 h immersion	Piferrer and Donaldson, 1992
			Oryzias latipes	NOEC	0.0010	0.0032		Lee et al., 2012
					0.0010	0.0032		Lee et al., 2012
					0.010	0.032	5	Kang et al., 2005
					0.10	3.16	21	Thompson et al., 2000
					1.00	3.16		Lee et al., 2012
					0.15	4.86	14	Jukosky et al., 2008b
					0.23	7.18	25	Kang et al., 2002
					10.00	31.62	5	Kang,et al., 2006b
					2.53	79.95	14	Jukosky et al., 2008b
				LOEC	0.010	0.032	5	Kang et al., 2005
					0.010	0.032		Lee et al., 2012
					0.010	0.032		Lee et al., 2012
					0.0050	0.16	21	Kashiwada et al., 2002
					0.10	0.32		Lee et al., 2012
					0.029	0.93	21	Kang et al., 2002
					0.056	1.76	21	Kang et al., 2002
					0.056	1.78	14	Jukosky et al., 2008b
					1.00	3.16		Lee et al., 2012
					1.00	3.16		Lee et al., 2012
					0.46	14.64	25	Kang et al., 2002
					10.00	31.62	5	Kang,et al., 2006b
					1.00	31.62	21	Thompson et al., 2000
					2.53	79.95	14	Jukosky et al., 2008b
				EC50	0.20	6.32	21	Thompson et al., 2000
					0.23	7.12	14	Sun et al., 2009
					470	14863	21	Kashiwada et al., 2002
				LC50	460	1455	3	Kashiwada et al., 2002
					460	1455	3	Tabata et al., 2001
					2000	6325	4	Kang et al., 2002
					3500	11068	3	Kashiwada et al., 2002
					3500	11068	3	Tabata et al., 2001
			Pimephales promelas	NOEC	0.010	0.32	14	Thorpe et al., 2007
					0.027	0.85	9	Cline et al., 2003
					0.028	0.89	17	McGee et al., 2009
					0.030	0.95	21	Schultz et al., 2012
					0.030	0.95	21	Schultz et al., 2012
					0.030	0.95	21	Schultz et al., 2012
					0.030	0.95	21	Schultz et al., 2012
					0.030	0.95	21	Schultz et al., 2012
					0.030	0.95	21	Schultz et al., 2012
					0.10	3.16	14	Thorpe et al., 2007
					0.50	15.81	21	Bringolf et al., 2004
					0.50	15.81	21	Bringolf et al., 2004
				LOEC	0.022	0.70	14	Thorpe et al., 2007
					0.030	0.95	21	Schultz et al., 2012
					0.27	8.54	9	Cline et al., 2003
					0.50	15.81	21	Bringolf et al., 2004
					0.50	15.81	21	Bringolf et al., 2004
					0.50	15.81	21	Bringolf et al., 2004
				EC50	0.025	0.79	14	Brian et al., 2005
					0.12	3.79	19	Kramer et al., 1998
					0.25	7.94	19	Kramer et al., 1998
				LC50	1.15	36.37	19	Kramer et al., 1998
			Poecilia reticulata	NOEC	0.050	1.58	120	Nielsen and Baatrup, 2006
					1.00	31.62	21	Li and Wang , 2005
				LOEC	1.00	31.62	21	Li and Wang , 2005
					1.00	31.62	21	Li and Wang , 2005
			Pomatoschistus minutus	LOEC	0.071	2.25	243	Robinson et al., 2004
				EC50	0.087	2.75	243	Robinson et al., 2004
					0.13	4.02	243	Robinson et al., 2004
					0.17	5.22	243	Robinson et al., 2004
			Salmo trutta	NOEC	0.015	0.48	8	Bjerregaard et al., 2008
				LOEC	0.020	0.63	8	Bjerregaard et al., 2008
				EC50	0.015	0.48	8	Bjerregaard et al., 2008
			Thymallus thymallus	LOEC	0.0010	0.032	50	Lahnsteiner et al., 2006
					0.0010	0.032	50	Lahnsteiner et al., 2006
		Fish		LC50	2740	8665		Nendza and Wenzel, 2006
		Invertebrates	*Brachionus calyciflorus*	LOEC	0.0010	0.032	10	Huang et al., 2012a
					100	3162	10	Huang et al., 2012a
		Mollusca	*Elliptio complanata*	NOEC	100	316	0.25	Flynn et al., 2013
				LOEC	100	316	0.25	Flynn et al., 2013
			Aquatic community	PNEC	0.0004	0.013		Oekotoxzentrum, Centre Ecotox
					0.0010	0.032		Gross-Sorokin et al., 2006
					0.0010	0.032		Young et al., 2004

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
50-28-2	17β-estradiol		Aquatic community	PNEC	0.0020	0.063		Anderson et al., 2012 ; Caldwell et al., 2012
					0.0023	0.072		Yuan et al., 2014
1689-82-3	4-hydroxyazobenzene	Algae		EC50	9600	606	Not specified	Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	930	58.68	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	1170	73.82	Not specified	Nendza and Wenzel, 2006
14938-35-3	4-n-amylphenol	Algae	*Chlorella pyrenoidosa*	NOEC	980	49116	3	Ramos et al., 1999
				LOEC	2300	115273	3	Ramos et al., 1999
				EC50	2600	130309	3	Ramos et al., 1999
		Crustacea	*Daphnia magna*	EC50	1330	66658	2	Ramos et al., 1998
					2040	102242	1	Ramos et al., 1998
		Fish	*Poecilia reticulata*	LC50	1250	62648	4	Ramos et al., 1998
					1360	68161	3	Ramos et al., 1998
					1920	96228	2	Ramos et al., 1998
					2490	124796	1	Ramos et al., 1998
		Mollusca	*Lymnaea stagnalis*	LC50	3700	185439	3	Ramos et al., 1998
					4600	230546	2	Ramos et al., 1998
					5380	269639	1	Ramos et al., 1998
					3710	1859405	4	Ramos et al., 1998
1806-26-4	4-n-octylphenol	Amphibia	*Lithobates pipiens*	NOEC	206	41.17	7	Crump et al., 2002
					206	41.17	10	Crump et al., 2002
				LC50	578	115	7	Crump et al., 2002
		Fish	*Oryzias latipes*	LOEC	2.00	0.40	98	Knorr and Braunbeck, 2002
					20.00	3.99	98	Knorr and Braunbeck, 2002
140-66-9	4-tert-octylphenol	Crustacea	*Daphnia magna*	EC50	11.00	0.87	2	Ra et al., 2008
		Fish	*Danio rerio*	NOEC	12.00	9.53	185	Wenzel et al., 2001
					12.00	9.53	185	Wenzel et al., 2001
					35.00	27.80	185	Wenzel et al., 2001
					35.00	27.80	185	Wenzel et al., 2001
					35.00	27.80	185	Wenzel et al., 2001
				LOEC	35.00	27.80	185	Wenzel et al., 2001
					35.00	27.80	185	Wenzel et al., 2001
				EC50	28.00	22.24	185	Wenzel et al., 2001
				LC50	370	29.39	4	Wenzel et al., 2001
15972-60-8	Alachlor	Algae	*Chlorella vulgaris*	NOEC	100	15.85	4	Garten and Frank, 1984
				LOEC	1000	158	4	Garten and Frank, 1984
		Algae	*Selenastrum capricornutum*	NOEC	0.35	0.055	5	U.S. EPA, 2013
				LOEC	10.00	1.58	4	Garten and Frank, 1984
				EC50	1.64	0.26	5	U.S. EPA, 2013
		Algae		NOEC	5.35	0.85	28	Carder et al., 1998
		Algae			78.55	12.45	28	Carder et al., 1998
		Algae		LOEC	78.55	12.45	28	Carder et al., 1998
		Crustacea	*Daphnia magna*	NOEC	5600	88.75	2	U.S. EPA, 2013
					12000	190	2	U.S. EPA, 2013
					14000	222	2	U.S. EPA, 2013
					18000	285	2	U.S. EPA, 2013
				LOEC	230	36.45	21	U.S. EPA, 2013
					430	68.15	21	U.S. EPA, 2013
					1700	269	21	U.S. EPA, 2013
		Fish	*Cyprinodon variegatus*	NOEC	2600	41.21	4	U.S. EPA, 2013
				LC50	3900	61.81	4	U.S. EPA, 2013
			Ictalurus punctatus	LC50	6500	103	4	U.S. EPA, 2013
			Lepomis macrochirus	NOEC	1800	28.53	4	U.S. EPA, 2013
					3700	58.64	4	U.S. EPA, 2013
					4200	66.57	4	U.S. EPA, 2013
					5600	88.75	4	U.S. EPA, 2013
				LC50	2800	44.38	4	U.S. EPA, 2013
					6200	98.26	4	U.S. EPA, 2013
					6400	101	4	U.S. EPA, 2013
					7600	120	4	U.S. EPA, 2013
					12400	197	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	1000	15.85	4	U.S. EPA, 2013
					1800	28.53	4	U.S. EPA, 2013
					2400	38.04	4	U.S. EPA, 2013
					2400	38.04	4	U.S. EPA, 2013
				LOEC	388	61.49	96	U.S. EPA, 2013
					390	61.81	96	U.S. EPA, 2013
				LC50	240	3.80	4	U.S. EPA, 2013
					1800	28.53	4	U.S. EPA, 2013
					3600	57.06	4	U.S. EPA, 2013
					3700	58.64	4	U.S. EPA, 2013
					4200	66.57	4	U.S. EPA, 2013
1912-24-9	Atrazine	Algae		EC50	50.00	0.050		Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	24200	24.20		Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	240	0.24		Nendza and Wenzel, 2006
		Fish		LC50	6300	6.30		Nendza and Wenzel, 2006
71-43-2	Benzene	Crustacea	*Daphnia magna*	NOEC	98000	19554	21	LeBlanc and Surprenant, 1980
					98000	19554	21	LeBlanc and Surprenant, 1980
		Fish	*Oncorhynchus mykiss*	LC50	21639	432	4	Hodson et al., 1984
			Aquatic community	PNEC	8.00	1.60		OSPAR Agreement, 2014-05
					46.00	9.18		U.S. EPA, 1996
50-32-8	Benzo [a] pyrene	Algae	*Anabaena flosaquae*	NOEC	4000	400	3	Schoeny et al., 1988
				EC50	4000	400	3	Schoeny et al., 1988
			Ankistrodesmus braunii	NOEC	4000	400	3	Schoeny et al., 1988
				EC50	1300	130	3	Schoeny et al., 1988
			Chlamydomonas reinhardtii	NOEC	4000	400	3	Schoeny et al., 1988
				EC50	4000	400	3	Schoeny et al., 1988
			Euglena gracilis	NOEC	4000	400	3	Schoeny et al., 1988
				EC50	4000	400	3	Schoeny et al., 1988
			Ochromonas malhamensis	NOEC	4000	400	3	Schoeny et al., 1988
				EC50	4000	400	3	Schoeny et al., 1988
			Scenedesmus acutus	NOEC	4000	400	3	Schoeny et al., 1988
				EC50	5.00	0.50	3	Schoeny et al., 1988
			Selenastrum capricornutum	NOEC	4000	400	3	Schoeny et al., 1988
				EC50	15.00	1.50	3	Schoeny et al., 1988
				LC50	400	40.00	1	Warshawskyet al., 1995
					400	400	6	Warshawskyet al., 1995
		Algae		EC50	5.00	0.50	Not specified	Nendza and Wenzel, 2006
		Amphibia	*Pelophylax kl. Esculentus*	LOEC	10.00	1.00	6	Reynaud et al., 2012
			Pleurodeles waltl	NOEC	500	500	16	Jaylet et al., 1986
				LOEC	125	125	12	Mouchet et al., 2006
			Rana temporaria	NOEC	500	50.00	6	Marquiset al., 2009
				LOEC	50.00	5.00	6	Marquiset al., 2009

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
50-32-8	Benzo [a] pyrene	Amphibia	*Xenopus laevis*	EC50	8700	870	4	Propst et al., 1997
					9600	960	4	Propst et al., 1997
				LC50	13400	1340	4	Propst et al., 1997
					16700	1670	4	Propst et al., 1997
		Crustacea	*Daphnia magna*	NOEC	25.00	25.00	14	Atienzar et al., 1999
				LOEC	0.020	0.0020	1	Ha and Choi, 2009
					0.020	0.020	21	Ha and Choi, 2009
					25.00	25.00	14	Atienzar et al., 1999
					50.00	50.00	14	Atienzar et al., 1999
				EC50	0.98	0.10	2	Lampi et al., 2005
					1.62	0.16	2	Lampi et al., 2005
					5.00	0.50	Not specified	Nendza and Wenzel, 2006
					8.60	0.86	1	Wernersson and Dave, 1997
					29.30	2.93	1	Ha and Choi, 2009
					40.00	4.00	1	Wernersson and Dave, 1997
					40.00	4.00	2	Atienzar et al., 1999
					5.00	5.00	4	Trucco et al., 1983
					250	25.00	2	Atienzar et al., 1999
			Eurytemora affinis	NOEC	12.00	12.00	10	Forget-Leray et al., 2005
				LOEC	12.00	12.00	10	Forget-Leray et al., 2005
					23.00	23.00	10	Forget-Leray et al., 2005
				LC50	58.00	58.00	4	Forget-Leray et al., 2005
			Gammarus duebeni	LC50	11.00	1.10	2	Lawrence and Poulter, 1998
					371	37.10	1	Lawrence and Poulter, 1998
			Palaemonetes pugio	LC50	1.02	1.02	4	Weinstein and Garner, 2008
		Fish	*Cyprinus carpio*	NOEC	0.76	0.76	60	Chang et al., 2005
					0.76	0.76	60	Chang et al., 2005
				LOEC	0.76	0.76	60	Chang et al., 2005
			Danio rerio	NOEC	63.08	6.31	3	Weigt et al., 2011
					252	25.23	1	Jonsson et al., 2009
					252	25.23	3	Kazeto et al., 2004
					2523	252	3	Kazeto et al., 2004
				LOEC	25.23	2.52	1	Jonsson et al., 2009
					2523	252	3	Kazeto et al., 2004
				EC50	131	13.12	3	Weigt et al., 2011
				LC50	1287	129	3	Weigt et al., 2011
			Oncorhynchus kisutch	NOEC	1.00	0.10	7	Hook et al., 2006
				LOEC	0.25	0.025	1	Ostrander et al., 1988
			Oncorhynchus mykiss	LOEC	1.00	0.10	7	Hook et al., 2006
					25.23	2.52	1	Jonsson et al., 2009
			Oryzias latipes	NOEC	10.00	10.00	16	Shugart et al., 1991
				LC50	1.00	0.10	Not specified	Nendza and Wenzel, 2006
		Insecta	*Chironomus riparius*	LOEC	10.00	1.00	1	Ha and Choi, 2008a
				LC50	31590	3159	1	Ha and Choi, 2008a
			Chironomus tentans	NOEC	500	50.00	1	Lee et al., 2006
				LOEC	5.00	0.50	1	Lee et al., 2006
				LC50	9873	987	1	Ha and Choi, 2008b
		Mollusca	*Physella acuta*	LOEC	5.00	5.00	7	Sanchez-Arguello et al., 2012
					20.00	20.00	7	Sanchez-Arguello et al., 2012
					40.00	40.00	7	Sanchez-Arguello et al., 2012
			Aquatic community	PNEC	0.0002	0.0002		OSPAR Agreement, 2014-05
					0.014	0.014		U.S. EPA, 1996
					0.022	0.022		EU Risk Assessment Report, 2008
207-08-9	Benzo(k)fluoranthene	Crustacea	*Daphnia magna*	EC50	1.40	0.44	0.5	Newsted and Giesy, 1987
		Fish	*Fundulus heteroclitus*	NOEC	300	94.87	5	Clark et al., 2010
				LOEC	300	94.87	5	Clark et al., 2010
					300	94.87	5	Clark, 2010
					300	94.87	5	Clark, 2010
					300	94.87	5	Clark, 2010
			Aquatic community	PNEC	0.0002	0.0005		OSPAR Agreement, 2014-05
					0.017	0.054		EU Risk Assessment Report, 2008
80-05-7	Bisphenol-A	Algae		EC50	1000	200	Not specified	Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	7050	1407	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	6010	1199	Not specified	Nendza and Wenzel, 2006
			Aquatic community	PNEC	0.002	0.0033		Yuan et al., 2014
					1.50	2.99		Oekotoxzentrum, Centre Ecotox
85-68-7	Butyl benzyl phthalate	Algae		EC50	190	2.39	Not specified	Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	1640	20.65	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	1250	15.74	Not specified	Nendza and Wenzel, 2006
133-06-2	Captan	Algae	*Chlorella pyrenoidosa*	NOEC	6020	1904	4	Anton, 1993
				EC50	44500	14072	4	Anton, 1993
			Selenastrum capricornutum	EC50	2400	75.89	3	Kikuchi, 1993
		Amphibia	*Pleurodeles waltl*	NOEC	31.25	9.88	12	Mouchet et al., 2006
					125	39.53	12	Mouchet et al., 2006
					125	39.53	12	Mouchet et al., 2006
				LOEC	62.50	19.76	12	Mouchet et al., 2006
					250	79.06	12	Mouchet et al., 2006
			Xenopus laevis	NOEC	31.25	9.88	12	Mouchet et al., 2006
					62.50	19.76	12	Mouchet et al., 2006
				LOEC	15.60	4.93	12	Mouchet et al., 2006
					62.50	19.76	12	Mouchet et al., 2006
					125	39.53	12	Mouchet et al., 2006
		Fish	*Carassius auratus*	LC50	890	28.14	4	Anton, 1993
			Danio rerio	EC50	358	11.34	5	Padilla et al., 2012
			Ictalurus punctatus	LC50	77.50	2.45	4	Johnson and Finley, 1980
			Lepomis macrochirus	LC50	141	4.46	4	Johnson and Finley, 1980
			Oncorhynchus clarkii	LC50	56.40	1.78	4	Johnson and Finley, 1980
			Oncorhynchus kisutch	LC50	138	4.36	4	Johnson and Finley, 1980
			Oncorhynchus mykiss	LC50	73.20	2.31	4	Johnson and Finley, 1980
			Oncorhynchus tshawytscha	LC50	56.50	1.79	4	Johnson and Finley, 1980
			Oryzias latipes	LC50	500	15.81	2	Tsuji et al., 1986
					610	19.29	2	Tsuji et al., 1986
					800	25.30	2	Tsuji et al., 1986
			Perca flavescens	LC50	120	3.79	4	Johnson and Finley, 1980
			Pimephales promelas	LC50	200	6.32	4	Johnson and Finley, 1980
			Salmo trutta	LC50	80.00	2.53	4	Johnson and Finley, 1980
			Salvelinus namaycush	LC50	49.00	1.55	4	Johnson and Finley, 1980
63-25-2	Carbaryl	Algae		EC50	4000	126	Not specified	Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	636	20.11	Not specified	Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	6.40	0.20	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	8870	280	Not specified	Nendza and Wenzel, 2006
10605-21-7	Carbendazim	Algae	*Achnanthes sp.*	NOEC	330	0.66	28	Van den Brink et al., 2000

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
10605-21-7	Carbendazim	Algae	*Chara sp.*	NOEC	1000	2.00	28	Van den Brink et al., 2000
			Chilomonas sp.	NOEC	330	0.66	28	Van den Brink et al., 2000
			Chlamydomonas sp.	NOEC	100	0.20	28	Van den Brink et al., 2000
			Chlorella pyrenoidosa	EC50	340	0.068	2	Canton, 1976
					34650	69.14	4	Ma et al., 2002a
			Cryptomonas sp.	NOEC	100	0.20	28	Van den Brink et al., 2000
			Cyclotella sp.	NOEC	100	0.20	28	Van den Brink et al., 2000
			Epithemia sp.	NOEC	1000	2.00	28	Van den Brink et al., 2000
			Monoraphidium sp.	NOEC	1000	2.00	28	Van den Brink et al., 2000
			Oedogonium sp.	NOEC	1000	2.00	28	Van den Brink et al., 2000
			Scenedesmus acutus	NOEC	1000	2.00	28	Van den Brink et al., 2000
			Scenedesmus obliqnus	EC50	19050	38.01	4	Ma et al., 2002a
			Stephanodiscus sp.	NOEC	100	0.20	28	Van den Brink et al., 2000
		Amphibia	*Xenopus laevis*	NOEC	191	0.038	4	Yoon et al., 2008
				LOEC	382	0.076	4	Yoon et al., 2008
					574	0.11	4	Yoon et al., 2008
				LC50	1072	0.21	4	Yoon et al., 2008
		Crustacea	*Acroperus harpae*	NOEC	3.30	0.0066	28	Van den Brink et al., 2000
			Alona rectangula	NOEC	33.00	0.066	21	Daam and Van den Brink, 2007
			Alonella exigua	NOEC	33.00	0.066	28	Van den Brink et al., 2000
			Cyclopoida	NOEC	100	0.20	28	Van den Brink et al., 2000
			Daphnia magna	NOEC	10.00	0.0020		Canton, 1976
					60.00	0.012	1	Ferreira et al., 2008
					33.00	0.066	28	Van den Brink et al., 2000
					100	0.20	4	Van den Brink et al., 2000
				LOEC	70.00	0.014	1	Ferreira et al., 2008
				EC50	3.50	0.0007	1	Ferreira et al., 2008
					20.00	0.0040		Canton, 1976
					22.90	0.0046	1	Ferreira et al., 2008
					24.40	0.0049	1	Ferreira et al., 2008
					28.20	0.0056	2	Ferreira et al., 2008
					28.60	0.0057	1	Ferreira et al., 2008
					54.10	0.011	2	Ferreira et al., 2008
					68.70	0.014	2	Ferreira et al., 2008
					73.10	0.015	2	Ferreira et al., 2008
					97.54	0.019	1	Ferreira et al., 2008
					103	0.021	2	Ferreira et al., 2008
					137	0.027	1	Ferreira et al., 2008
					145	0.029	2	Ferreira et al., 2008
					157	0.031	2	Ferreira et al., 2008
					37.00	0.074	28	Van den Brink et al., 2000
					460	0.092	2	Canton, 1976
					113	0.23	4	Van den Brink et al., 2000
			Graptoleberis testudinaria	NOEC	33.00	0.066	21	Daam and Van den Brink, 2007
			Macrobrachium ferreirai	LC50	16767	33.45	4	Rico et al., 2011
			Simocephalus vetulus	NOEC	33.00	0.066	21	Daam and Van den Brink, 2007
					33.00	0.066	28	Van den Brink et al., 2000
		Fish	*Colossoma macropomum*	LC50	4162	0.83	4	Rico et al., 2011
			Hyphessobrycon erythrostigma	LC50	3690	0.74	4	Rico et al., 2011
			Nannostomus unifasciatus	LC50	4138	0.83	4	Rico et al., 2011
			Oncorhynchus mykiss	LC50	1800	0.36	2	Canton, 1976
			Otocinclus affinis	LC50	4238	0.85	4	Rico et al., 2011
			Paracheirodon axelrodi	LC50	1648	0.33	4	Rico et al., 2011
		Fungi	*Fusarium sporotrichioides*	NOEC	2000	3.99	14	Dijksterhuis et al., 2011
			Trichoderma hamatum	NOEC	260	0.52	14	Dijksterhuis et al., 2011
		Insecta	*Kiefferulus calligaster*	NOEC	1700	0.34	3	Domingues et al., 2009
					1700	0.34	3	Domingues et al., 2009
					15000	2.99	3	Domingues et al., 2009
					15000	2.99	3	Domingues et al., 2009
					15000	2.99	3	Domingues et al., 2009
					1700	3.39	6	Domingues et al., 2009
				LOEC	5000	1.00	3	Domingues et al., 2009
					5000	1.00	3	Domingues et al., 2009
					1700	3.39	6	Domingues et al., 2009
					5000	9.98	6	Domingues et al., 2009
		Invertebrates	*Colurella uncinata*	NOEC	100	0.20	21	Daam and Van den Brink, 2007
			Epiphanes brachionus	NOEC	33.00	0.066	21	Daam and Van den Brink, 2007
			Keratella quadrata	NOEC	330	0.66	28	Van den Brink et al., 2000
			Lecane sp.	NOEC	330	0.66	28	Van den Brink et al., 2000
			Lepadella patella	NOEC	33.00	0.066	21	Daam and Van den Brink, 2007
			Testudinella parva	NOEC	330	0.66	28	Van den Brink et al., 2000
			Trichocerca sp.	NOEC	330	0.66	28	Van den Brink et al., 2000
		Mollusca	*Pomacea dolioides*	LC50	1758576	3509	4	Rico et al., 2011
		Plants	*Buenoa unguis*	LC50	73822	14.73	3	Rico et al., 2011
			Elodea canadensis	NOEC	10000	19.95	21	Belgers et al., 2009
				EC50	9743	19.44	21	Belgers et al., 2009
			Elodea nuttallii	NOEC	10000	19.95	21	Belgers et al., 2009
			Hydrophilus sp.	LC50	80669	16.10	4	Rico et al., 2011
			Myriophyllum spicatum	NOEC	10000	19.95	21	Belgers et al., 2009
			Palustra laboulbeni	LC50	111329	22.21	4	Rico et al., 2011
			Potamogeton crispus	NOEC	10000	19.95	21	Belgers et al., 2009
			Aquatic community	PNEC	0.34	0.0007		Oekotoxzentrum, Centre Ecotox
					0.57	0.0011		Oekotoxzentrum, Centre Ecotox
50-22-6	Corticosterone	Amphibia	*Xenopus laevis*	LOEC	34.65	43.62	21	Lorenz et al., 2009
					34.65	43.62	21	Lorenz et al., 2009
					173	218	21	Lorenz et al., 2009
84-74-2	Dibutylphthalate	Algae		EC50	1200	12.00	Not specified	Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	10900	109	Not specified	Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	3400	34.00	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	980	9.80	Not specified	Nendza and Wenzel, 2006
683-18-1	Dibutyltindichloride	Algae	*Scenedesmus acutus*	EC50	0.031	0.16	4	Huang et al., 1996
					0.031	0.16	4	Huang et al., 1996
		Crustacea	*Daphnia magna*	EC50	900	451	1	Vighi and Calamari, 1985
					900	451	1	Vighi and Calamari, 1985
		Fish	*Oncorhynchus mykiss*	NOEC	48.61	244	110	De Vries et al., 1991
					48.61	244	110	De Vries et al., 1991
					48.61	244	110	De Vries et al., 1991
					48.61	244	110	De Vries et al., 1991
				LOEC	243	1218	110	De Vries et al., 1991
					243	1218	110	De Vries et al., 1991
					243	1218	110	De Vries et al., 1991
					243	1218	110	De Vries et al., 1991

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
683-18-1	Dibutyltindichloride	Fish	*Oryzias latipes*	NOEC	1800	9021	30	Wester and Canton, 1991
					1800	9021	30	Wester and Canton, 1991
				LOEC	320	1604	30	Wester and Canton, 1991
					320	1604	30	Wester and Canton, 1991
			Poecilia reticulata	NOEC	1800	9021	30	Wester and Canton, 1991
					1800	9021	30	Wester and Canton, 1991
				LOEC	320	1604	30	Wester and Canton, 1991
					320	1604	30	Wester and Canton, 1991
		Mollusca	*Anodonta anatina*	LOEC	37.98	190	210	Herwig and Holwerda, 1986
					37.98	190	210	Herwig and Holwerda, 1986
115-32-2	Dicofol	Crustacea	*Daphnia magna*	NOEC	100	50.12	21	Haeba et al., 2008
				LOEC	100	50.12	21	Haeba et al., 2008
				EC50	200	10.02	2	Haeba et al., 2008
					380	19.05	1	Haeba et al., 2008
		Fish	*Danio rerio*	EC50	3827	192	5	Padilla et al., 2012
56-53-1	Diethylstilbestrol	Amphibia	*Xenopus laevis*	LOEC	2.68	0.21	3	Nishimura et al., 1997
					2.68	0.21	3	Nishimura et al., 1997
		Crustacea	*Daphnia magna*	NOEC	200	15.89	2	Zou and Fingerman, 1997
					540	42.89	2	Baldwin et al., 1995
					900	71.49	2	Baldwin et al., 1995
					100	79.43	6	Kashian and Dodson, 2004
					100	79.43	6	Kashian and Dodson, 2004
					100	79.43	21	Brennan et al., 2006
					500	397	21	Baldwin et al., 1995
					500	397	21	Baldwin et al., 1995
					500	397	21	Baldwin et al., 1995
					500	397	21	Brennan et al., 2006
					500	397	21	Brennan et al., 2006
					500	397	21	Brennan et al., 2006
				LOEC	500	39.72	2	Baldwin et al., 1995
					500	39.72	3	Hannas et al., 2011
					100	79.43	6	Kashian and Dodson, 2004
					200	159	21	Brennan et al., 2006
					500	397	21	Baldwin et al., 1995
					500	397	21	Baldwin et al., 1995
					500	397	21	Brennan et al., 2006
				EC50	1090	86.58	2	Zou and Fingerman, 1997
					1200	95.32	2	Baldwin et al., 1995
					1550	123	2	Brennan et al., 2006
					1870	149	2	Brennan et al., 2006
					2030	161	1	Brennan et al., 2006
					3710	295	1	Brennan et al., 2006
			Nitocra spinipes	NOEC	30.00	23.83	18	Breitholtz and Bengtsson, 2001
					30.00	23.83	18	Breitholtz and Bengtsson, 2001
				LOEC	30.00	23.83	18	Breitholtz and Bengtsson, 2001
				LC50	290	230	4	Breitholtz and Bengtsson, 2001
		Fish	*Pimephales promelas*	NOEC	3.20	2.54	21	Panter et al., 2002
				LOEC	3.20	2.54	21	Panter et al., 2002
		Worm	*Dugesia japonica*	LC50	600	47.66	3	Li, 2013
					700	55.60	2	Li, 2013
					800	63.55	1	Li, 2013
					500	397	4	Li, 2013
330-54-1	Diuron	Algae		EC50	13.00	1.03	Not specified	Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	16400	1303	Not specified	Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	380	30.18	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	14200	1128	Not specified	Nendza and Wenzel, 2006
			Aquatic community	PNEC	0.060	0.0048		Oekotoxzentrum, Centre Ecotox
					0.020	0.016		Oekotoxzentrum, Centre Ecotox
115-29-7	Endosulfan	Amphibia	*Pseudacris regilla*	NOEC	3.12	9.87	45	Sparling and Fellers, 2009
					3.12	9.87	45	Sparling and Fellers, 2009
					3.12	9.87	45	Sparling and Fellers, 2009
					12.50	39.53	45	Sparling and Fellers, 2009
					12.50	39.53	45	Sparling and Fellers, 2009
					12.50	39.53	45	Sparling and Fellers, 2009
					12.50	39.53	45	Sparling and Fellers, 2009
					200	632	45	Sparling and Fellers, 2009
				LOEC	12.50	39.53	45	Sparling and Fellers, 2009
					12.50	39.53	45	Sparling and Fellers, 2009
					12.50	39.53	45	Sparling and Fellers, 2009
					50.00	158	45	Sparling and Fellers, 2009
			Pseudacris sierra	NOEC	4.50	14.23	63	Dimitrie, 2010
					4.50	14.23	63	Dimitrie, 2010
					11.30	35.73	63	Dimitrie, 2010
					11.30	35.73	63	Dimitrie, 2010
				LOEC	4.50	14.23	63	Dimitrie, 2010
					4.50	14.23	63	Dimitrie, 2010
					7.90	24.98	63	Dimitrie, 2010
					7.90	24.98	63	Dimitrie, 2010
			Rana boylii	NOEC	0.80	2.53	85	Sparling and Fellers, 2009
					0.80	2.53	85	Sparling and Fellers, 2009
					0.80	2.53	85	Sparling and Fellers, 2009
					3.12	9.87	85	Sparling and Fellers, 2009
					200	632	85	Sparling and Fellers, 2009
					200	632	85	Sparling and Fellers, 2009
				LOEC	3.12	9.87	85	Sparling and Fellers, 2009
					12.50	39.53	85	Sparling and Fellers, 2009
			Rana sierrae	NOEC	8.00	25.30	63	Dimitrie, 2010
					14.00	44.27	63	Dimitrie, 2010
					14.00	44.27	63	Dimitrie, 2010
					17.75	56.13	63	Dimitrie, 2010
					17.75	56.13	63	Dimitrie, 2010
					17.75	56.13	63	Dimitrie, 2010
				LOEC	12.00	37.95	63	Dimitrie, 2010
					17.75	56.13	63	Dimitrie, 2010
				EC50	18.10	57.24	63	Dimitrie, 2010
				LC50	17.20	54.39	63	Dimitrie, 2010
					19.80	62.61	63	Dimitrie, 2010
		Crustacea	*Callinectes sapidus*	LC50	19.00	6.01	2	U.S. EPA, 2013
			Ceriodaphnia dubia	EC50	53.30	16.85	2	Woods et al., 2002
			Cypris subglobosa	EC50	1.00	0.32	2	Khangarot and Das, 2009
					2.10	0.66	2	Khangarot and Das, 2009
			Hyalella curvispina	NOEC	1.00	0.32	2	Mugni et al., 2012

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
115-29-7	Endosulfan	Crustacea	*Hyalella curvispina*	LC50	17.20	5.44	2	Mugni et al., 2012
			Mesocyclops longisetus	NOEC	0.0040	0.0013	1	Gutierrez et al., 2013
					0.0060	0.0019	1	Gutierrez et al., 2013
				LOEC	0.0040	0.0013	1	Gutierrez et al., 2013
					0.0060	0.0019	1	Gutierrez et al., 2013
				LC50	0.016	0.0051	2	Gutierrez et al., 2013
					0.020	0.0063	2	Gutierrez et al., 2013
			Palaemonetes pugio	NOEC	0.18	0.56	4	Pennington, 2002
				LOEC	0.52	1.65	4	Pennington, 2002
				LC50	0.37	1.16	4	Pennington, 2002
					0.51	1.62	4	Pennington, 2002
					0.55	1.74	4	Pennington, 2002
					1.02	3.23	4	Pennington, 2002
					1.30	4.11	4	U.S. EPA, 2013
			Penaeus aztecus	LC50	0.24	0.076	2	U.S. EPA, 2013
			Uca pugilator	NOEC	2.99	9.45	4	Pennington, 2002
					100	31.62	2	U.S. EPA, 2013
				LC50	3.34	10.56	4	Pennington, 2002
					790	250	2	U.S. EPA, 2013
		Fish	*Bidyanus bidyanus*	NOEC	10.00	3.16	0.75	Patra et al., 2009
			Channa punctata	NOEC	8.10	25.61	90	Sarma et al., 2009
					8.10	25.61	90	Sarma et al., 2009
					8.10	25.61	90	Sarma et al., 2009
				LOEC	8.10	25.61	90	Sarma et al., 2009
					8.10	25.61	90	Sarma et al., 2009
					8.10	25.61	90	Sarma et al., 2009
			Cnesterodon decemmaculatus	NOEC	0.0040	0.0013	1	Gutierrez et al., 2013
					0.0060	0.0019	1	Gutierrez et al., 2013
					1.00	0.32	4	Mugni et al., 2012
				LOEC	0.0060	0.0019	1	Gutierrez et al., 2013
			Cyprinodon variegatus	NOEC	0.60	0.19	7	Hemmer et al., 2011
					0.27	0.85	28	U.S. EPA, 2013
				LOEC	0.60	1.90	28	U.S. EPA, 2013
			Cyprinus carpio	NOEC	0.50	0.16	7	U.S. EPA, 2013
					0.90	0.28	4	U.S. EPA, 2013
				LC50	0.90	0.28	7	U.S. EPA, 2013
					2.20	0.70	4	U.S. EPA, 2013
			Fundulus heteroclitus	NOEC	0.52	0.16	4	Pennington, 2002
				LOEC	2.99	0.94	4	Pennington, 2002
				LC50	2.23	0.71	4	Pennington, 2002
					2.55	0.81	4	Pennington, 2002
			Labeo rohita	LC50	400	126	4	Alam et al., 2010
					500	158	4	Alam et al., 2010
					750	237	4	Alam et al., 2010
					1100	348	4	Alam et al., 2010
			Leiostomus xanthurus	LC50	0.32	0.10	2	U.S. EPA, 2013
			Lepomis macrochirus	NOEC	1.00	0.32	4	U.S. EPA, 2013
					1.80	0.57	4	U.S. EPA, 2013
				LC50	1.70	0.54	4	U.S. EPA, 2013
					2.08	0.66	4	U.S. EPA, 2013
					3.90	1.23	4	U.S. EPA, 2013
					5.60	1.77	4	U.S. EPA, 2013
			Morone saxatalis	LC50	1000	316	4	U.S. EPA, 2013
			Mugil cephalus	LC50	0.32	0.10	2	U.S. EPA, 2013
			Oncorhynchus kisutch	NOEC	10.00	3.16	0.020833333	Tierney et al., 2006
					100	31.62	0.020833333	Tierney et al., 2006
				LOEC	100	31.62	0.02	Tierney et al., 2006
			Oncorhynchus mykiss	NOEC	0.32	0.10	4	U.S. EPA, 2013
					1.00	0.32	4	U.S. EPA, 2013
					1.80	0.57	4	U.S. EPA, 2013
				LC50	0.37	0.12	4	U.S. EPA, 2013
					0.47	0.15	4	U.S. EPA, 2013
					0.83	0.26	4	U.S. EPA, 2013
					2.30	0.73	4	U.S. EPA, 2013
					2.70	0.85	4	U.S. EPA, 2013
					28.00	8.85	4	U.S. EPA, 2013
			Pimephales promelas	NOEC	0.030	0.095	260	U.S. EPA, 2013
				LOEC	0.030	0.095	260	U.S. EPA, 2013
					0.11	0.35	260	U.S. EPA, 2013
					0.11	0.35	260	U.S. EPA, 2013
					0.46	1.45	260	U.S. EPA, 2013
		Insecta	*Enallagma cyathigerum*	LOEC	50.00	15.81	1	Janssens and Stoks, 2012
					50.00	15.81	1	Janssens and Stoks, 2012
		Mollusca	*Crassostrea virginica*	NOEC	0.10	0.032	2	U.S. EPA, 2013
					2.99	9.45	4	Pennington, 2002
				EC50	460	145	2	U.S. EPA, 2013
				LC50	3.34	10.56	4	Pennington, 2002
		Plants	*Bidens laevis*	NOEC	0.50	0.16	2	Perez et al., 2011a
					10.00	3.16	2	Perez et al., 2011a
					100	31.62	2	Perez et al., 2011a
				LOEC	5.00	1.58	2	Perez et al., 2011a
					50.00	15.81	2	Perez et al., 2011a
			Aquatic community	PNEC	0.051	0.16		U.S. EPA, 1996
13311-84-7	Flutamide	Crustacea	*Acartia tonsa*	EC50	480	480	5	Andersen et al., 2001
				LC50	5400	540	2	Andersen et al., 2001
			Daphnia magna	NOEC	100	100	21	Haeba et al., 2008
					1000	1000	21	Haeba et al., 2008
				LOEC	1000	1000	21	Haeba et al., 2008
				EC50	2700	270	2	Haeba et al., 2008
					7800	780	1	Haeba et al., 2008
			Neomysis integer	LC50	1380	1380	4	Verslycke et al., 2004
		Fish	*Danio rerio*	NOEC	100	10.00	7	Andersen et al., 2003
				LOEC	100	10.00	7	Andersen et al., 2003
			Gasterosteus aculeatus	LOEC	50.00	50.00	21	Jolly et al., 2009
			Oryzias latipes	NOEC	32.00	3.20	4	León et al., 2007
					1560	1560	21	Kang et al., 2006a
					1560	1560	21	Kang et al., 2006a
				LOEC	32.00	3.20	4	León et al., 2007
					320	32.00	4	León et al., 2007
					320	32.00	4	León et al., 2007
					202	202	21	Kang et al., 2006a
					1560	1560	21	Kang et al., 2006a

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
118-74-1	Hexachlorobenzene	Fish	*Lepomis macrochirus*	NOEC	2800	88.54	4	U.S. EPA, 2013
				LC50	3400	108	4	U.S. EPA, 2013
					7600	240	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	1000	31.62	4	U.S. EPA, 2013
				LC50	2300	72.73	4	U.S. EPA, 2013
			Pimephales promelas	NOEC	4.80	1.52	32	Carlson et al., 1987
					4.80	1.52	32	Carlson et al., 1987
13311-84-7	Flutamide	Fish	*Oryzias latipes*	LC50	1920	192	4	León et al., 2007
			Pimephales promelas	NOEC	320	320	21	Filby et al., 2007
					939	939	21	Panter et al., 2004
					939	939	21	Panter et al., 2004
					939	939	21	Panter et al., 2004
				LOEC	50.00	5.00	2	Garcia-Reyero et al., 2009
					50.00	5.00	2	Garcia-Reyero et al., 2009
					53.00	5.30	2	Martyniuk et al., 2009
					500	50.00	2	Garcia-Reyero et al., 2009
					95.40	95.40	21	Panter et al., 2004
					320	320	21	Filby et al., 2007
					320	320	21	Filby et al., 2007
					320	320	21	Filby et al., 2007
					500	500	21	Jensen and Ankley, 2006
					939	939	21	Panter et al., 2004
		Invertebrates	*Brachionus calyciflorus*	NOEC	0.10	0.10	4	Preston et al., 2000
				LOEC	1.00	1.00	4	Preston et al., 2000
330-55-2	Linuron	Algae	*Anabaena flosaquae*	NOEC	12.80	8.08	5	U.S. EPA, 2013
				EC50	38.80	24.48	5	U.S. EPA, 2013
			Chlorella pyrenoidosa	LOEC	1.00	0.063	0.5	Thomas et al., 1973
				EC50	110	6.94	1.5	Kratky and Warren, 1971
					130	8.20	1.5	Kratky and Warren, 1971
			Navicula pelliculosa	EC50	13.70	8.64	5	U.S. EPA, 2013
			Scenedesmus acutus	EC50	6.00	0.38	3	Snel et al., 1998
					17.30	1.09	3	Snel et al., 1998
			Scenedesmus vacuolatus	NOEC	0.25	0.016	1	Junghans et al., 2006
				EC50	19.93	1.26	1	Junghans et al., 2006
			Selenastrum capricornutum	NOEC	20.00	12.62	5	U.S. EPA, 2013
				EC50	67.00	42.27	5	U.S. EPA, 2013
			Skeletonema costatum	NOEC	5.35	3.38	5	U.S. EPA, 2013
				EC50	35.90	22.65	5	U.S. EPA, 2013
			Spirogyra sp.	EC50	25.10	15.84	35	Snel et al., 1998
		Bacteria	*Vibrio fischeri*	EC50	5500	347	30 min	Hernando et al., 2003
		Crustacea	*Americamysis bahia*	NOEC	1200	757	4	U.S. EPA, 2013
				LOEC	297	187	28	U.S. EPA, 2013
					582	367	28	U.S. EPA, 2013
				LC50	3300	2082	4	U.S. EPA, 2013
			Daphnia magna	NOEC	100	6.31	2	U.S. EPA, 2013
					130	82.02	21	U.S. EPA, 2013
					130	82.02	21	U.S. EPA, 2013
					1580	100	2	U.S. EPA, 2013
				LOEC	130	82.02	21	U.S. EPA, 2013
					240	151	21	U.S. EPA, 2013
					240	151	21	U.S. EPA, 2013
				EC50	120	7.57	2	U.S. EPA, 2013
					310	19.56	1	Stephenson and Kane, 1984
					360	22.71	1	Stephenson and Kane, 1984
					590	37.23	1	Stephenson and Kane, 1984
					1100	69.41	2	U.S. EPA, 2013
					1910	121	2	U.S. EPA, 2013
					3000	189	15 min	Martins et al., 2007
					7000	4417	4	Hernando et al., 2003
			Diaptomus gracilis	EC50	330	20.82	1	Stephenson and Kane, 1984
		Fish	*Cyprinodon variegatus*	NOEC	498	31.42	4	U.S. EPA, 2013
				LOEC	357	225	35	U.S. EPA, 2013
					760	480	35	U.S. EPA, 2013
					760	480	35	U.S. EPA, 2013
					766	483	35	U.S. EPA, 2013
				LC50	890	56.16	4	U.S. EPA, 2013
			Danio rerio	EC50	8895	561	5	Padilla et al., 2012
			Gasterosteus aculeatus	LOEC	100	63.10	21	Jolly et al., 2009
			Lepomis macrochirus	NOEC	4900	309	4	U.S. EPA, 2013
					5600	353	4	U.S. EPA, 2013
					7500	473	4	U.S. EPA, 2013
				LC50	9200	580	4	U.S. EPA, 2013
					9600	606	4	U.S. EPA, 2013
					16200	1022	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	2090	132	4	U.S. EPA, 2013
					5600	353	4	U.S. EPA, 2013
				LOEC	30.00	18.93	28	Bruggemann et al., 1995
					40.00	25.24	80	U.S. EPA, 2013
					60.00	37.86	28	Bruggemann et al., 1995
					390	246	80	U.S. EPA, 2013
				LC50	3085	195	4	U.S. EPA, 2013
					16400	1035	4	U.S. EPA, 2013
		Mollusca	*Crassostrea virginica*	NOEC	3600	227	2	U.S. EPA, 2013
				EC50	5400	341	2	U.S. EPA, 2013
		Plants	*Ceratophyllum demersum*	EC50	8.70	5.49	35	Snel et al., 1998
			Chara globularis	EC50	12.10	0.76	1	Snel et al., 1998
			Elodea nuttallii	EC50	13.40	0.85	1	Snel et al., 1998
					10.50	6.63	56	Snel et al., 1998
			Lemna gibba	NOEC	9.65	6.09	14	U.S. EPA, 2013
				LOEC	19.93	12.57	7	Hulsen et al., 2002
				EC50	27.30	17.23	14	U.S. EPA, 2013
			Myriophyllum spicatum	EC50	11.80	0.74	1	Snel et al., 1998
			Potamogeton crispus	EC50	12.90	0.81	1	Snel et al., 1998
			Ranunculus circinatus	EC50	13.20	0.83	1	Snel et al., 1998
			Aquatic community	PNEC	0.26	0.16		Oekotoxzentrum, Centre Ecotox
					1.37	0.86		Oekotoxzentrum, Centre Ecotox
65277-42-1	Ketoconazole	Crustacea	*Daphnia magna*	NOEC	1000	100	21	Haeba et al., 2008
				EC50	1510	15.10	2	Haeba et al., 2008
					8100	81.00	1	Haeba et al., 2008
		Fish	*Pimephales promelas*	LOEC	400	40.00	21	Villeneuve et al., 2007
84371-65-3	Mifepristone	Amphibia	*Xenopus laevis*	NOEC	10740	33963	1	Pickford and Morris, 1999
		Fish	*Danio rerio*	NOEC	107	340	4	Hillegass et al., 2008

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
84371-65-3	Mifepristone	Fish	*Danio rerio*	NOEC	108	341	4	Hillegass et al., 2008
104-40-5	Nonylphenol	Algae		EC50	410	41.00	Not specified	Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	1300	130	Not specified	Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	220	22.00	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	140	14.00	Not specified	Nendza and Wenzel, 2006
			Aquatic community	PNEC	0.30	0.30		OSPAR Agreement, 2014-05
84852-15-3	Nonylphenol technical mixture	Fish	*Danio rerio*	NOEC	2.50	0.13	3	Jin et al., 2010
					10.00	0.50	2	Jin et al., 2009
					12.50	0.63	3	Jin et al., 2010
					100	5.01	2	Jin et al., 2009
					1000	50.12	2	Kammann et al., 2009
					1000	50.12	2	Kammann et al., 2009
					1200	60.14	2	Kammann et al., 2009
					1400	70.17	2	Kammann et al., 2009
					1500	75.18	2	Kammann et al., 2009
					2000	100	2	Kammann et al., 2009
				LOEC	10.00	0.50	2	Jin et al., 2009
					12.50	0.63	3	Jin et al., 2010
					100	5.01	2	Jin et al., 2009
				EC50	2000	100	2	Kammann et al., 2009
					2100	105	2	Kammann et al., 2009
					4400	221	2	Kammann et al., 2009
			Oncorhynchus mykiss	NOEC	2.30	0.12	4	Shelley et al., 2012
					18.00	0.90	4	Shelley et al., 2012
					18.00	0.90	4	Shelley et al., 2012
					18.00	0.90	4	Shelley et al., 2012
					18.00	0.90	4	Shelley et al., 2012
				LOEC	18.00	0.90	4	Shelley et al., 2012
					18.00	0.90	4	Shelley et al., 2012
298-00-0	Parathion-methyl	Algae		EC50	5000	500	Not specified	Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	510	51.00	Not specified	Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	0.14	0.014	Not specified	Nendza and Wenzel, 2006
		Fish		LC50	5400	540	Not specified	Nendza and Wenzel, 2006
57465-28-8	PCB 126	Fish	*Fundulus heteroclitus*	LOEC	1.00	0.10	5	Clark et al., 2010
					1.00	0.10	5	Clark, 2010
					1.00	0.10	5	Clark, 2010
			Oryzias latipes	NOEC	0.15	0.015	until 3 dph	Kim and Cooper, 1998
					0.15	0.015	until 3 dph	Kim and Cooper, 1998
				EC50	0.17	0.017	until 3 dph	Kim and Cooper, 1999
					0.43	0.043	until 3 dph	Kim and Cooper, 1999
					0.45	0.045	until 3 dph	Kim and Cooper, 1999
				LC50	0.25	0.025	until 3 dph	Kim and Cooper, 1999
		Polyp	*Hydra vulgaris*	NOEC	1000	1000	4	Becker, 1991
2310-17-0	Phosalone	Algae	*Selenastrum capricornutum*	EC50	830	41.60	3	Graff et al., 2003
					930	46.61	3	Graff et al., 2003
		Fish	*Channa orientalis*	LC50	81.00	4.06	4	Verma et al., 1978b
			Danio rerio	EC50	3443	173	5	Padilla et al., 2012
			Heteropneustes fossilis	LC50	83.00	4.16	4	Verma et al., 1982
114-26-1	Propoxur	Algae		EC50	10000	31.62		Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	36000	114		Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	110	0.35		Nendza and Wenzel, 2006
		Fish		LC50	8800	27.83		Nendza and Wenzel, 2006
302-79-4	Retinoic acid	Crustacea	*Daphnia magna*	NOEC	100	100	>7	Peterson et al., 2001
					800	800		Wang et al., 2005
		Fish	*Danio rerio*	NOEC	0.60	0.060	2	Teixido et al., 2013
					3.00	0.30	2	Teixido et al., 2013
				LOEC	0.30	0.030	2	Teixido et al., 2013
					1.50	0.15	2	Teixido et al., 2013
					3004351	300435	2	Elo et al., 2007
				EC50	0.42	0.042	6	Selderslaghs et al., 2012
					1.48	0.15	3	Selderslaghs et al., 2012
					3.58	0.36	2	Selderslaghs et al., 2012
					5.71	0.57	2	Teixido et al., 2013
					234	23.37	1	Selderslaghs et al., 2012
				LC50	15.32	1.53	2	Teixido et al., 2013
					40.26	4.03	6	Selderslaghs et al., 2012
					442	44.16	3	Selderslaghs et al., 2012
					865	86.52	2	Selderslaghs et al., 2012
					2121	212	1	Selderslaghs et al., 2012
122320-73-4	Rosiglitazone	Fish	*Danio rerio*	LOEC	357	1.13	2	Elo et al., 2007
688-73-3	Tributyltin hydride	Fish	*Salmo salar*	NOEC	0.25	0.025	7	Greco et al., 2007
				LOEC	0.050	0.0050	7	Greco et al., 2007
					0.25	0.025	7	Greco et al., 2007
		Invertebrates	*Brachionus calyciflorus*	LC50	19.00	1.90	1	Snell, 1991
		Mollusca	*Lymnaea stagnalis*	NOEC	0.019	0.019	21	Giusti et al., 2013
					0.094	0.094	21	Giusti et al., 2013
				LOEC	0.094	0.094	21	Giusti et al., 2013
			Marisa cornuarietis	LOEC	0.20	0.20	180	Tillmann et al., 2001
3380-34-5	Triclosan (Irgasan)	Algae	*Anabaena flosaquae*	NOEC	0.81	2.56	4	Orvos et al., 2002
				EC50	0.97	3.07	4	Orvos et al., 2002
					1.20	3.79	4	U.S. EPA, 2013
					1.60	5.06	4	Orvos et al., 2002
			Dunaliella tertiolecta	EC50	3.55	11.23	4	DeLorenzo et el., 2008
			Navicula pelliculosa	EC50	16.00	50.60	4	U.S. EPA, 2013
					19.10	60.40	4	Orvos et al., 2002
			Scenedesmus subspicatus	NOEC	40.00	12.65	3	U.S. EPA, 2013
				EC50	120	37.95	3	U.S. EPA, 2013
			Selenastrum capricornutum	NOEC	0.20	0.063	3	Yang et al., 2008
					0.50	0.16	3	Orvos et al., 2002
					0.69	2.18	4	Orvos et al., 2002
					2.50	7.91	4	U.S. EPA, 2013
				LOEC	0.40	0.13	3	Yang et al., 2008
					1.20	0.38	3	Orvos et al., 2002
				EC50	0.53	0.17	3	Yang et al., 2008
					0.70	0.22	3	Orvos et al., 2002
					2.90	0.92	3	Orvos et al., 2002
					4.70	1.49	3	Tatarazako et al., 2004
					1.40	4.43	4	Orvos et al., 2002
					3.40	10.75	4	U.S. EPA, 2013
					4.46	14.10	4	Orvos et al., 2002
		Amphibia	*Lithobates pipiens*	LOEC	0.10	0.32	24	Fraker and Smith, 2004
					230	727	25	Fraker and Smith, 2004

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
3380-34-5	Triclosan (Irgasan)	Amphibia	*Xenopus laevis*	NOEC	200	632	14	Matsumura et al., 2005
					200	632	14	Matsumura et al., 2005
		Bacteria	*Vibrio fischeri*	EC50	150	47.43	15 min	Tatarazako et al., 2004
					53000	16760	15 min	DeLorenzo et el., 2008
					280000	88544	15-30 min	Farre et al., 2008
		Crustacea	*Ceriodaphnia dubia*	EC50	220	696	7	Tatarazako et al., 2004
			Daphnia magna	NOEC	100	3162	2	U.S. EPA, 2013
					180	56.92	2	U.S. EPA, 2013
					240	75.89	2	U.S. EPA, 2013
					240	75.89	2	U.S. EPA, 2013
					40.00	126	21	Orvos et al., 2002
					100	316	6	Flaherty and Dodson, 2005
				LOEC	10.00	3162	30	Flaherty and Dodson, 2005
					200	632	21	Orvos et al., 2002
				EC50	390	123	2	Orvos et al., 2002
					390	123	2	U.S. EPA, 2013
					420	133	2	U.S. EPA, 2013
					420	133	2	U.S. EPA, 2013
			Hyalella azteca	EC50	250	791	10	Dussault et al., 2008a
				LC50	200	632	10	Dussault et al., 2008a
			Thamnocephalus platyurus	LC50	470	149	1	Kim et al., 2009
		Fish	*Danio rerio*	LC50	220	696	9	Tatarazako et al., 2004
			Lepomis macrochirus	NOEC	18000	5692	4	U.S. EPA, 2013
				LC50	370	117	4	Orvos et al., 2002
					410	130	2	Orvos et al., 2002
					440	139	1	Orvos et al., 2002
					36200	11447	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	100	3162	4	U.S. EPA, 2013
					34.10	108	70	Orvos et al., 2002
					18000	5692	4	U.S. EPA, 2013
				LOEC	7130	225	70	Orvos et al., 2002
				LC50	288	9107	4	U.S. EPA, 2013
					23400	7400	4	U.S. EPA, 2013
			Oryzias latipes	NOEC	200	632	21	Ishibashi et al., 2004
				LOEC	20.00	63.25	21	Ishibashi et al., 2004
					20.00	63.25	21	Ishibashi et al., 2004
					100	316	21	Ishibashi et al., 2004
					200	632	21	Ishibashi et al., 2004
					200	632	21	Ishibashi et al., 2004
					313	990	14	Ishibashi et al., 2004
				EC50	170	538	9	Nassef et al., 2010
				LC50	350	111	2	Foran et al., 2000
					399	126	4	Ishibashi et al., 2004
					600	190	4	Kim et al., 2009
					602	190	4	Ishibashi et al., 2004
					400	1265	14	Tatarazako et al., 2004
			Pimephales promelas	NOEC	1.60	5.06	12	Schultz et al., 2012
					1.60	5.06	21	Schultz et al., 2012
					1.60	5.06	21	Schultz et al., 2012
					100	3162	4	U.S. EPA, 2013
				LOEC	1.60	5.06	21	Schultz et al., 2012
				LC50	250	79.06	4	U.S. EPA, 2013
					260	82.22	4	Orvos et al., 2002
					270	85.38	2	Orvos et al., 2002
					270	85.38	3	Orvos et al., 2002
					360	114	1	Orvos et al., 2002
		Insecta	*Chironomus dilutus*	EC50	280	885	10	Dussault et al., 2008a
				LC50	400	1265	10	Dussault et al., 2008a
			Aquatic community	PNEC	0.020	0.063		Oekotoxzentrum, Centre Ecotox
50471-44-8	Vinclozolin	Algae	*Navicula pelliculosa*	EC50	1060	3352	5	U.S. EPA, 2013
			Selenastrum capricornutum	NOEC	2540	8032	5	U.S. EPA, 2013
				EC50	1020	3226	5	U.S. EPA, 2013
			Skeletonema costatum	EC50	870	2751	5	U.S. EPA, 2013
		Crustacea	*Americamysis bahia*	NOEC	580	1834	4	U.S. EPA, 2013
				LC50	1800	5692	4	U.S. EPA, 2013
			Daphnia magna	NOEC	1000	316	2	U.S. EPA, 2013
					3000	949	1	Haeba et al., 2008
					3000	949	2	Haeba et al., 2008
					790	2498	21	U.S. EPA, 2013
					790	2498	21	U.S. EPA, 2013
					790	2498	21	U.S. EPA, 2013
					1000	3162	21	Haeba et al., 2008
				LOEC	1000	3162	21	Haeba et al., 2008
					1400	4427	21	U.S. EPA, 2013
					1400	4427	21	U.S. EPA, 2013
					1400	4427	21	U.S. EPA, 2013
					2400	7589	21	U.S. EPA, 2013
				EC50	3650	1154	2	U.S. EPA, 2013
		Fish	*Cyprinodon variegatus*	NOEC	1100	348	4	U.S. EPA, 2013
			Danio rerio	EC50	10741	3396	5	Padilla et al., 2012
			Gasterosteus aculeatus	LOEC	100	316	21	Jolly et al., 2009
			Lepomis gibbosus	NOEC	68100	21535	4	U.S. EPA, 2013
				LC50	49800	15748	4	U.S. EPA, 2013
			Lepomis macrochirus	LC50	47500	15021	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	1040	329	4	U.S. EPA, 2013
					1800	569	4	U.S. EPA, 2013
					3160	999	4	U.S. EPA, 2013
				LC50	2840	898	4	U.S. EPA, 2013
					13600	4301	4	U.S. EPA, 2013
			Oryzias latipes	NOEC	2500	7906	100	Kiparissis et al., 2003
				LOEC	2500	7906	100	Kiparissis et al., 2003
					2500	7906	100	Kiparissis et al., 2003
			Pimephales promelas	NOEC	50.00	158	175	U.S. EPA, 2013
					50.00	158	175	U.S. EPA, 2013
					50.00	158	175	U.S. EPA, 2013
					50.00	158	175	U.S. EPA, 2013
					450	1423	21	Martinovic et al., 2008
					700	2214	21	Makynen et al., 2000
					700	2214	21	Makynen et al., 2000
					1200	3795	34	Makynen et al., 2000
					1200	3795	34	Makynen et al., 2000
				LOEC	60.00	190	21	Martinovic et al., 2008
50471-44-8	Vinclozolin	Fish	*Pimephales promelas*	LOEC	60.00	190	21	Martinovic et al., 2008
					100	316	21	Villeneuve et al., 2007
					150	474	175	U.S. EPA, 2013
					150	474	175	U.S. EPA, 2013
					150	474	175	U.S. EPA, 2013
					150	474	175	U.S. EPA, 2013
					255	806	21	Martinovic et al., 2008
					255	806	21	Martinovic et al., 2008
					450	1423	21	Martinovic et al., 2008
					450	1423	21	Martinovic et al., 2008
					450	1423	21	Martinovic et al., 2008
					700	2214	21	Makynen et al., 2000
					700	2214	21	Makynen et al., 2000
					700	2214	21	Makynen et al., 2000
					1200	3795	34	Makynen et al., 2000
		Invertebrates	*Brachionus calyciflorus*	NOEC	3120	987	1	Zavala-Aguirre et al., 2007
				LOEC	6250	1976	1	Zavala-Aguirre et al., 2007
				LC50	30500	9645	1	Zavala-Aguirre et al., 2007
		Mollusca	*Crassostrea virginica*	NOEC	2100	6641	4	U.S. EPA, 2013
				EC50	3200	10119	4	U.S. EPA, 2013
			Marisa cornuarietis	LOEC	0.030	0.095	140	Tillmann et al., 2001
			Physella acuta	LOEC	5000	15811	21	Sanchez-Arguello et al., 2012
		Plants	*Lemna gibba*	NOEC	2400	7589	14	U.S. EPA, 2013
				EC50	900	285	5	U.S. EPA, 2013
		Protozoa	*Acanthamoeba castellani*	LOEC	10000	31623	6	Prescott et al., 1977

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CAS	Compound	Organism		Measured endpoint	Concentration (pg/L)	Final TEQs (pg/L)	Exposure time (days)	Reference
1746-01-6	2,3,7,8-TCDD	Amphibia	*Pseudacris triseriata*	NOEC	30000000	3000000	2	Collier et al., 2008
					30000000	3000000	2	Collier et al., 2008
				LOEC	300000	30000	2	Collier et al., 2008
					300000	30000	2	Collier et al., 2008
			Xenopus laevis	NOEC	30000000	3000000	3	Collier et al., 2008
				LOEC	300000	30000	2	Collier et al., 2008
					30000000	3000000	2	Collier et al., 2008
		Crustacea	*Daphnia magna*	NOEC	1000000	1000000		Wu et al., 2001
					1030000	103000	2	Adams et al., 1986
				LOEC	100	100	8	Wu et al., 2001
		Fish	*Esox lucius*	LOEC	100	10.00	4	Helder, 1980
					100	10.00	4	Helder, 1980
					1100	110	4	Helder, 1980
			Fundulus heteroclitus	LC50	20000000	2000000	2h	Toomey et al., 2001
			Gobiocypris rarus	LOEC	2.00	2.00	120	Wu et al., 2001
					2.00	2.00	chonic	Wu et al., 2001
					1000	100	2	Wu et al., 2001
					1000	1000	120	Wu et al., 2001
					1000	1000	chonic	Wu et al., 2001
			Oryzias latipes	NOEC	3400	340	until 3 dph	Kim and Cooper, 1998
				LOEC	12000	12000	10	Wisk and Cooper, 1992
					12000	12000	10	Wisk and Cooper, 1992
				EC50	1200	120	3	Chen and Cooper, 1999
					2200	2200	11 dph	Wisk and Cooper, 1990b
					2800	280	4	Kim and Cooper, 1998
					3500	350	until 3 dph	Wisk and Cooper, 1990b
					5600	560	until 3 dph	Kim and Cooper, 1999
					6000	600	3	Wisk and Cooper, 1990a
					10100	1010	until 3 dph	Kim and Cooper, 1999
					12500	1250	until 3 dph	Kim and Cooper, 1999
					14000	1400	until 3 dph	Wisk and Cooper, 1990b
					14000	1400	until 3 dph	Wisk and Cooper, 1990b
					15000	1500	3	Wisk and Cooper, 1990a
					15800	1580	until 3 dph	Chen and Cooper, 1999
					18400	1840	until 3 dph	Chen and Cooper, 1999
					26800	2680	until 3 dph	Chen and Cooper, 1999
				LC50	5700	5700	17	Metcalfe et al., 1997
					8100	810	until 3 dph	Kim and Cooper, 1999
					9000	900	until 3 dph	Wisk and Cooper, 1990b
					13000	1300	3	Wisk and Cooper, 1990a
					13500	1350	until 3 dph	Chen and Cooper, 1999
			Pimephales promelas	NOEC	700	700	28	Adams et al., 1986
					3800	380	1	Olivieri and Cooper, 1997
					3800	380	1	Olivieri and Cooper, 1997
					10160	1016	until 2 dph	Olivieri and Cooper, 1997
				LOEC	370	37.00	until 2 dph	Olivieri and Cooper, 1997
				LC50	1700	1700	28	Adams et al., 1986
			Salvelinus namaycush	NOEC	34000	3400	2	Walker et al., 1991
				LOEC	1000	100	2	Spitsbergen et al., 1991
					10000	1000	2	Spitsbergen et al., 1991
					55000	5500	2	Walker et al., 1991
					55000	5500	2	Walker et al., 1991
					226000	22600	2	Walker et al., 1991
				LC50	65000	6500	2	Walker et al., 1991
		Insecta	*Aedes aegypti*	NOEC	200000	200000	17	Miller et al., 1973
		Mollusca	*Physa sp.*	LOEC	200000	200000	36	Miller et al., 1973
		Worm	*Paranais sp.*	LOEC	200000	200000	55	Miller et al., 1973
207-08-9	Benzo(k)fluoranthene	Crustacea	*Daphnia magna*	EC50	1400000	702	0.5	Newsted and Giesy, 1987
		Fish	*Fundulus heteroclitus*	NOEC	300000000	150356	5	Clark et al., 2010
				LOEC	300000000	150356	5	Clark et al., 2010
					300000000	150356	5	Clark, 2010
					300000000	150356	5	Clark, 2010
					300000000	150356	5	Clark, 2010
			Aquatic community	PNEC	170	0.85		OSPAR Agreement, 2014-05
					17000	85.20		EU Risk Assessment Report, 2008
50-02-2	Dexamethasone	Algae	*Selenastrum capricornutum*	NOEC	100000000000	10000000	3	DellaGreca et al., 2004
		Amphibia	*Xenopus laevis*	LOEC	39246100	39246	21	Lorenz et al., 2009
					39246100	39246	21	Lorenz et al., 2009
					39246100	39246	21	Lorenz et al., 2009
					196230500	196230	21	Lorenz et al., 2009
					196230500	196230	21	Lorenz et al., 2009
					196230500	196230	21	Lorenz et al., 2009
		Crustacea	*Ceriodaphnia dubia*	EC50	50000000	50000	7	DellaGreca et al., 2004
			Daphnia magna	EC50	48300000000	4830000	1	DellaGreca et al., 2004
			Thamnocephalus platyurus	LC50	60110000000	6011000	1	DellaGreca et al., 2004
		Fish	*Danio rerio*	NOEC	39246100	3925	5	Gustafson et al., 2012
					392461000	39246	5	Gustafson et al., 2012
					392461000	39246	5	Gustafson et al., 2012
					3924610000	392461	5	Gustafson et al., 2012
					39246100000	3924610	4	Sun et al., 2010a
				LOEC	500000000	500000	21	Lalone et al., 2012
					13736135000	1373614	4	Sun et al., 2010a
					15698440000	1569844	5	To et al., 2007
					19623050000	1962305	5	Liu et al., 2003
50-02-2	Dexamethasone	Fish	*Danio rerio*	LOEC	100000000000	10000000	3	Hillegass et al., 2007
					100000000000	10000000	3	Hillegass et al., 2008
			Pimephales promelas	NOEC	254000000	254000	30 dph	Overturf et al., 2012
					1160000000	1160000	31 dph	Overturf et al., 2012
				LOEC	100000	100	21	Lalone et al., 2012
					50000000	50000	21	Lalone et al., 2012
					500000000	500000	21	Lalone et al., 2012
					500000000	500000	29	Lalone et al., 2012
					500000000	500000	29	Lalone et al., 2012
					577000000	577000	29 dph	Overturf et al., 2012
				LC50	254000000	254000	28 dph	Overturf et al., 2012
		Invertebrates	*Brachionus calyciflorus*	LC50	48220000000	4822000	1	DellaGreca et al., 2004
57465-28-8	PCB 126	Fish	*Fundulus heteroclitus*	LOEC	1000000	31623	5	Clark et al., 2010
					1000000	31623	5	Clark, 2010
					1000000	31623	5	Clark, 2010
			Oryzias latipes	NOEC	150000	4743	until 3 dph	Kim and Cooper, 1998
					150000	4743	until 3 dph	Kim and Cooper, 1998
				EC50	170000	5376	until 3 dph	Kim and Cooper, 1999
					430000	13598	until 3 dph	Kim and Cooper, 1999
					450000	14230	until 3 dph	Kim and Cooper, 1999
				LC50	250000	7906	until 3 dph	Kim and Cooper, 1999
		Polyp	*Hydra vulgaris*	NOEC	1000000000	316227766	4	Becker, 1991

D: GR CALUX

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
52-39-1	Aldosterone	Amphibia	*Xenopus laevis*	NOEC	36044	288	21	Lorenz et al., 2009
					36044	288	21	Lorenz et al., 2009
					36044	288	21	Lorenz et al., 2009
2242-98-0	Cortisol	Crustacea	*Daphnia magna*	NOEC	100000	7000	6	Kashian and Dodson, 2004
		Fish	*Danio rerio*	LOEC	100000000	700000	3	Hillegass et al., 2007
					100000000	700000	3	Hillegass et al., 2008
			Pimephales promelas	NOEC	800000	56000	14	Brodeur et al., 2005
50-02-2	Dexamethasone	Algae	*Selenastrum capricornutum*	NOEC	100000000	10000000	3	DellaGreca et al., 2004
		Amphibia	*Xenopus laevis*	LOEC	39246	39246	21	Lorenz et al., 2009
					39246	39246	21	Lorenz et al., 2009
					39246	39246	21	Lorenz et al., 2009
					196231	196231	21	Lorenz et al., 2009
					196231	196231	21	Lorenz et al., 2009
					196231	196231	21	Lorenz et al., 2009
		Crustacea	*Ceriodaphnia dubia*	EC50	50000	50000	7	DellaGreca et al., 2004
			Daphnia magna	EC50	48300000	4830000	1	DellaGreca et al., 2004
			Thamnocephalus platyurus	LC50	60110000	6011000	1	DellaGreca et al., 2004
		Fish	*Danio rerio*	NOEC	39246	3925	5	Gustafson et al., 2012
					392461	39246	5	Gustafson et al., 2012
					392461	39246	5	Gustafson et al., 2012
					3924610	392461	5	Gustafson et al., 2012
					39246100	3924610	4	Sun et al., 2010a
				LOEC	500000	500000	21	Lalone et al., 2012
					13736135	1373614	4	Sun et al., 2010a
					15698440	1569844	5	To et al., 2007
					19623050	1962305	5	Liu et al., 2003
					100000000	10000000	3	Hillegass et al., 2007
					100000000	10000000	3	Hillegass et al., 2008
			Pimephales promelas	NOEC	254000	254000	28 dph	Overturf et al., 2012
					1160000	1160000	28 dph	Overturf et al., 2012
				LOEC	100	100	21	Lalone et al., 2012
					50000	50000	21	Lalone et al., 2012
					500000	500000	21	Lalone et al., 2012
					500000	500000	29	Lalone et al., 2012
					500000	500000	29	Lalone et al., 2012
					577000	577000	28 dph	Overturf et al., 2012
				LC50	254000	254000	28 dph	Overturf et al., 2012
		Invertebrates	*Brachionus calyciflorus*	LC50	48220000	4822000	1	DellaGreca et al., 2004
50-24-8	Prednisolone	Algae	*Selenastrum capricornutum*	NOEC	160000000	3200000	3	DellaGreca et al., 2004
		Crustacea	*Ceriodaphnia dubia*	EC50	230000	46000	7	DellaGreca et al., 2004
			Daphnia magna	NOEC	85000000	1700000	1	DellaGreca et al., 2004
		Fish	*Pimephales promelas*	LOEC	1000	200	21	Kugathas, 2011
					1000	200	21	Kugathas, 2011
		Invertebrates	*Brachionus calyciflorus*	LC50	22290000	445800	1	DellaGreca et al., 2004
			Aquatic community	PNEC	139000	27800		Escher et al., 2011

E: NRF2 CALUX

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
50-28-2	17β-estradiol	Algae	*Melosira varians*	NOEC	20.00	1.26	10	Julius et al., 2007
					400	25.24	10	Julius et al., 2007
					800	50.48	10	Julius et al., 2007
				LOEC	80.00	5.05	10	Julius et al., 2007
					200	12.62	10	Julius et al., 2007
		Amphibia	*Lithobates clamitans*	NOEC	100	6.31	506	Coady et al., 2004
					100	6.31	506	Coady et al., 2004
				LOEC	100	6.31	506	Coady et al., 2004
			Lithobates pipiens	NOEC	100	6.31	124	Mackenzie et al., 2003
					100	6.31	124	Mackenzie et al., 2003
				LOEC	1.00	0.063	124	Mackenzie et al., 2003
					1.00	0.063	124	Mackenzie et al., 2003
				LC50	1242	78.37	14	Hogan et al., 2006
					1517	95.73	14	Hogan et al., 2006
			Lithobates sylvaticus	LC50	681	42.97	14	Hogan et al., 2006
			Rhinella arenarum	NOEC	100	6.31	200	Brodeur et al., 2013
				LOEC	100	6.31	200	Brodeur et al., 2013
					100	6.31	200	Brodeur et al., 2013
			Xenopus laevis	NOEC	100	6.31	78	Carr et al., 2003
				LOEC	100	6.31	34	Cong et al., 2006
					100	6.31	34	Cong et al., 2006
					100	6.31	78	Carr et al., 2003
					100	6.31	78	Carr et al., 2003
		Crustacea	*Americamysis bahia*	LC50	890	56.16	4	Hirano et al., 2004
					1690	10.66	2	Hirano et al., 2004
			Ceriodaphnia dubia	NOEC	1000	63.10	7	Jukosky et al., 2008a
			Daphnia magna	NOEC	200	12.62	21	Brennan et al., 2006
					1000	63.10	21	Brennan et al., 2006
					1000	63.10	21	Brennan et al., 2006
				LOEC	400	25.24	21	Brennan et al., 2006
				EC50	1550	9.78	1	Brennan et al., 2006
					2040	12.87	2	Brennan et al., 2006
					2870	18.11	2	Brennan et al., 2006
					2970	18.74	2	Hirano et al., 2004
					3670	23.16	1	Brennan et al., 2006
			Eurytemora affinis	NOEC	6.00	0.38	10	Forget-Leray et al., 2005
				LOEC	18.00	1.14	10	Forget-Leray et al., 2005
				LC50	45.00	2.84	4	Forget-Leray et al., 2005
			Neocaridina denticulata	LOEC	10.00	0.63	28	Huang et al., 2006
					10.00	0.63	28	Huang et al., 2006
					10.00	0.63	28	Huang et al., 2006
					10.00	0.63	28	Huang et al., 2006
		Fish	*Cyprinus carpio*	NOEC	0.10	0.0063	90	Gimeno et al., 1998
				LOEC	0.10	0.0063	90	Gimeno et al., 1998
					1.00	0.063	90	Gimeno et al., 1998
			Danio rerio	NOEC	0.013	0.0008	8	Rose et al., 2002
					0.024	0.0015	18	Holbech et al., 2006
					0.024	0.0015	18	Holbech et al., 2006
					0.025	0.0002	2	Jin et al., 2009
					0.25	0.0016	2	Jin et al., 2009
					0.25	0.016	18	Holbech et al., 2006
					2.50	0.016	3	Jin et al., 2010
					12.50	0.079	3	Jin et al., 2010
				LOEC	0.021	0.0013	8	Rose et al., 2002
					0.025	0.0002	2	Jin et al., 2009
					0.054	0.0034	18	Holbech et al., 2006
					0.054	0.0034	18	Holbech et al., 2006
					1.00	0.063	16	Peute et al., 1985
					12.50	0.079	3	Jin et al., 2010
				EC50	0.041	0.0026	8	Rose et al., 2002
					0.055	0.0035	18	Holbech et al., 2006
					0.17	0.011	21	Van den Belt et al., 2004
					0.24	0.015	21	Van den Belt et al., 2004
			Gambusia affinis	NOEC	1.00	0.063	8	Huang et al., 2013
					250	1.58	3	Kamata et al., 2011
				LOEC	1.00	0.063	8	Huang et al., 2012b
					1.00	0.063	8	Huang et al., 2013
					500	3.15	3	Kamata et al., 2011
			Gambusia holbrooki	NOEC	0.020	0.0013	28	Doyle and Lim, 2005
					0.10	0.0063	84	Rawson et al., 2006
				LOEC	0.10	0.0063	28	Doyle and Lim, 2005
					0.50	0.032	28	Doyle and Lim, 2005
					0.50	0.032	84	Rawson et al., 2006
			Gasterosteus aculeatus	NOEC	0.0010	0.00006	7	Hogan et al., 2008
					0.010	0.0006	21	Allen et al., 2008
					0.010	0.0006	58	Hahlbeck et al., 2004a
					0.020	0.0013	21	Allen et al., 2008
					0.032	0.0020	21	Allen et al., 2008
					10.00	0.63	58	Hahlbeck et al., 2004a
				LOEC	0.010	0.0006	7	Hogan et al., 2008
					0.050	0.0032	21	Allen et al., 2008
					0.070	0.0044	21	Allen et al., 2008
					0.10	0.0063	21	Allen et al., 2008
					1.00	0.063	58	Hahlbeck et al., 2004a
			Gobiocypris rarus	NOEC	0.10	0.0006	4	Ma et al., 2009
				LOEC	0.10	0.0006	4	Ma et al., 2009
			Ictalurus punctatus	NOEC	0.10	0.0063	21	Thompson et al., 2000
				LOEC	1.00	0.063	21	Thompson et al., 2000
				EC50	0.17	0.011	21	Thompson et al., 2000
			Morone saxatalis	NOEC	1.00	0.063	21	Thompson et al., 2000
				LOEC	10.00	0.63	21	Thompson et al., 2000
				EC50	1.56	0.10	21	Thompson et al., 2000
			Oncorhynchus mykiss	NOEC	0.0032	0.0002	21	Thorpe et al., 2000
					0.0048	0.0003	14	Thorpe et al., 2003
					0.0096	0.0006	14	Thorpe et al., 2003
					0.10	0.0006	5	Ward et al., 2006
					0.10	0.0063	21	Thorpe et al., 2000
					0.10	0.0063	21	Tremblay and Van der Kraak, 1999
					0.10	0.0063	21	Tremblay and Van der Kraak, 1999
					0.25	0.016	21	Thorpe et al., 2000
					0.25	0.016	21	Tremblay and Van der Kraak, 1999
					0.46	0.029	14	Thorpe et al., 2003
				LOEC	0.0089	0.0006	21	Thorpe et al., 2000
					0.014	0.0009	14	Thorpe et al., 2003
					0.022	0.0014	14	Thorpe et al., 2003

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
50-28-2	17β-estradiol	Fish	*Oncorhynchus mykiss*	LOEC	0.10	0.0063	21	Tremblay and Van der Kraak, 1999
					0.25	0.016	21	Thorpe et al., 2000
					0.25	0.016	21	Tremblay and Van der Kraak, 1999
					0.25	0.016	21	Tremblay and Van der Kraak, 1999
				EC50	0.015	0.0009	21	Thorpe et al., 2000
			Oncorhynchus tshawytscha	LOEC	400	2.52	0.3	Piferrer and Donaldson, 1992
			Oryzias latipes	NOEC	0.0010	0.000006	4	Lee et al., 2012
					0.0010	0.000006	4	Lee et al., 2012
					0.010	0.00006	5	Kang et al., 2005
					0.10	0.0063	21	Thompson et al., 2000
					0.15	0.010	14	Jukosky et al., 2008b
					0.23	0.014	25	Kang et al., 2002
					1.00	0.0063	4	Lee et al., 2012
					2.53	0.16	14	Jukosky et al., 2008b
					10.00	0.063	5	Kang,et al., 2006b
				LOEC	0.0050	0.0003	21	Kashiwada et al., 2002
					0.010	0.00006	4	Lee et al., 2012
					0.010	0.00006	4	Lee et al., 2012
					0.010	0.00006	5	Kang et al., 2005
					0.029	0.0018	21	Kang et al., 2002
					0.056	0.0035	21	Kang et al., 2002
					0.056	0.0036	14	Jukosky et al., 2008b
					0.10	0.0006	4	Lee et al., 2012
					0.46	0.029	25	Kang et al., 2002
					1.00	0.0063	4	Lee et al., 2012
					1.00	0.0063	4	Lee et al., 2012
					1.00	0.063	21	Thompson et al., 2000
					2.53	0.16	14	Jukosky et al., 2008b
					10.00	0.063	5	Kang,et al., 2006b
				EC50	0.20	0.013	21	Thompson et al., 2000
					0.23	0.014	14	Sun et al., 2009
					470	29.65	21	Kashiwada et al., 2002
				LC50	460	2.90	3	Kashiwada et al., 2002
					460	2.90	3	Tabata et al., 2001
					2000	12.62	4	Kang et al., 2002
					3500	22.08	3	Kashiwada et al., 2002
					3500	22.08	3	Tabata et al., 2001
			Pimephales promelas	NOEC	0.010	0.0006	14	Thorpe et al., 2007
					0.027	0.0017	9	Cline et al., 2003
					0.028	0.0018	17	McGee et al., 2009
					0.030	0.0019	21	Schultz et al., 2012
					0.030	0.0019	21	Schultz et al., 2012
					0.030	0.0019	21	Schultz et al., 2012
					0.030	0.0019	21	Schultz et al., 2012
					0.030	0.0019	21	Schultz et al., 2012
					0.030	0.0019	21	Schultz et al., 2012
					0.10	0.0063	14	Thorpe et al., 2007
					0.50	0.032	21	Bringolf et al., 2004
					0.50	0.032	21	Bringolf et al., 2004
				LOEC	0.022	0.0014	14	Thorpe et al., 2007
					0.030	0.0019	21	Schultz et al., 2012
					0.27	0.017	9	Cline et al., 2003
					0.50	0.032	21	Bringolf et al., 2004
					0.50	0.032	21	Bringolf et al., 2004
					0.50	0.032	21	Bringolf et al., 2004
				EC50	0.025	0.0016	14	Brian et al., 2005
					0.12	0.0076	19	Kramer et al., 1998
					0.25	0.016	19	Kramer et al., 1998
				LC50	1.15	0.073	19	Kramer et al., 1998
			Poecilia reticulata	NOEC	0.050	0.0032	120	Nielsen and Baatrup, 2006
					1.00	0.063	21	Li and Wang , 2005
				LOEC	1.00	0.063	21	Li and Wang , 2005
					1.00	0.063	21	Li and Wang , 2005
			Pomatoschistus minutus	LOEC	0.071	0.0045	243	Robinson et al., 2004
				EC50	0.087	0.0055	243	Robinson et al., 2004
					0.13	0.0080	243	Robinson et al., 2004
					0.17	0.010	243	Robinson et al., 2004
			Salmo trutta	NOEC	0.015	0.0010	8	Bjerregaard et al., 2008
				LOEC	0.020	0.0013	8	Bjerregaard et al., 2008
				EC50	0.015	0.0010	8	Bjerregaard et al., 2008
			Thymallus thymallus	LOEC	0.0010	0.00006	50	Lahnsteiner et al., 2006
					0.0010	0.00006	50	Lahnsteiner et al., 2006
		Fish		LC50	2740	17.29		Nendza and Wenzel, 2006
		Invertebrates	*Brachionus calyciflorus*	LOEC	0.0010	0.00006	10	Huang et al., 2012a
					100	6.31	10	Huang et al., 2012a
		Mollusca	*Elliptio complanata*	NOEC	100	0.63	0.25	Flynn et al., 2013
				LOEC	100	0.63	0.25	Flynn et al., 2013
			Aquatic community	PNEC	0.0004	0.00003		Oekotoxzentrum, Centre Ecotox
					0.0010	0.00006		Gross-Sorokin et al., 2006
					0.0010	0.00006		Young et al., 2004
					0.0020	0.0001		Anderson et al., 2012 ; Caldwell et al., 2012
					0.0023	0.0001		Yuan et al., 2014
10108-64-2	Cadmium chloride	Algae	*Chlorella protothecoides*	EC50	7000	8812	14	Aliotta et al., 1983
					14000	17625	14	Aliotta et al., 1983
			Chlorella saccharophila	EC50	14000	17625	14	Aliotta et al., 1983
					14000	17625	14	Aliotta et al., 1983
			Coenochloris sp	EC50	220	277	14	Aliotta et al., 1983
					14000	17625	14	Aliotta et al., 1983
			Microcystis aeruginosa	NOEC	300	378	4	Qian et al., 2012
					300	378	4	Qian et al., 2012
					400	504	4	Qian et al., 2012
					400	504	4	Qian et al., 2012
				LOEC	300	378	4	Qian et al., 2012
					300	378	4	Qian et al., 2012
					400	504	4	Qian et al., 2012
					400	504	4	Qian et al., 2012
				EC50	250	315	4	Qian et al., 2012
					390	491	4	Qian et al., 2012
			Navicula pelliculosa	EC50	3100	39.03	4	Irving et al., 2009
			Selenastrum capricornutum	EC50	9.40	1.18	3	Kallqvist, 2009
					29.00	3.65	3	Kallqvist, 2009
					31.00	3.90	3	Kallqvist, 2009
					43.00	5.41	3	Kallqvist, 2009
					62.00	7.81	3	Kallqvist, 2009
					131	16.49	3	Kallqvist, 2009
					199	25.05	3	Kallqvist, 2009
			Stichococcus bacillaris	EC50	14000	17625	14	Aliotta et al., 1983
					122400	154092	14	Aliotta et al., 1983
		Amphibia	*Duttaphrynus melanostictus*	NOEC	2.00	2.52	10	Ranatunge et al., 2012

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
10108-64-2	Cadmium chloride	Amphibia	*Duttaphrynus melanostictus*	NOEC	2.00	2.52	10	Ranatunge et al., 2012
					19.00	23.92	10	Ranatunge et al., 2012
					19.00	23.92	10	Ranatunge et al., 2012
					182	229	10	Ranatunge et al., 2012
					939	1182	10	Ranatunge et al., 2012
					1879	2366	10	Ranatunge et al., 2012
				LOEC	19.00	23.92	10	Ranatunge et al., 2012
					19.00	23.92	10	Ranatunge et al., 2012
					182	229	10	Ranatunge et al., 2012
					182	229	10	Ranatunge et al., 2012
				LC50	300	37.77	4	Shuhaimi-Othman et al., 2012
					500	62.95	4	Shuhaimi-Othman et al., 2012
					700	88.12	4	Shuhaimi-Othman et al., 2012
					1000	126	4	Shuhaimi-Othman et al., 2012
			Rhinella arenarum	LC50	190	23.92	4	Mastrangelo et al., 2011
					660	83.09	4	Mastrangelo et al., 2011
					720	90.64	4	Mastrangelo et al., 2011
					1120	141	4	Mastrangelo et al., 2011
					2110	266	4	Mastrangelo et al., 2011
					4090	515	4	Mastrangelo et al., 2011
					4270	538	4	Mastrangelo et al., 2011
					7700	969	4	Mastrangelo et al., 2011
					10830	1363	4	Mastrangelo et al., 2011
					11400	1435	4	Mastrangelo et al., 2011
					11670	1469	4	Mastrangelo et al., 2011
					12520	1576	4	Mastrangelo et al., 2011
		Crustacea	*Americamysis bahia*	NOEC	7600	9568	7	Woods et al., 2004
			Cyclops strenuus	LOEC	100	126	21	Khalil et al., 2014
			Cypris subglobosa	EC50	821	103	2	Khangarot and Das, 2009
					3220	405	2	Khangarot and Das, 2009
			Daphnia magna	NOEC	0.75	0.94	4	Chadwick Ecological Consultants, 2003
					1.67	2.10	21	Chadwick Ecological Consultants, 2003
					1.97	2.48	21	Chadwick Ecological Consultants, 2003
					3.43	4.32	21	Chadwick Ecological Consultants, 2003
					3.43	4.32	21	Chadwick Ecological Consultants, 2003
					14.60	18.38	18	Chadwick Ecological Consultants, 2003
					14.60	18.38	18	Chadwick Ecological Consultants, 2003
					20.00	2.52	1	Haap and Kohler, 2009
					100	12.59	1	Haap and Kohler, 2009
					400	50.36	1	Taylor et al., 2010
				LOEC	3.43	4.32	21	Chadwick Ecological Consultants, 2003
					3.43	4.32	21	Chadwick Ecological Consultants, 2003
					3.43	4.32	21	Chadwick Ecological Consultants, 2003
					6.85	8.62	21	Chadwick Ecological Consultants, 2003
					14.60	18.38	18	Chadwick Ecological Consultants, 2003
					14.60	18.38	18	Chadwick Ecological Consultants, 2003
					20.00	2.52	1	Haap and Kohler, 2009
					50.00	6.29	1	Haap and Kohler, 2009
					300	37.77	1	Haap and Kohler, 2009
				EC50	3.43	4.32	21	Chadwick Ecological Consultants, 2003
					6.85	8.62	21	Chadwick Ecological Consultants, 2003
					7.50	0.94	2	Tan and Wang, 2011
					14.20	1.79	2	Tan and Wang, 2011
					14.60	18.38	18	Chadwick Ecological Consultants, 2003
					17.50	2.20	2	Tan and Wang, 2011
					20.00	25.18	4	Chadwick Ecological Consultants, 2003
					24.80	3.12	2	Tan and Wang, 2011
					46.20	5.82	2	Tan and Wang, 2011
					170	21.40	2	Tan and Wang, 2011
					200	25.18	1	Haap and Kohler, 2009
					250	31.47	1	Haap and Kohler, 2009
					300	37.77	1	Haap and Kohler, 2009
					350	44.06	1	Haap and Kohler, 2009
					400	50.36	1	Haap and Kohler, 2009
					450	56.65	1	Haap and Kohler, 2009
					550	69.24	1	Haap and Kohler, 2009
					600	75.54	1	Haap and Kohler, 2009
					714	89.84	1	Taylor et al., 2010
					750	94.42	1	Haap and Kohler, 2009
			Gammarus pseudolimnaeus	LC50	20.00	25.18	4	Call et al., 1983
					24.00	30.21	4	Call et al., 1983
					45.00	56.65	4	Call et al., 1983
					95.00	120	4	Call et al., 1983
					140	176	4	Call et al., 1983
			Gammarus pulex	NOEC	3.40	4.28	10	Vellinger et al., 2013
					3.40	4.28	10	Vellinger et al., 2013
					6.00	7.55	10	Vellinger et al., 2013
					6.00	7.55	10	Vellinger et al., 2013
					30.00	3.78	2	Alonso et al., 2009
					30.00	3.78	2	Alonso et al., 2009
					50.00	6.29	2	Alonso et al., 2009
					50.00	6.29	2	Alonso et al., 2009
					50.00	6.29	2	Alonso et al., 2009
				LOEC	3.40	4.28	10	Vellinger et al., 2013
					3.40	4.28	10	Vellinger et al., 2013
					3.40	4.28	10	Vellinger et al., 2013
					6.00	7.55	10	Vellinger et al., 2013
					6.00	7.55	10	Vellinger et al., 2013
					50.00	6.29	2	Alonso et al., 2009
					50.00	6.29	2	Alonso et al., 2009
			Hyalella azteca	NOEC	0.50	0.63	28	Chadwick Ecological Consultants, 2003
					0.80	1.01	28	Chadwick Ecological Consultants, 2003
					1.10	1.38	28	Malhi, 2012
					1.30	1.64	28	Chadwick Ecological Consultants, 2003
					4.50	5.67	28	Chadwick Ecological Consultants, 2003
				LOEC	1.10	1.38	28	Chadwick Ecological Consultants, 2003
					1.30	1.64	28	Chadwick Ecological Consultants, 2003
					2.20	2.77	28	Chadwick Ecological Consultants, 2003
					3.10	3.90	28	Malhi, 2012
					4.50	5.67	28	Chadwick Ecological Consultants, 2003
				LC50	110	138	4	Call et al., 1983
			Oziotelphusa senex	LOEC	240	30.21	1	Reddy et al., 2011
			Stenocypris major	LC50	13.15	16.55	4	Shuhaimi-Othman et al., 2011a
					28.76	36.21	4	Shuhaimi-Othman et al., 2011a
					50.73	63.87	4	Shuhaimi-Othman et al., 2011a
					125	158	4	Shuhaimi-Othman et al., 2011a
		Fish	*Cirrhinus mrigala*	NOEC	98.00	12.34	4	Bhilave et al., 2008
					98.00	123	30	Bhilave et al., 2008
				LOEC	98.00	123	30	Bhilave et al., 2008

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
10108-64-2	Cadmium chloride	Fish	*Cirrhinus mrigala*	LOEC	132	166	30	Bhilave et al., 2008
				LC50	132	16.62	4	Bhilave et al., 2008
			Danio rerio	NOEC	43.00	5.41	3	Kim et al., 2011
					43.00	5.41	3	Kim et al., 2011
					43.00	5.41	3	Kim et al., 2011
					43.00	5.41	3	Kim et al., 2011
					43.00	5.41	3	Kim et al., 2011
				LOEC	43.00	5.41	3	Kim et al., 2011
			Gambusia affinis	LC50	2360	297	4	Annabi et al., 2009
					3250	409	4	Annabi et al., 2009
					3840	483	4	Annabi et al., 2009
					5860	738	4	Annabi et al., 2009
			Halobatrachus didactylus	LC50	14670000	1846844	1	Soares et al., 2008
			Heteropneustes fossilis	LC50	392920	49466	4	Kasherwani et al., 2009
					401310	50522	4	Kasherwani et al., 2009
					409880	51601	4	Kasherwani et al., 2009
					434740	54731	4	Kasherwani et al., 2009
			Lepomis macrochirus	LC50	26000	3273	4	U.S. EPA, 2013
			Oncorhynchus kisutch	NOEC	3.70	0.47	2	Williams and Gallagher, 2013
					3.70	0.47	2	Williams and Gallagher, 2013
					347	43.68	2	Williams and Gallagher, 2013
					347	43.68	2	Williams and Gallagher, 2013
				LOEC	3.70	0.47	2	Williams and Gallagher, 2013
					347	43.68	2	Williams and Gallagher, 2013
					347	43.68	2	Williams and Gallagher, 2013
			Oncorhynchus mykiss	NOEC	0.16	0.20	62	Mebane et al., 2008
					0.60	0.76	69	Mebane et al., 2008
					0.71	0.89	28	Sandhu et al., 2014
					0.71	0.89	28	Sandhu et al., 2014
					0.71	0.89	28	Sandhu et al., 2014
					0.71	0.89	28	Sandhu et al., 2014
					1.10	1.38	62	Mebane et al., 2008
					1.30	1.64	69	Mebane et al., 2008
					1.30	1.64	69	Mebane et al., 2008
					1.60	2.01	62	Mebane et al., 2008
					1.85	2.33	28	Sandhu et al., 2014
					1.85	2.33	28	Sandhu et al., 2014
					1.85	2.33	28	Sandhu et al., 2014
					1.85	2.33	28	Sandhu et al., 2014
					2.90	3.65	69	Mebane et al., 2008
					50.00	6.29	0.125	Baldisserotto et al., 2005
				LOEC	0.16	0.20	62	Mebane et al., 2008
					0.71	0.89	28	Sandhu et al., 2014
					0.71	0.89	28	Sandhu et al., 2014
					0.71	0.89	28	Sandhu et al., 2014
					0.71	0.89	28	Sandhu et al., 2014
					1.30	1.64	69	Mebane et al., 2008
					1.30	1.64	69	Mebane et al., 2008
					1.85	2.33	28	Sandhu et al., 2014
					1.85	2.33	28	Sandhu et al., 2014
					1.85	2.33	28	Sandhu et al., 2014
					2.50	3.15	62	Mebane et al., 2008
					2.90	3.65	69	Mebane et al., 2008
					6.90	8.69	69	Mebane et al., 2008
					50.00	6.29	0.125	Baldisserotto et al., 2005
				LC50	0.84	0.11	4	Mebane et al., 2008
					0.89	0.11	4	Mebane et al., 2008
					4.40	0.55	4	Call et al., 1983
					5.70	0.72	4	Call et al., 1983
					7.80	0.98	4	Call et al., 1983
					18.00	2.27	4	Call et al., 1983
					26.00	3.27	4	Call et al., 1983
			Oreochromis niloticus	NOEC	5.00	6.29	28	Silva and Pathiratne, 2008
					15.00	18.88	9	Silva and Pathiratne, 2008
					30.00	37.77	28	Silva and Pathiratne, 2008
				LOEC	5.00	6.29	9	Silva and Pathiratne, 2008
					5.00	6.29	28	Silva and Pathiratne, 2008
					15.00	18.88	28	Silva and Pathiratne, 2008
			Oryzias latipes	NOEC	1.03	1.30	49	Tilton et al., 2004
					8.05	10.13	49	Tilton et al., 2004
					8.05	10.13	49	Tilton et al., 2004
					8.05	10.13	49	Tilton et al., 2004
					8.05	10.13	49	Tilton et al., 2004
					8.05	10.13	50	Thompson, 2000
				LOEC	1.03	1.30	49	Tilton et al., 2004
					1.03	1.30	50	Thompson, 2000
					4.63	5.83	49	Tilton et al., 2004
					8.05	10.13	50	Thompson, 2000
			Pimephales promelas	NOEC	32.40	40.79	21	Sellin and Kolok, 2009
					50.80	63.95	21	Sellin and Kolok, 2009
					50.80	63.95	21	Sellin and Kolok, 2009
					50.80	63.95	21	Sellin and Kolok, 2009
					86.70	109	8	Sellin and Kolok, 2009
					86.70	109	8	Sellin and Kolok, 2009
					86.70	109	8	Sellin and Kolok, 2009
					86.70	109	8	Sellin and Kolok, 2009
					86.70	109	8	Sellin and Kolok, 2009
					86.70	109	8	Sellin and Kolok, 2009
				LOEC	50.80	63.95	21	Sellin and Kolok, 2009
		Insecta	*Chironomus javanus*	LC50	60.00	75.54	4	Shuhaimi-Othman et al., 2011b
					90.00	113	4	Shuhaimi-Othman et al., 2011b
					130	164	4	Shuhaimi-Othman et al., 2011b
					190	239	4	Shuhaimi-Othman et al., 2011b
			Chironomus riparius	NOEC	200	25.18	1	Choi and Ha, 2009
					200	25.18	1	Choi and Ha, 2009
					200	25.18	1	Choi and Ha, 2009
					200	25.18	1	Choi and Ha, 2009
					2000	252	1	Choi and Ha, 2009
					2000	252	1	Park et al., 2012
					20000	2518	1	Choi and Ha, 2009
					20000	2518	1	Choi and Ha, 2009
				LOEC	200	25.18	1	Choi and Ha, 2009
					2000	252	1	Choi and Ha, 2009
					2000	252	1	Choi and Ha, 2009
					2000	252	1	Choi and Ha, 2009
					2000	252	1	Choi and Ha, 2009
					2000	252	1	Park et al., 2012
					10000	1259	1	Park et al., 2012
					20000	2518	1	Choi and Ha, 2009

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
10108-64-2	Cadmium chloride	Insecta	*Chironomus riparius*	LC50	212230	26718	1	Choi and Ha, 2009
		Mollusca	*Dreissena polymorpha*	NOEC	34.00	42.80	5	Faria et al., 2009
					34.00	42.80	5	Faria et al., 2009
					34.00	42.80	5	Faria et al., 2009
					34.00	42.80	5	Faria et al., 2009
					47.50	59.80	20	Desouky, 2012
				LOEC	34.00	42.80	5	Faria et al., 2009
					34.00	42.80	5	Faria et al., 2009
					47.50	59.80	20	Desouky, 2012
			Lymnaea stagnalis	NOEC	48.00	60.43	20	Desouky, 2012
				LOEC	48.00	60.43	20	Desouky, 2012
		Polyp	*Hydra vulgaris*	LOEC	64.00	80.57	4	Kar and Aditya, 2010
		Worm	*Nais elinguis*	LC50	27.00	33.99	4	Shuhaimi-Othman et al., 2012
					74.00	93.16	4	Shuhaimi-Othman et al., 2012
					94.00	118	4	Shuhaimi-Othman et al., 2012
					158	199	4	Shuhaimi-Othman et al., 2012
133-06-2	Captan	Algae	*Chlorella pyrenoidosa*	NOEC	6020	9541	4	Anton, 1993
				EC50	44500	70528	4	Anton, 1993
			Selenastrum capricornutum	EC50	2400	380	3	Kikuchi, 1993
		Amphibia	*Pleurodeles waltl*	NOEC	3125	49.53	12	Mouchet et al., 2006
					125	198	12	Mouchet et al., 2006
					125	198	12	Mouchet et al., 2006
				LOEC	62.50	99.06	12	Mouchet et al., 2006
					250	396	12	Mouchet et al., 2006
			Xenopus laevis	NOEC	3125	49.53	12	Mouchet et al., 2006
					62.50	99.06	12	Mouchet et al., 2006
				LOEC	15.60	24.72	12	Mouchet et al., 2006
					62.50	99.06	12	Mouchet et al., 2006
					125	198	12	Mouchet et al., 2006
		Fish	*Carassius auratus*	LC50	890	141	4	Anton, 1993
			Danio rerio	EC50	358	56.82	5	Padilla et al., 2012
			Ictalurus punctatus	LC50	77.50	12.28	4	Johnson and Finley, 1980
			Lepomis macrochirus	LC50	141	22.35	4	Johnson and Finley, 1980
			Oncorhynchus clarkii	LC50	56.40	8.94	4	Johnson and Finley, 1980
			Oncorhynchus kisutch	LC50	138	21.87	4	Johnson and Finley, 1980
			Oncorhynchus mykiss	LC50	73.20	11.60	4	Johnson and Finley, 1980
			Oncorhynchus tshawytscha	LC50	56.50	8.95	4	Johnson and Finley, 1980
			Oryzias latipes	LC50	500	79.24	2	Tsuji et al., 1986
					610	96.68	2	Tsuji et al., 1986
					800	127	2	Tsuji et al., 1986
			Perca flavescens	LC50	120	19.02	4	Johnson and Finley, 1980
			Pimephales promelas	LC50	200	31.70	4	Johnson and Finley, 1980
			Salmo trutta	LC50	80.00	12.68	4	Johnson and Finley, 1980
			Salvelinus namaycush	LC50	49.00	7.77	4	Johnson and Finley, 1980
10605-21-7	Carbendazim	Algae	*Achnanthes sp.*	NOEC	330	131	28	Van den Brink et al., 2000
			Chara sp.	NOEC	1000	398	28	Van den Brink et al., 2000
			Chilomonas sp.	NOEC	330	131	28	Van den Brink et al., 2000
			Chlamydomonas sp.	NOEC	100	39.81	28	Van den Brink et al., 2000
			Chlorella pyrenoidosa	EC50	340	13.54	2	Canton, 1976
					34650	13794	4	Ma et al., 2002a
			Cryptomonas sp.	NOEC	100	39.81	28	Van den Brink et al., 2000
			Cyclotella sp.	NOEC	100	39.81	28	Van den Brink et al., 2000
			Epithemia sp.	NOEC	1000	398	28	Van den Brink et al., 2000
			Monoraphidium sp.	NOEC	1000	398	28	Van den Brink et al., 2000
			Oedogonium sp.	NOEC	1000	398	28	Van den Brink et al., 2000
			Scenedesmus acutus	NOEC	1000	398	28	Van den Brink et al., 2000
			Scenedesmus obliqnus	EC50	19050	7584	4	Ma et al., 2002a
			Stephanodiscus sp.	NOEC	100	39.81	28	Van den Brink et al., 2000
		Amphibia	*Xenopus laevis*	NOEC	191	7.61	4	Yoon et al., 2008
				LOEC	382	15.22	4	Yoon et al., 2008
					574	22.83	4	Yoon et al., 2008
				LC50	1072	42.67	4	Yoon et al., 2008
		Crustacea	*Acroperus harpae*	NOEC	3.30	1.31	28	Van den Brink et al., 2000
			Alona rectangula	NOEC	33.00	13.14	21	Daam and Van den Brink, 2007
			Alonella exigua	NOEC	33.00	13.14	28	Van den Brink et al., 2000
			Cyclopoida	NOEC	100	39.81	28	Van den Brink et al., 2000
			Daphnia magna	NOEC	10.00	3.98		Canton, 1976
					33.00	13.14	28	Van den Brink et al., 2000
					60.00	2.39	1	Ferreira et al., 2008
					100	39.81	4	Van den Brink et al., 2000
				LOEC	70.00	2.79	1	Ferreira et al., 2008
				EC50	3.50	0.14	1	Ferreira et al., 2008
					20.00	7.96		Canton, 1976
					22.90	0.91	1	Ferreira et al., 2008
					24.40	0.97	1	Ferreira et al., 2008
					28.20	1.12	2	Ferreira et al., 2008
					28.60	1.14	1	Ferreira et al., 2008
					37.00	14.73	28	Van den Brink et al., 2000
					54.10	2.15	2	Ferreira et al., 2008
					68.70	2.73	2	Ferreira et al., 2008
					73.10	2.91	2	Ferreira et al., 2008
					97.54	3.88	1	Ferreira et al., 2008
					103	4.10	2	Ferreira et al., 2008
					113	44.99	4	Van den Brink et al., 2000
					137	5.45	1	Ferreira et al., 2008
					145	5.78	2	Ferreira et al., 2008
					157	6.24	2	Ferreira et al., 2008
					460	18.31	2	Canton, 1976
			Graptoleberis testudinaria	NOEC	33.00	13.14	21	Daam and Van den Brink, 2007
			Macrobrachium ferreirai	LC50	16767	6675	4	Rico et al., 2011
			Simocephalus vetulus	NOEC	33.00	13.14	21	Daam and Van den Brink, 2007
			Simocephalus vetulus	NOEC	33.00	13.14	28	Van den Brink et al., 2000
		Fish	*Colossoma macropomum*	LC50	4162	166	4	Rico et al., 2011
			Hyphessobrycon erythrostigma	LC50	3690	147	4	Rico et al., 2011
			Nannostomus unifasciatus	LC50	4138	165	4	Rico et al., 2011
			Oncorhynchus mykiss	LC50	1800	71.66	2	Canton, 1976
			Otocinclus affinis	LC50	4238	169	4	Rico et al., 2011
			Paracheirodon axelrodi	LC50	1648	65.61	4	Rico et al., 2011
		Fungi	*Fusarium sporotrichioides*	NOEC	2000	796	14	Dijksterhuis et al., 2011
			Trichoderma hamatum	NOEC	260	104	14	Dijksterhuis et al., 2011
		Insecta	*Kiefferulus calligaster*	NOEC	1700	67.68	3	Domingues et al., 2009
					1700	67.68	3	Domingues et al., 2009
					1700	677	6	Domingues et al., 2009
					15000	597	3	Domingues et al., 2009
					15000	597	3	Domingues et al., 2009
					15000	597	3	Domingues et al., 2009
				LOEC	1700	677	6	Domingues et al., 2009
					5000	199	3	Domingues et al., 2009
					5000	199	3	Domingues et al., 2009

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
10605-21-7	Carbendazim	Insecta	*Kiefferulus calligaster*	LOEC	5000	1991	6	Domingues et al., 2009
		Invertebrates	*Colurella uncinata*	NOEC	100	39.81	21	Daam and Van den Brink, 2007
			Epiphanes brachionus	NOEC	33.00	13.14	21	Daam and Van den Brink, 2007
			Keratella quadrata	NOEC	330	131	28	Van den Brink et al., 2000
			Lecane sp.	NOEC	330	131	28	Van den Brink et al., 2000
			Lepadella patella	NOEC	33.00	13.14	21	Daam and Van den Brink, 2007
			Testudinella parva	NOEC	330	131	28	Van den Brink et al., 2000
			Trichocerca sp.	NOEC	330	131	28	Van den Brink et al., 2000
		Mollusca	*Pomacea dolioides*	LC50	1758576	700102	4	Rico et al., 2011
		Plants	*Buenoa unguis*	LC50	73822	2939	3	Rico et al., 2011
			Elodea canadensis	NOEC	10000	3981	21	Belgers et al., 2009
				EC50	9743	3879	21	Belgers et al., 2009
			Elodea nuttallii	NOEC	10000	3981	21	Belgers et al., 2009
			Hydrophilus sp.	LC50	80669	3211	4	Rico et al., 2011
			Myriophyllum spicatum	NOEC	10000	3981	21	Belgers et al., 2009
			Palustra laboulbeni	LC50	111329	4432	4	Rico et al., 2011
			Potamogeton crispus	NOEC	10000	3981	21	Belgers et al., 2009
			Aquatic community	PNEC	0.34	0.14		Oekotoxzentrum, Centre Ecotox
					0.57	0.023		Oekotoxzentrum, Centre Ecotox
683-18-1	Dibutyltindichloride	Algae	*Scenedesmus acutus*	EC50	0.031	1.25	4	Huang et al., 1996
		Crustacea	*Daphnia magna*	EC50	900	3583	1	Vighi and Calamari, 1985
		Fish	*Oncorhynchus mykiss*	NOEC	48.61	1935	110	De Vries et al., 1991
					48.61	1935	110	De Vries et al., 1991
				LOEC	243	9677	110	De Vries et al., 1991
					243	9677	110	De Vries et al., 1991
			Oryzias latipes	NOEC	1800	71659	30	Wester and Canton, 1991
				LOEC	320	12739	30	Wester and Canton, 1991
			Poecilia reticulata	NOEC	1800	71659	30	Wester and Canton, 1991
				LOEC	320	12739	30	Wester and Canton, 1991
		Mollusca	*Anodonta anatina*	LOEC	37.98	1512	210	Herwig and Holwerda, 1986
56-53-1	Diethylstilbestrol	Amphibia	*Xenopus laevis*	LOEC	2.68	0.27	3	Nishimura et al., 1997
					2.68	0.27	3	Nishimura et al., 1997
		Crustacea	*Daphnia magna*	NOEC	100	100	6	Kashian and Dodson, 2004
					100	100	6	Kashian and Dodson, 2004
					100	100	21	Brennan et al., 2006
					200	20.00	2	Zou and Fingerman, 1997
					500	500	21	Baldwin et al., 1995
					500	500	21	Baldwin et al., 1995
					500	500	21	Baldwin et al., 1995
					500	500	21	Brennan et al., 2006
					500	500	21	Brennan et al., 2006
					500	500	21	Brennan et al., 2006
					540	54.00	2	Baldwin et al., 1995
					900	90.00	2	Baldwin et al., 1995
				LOEC	100	100	6	Kashian and Dodson, 2004
					200	200	21	Brennan et al., 2006
					500	50.00	2	Baldwin et al., 1995
					500	500	21	Baldwin et al., 1995
					500	500	21	Baldwin et al., 1995
					500	500	21	Brennan et al., 2006
					500	500		Hannas et al., 2011
				EC50	1090	109	2	Zou and Fingerman, 1997
					1200	120	2	Baldwin et al., 1995
					1550	155	2	Brennan et al., 2006
					1870	187	2	Brennan et al., 2006
					2030	203	1	Brennan et al., 2006
					3710	371	1	Brennan et al., 2006
			Nitocra spinipes	NOEC	30.00	30.00	18	Breitholtz and Bengtsson, 2001
					30.00	30.00	18	Breitholtz and Bengtsson, 2001
				LOEC	30.00	30.00	18	Breitholtz and Bengtsson, 2001
				LC50	290	290	4	Breitholtz and Bengtsson, 2001
		Fish	*Pimephales promelas*	NOEC	3.20	3.20	21	Panter et al., 2002
				LOEC	3.20	3.20	21	Panter et al., 2002
		Worm	*Dugesia japonica*	LC50	500	500	4	Li, 2013
					600	60.00	3	Li, 2013
					700	70.00	2	Li, 2013
					800	80.00	1	Li, 2013
121-75-5	Malathion	Algae		EC50	60000	3786		Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	3000	189		Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	1.00	0.063		Nendza and Wenzel, 2006
		Fish		LC50	200	12.62		Nendza and Wenzel, 2006
			Aquatic community	PNEC	0.097	0.061		U.S. EPA, 1996
7487-94-7	Mercuric chloride	Algae	*Chlorella protothecoides*	LC50	390	778	14	Aliotta et al., 1983
					1960	3911	14	Aliotta et al., 1983
			Chlorella saccharophila	LC50	260	519	14	Aliotta et al., 1983
					3000	5986	14	Aliotta et al., 1983
			Coenochloris sp	LC50	100	200	14	Aliotta et al., 1983
					780	1556	14	Aliotta et al., 1983
			Stichococcus bacillaris	LC50	200	399	14	Aliotta et al., 1983
					600	1197	14	Aliotta et al., 1983
		Crustacea	*Barytelphusa cunicularis*	LC50	450	898	4	Chourpagar and Kulkarni, 2011
					630	1257	4	Chourpagar and Kulkarni, 2011
				LC50	860	1716	4	Chourpagar and Kulkarni, 2011
					1040	2075	4	Chourpagar and Kulkarni, 2011
			Ceriodaphnia dubia	EC50	7.00	1.40	2	Valenti et al., 2006
					11.00	2.19	2	Valenti et al., 2006
			Cypris subglobosa	EC50	97.00	19.35	2	Khangarot and Das, 2009
					369	73.63	2	Khangarot and Das, 2009
			Daphnia magna	NOEC	8.00	1.60	2	Valenti et al., 2006
				EC50	19.00	3.79	2	Valenti et al., 2006
					90.00	17.96	2	Valenti et al., 2006
			Macrobrachium rosenbergii	NOEC	10.00	19.95	4	Kaoud et al., 2011
					50.00	99.76	4	Kaoud et al., 2011
					50.00	99.76	4	Kaoud et al., 2011
				LOEC	50.00	99.76	4	Kaoud et al., 2011
					100	200	4	Kaoud et al., 2011
					100	200	4	Kaoud et al., 2011
				LC50	430	858	4	Kaoud et al., 2011
			Oziotelphusa senex	LOEC	70.00	13.97	1	Reddy et al., 2011
		Fish	*Danio rerio*	LC50	20.00	3.99	2	Lahnsteiner, 2008
			Oreochromis niloticus	NOEC	80.00	160	14	Carvalho et al., 2009
					80.00	160	14	Carvalho et al., 2009
				LOEC	80.00	160	14	Carvalho et al., 2009
			Tinca tinca	NOEC	100	19.95	1	Shah and Altindag, 2004
					100	19.95	4	Shah and Altindag, 2004
					100	19.95	4	Shah and Altindag, 2004
					100	200	21	Shah and Altindag, 2004
					250	49.88	1	Shah and Altindag, 2004
					250	49.88	1	Shah and Altindag, 2004

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
7487-94-7	Mercuric chloride	Fish	*Tinca tinca*	NOEC	250	49.88	1	Shah and Altindag, 2004
					250	49.88	4	Shah and Altindag, 2004
					250	499	21	Shah and Altindag, 2004
					1000	200	2	Shah and Altindag, 2004
				LOEC	100	19.95	1	Shah and Altindag, 2004
					100	19.95	4	Shah and Altindag, 2004
					100	200	21	Shah and Altindag, 2004
					100	200	21	Shah and Altindag, 2004
					250	49.88	4	Shah and Altindag, 2004
					250	49.88	4	Shah and Altindag, 2004
					250	499	21	Shah and Altindag, 2004
					250	499	21	Shah and Altindag, 2004
					1000	200	2	Shah and Altindag, 2004
					1000	200	2	Shah and Altindag, 2004
		Insecta	*Chimarra sp.*	NOEC	1.00	2.00	4	Xie et al., 2009
				LOEC	1.00	2.00	4	Xie et al., 2009
			Hydropsyche betteni	NOEC	1.00	2.00	4	Xie et al., 2009
				LOEC	1.00	2.00	4	Xie et al., 2009
			Isonychia sp.	LOEC	1.00	2.00	4	Xie et al., 2009
			Maccaffertium modestum	NOEC	1.00	2.00	4	Xie et al., 2009
				LOEC	1.00	2.00	4	Xie et al., 2009
		Mollusca	*Dreissena polymorpha*	NOEC	40.00	79.81	5	Faria et al., 2009
					40.00	79.81	5	Faria et al., 2009
					40.00	79.81	5	Faria et al., 2009
					40.00	79.81	5	Faria et al., 2009
				LOEC	40.00	79.81	5	Faria et al., 2009
					40.00	79.81	5	Faria et al., 2009
				EC50	0.73	0.15	2	Faria et al., 2010
			Epioblasma brevidens	LC50	27.00	5.39	2	Valenti et al., 2006
					47.00	9.38	2	Valenti et al., 2006
			Epioblasma capsaeformis	LC50	25.00	4.99	2	Valenti et al., 2006
					27.00	5.39	2	Valenti et al., 2006
					36.00	7.18	2	Valenti et al., 2006
					54.00	10.77	2	Valenti et al., 2006
			Lampsilis fasciola	LC50	40.00	7.98	1	Valenti et al., 2006
					40.00	7.98	2	Valenti et al., 2006
			Unio elongatulus	EC50	104	20.74	2	Faria et al., 2010
115-09-3	Methylmercury(II) chloride	Crustacea	*Ceriodaphnia dubia*	EC50	4.00	10.05	2	Valenti et al., 2006
					8.00	20.10	2	Valenti et al., 2006
					25.00	62.80	2	Valenti et al., 2006
					30.00	75.36	2	Valenti et al., 2006
			Daphnia magna	NOEC	15.00	37.68	2	Valenti et al., 2006
				EC50	15.00	37.68	2	Valenti et al., 2006
					18.00	45.21	2	Valenti et al., 2006
					20.00	50.24	2	Valenti et al., 2006
					60.00	151	2	Valenti et al., 2006
		Fish	*Danio rerio*	LC50	11.50	28.89	4	OECD, 2012
					13.40	33.66	4	OECD, 2012
					14.40	36.17	4	OECD, 2012
					20.10	50.49	2	OECD, 2012
					21.70	54.51	2	OECD, 2012
					22.20	55.76	2	OECD, 2012
					29.20	73.35	4	OECD, 2012
					30.30	76.11	4	OECD, 2012
					30.30	76.11	4	OECD, 2012
					39.90	100	4	OECD, 2012
					40.60	102	4	OECD, 2012
					42.70	107	4	OECD, 2012
					43.10	108	2	OECD, 2012
					43.70	110	2	OECD, 2012
					46.20	116	2	OECD, 2012
					60.60	152	2	OECD, 2012
					124	311	2	Bachmann, 2002
			Pimephales promelas	LC50	39.00	97.96	4	Devlin, 2006
					67.00	168	2	Valenti et al., 2006
					120	301	2	Valenti et al., 2006
		Mollusca	*Dreissena polymorpha*	NOEC	40.00	1005	5	Faria et al., 2009
					40.00	1005	5	Faria et al., 2009
					40.00	1005	5	Faria et al., 2009
					40.00	1005	5	Faria et al., 2009
				LOEC	40.00	1005	5	Faria et al., 2009
				EC50	1.42	3.57	2	Faria et al., 2010
			Epioblasma brevidens	LC50	8.00	20.10	2	Valenti et al., 2006
					25.00	62.80	2	Valenti et al., 2006
			Epioblasma capsaeformis	LC50	8.00	20.10	2	Valenti et al., 2006
					8.00	20.10	2	Valenti et al., 2006
					21.00	52.75	2	Valenti et al., 2006
					26.00	65.31	2	Valenti et al., 2006
			Unio elongatulus	EC50	31.37	78.80	2	Faria et al., 2010
			Villosa iris	LC50	43.00	108	2	Valenti et al., 2006
					120	301	2	Valenti et al., 2006
84371-65-3	Mifepristone	Amphibia	*Xenopus laevis*	NOEC	10740	2.14	1	Pickford and Morris, 1999
		Fish	*Danio rerio*	NOEC	107	2.14	4	Hillegass et al., 2008
					108	2.15	4	Hillegass et al., 2008
7718-54-9	Nickel (II) chloride	Algae	*Selenastrum capricornutum*	NOEC	16.60	0.17	3	Deleebeeck et al., 2009
					18.00	0.18	3	Deleebeeck et al., 2009
					21.20	0.21	3	Deleebeeck et al., 2009
					21.50	0.22	3	Deleebeeck et al., 2009
					26.20	0.26	3	Deleebeeck et al., 2009
					26.40	0.26	3	Deleebeeck et al., 2009
					26.90	0.27	3	Deleebeeck et al., 2009
					29.40	0.29	3	Deleebeeck et al., 2009
					31.50	0.32	3	Deleebeeck et al., 2009
					31.90	0.32	3	Deleebeeck et al., 2009
					33.40	0.33	3	Deleebeeck et al., 2009
					34.50	0.35	3	Deleebeeck et al., 2009
					38.10	0.38	3	Deleebeeck et al., 2009
					41.90	0.42	3	Deleebeeck et al., 2009
					47.30	0.47	3	Deleebeeck et al., 2009
					47.90	0.48	3	Deleebeeck et al., 2009
					48.60	0.49	3	Deleebeeck et al., 2009
					52.10	0.52	3	Deleebeeck et al., 2009
					52.30	0.52	3	Deleebeeck et al., 2009
					54.00	0.54	3	Deleebeeck et al., 2009
					55.70	0.56	3	Deleebeeck et al., 2009
					65.00	0.65	3	Deleebeeck et al., 2009
					65.00	0.65	3	Deleebeeck et al., 2009
					67.10	0.67	3	Deleebeeck et al., 2009
					68.40	0.68	3	Deleebeeck et al., 2009

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
7718-54-9	Nickel (II) chloride	Algae	*Selenastrum capricornutum*	NOEC	73.00	0.73	3	Deleebeeck et al., 2009
					78.40	0.78	3	Deleebeeck et al., 2009
					83.00	0.83	3	Deleebeeck et al., 2009
					88.90	0.89	3	Deleebeeck et al., 2009
					89.40	0.89	3	Deleebeeck et al., 2009
					93.80	0.94	3	Deleebeeck et al., 2009
					97.70	0.98	3	Deleebeeck et al., 2009
					98.60	0.99	3	Deleebeeck et al., 2009
					104	1.04	3	Deleebeeck et al., 2009
					132	1.32	3	Deleebeeck et al., 2009
					145	1.45	3	Deleebeeck et al., 2009
					154	1.54	3	Deleebeeck et al., 2009
					181	1.81	3	Deleebeeck et al., 2009
					187	1.87	3	Deleebeeck et al., 2009
					278	2.78	3	Deleebeeck et al., 2009
					285	2.85	3	Deleebeeck et al., 2009
					292	2.92	3	Deleebeeck et al., 2009
					327	3.27	3	Deleebeeck et al., 2009
				LOEC	16.60	0.17	3	Deleebeeck et al., 2009
					31.50	0.32	3	Deleebeeck et al., 2009
					32.30	0.32	3	Deleebeeck et al., 2009
					36.70	0.37	3	Deleebeeck et al., 2009
					38.10	0.38	3	Deleebeeck et al., 2009
					42.50	0.43	3	Deleebeeck et al., 2009
					43.00	0.43	3	Deleebeeck et al., 2009
					45.50	0.46	3	Deleebeeck et al., 2009
					48.40	0.48	3	Deleebeeck et al., 2009
					49.30	0.49	3	Deleebeeck et al., 2009
					51.00	0.51	3	Deleebeeck et al., 2009
					52.10	0.52	3	Deleebeeck et al., 2009
					52.30	0.52	3	Deleebeeck et al., 2009
					54.10	0.54	3	Deleebeeck et al., 2009
					55.70	0.56	3	Deleebeeck et al., 2009
					59.60	0.60	3	Deleebeeck et al., 2009
					65.00	0.65	3	Deleebeeck et al., 2009
					84.90	0.85	3	Deleebeeck et al., 2009
					89.40	0.89	3	Deleebeeck et al., 2009
					93.80	0.94	3	Deleebeeck et al., 2009
					97.20	0.97	3	Deleebeeck et al., 2009
					100	1.00	3	Deleebeeck et al., 2009
					101	1.01	3	Deleebeeck et al., 2009
					102	1.02	3	Deleebeeck et al., 2009
					103	1.03	3	Deleebeeck et al., 2009
					104	1.04	3	Deleebeeck et al., 2009
					116	1.16	3	Deleebeeck et al., 2009
					119	1.19	3	Deleebeeck et al., 2009
					129	1.29	3	Deleebeeck et al., 2009
					155	1.55	3	Deleebeeck et al., 2009
					163	1.63	3	Deleebeeck et al., 2009
					168	1.68	3	Deleebeeck et al., 2009
					176	1.76	3	Deleebeeck et al., 2009
					186	1.86	3	Deleebeeck et al., 2009
					217	2.17	3	Deleebeeck et al., 2009
					278	2.78	3	Deleebeeck et al., 2009
					280	2.80	3	Deleebeeck et al., 2009
					320	3.20	3	Deleebeeck et al., 2009
					326	3.26	3	Deleebeeck et al., 2009
					390	3.90	3	Deleebeeck et al., 2009
					537	5.37	3	Deleebeeck et al., 2009
					570	5.70	3	Deleebeeck et al., 2009
					953	9.53	3	Deleebeeck et al., 2009
				EC50	81.50	0.81	3	Deleebeeck et al., 2009
					83.10	0.83	3	Deleebeeck et al., 2009
					91.80	0.92	3	Deleebeeck et al., 2009
					93.70	0.94	3	Deleebeeck et al., 2009
					98.30	0.98	3	Deleebeeck et al., 2009
					108	1.08	3	Deleebeeck et al., 2009
					114	1.14	3	Deleebeeck et al., 2009
					122	1.22	3	Deleebeeck et al., 2009
					124	1.24	3	Deleebeeck et al., 2009
					125	1.25	3	Deleebeeck et al., 2009
					136	1.36	3	Deleebeeck et al., 2009
					141	1.41	3	Deleebeeck et al., 2009
					144	1.44	3	Deleebeeck et al., 2009
					145	1.45	3	Deleebeeck et al., 2009
					172	1.72	3	Deleebeeck et al., 2009
					255	2.55	3	Deleebeeck et al., 2009
					321	3.21	3	Deleebeeck et al., 2009
					339	3.39	3	Deleebeeck et al., 2009
					345	3.45	3	Deleebeeck et al., 2009
					362	3.62	3	Deleebeeck et al., 2009
					395	3.95	3	Deleebeeck et al., 2009
					399	3.99	3	Deleebeeck et al., 2009
					400	4.00	3	Deleebeeck et al., 2009
					483	4.83	3	Deleebeeck et al., 2009
					506	5.06	3	Deleebeeck et al., 2009
					508	5.08	3	Deleebeeck et al., 2009
					584	5.84	3	Deleebeeck et al., 2009
					596	5.96	3	Deleebeeck et al., 2009
					601	6.01	3	Deleebeeck et al., 2009
					669	6.69	3	Deleebeeck et al., 2009
					742	7.42	3	Deleebeeck et al., 2009
					750	7.50	3	Deleebeeck et al., 2009
					812	8.12	3	Deleebeeck et al., 2009
					821	8.21	3	Deleebeeck et al., 2009
					880	8.80	3	Deleebeeck et al., 2009
					883	8.83	3	Deleebeeck et al., 2009
					914	9.14	3	Deleebeeck et al., 2009
					1040	10.40	3	Deleebeeck et al., 2009
					1120	11.20	3	Deleebeeck et al., 2009
					1190	11.90	3	Deleebeeck et al., 2009
					1240	12.40	3	Deleebeeck et al., 2009
					1630	16.30	3	Deleebeeck et al., 2009
		Amphibia	*Rhinella arenarum*	NOEC	4000	40.00	1	Sztrum et al., 2011
					10000	100	1	Sztrum et al., 2011
				LOEC	10000	100	1	Sztrum et al., 2011
				LC50	50.00	5.00	14	Sztrum et al., 2011
					150	15.00	14	Sztrum et al., 2011
					250	25.00	14	Sztrum et al., 2011

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
7718-54-9	Nickel (II) chloride	Amphibia	*Rhinella arenarum*	LC50	350	35.00	14	Sztrum et al., 2011
					1000	100	14	Sztrum et al., 2011
					2000	200	14	Sztrum et al., 2011
					3000	300	14	Sztrum et al., 2011
					4000	400	14	Sztrum et al., 2011
					6000	600	14	Sztrum et al., 2011
					8000	800	14	Sztrum et al., 2011
					17000	1700	14	Sztrum et al., 2011
					20000	2000	14	Sztrum et al., 2011
		Crustacea	*Acartia tonsa*	LC50	747	7.47	3	Lussier and Cardin, 1985
			Asellus intermedius	LC50	75000	7500	4	Ewell et al., 1986
					100000	10000	4	Ewell et al., 1986
			Ceriodaphnia dubia	NOEC	2.25	0.23	8	Puttaswamy and Liber, 2012
					2.25	0.23	8	Puttaswamy and Liber, 2012
					3.00	0.30	8	Puttaswamy and Liber, 2012
					3.40	0.34	7	Keithly et al., 2004
					3.80	0.38	7	Keithly et al., 2004
					3.80	0.38	7	Keithly et al., 2004
					5.30	0.53	7	Keithly et al., 2004
					5.30	0.53	7	Keithly et al., 2004
					5.80	0.58	7	Keithly et al., 2004
					8.00	0.80	8	Puttaswamy and Liber, 2012
					9.60	0.96	7	Keithly et al., 2004
					15.30	1.53	7	Keithly et al., 2004
				LOEC	3.80	0.38	7	Keithly et al., 2004
					3.80	0.38	7	Keithly et al., 2004
					5.30	0.53	7	Keithly et al., 2004
					8.00	0.80	8	Puttaswamy and Liber, 2012
					9.60	0.96	7	Keithly et al., 2004
					9.90	0.99	7	Keithly et al., 2004
					9.90	0.99	7	Keithly et al., 2004
					17.30	1.73	7	Keithly et al., 2004
					27.50	2.75	7	Keithly et al., 2004
				EC50	5.00	0.50	8	Puttaswamy and Liber, 2012
					5.90	0.59	8	Puttaswamy and Liber, 2012
					5.90	0.59	8	Puttaswamy and Liber, 2012
					8100	0.81	2	Keithly et al., 2004
					148	1.48	2	Keithly et al., 2004
					261	2.61	2	Keithly et al., 2004
					400	4.00	2	Keithly et al., 2004
					1723	172	14	Keithly et al., 2004
			Cypris subglobosa	EC50	75780	758	2	Khangarot and Das, 2009
					86840	868	2	Khangarot and Das, 2009
			Daphnia magna	NOEC	125	12.50	4	Vandenbrouck et al., 2009
					125	12.50	4	Vandenbrouck et al., 2009
					500	50.00	4	Vandenbrouck et al., 2009
					500	50.00	4	Vandenbrouck et al., 2009
					2000	200	4	Vandenbrouck et al., 2009
				LOEC	125	12.50	4	Vandenbrouck et al., 2009
					125	12.50	4	Vandenbrouck et al., 2009
					125	12.50	4	Vandenbrouck et al., 2009
					500	50.00	4	Vandenbrouck et al., 2009
					500	50.00	4	Vandenbrouck et al., 2009
					1000	100	4	Vandenbrouck et al., 2009
					1000	100	4	Vandenbrouck et al., 2009
				EC50	2400	24.00	1	Loureiro et al., 2010
					3200	320	4	Ewell et al., 1986
					8000	80.00	2	Loureiro et al., 2010
			Eurytemora affinis	LC50	13182	1318	4	Lussier and Cardin, 1985
			Gammarus fasciatus	LC50	100000	10000	4	Ewell et al., 1986
			Hyalella azteca	NOEC	29.00	2.90	14	Keithly et al., 2004
				LOEC	58.00	5.80	14	Keithly et al., 2004
					1500	150	14	Mwangi et al., 2012
					1500	150	14	Mwangi et al., 2012
				LC50	3045	305	4	Keithly et al., 2004
		Fish	*Capoeta fusca*	LC50	78000	780	4	Pourkhabbaz et al., 2011
					86200	862	4	Pourkhabbaz et al., 2011
					95800	958	4	Pourkhabbaz et al., 2011
					121300	1213	4	Pourkhabbaz et al., 2011
					127200	1272	4	Pourkhabbaz et al., 2011
					139900	1399	4	Pourkhabbaz et al., 2011
					165500	1655	4	Pourkhabbaz et al., 2011
					215000	2150	4	Pourkhabbaz et al., 2011
			Danio rerio	NOEC	5000	50.00	0.08	Kienle et al., 2009
					5080	508	11	Kienle et al., 2009
					15000	150	0.08	Kienle et al., 2009
					15420	1542	11	Kienle et al., 2009
				LOEC	7500	75.00	0.08	Kienle et al., 2009
					10470	1047	11	Kienle et al., 2009
				LC50	289800	2898	2	Lahnsteiner, 2008
			Ictalurus punctatus	LOEC	15000	150	4	Kuykendall et al., 2009
			Lepomis macrochirus	LOEC	15000	150	4	Kuykendall et al., 2009
			Oncorhynchus mykiss	LOEC	15000	150	4	Kuykendall et al., 2009
			Pimephales promelas	LC50	40000	400	4	Ewell et al., 1986
					100000	1000	4	Ewell et al., 1986
		Insecta	*Chironomus riparius*	NOEC	5000	500	28	Langer-Jaesrich et al., 2010
		Mollusca	*Planorbella trivolvis*	LC50	3200	320	4	Ewell et al., 1986
		Worm	*Dugesia tigrina*	LC50	32000	3200	4	Ewell et al., 1986
			Lumbriculus variegatus	LC50	32000	3200	4	Ewell et al., 1986
					48000	4800	4	Ewell et al., 1986
2310-17-0	Phosalone	Algae	*Selenastrum capricornutum*	EC50	830	132	3	Graff et al., 2003
					930	147	3	Graff et al., 2003
		Fish	*Channa orientalis*	LC50	81.00	12.84	4	Verma et al., 1978b
			Danio rerio	EC50	3443	546	5	Padilla et al., 2012
			Heteropneustes fossilis	LC50	83.00	13.15	4	Verma et al., 1982
114-26-1	Propoxur	Algae		EC50	10000	19.95		Nendza and Wenzel, 2006
		Bacteria	*Vibrio fisheri*	EC50	36000	71.83		Nendza and Wenzel, 2006
		Crustacea	*Daphnia magna*	EC50	110	0.22		Nendza and Wenzel, 2006
		Fish		LC50	8800	17.56		Nendza and Wenzel, 2006
302-79-4	Retinoic acid	Crustacea	*Daphnia magna*	NOEC	100	15.85	>7	Peterson et al., 2001
					800	127		Wang et al., 2005
		Fish	*Danio rerio*	NOEC	0.60	0.010	2	Teixido et al., 2013
					3.00	0.048	2	Teixido et al., 2013
				LOEC	0.30	0.0048	2	Teixido et al., 2013
					1.50	0.024	2	Teixido et al., 2013
					3004351	47616	2	Elo et al., 2007
				EC50	0.42	0.0067	6	Selderslaghs et al., 2012
					1.48	0.023	3	Selderslaghs et al., 2012
					3.58	0.057	2	Selderslaghs et al., 2012

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
302-79-4	Retinoic acid	Fish	*Danio rerio*	EC50	5.71	0.090	2	Teixido et al., 2013
					234	3.70	1	Selderslaghs et al., 2012
				LC50	15.32	0.24	2	Teixido et al., 2013
					40.26	0.64	6	Selderslaghs et al., 2012
					442	7.00	3	Selderslaghs et al., 2012
					865	13.71	2	Selderslaghs et al., 2012
					2121	33.62	1	Selderslaghs et al., 2012
1948-33-0	tBHQ	Fish	*Ictalurus punctatus*	LC50	370	73.82	2	Cope et al., 1997
			Lepomis macrochirus	LC50	150	29.93	2	Cope et al., 1997
			Oncorhynchus mykiss	LC50	370	73.82	2	Cope et al., 1997
		Mollusca	*Dreissena polymorpha*	EC50	1000	200	2	Cope et al., 1997
				LC50	118000	23544	2	Cope et al., 1997
56-36-0	Tributyltin acetate	Fish	*Oryzias latipes*	LC50	34.00	67.84	2	Tsuji et al., 1986
					38.00	75.82	1	Tsuji et al., 1986
		Insecta	*Aedes aegypti*	LC50	430	858	1	Kumar-Das et al., 1984
		Mollusca	*Biomphalaria glabrata*	LC50	19.00	37.91	1	Frick and Dejimenez , 1964
					31.00	61.85	1	Frick and Dejimenez , 1964
					41.00	81.81	1	Frick and Dejimenez , 1964
					74.00	148	0.25	Frick and Dejimenez , 1964
					74.00	148	1	Frick and Dejimenez , 1964
					85.00	170	1	Frick and Dejimenez , 1964
					88.00	176	0.25	Frick and Dejimenez , 1964
					94.00	188	0.25	Frick and Dejimenez , 1964
					190	379	0.25	Frick and Dejimenez , 1964
					200	399	0.25	Frick and Dejimenez , 1964
					200	399	1	Frick and Dejimenez, 1963
					230	459	1	Frick and Dejimenez , 1964
					230	459	1	Frick and Dejimenez, 1963
					270	539	0.25	Frick and Dejimenez, 1963
					560	1117	0.25	Frick and Dejimenez , 1964
					560	1117	0.25	Frick and Dejimenez, 1963
1461-22-9	Tributyltinchloride	Algae	*Scenedesmus acutus*	EC50	0.058	5.80	4	Huang et al., 1996
			Selenastrum capricornutum	NOEC	1.20	120	4	Miana et al., 1993
					2.00	200	4	Miana et al., 1993
				LOEC	4.00	400	4	Miana et al., 1993
				EC50	12.40	1240	4	Miana et al., 1993
		Crustacea	*Daphnia magna*	NOEC	1.00	100	21	Baer and Owens, 1999
					1.20	12.00	2	LeBlanc and McLachlan, 2000
					1.25	125	21	Oberdorster et al., 1998
					1.90	19.00	2	Miana et al., 1993
					5.50	55.00	1	Miana et al., 1993
				LOEC	1.25	125	21	Oberdorster et al., 1998
					2.50	250	21	Oberdorster et al., 1998
				EC50	0.95	9.50	1	Kungolos et al., 2001
					3.40	340	5	Meador, 1986
					4.38	43.80	2	Bao et al., 1997
					5.90	590	4	Meador, 1986
					9.80	98.00	2	Miana et al., 1993
					12.50	125	1	Miana et al., 1993
					13.00	130	1	Vighi and Calamari, 1985
					13.20	132	1	Bao et al., 1997
					15.00	150	1	De Coen et al., 1998
			Hyalella azteca	LC50	1.56	156	28	Borgmann et al., 1996
					6.18	618	7	Borgmann et al., 1996
		Fish	*Oncorhynchus mykiss*	NOEC	0.039	3.91	110	De Vries et al., 1991
					0.20	19.53	110	De Vries et al., 1991
					1.00	100	110	Seinen et al., 1981
				LOEC	0.20	19.53	110	De Vries et al., 1991
					0.20	19.53	110	De Vries et al., 1991
					0.20	20.00	110	Seinen et al., 1981
					0.98	97.65	110	De Vries et al., 1991
					1.00	100	110	Seinen et al., 1981
					50.00	500	0.045	Baldwin et al., 1994
				LC50	11.20	112	4	Douglas et al., 1986
					20.00	200	4	Baldwin et al., 1994
			Phoxinus phoxinus	NOEC	0.89	89.00	9	Fent and Meier, 1992
				LOEC	0.89	89.00	8	Fent and Meier, 1992
					4.50	450	9	Fent and Meier, 1992
			Salmo salar	NOEC	0.050	5.00	7	Lyssimachou et al., 2006
					0.25	25.00	7	Lyssimachou et al., 2006
				LOEC	0.25	25.00	7	Lyssimachou et al., 2006
		Insecta	*Aedes aegypti*	LC50	390	3900	1	Kumar-Das et al., 1984
		Mollusca	*Dreissena polymorpha*	LOEC	1.00	10.00	1	Clayton et al, 2000
				EC50	0.36	3.60	2	Faria et al., 2010
			Lamellidens marginalis	LC50	1720	172000	4	Jagtap and Shejule, 2010
					2650	26500	3	Jagtap and Shejule, 2010
					3390	33900	2	Jagtap and Shejule, 2010
					4650	46500	1	Jagtap and Shejule, 2010
			Marisa cornuarietis	NOEC	0.50	50.00	150	Janer et al., 2006
				LOEC	0.030	3.00	150	Janer et al., 2006
					0.030	3.00	150	Janer et al., 2006
					0.13	12.50	150	Janer et al., 2006
					0.50	50.00	150	Janer et al., 2006
			Unio elongatulus	EC50	13.90	139	2	Faria et al., 2010
		Protozoa	*Paramecium caudatum*	EC50	18.55	1855	5	Miyoshi et al., 2003
					29.30	2930	2	Miyoshi et al., 2003
			Paramecium trichium	EC50	74.87	7487	5	Miyoshi et al., 2003
					97.65	9765	2	Miyoshi et al., 2003
50471-44-8	Vinclozolin	Algae	*Navicula pelliculosa*	EC50	1060	168	5	U.S. EPA, 2013
			Selenastrum capricornutum	NOEC	2540	403	5	U.S. EPA, 2013
				EC50	1020	162	5	U.S. EPA, 2013
			Skeletonema costatum	EC50	870	138	5	U.S. EPA, 2013
		Crustacea	*Americamysis bahia*	NOEC	580	91.92	4	U.S. EPA, 2013
				LC50	1800	285	4	U.S. EPA, 2013
			Daphnia magna	NOEC	790	125	21	U.S. EPA, 2013
					790	125	21	U.S. EPA, 2013
					790	125	21	U.S. EPA, 2013
					1000	15.85	2	U.S. EPA, 2013
					1000	158	21	Haeba et al., 2008
					3000	47.55	1	Haeba et al., 2008
					3000	47.55	2	Haeba et al., 2008
				LOEC	1000	158	21	Haeba et al., 2008
					1400	222	21	U.S. EPA, 2013
					1400	222	21	U.S. EPA, 2013
					1400	222	21	U.S. EPA, 2013
					2400	380	21	U.S. EPA, 2013
				EC50	3650	57.85	2	U.S. EPA, 2013
		Fish	*Cyprinodon variegatus*	NOEC	1100	17.43	4	U.S. EPA, 2013
			Danio rerio	EC50	10741	170	5	Padilla et al., 2012

CAS	Compound	Organism		Measured endpoint	Concentration (µg/L)	Final TEQs (µg/L)	Exposure time (days)	Reference
50471-44-8	Vinclozolin	Fish	*Gasterosteus aculeatus*	LOEC	100	15.85	21	Jolly et al., 2009
			Lepomis gibbosus	NOEC	68100	1079	4	U.S. EPA, 2013
				LC50	49800	789	4	U.S. EPA, 2013
			Lepomis macrochirus	LC50	47500	753	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	1040	16.48	4	U.S. EPA, 2013
					1800	28.53	4	U.S. EPA, 2013
					3160	50.08	4	U.S. EPA, 2013
				LC50	2840	45.01	4	U.S. EPA, 2013
					13600	216	4	U.S. EPA, 2013
			Oryzias latipes	NOEC	2500	396	100	Kiparissis et al., 2003
				LOEC	2500	396	100	Kiparissis et al., 2003
					2500	396	100	Kiparissis et al., 2003
			Pimephales promelas	NOEC	50.00	7.92	175	U.S. EPA, 2013
					50.00	7.92	175	U.S. EPA, 2013
					50.00	7.92	175	U.S. EPA, 2013
					50.00	7.92	175	U.S. EPA, 2013
					450	71.32	21	Martinovic et al., 2008
					700	111	21	Makynen et al., 2000
					700	111	21	Makynen et al., 2000
					1200	190	34	Makynen et al., 2000
					1200	190	34	Makynen et al., 2000
				LOEC	60.00	9.51	21	Martinovic et al., 2008
					60.00	9.51	21	Martinovic et al., 2008
					100	15.85	21	Villeneuve et al., 2007
					150	23.77	175	U.S. EPA, 2013
					150	23.77	175	U.S. EPA, 2013
					150	23.77	175	U.S. EPA, 2013
					150	23.77	175	U.S. EPA, 2013
					255	40.41	21	Martinovic et al., 2008
					255	40.41	21	Martinovic et al., 2008
					450	71.32	21	Martinovic et al., 2008
					450	71.32	21	Martinovic et al., 2008
					450	71.32	21	Martinovic et al., 2008
					700	111	21	Makynen et al., 2000
					700	111	21	Makynen et al., 2000
					700	111	21	Makynen et al., 2000
					1200	190	34	Makynen et al., 2000
		Invertebrates	*Brachionus calyciflorus*	NOEC	3120	49.45	1	Zavala-Aguirre et al., 2007
				LOEC	6250	99.06	1	Zavala-Aguirre et al., 2007
				LC50	30500	483	1	Zavala-Aguirre et al., 2007
		Mollusca	*Crassostrea virginica*	NOEC	2100	333	4	U.S. EPA, 2013
				EC50	3200	507	4	U.S. EPA, 2013
			Marisa cornuarietis	LOEC	0.030	0.0048	140	Tillmann et al., 2001
			Physa acuta	LOEC	5000	792	21	Sanchez-Arguello et al., 2012
		Plants	*Lemna gibba*	NOEC	2400	380	14	U.S. EPA, 2013
				EC50	900	14.26	5	U.S. EPA, 2013
		Protozoa	*Acanthamoeba castellani*	LOEC	10000	1585	6	Prescott et al., 1977

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CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
1746-01-6	2,3,7,8 TCDD	Amphibia	*Pseudacris triseriata*	NOEC	30000	598579	2	Collier et al., 2008
					30000	598579	2	Collier et al., 2008
				LOEC	300	5986	2	Collier et al., 2008
					300	5986	2	Collier et al., 2008
			Xenopus laevis	NOEC	30000	598579	3	Collier et al., 2008
				LOEC	300	5986	2	Collier et al., 2008
					30000	598579	2	Collier et al., 2008
		Crustacea	*Daphnia magna*	NOEC	1000	199526		Wu et al., 2001
					1030	20551	2	Adams et al., 1986
				LOEC	0.10	19.95	8	Wu et al., 2001
		Fish	*Esox lucius*	LOEC	0.10	2.00	4	Helder, 1980
					0.10	2.00	4	Helder, 1980
					1.10	21.95	4	Helder, 1980
			Fundulus heteroclitus	LC50	20000	399052	0.08	Toomey et al., 2001
			Gobiocypris rarus	LOEC	0.0020	0.40	120	Wu et al., 2001
					0.0020	0.40	chronic	Wu et al., 2001
					1.00	19.95	2	Wu et al., 2001
					1.00	200	120	Wu et al., 2001
					1.00	200	chronic	Wu et al., 2001
			Oryzias latipes	NOEC	3.40	67.84	until 3 dph	Kim and Cooper, 1998
				LOEC	12.00	2394	10	Wisk and Cooper, 1992
					12.00	2394	10	Wisk and Cooper, 1992
				EC50	1.20	23.94	3	Chen and Cooper, 1999
					2.20	439	11 dph	Wisk and Cooper, 1990b
					2.80	55.87	4	Kim and Cooper, 1998
					3.50	69.83	until 3 dph	Wisk and Cooper, 1990b
					5.60	112	until 3 dph	Kim and Cooper, 1999
					6.00	120	3	Wisk and Cooper, 1990a
					10.10	202	until 3 dph	Kim and Cooper, 1999
					12.50	249	until 3 dph	Kim and Cooper, 1999
					14.00	279	until 3 dph	Wisk and Cooper, 1990b
					14.00	279	until 3 dph	Wisk and Cooper, 1990b
					15.00	299	3	Wisk and Cooper, 1990a
					15.80	315	until 3 dph	Chen and Cooper, 1999
					18.40	367	until 3 dph	Chen and Cooper, 1999
					26.80	535	until 3 dph	Chen and Cooper, 1999
				LC50	5.70	1137	17	Metcalfe et al., 1997
					8.10	162	until 3 dph	Kim and Cooper, 1999
					9.00	180	until 3 dph	Wisk and Cooper, 1990b
					13.00	259	3	Wisk and Cooper, 1990a
					13.50	269	until 3 dph	Chen and Cooper, 1999
			Pimephales promelas	NOEC	0.70	140	28	Adams et al., 1986
					3.80	75.82	1	Olivieri and Cooper, 1997
					3.80	75.82	1	Olivieri and Cooper, 1997
					10.16	203	until 2 dph	Olivieri and Cooper, 1997
				LOEC	0.37	7.38	until 2 dph	Olivieri and Cooper, 1997
				LC50	1.70	339	28	Adams et al., 1986
			Salvelinus namaycush	NOEC	34.00	678	2	Walker et al., 1991
				LOEC	1.00	19.95	2	Spitsbergen et al., 1991
					10.00	200	2	Spitsbergen et al., 1991
					55.00	1097	2	Walker et al., 1991
					55.00	1097	2	Walker et al., 1991
					226	4509	2	Walker et al., 1991
				LC50	65.00	1297	2	Walker et al., 1991
		Insecta	*Aedes aegypti*	NOEC	200	39905	17	Miller et al., 1973
		Mollusca	*Physa sp.*	LOEC	200	39905	36	Miller et al., 1973
		Worm	*Paranais sp.*	LOEC	200	39905	55	Miller et al., 1973
50-32-8	Benzo [a] pyrene	Algae	*Anabaena flosaquae*	NOEC	4000000	400000	3	Schoeny et al., 1988
				EC50	4000000	400000	3	Schoeny et al., 1988
			Ankistrodesmus braunii	NOEC	4000000	400000	3	Schoeny et al., 1988
				EC50	1300000	130000	3	Schoeny et al., 1988
			Chlamydomonas reinhardtii	NOEC	4000000	400000	3	Schoeny et al., 1988
				EC50	4000000	400000	3	Schoeny et al., 1988
			Euglena gracilis	NOEC	4000000	400000	3	Schoeny et al., 1988
				EC50	4000000	400000	3	Schoeny et al., 1988
			Ochromonas malhamensis	NOEC	4000000	400000	3	Schoeny et al., 1988
				EC50	4000000	400000	3	Schoeny et al., 1988
			Scenedesmus acutus	NOEC	4000000	400000	3	Schoeny et al., 1988
				EC50	5000	500	3	Schoeny et al., 1988
			Selenastrum capricornutum	NOEC	4000000	400000	3	Schoeny et al., 1988
				EC50	15000	1500	3	Schoeny et al., 1988
				LC50	400000	40000	1	Warshawskyet al., 1995
					400000	400000	6	Warshawskyet al., 1995
		Algae		EC50	5000	500		Nendza and Wenzel, 2006
		Amphibia	*Pelophylax kl. Esculentus*	LOEC	10000	1000	6	Reynaud et al., 2012
			Pleurodeles waltl	NOEC	500000	500000	16	Jaylet et al., 1986
				LOEC	125000	125000	12	Mouchet et al., 2006
			Rana temporaria	NOEC	500000	50000	6	Marquiset al., 2009
				LOEC	50000	5000	6	Marquiset al., 2009
			Xenopus laevis	EC50	8700000	870000	4	Propst et al., 1997
					9600000	960000	4	Propst et al., 1997
				LC50	13400000	1340000	4	Propst et al., 1997
					16700000	1670000	4	Propst et al., 1997
		Crustacea	*Daphnia magna*	NOEC	25000	25000	14	Atienzar et al., 1999

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
50-32-8	Benzo [a] pyrene	Crustacea	*Daphnia magna*	LOEC	20.00	2.00	1	Ha and Choi, 2009
					20.00	20.00	21	Ha and Choi, 2009
					25000	25000	14	Atienzar et al., 1999
					50000	50000	14	Atienzar et al., 1999
				EC50	981	98.15	2	Lampi et al., 2005
					1625	162	2	Lampi et al., 2005
					5000	5000	4	Trucco et al., 1983
					5000	500		Nendza and Wenzel, 2006
					8600	860	1	Wernersson and Dave, 1997
					29300	2930	1	Ha and Choi, 2009
					40000	4000	1	Wernersson and Dave, 1997
					40000	4000	2	Atienzar et al., 1999
					250000	25000	2	Atienzar et al., 1999
			Eurytemora affinis	NOEC	12000	12000	10	Forget-Leray et al., 2005
				LOEC	12000	12000	10	Forget-Leray et al., 2005
					23000	23000	10	Forget-Leray et al., 2005
				LC50	58000	58000	4	Forget-Leray et al., 2005
			Gammarus duebeni	LC50	11000	1100	2	Lawrence and Poulter, 1998
					371000	37100	1	Lawrence and Poulter, 1998
			Palaemonetes pugio	LC50	1020	1020	4	Weinstein and Garner, 2008
		Fish	*Cyprinus carpio*	NOEC	760	760	60	Chang et al., 2005
					760	760	60	Chang et al., 2005
				LOEC	760	760	60	Chang et al., 2005
			Danio rerio	NOEC	63078	6308	3	Weigt et al., 2011
					252310	25231	1	Jonsson et al., 2009
					252310	25231	3	Kazeto et al., 2004
					2523100	252310	3	Kazeto et al., 2004
				LOEC	25231	2523	1	Jonsson et al., 2009
					2523100	252310	3	Kazeto et al., 2004
				EC50	131201	13120	3	Weigt et al., 2011
				LC50	1286781	128678	3	Weigt et al., 2011
			Oncorhynchus kisutch	NOEC	1000	1000	7	Hook et al., 2006
				LOEC	250	25.00	1	Ostrander et al., 1988
			Oncorhynchus mykiss	LOEC	1000	1000	7	Hook et al., 2006
					25231	2523	1	Jonsson et al., 2009
			Oryzias latipes	NOEC	10000	10000	16	Shugart et al., 1991
		Fish		LC50	1000	100		Nendza and Wenzel, 2006
		Insecta	*Chironomus riparius*	LOEC	10000	1000	1	Ha and Choi, 2008a
				LC50	31590000	3159000	1	Ha and Choi, 2008a
			Chironomus tentans	NOEC	500000	50000	1	Lee et al., 2006
				LOEC	5000	500	1	Lee et al., 2006
				LC50	9873000	987300	1	Ha and Choi, 2008b
		Mollusca	*Physella acuta*	LOEC	5000	5000	7	Sanchez-Arguello et al., 2012
					20000	20000	7	Sanchez-Arguello et al., 2012
					40000	40000	7	Sanchez-Arguello et al., 2012
			Aquatic community	PNEC	0.17	0.17		OSPAR Agreement, 2014-05
					14.00	14.00		US EPA, 1996
					22.00	22.00		EU Risk Assessment Report, 2008
6055-19-2	cyclophosphamide	Algae	*Selenastrum capricornutum*	NOEC	100000000	19953	3	Grung et al., 2006
		Crustacea	*Daphnia magna*	NOEC	56000000	111735	21	Grung et al., 2006
				LOEC	100000000	199526	21	Grung et al., 2006
			Aquatic community	PNEC	1120000	2235		Grung et al., 2006
50-02-2	Dexamethasone	Algae	*Selenastrum capricornutum*	NOEC	100000000	199526	3	DellaGreca et al., 2004
		Amphibia	*Xenopus laevis*	LOEC	39246	783	21	Lorenz et al., 2009
					39246	783	21	Lorenz et al., 2009
					39246	783	21	Lorenz et al., 2009
					196231	3915	21	Lorenz et al., 2009
					196231	3915	21	Lorenz et al., 2009
					196231	3915	21	Lorenz et al., 2009
		Crustacea	*Ceriodaphnia dubia*	EC50	50000	998	7	DellaGreca et al., 2004
			Daphnia magna	EC50	48300000	96371	1	DellaGreca et al., 2004
			Thamnocephalus platyurus	LC50	60110000	119935	1	DellaGreca et al., 2004
		Fish	*Danio rerio*	NOEC	39246	78.31	5	Gustafson et al., 2012
					392461	783	5	Gustafson et al., 2012
					392461	783	5	Gustafson et al., 2012
					3924610	7831	5	Gustafson et al., 2012
					39246100	78306	4	Sun et al., 2010a
				LOEC	500000	9976	21	Lalone et al., 2012
					13736135	27407	4	Sun et al., 2010a
					15698440	31323	5	To et al., 2007
					19623050	39153	5	Liu et al., 2003
					100000000	199526	3	Hillegass et al., 2007
					100000000	199526	3	Hillegass et al., 2008
			Pimephales promelas	NOEC	254000	5068	28 dph	Overturf et al., 2012
					1160000	23145	28 dph	Overturf et al., 2012
				LOEC	100	2.00	21	Lalone et al., 2012
					50000	998	21	Lalone et al., 2012
					500000	9976	21	Lalone et al., 2012
					500000	9976	29	Lalone et al., 2012
					500000	9976	29	Lalone et al., 2012
					577000	11513	28 dph	Overturf et al., 2012
				LC50	254000	5068	28 dph	Overturf et al., 2012
		Invertebrates	*Brachionus calyciflorus*	LC50	48220000	96212	1	DellaGreca et al., 2004
53-70-3	dibenzo[a,h]anthracene	Crustacea	*Daphnia magna*	EC50	400	79.81	0.1	Newsted and Giesy, 1987
					551	110	2	Lampi et al., 2005
					1559	311	2	Lampi et al., 2005
			Aquatic community	PNEC	0.14	0.28		OSPAR Agreement, 2014-05
					1.40	2.79		EU Risk Assessment Report, 2008
57465-28-8	PCB126	Fish	*Fundulus heteroclitus*	LOEC	1000	316	5	Clark et al., 2010
					1000	316	5	Clark, 2010
					1000	316	5	Clark, 2010
			Oryzias latipes	NOEC	150	47.43	until 3 dph	Kim and Cooper, 1998
					150	47.43	until 3 dph	Kim and Cooper, 1998
				EC50	170	53.76	until 3 dph	Kim and Cooper, 1999
					430	136	until 3 dph	Kim and Cooper, 1999
					450	142	until 3 dph	Kim and Cooper, 1999
				LC50	250	79.06	until 3 dph	Kim and Cooper, 1999
		Polyp	*Hydra vulgaris*	NOEC	1000000	3162278	4	Becker, 1991

G: PPARG CALUX

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
53-70-3	dibenzo[a,h]anthracene	Crustacea	*Daphnia magna*	EC50	400	0.040	0.1	Newsted and Giesy, 1987
					551	0.055	2	Lampi et al., 2005
					1559	0.16	2	Lampi et al., 2005
			Aquatic community	PNEC	0.14	0.0001		OSPAR Agreement, 2014-05
					1.40	0.0014		EU Risk Assessment Report, 2008
683-18-1	Dibutyltindichloride	Algae	*Scenedesmus acutus*	EC50	3144	0.99	4	Huang et al., 1996
		Crustacea	*Daphnia magna*	EC50	900000	2846	1	Vighi and Calamari, 1985
		Fish	*Oncorhynchus mykiss*	NOEC	48614	1537	110	De Vries et al., 1991
					48614	1537	110	De Vries et al., 1991
				LOEC	243072	7687	110	De Vries et al., 1991
					243072	7687	110	De Vries et al., 1991
			Oryzias latipes	NOEC	1800000	56921	30	Wester and Canton, 1991
				LOEC	320000	10119	30	Wester and Canton, 1991
			Poecilia reticulata	NOEC	1800000	56921	30	Wester and Canton, 1991
				LOEC	320000	10119	30	Wester and Canton, 1991
		Mollusca	*Anodonta anatina*	LOEC	37980	1201	210	Herwig and Holwerda, 1986
84371-65-3	Mifepristone	Amphibia	*Xenopus laevis*	NOEC	10740000	33963	1	Pickford and Morris, 1999
		Fish	*Danio rerio*	NOEC	107400	340	4	Hillegass et al., 2008
					107830	341	4	Hillegass et al., 2008
302-79-4	Retinoic acid	Crustacea	*Daphnia magna*	NOEC	100000	31623	chronic	Peterson et al., 2001
					800000	252982	chronic	Wang et al., 2005
		Fish	*Danio rerio*	NOEC	601	19.00	2	Teixido et al., 2013
					3004	95.01	2	Teixido et al., 2013
				LOEC	300	9.50	2	Teixido et al., 2013
					1502	47.50	2	Teixido et al., 2013
					3004351000	95005921	2	Elo et al., 2007
				EC50	424	13.40	6	Selderslaghs et al., 2012
					1475	46.65	3	Selderslaghs et al., 2012
					3575	113	2	Selderslaghs et al., 2012
					5708	181	2	Teixido et al., 2013
					233739	7391	1	Selderslaghs et al., 2012
				LC50	15322	485	2	Teixido et al., 2013
					40258	1273	6	Selderslaghs et al., 2012
					441640	13966	3	Selderslaghs et al., 2012
					865253	27362	2	Selderslaghs et al., 2012
					2121072	67074	1	Selderslaghs et al., 2012
122320-73-4	Rosiglitazone	Fish	*Danio rerio*	LOEC	357428	35743	2	Elo et al., 2007
56-36-0	Tributyltin acetate	Fish	*Oryzias latipes*	LC50	34000	10752	2	Tsuji et al., 1986
					38000	12017	1	Tsuji et al., 1986
		Insecta	*Aedes aegypti*	LC50	430000	135978	1	Kumar-Das et al., 1984
		Mollusca	*Biomphalaria glabrata*	LC50	19000	6008	1	Frick and Dejimenez , 1964
					31000	9803	1	Frick and Dejimenez , 1964
					41000	12965	1	Frick and Dejimenez , 1964
					74000	23401	0.25	Frick and Dejimenez , 1964
					74000	23401	1	Frick and Dejimenez , 1964
					85000	26879	1	Frick and Dejimenez , 1964
					88000	27828	0.25	Frick and Dejimenez , 1964
					94000	29725	0.25	Frick and Dejimenez , 1964
					190000	60083	0.25	Frick and Dejimenez , 1964
					200000	63246	0.25	Frick and Dejimenez , 1964
					200000	63246	1	Frick and Dejimenez, 1963
					230000	72732	1	Frick and Dejimenez , 1964
					230000	72732	1	Frick and Dejimenez, 1963
					270000	85381	0.25	Frick and Dejimenez, 1963
					560000	177088	0.25	Frick and Dejimenez , 1964
					560000	177088	0.25	Frick and Dejimenez, 1963
688-73-3	Tributyltin hydride	Fish	*Salmo salar*	NOEC	250	199	7	Greco et al., 2007
				LOEC	50.00	39.72	7	Greco et al., 2007
					250	199	7	Greco et al., 2007
		Invertebrates	*Brachionus calyciflorus*	LC50	19000	1509	1	Snell, 1991
		Mollusca	*Lymnaea stagnalis*	NOEC	19.20	15.25	21	Giusti et al., 2013
					94.20	74.83	21	Giusti et al., 2013
				LOEC	94.20	74.83	21	Giusti et al., 2013
			Marisa cornuarietis	LOEC	200	159	180	Tillmann et al., 2001
1461-22-9	Tributyltinchloride	Algae	*Scenedesmus acutus*	EC50	58.00	183	4	Huang et al., 1996
			Selenastrum capricornutum	NOEC	1200	3795	4	Miana et al., 1993
					2000	6325	4	Miana et al., 1993
				LOEC	4000	12649	4	Miana et al., 1993
				EC50	12400	39212	4	Miana et al., 1993
		Crustacea	*Daphnia magna*	NOEC	1000	3162	21	Baer and Owens, 1999
					1200	379	2	LeBlanc and McLachlan, 2000
					1250	3953	21	Oberdorster et al., 1998
					1900	601	2	Miana et al., 1993
					5500	1739	1	Miana et al., 1993
				LOEC	1250	3953	21	Oberdorster et al., 1998
					2500	7906	21	Oberdorster et al., 1998
				EC50	950	300	1	Kungolos et al., 2001
					3400	10752	5	Meador, 1986
					4380	1385	2	Bao et al., 1997
					5900	18657	4	Meador, 1986
					9800	3099	2	Miana et al., 1993
					12500	3953	1	Miana et al., 1993
					13000	4111	1	Vighi and Calamari, 1985
					13200	4174	1	Bao et al., 1997
					15000	4743	1	De Coen et al., 1998
			Hyalella azteca	LC50	1562	4941	28	Borgmann et al., 1996
					6185	19557	7	Borgmann et al., 1996
		Fish	*Oncorhynchus mykiss*	NOEC	39.06	124	110	De Vries et al., 1991
					195	618	110	De Vries et al., 1991
					1000	3162	110	Seinen et al., 1981
				LOEC	195	618	110	De Vries et al., 1991
					195	618	110	De Vries et al., 1991
					200	632	110	Seinen et al., 1981
					977	3088	110	De Vries et al., 1991
					1000	3162	110	Seinen et al., 1981
					50000	15811	0.05	Baldwin et al., 1994
				LC50	11200	3542	4	Douglas et al., 1986
					20000	6325	4	Baldwin et al., 1994
			Phoxinus phoxinus	NOEC	890	2814	9	Fent and Meier, 1992
				LOEC	890	2814	8	Fent and Meier, 1992
					4500	14230	9	Fent and Meier, 1992
			Salmo salar	NOEC	50.00	158	7	Lyssimachou et al., 2006
					250	791	7	Lyssimachou et al., 2006
				LOEC	250	791	7	Lyssimachou et al., 2006
		Insecta	*Aedes aegypti*	LC50	390000	123329	1	Kumar-Das et al., 1984
		Mollusca	*Dreissena polymorpha*	LOEC	1000	316	1	Clayton et al, 2000
				EC50	360	114	2	Faria et al., 2010
			Lamellidens marginalis	LC50	1720000	5439118	4	Jagtap and Shejule, 2010
					2650000	838004	3	Jagtap and Shejule, 2010
					3390000	1072012	2	Jagtap and Shejule, 2010
					4650000	1470459	1	Jagtap and Shejule, 2010
			Marisa cornuarietis	NOEC	500	1581	150	Janer et al., 2006
				LOEC	30.00	94.87	150	Janer et al., 2006
					30.00	94.87	150	Janer et al., 2006
					125	395	150	Janer et al., 2006
					500	1581	150	Janer et al., 2006
			Unio elongatulus	EC50	13900	4396	2	Faria et al., 2010
		Protozoa	*Paramecium caudatum*	EC50	18554	58672	5	Miyoshi et al., 2003
					29296	92641	2	Miyoshi et al., 2003
			Paramecium trichium	EC50	74866	236748	5	Miyoshi et al., 2003
					97652	308802	2	Miyoshi et al., 2003

H: PXR CALUX

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
1806-26-4	4-n-octylphenol	Amphibia	*Lithobates pipiens*	NOEC	206320	33054	7	Crump et al., 2002
					206320	33054	10	Crump et al., 2002
				LC50	577696	92550	7	Crump et al., 2002
		Fish	*Oryzias latipes*	LOEC	2000	320	98	Knorr and Braunbeck, 2002
					20000	3204	98	Knorr and Braunbeck, 2002
15972-60-8	Alachlor	Algae	*Chlorella vulgaris*	NOEC	100000	10108	4	Garten and Frank, 1984
				LOEC	1000000	101083	4	Garten and Frank, 1984
			Selenastrum capricornutum	NOEC	350	35.38	5	U.S. EPA, 2013
				LOEC	10000	1011	4	Garten and Frank, 1984
				EC50	1640	166	5	U.S. EPA, 2013
		Algae		NOEC	5350	541	28	Carder et al., 1998
					78550	7940	28	Carder et al., 1998
				LOEC	78550	7940	28	Carder et al., 1998
		Crustacea	*Daphnia magna*	NOEC	5600000	56607	2	U.S. EPA, 2013
					12000000	121300	2	U.S. EPA, 2013
					14000000	141516	2	U.S. EPA, 2013
					18000000	181950	2	U.S. EPA, 2013
				LOEC	230000	23249	21	U.S. EPA, 2013
					430000	43466	21	U.S. EPA, 2013
					1700000	171841	21	U.S. EPA, 2013
		Fish	*Cyprinodon variegatus*	NOEC	2600000	26282	4	U.S. EPA, 2013
				LC50	3900000	39422	4	U.S. EPA, 2013
			Ictalurus punctatus	LC50	6500000	65704	4	U.S. EPA, 2013
			Lepomis macrochirus	NOEC	1800000	18195	4	U.S. EPA, 2013
					3700000	37401	4	U.S. EPA, 2013
					4200000	42455	4	U.S. EPA, 2013
					5600000	56607	4	U.S. EPA, 2013
				LC50	2800000	28303	4	U.S. EPA, 2013
					6200000	62672	4	U.S. EPA, 2013
					6400000	64693	4	U.S. EPA, 2013
					7600000	76823	4	U.S. EPA, 2013
					12400000	125343	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	1000000	10108	4	U.S. EPA, 2013
					1800000	18195	4	U.S. EPA, 2013
					2400000	24260	4	U.S. EPA, 2013
					2400000	24260	4	U.S. EPA, 2013
				LOEC	388000	39220	96	U.S. EPA, 2013
					390000	39422	96	U.S. EPA, 2013
				LC50	240000	2426	4	U.S. EPA, 2013
					1800000	18195	4	U.S. EPA, 2013
					3600000	36390	4	U.S. EPA, 2013
					3700000	37401	4	U.S. EPA, 2013
					4200000	42455	4	U.S. EPA, 2013
120-12-7	Anthracene	Algae	*Chlorella fusca*	EC50	499044	3183	1	Altenburger et al., 2004
			Scenedesmus subspicatus	EC50	1040000	66330	7	Djomo et al., 2004
			Selenastrum capricornutum	EC50	3300	21.05	1	Gala and Giesy, 1992
					3900	24.87	0.9	Gala and Giesy, 1992
					12100	77.17	0.9	Gala and Giesy, 1992
					37400	239	0.9	Gala and Giesy, 1992
		Amphibia	*Lithobates pipiens*	LC50	25000	159	0.2	Kagan et al., 1984
					65000	415	0.02	Kagan et al., 1984
					110000	702	1	Kaganet al., 1987
		Crustacea	*Daphnia magna*	EC50	95000	606	2	Munoz and Tarazona, 1993.
					211000	1346	1	Munoz and Tarazona, 1993.
			Hyalella azteca	LC50	5600	357	10	Hatch, 1999
		Fish	*Lepomis macrochirus*	LC50	3360	21.43	2	McCloskey and Oris, 1991
					3740	23.85	4	McCloskey and Oris, 1991
					5100	32.53	2	McCloskey and Oris, 1991
					7470	47.64	4	McCloskey and Oris, 1991
					8270	52.75	4	McCloskey and Oris, 1991
					9690	61.80	2	McCloskey and Oris, 1991
					10050	64.10	2	McCloskey and Oris, 1991
					11920	76.02	4	Oris et al., 1984
		Insecta	*Chironomus tentans*	LC50	6000	383	10	Hatch, 1999
		Mollusca	*Utterbackia imbecillis*	LC50	1930	12.31	1	Weinstein and Polk, 2001
					2010	12.82	0.7	Weinstein and Polk, 2001
					2840	18.11	0.3	Weinstein and Polk, 2001
		Plants	*Lemna gibba*	EC50	300000	19134	7	Mallakin et al., 1999
					1300000	82913	7	Mallakin et al., 1999
			Aquatic community	PNEC	100	6.38		EU Risk Assessment Report, 2008
					100	6.38		OSPAR Agreement, 2014-05
25057-89-0	bentazon	Algae	*Anabaena flosaquae*	NOEC	3040000	3869	5	U.S. EPA, 2013
				EC50	10130000	12891	5	U.S. EPA, 2013
			Selenastrum capricornutum	NOEC	880000	1120	5	U.S. EPA, 2013
				EC50	4500000	5727	5	U.S. EPA, 2013
			Skeletonema costatum	NOEC	3720000	4734	5	U.S. EPA, 2013
				EC50	10100000	12853	5	U.S. EPA, 2013
		Algae		NOEC	5670	7.22	7	De la Broise and Stachowski-Haberkorn, 2012
					5670	7.22	7	De la Broise and Stachowski-Haberkorn, 2012
					5670	7.22	7	De la Broise and Stachowski-Haberkorn, 2012
				LOEC	28490	36.26	7	De la Broise and Stachowski-Haberkorn, 2012
					28490	36.26	7	De la Broise and Stachowski-Haberkorn, 2012
		Crustacea	*Americamysis bahia*	NOEC	132500000	168614	4	U.S. EPA, 2013
				LC50	132500000	168614	4	U.S. EPA, 2013
		Fish	*Carassius auratus*	NOEC	10000000	1273	0.01	Saglio et al., 2001
					10000000	1273	0.01	Saglio et al., 2001
			Oncorhynchus mykiss	NOEC	50000000	6363	4	U.S. EPA, 2013
					100000000	12726	4	U.S. EPA, 2013
				LC50	100000000	12726	4	U.S. EPA, 2013
		Mollusca	*Crassostrea virginica*	NOEC	10000000	12726	4	U.S. EPA, 2013
				EC50	109000000	138709	4	U.S. EPA, 2013
		Plants	*Lemna gibba*	NOEC	1530000	1947	14	U.S. EPA, 2013
				EC50	5350000	6808	14	U.S. EPA, 2013
71-43-2	Benzene	Crustacea	*Daphnia magna*	NOEC	98000000	9906154	21	LeBlanc and Surprenant, 1980
					98000000	9906154	21	LeBlanc and Surprenant, 1980
		Fish	*Oncorhynchus mykiss*	LC50	21639240	218736	4	Hodson et al., 1984
			Aquatic community	PNEC	8000	809		OSPAR Agreement, 2014-05
					46000	4650		U.S. EPA, 1996
207-08-9	Benzo(k)fluoranthene	Crustacea	*Daphnia magna*	EC50	1400	28.24	0.5	Newsted and Giesy, 1987

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
207-08-9	Benzo(k)fluoranthene	Fish	*Fundulus heteroclitus*	NOEC	300000	6051	5	Clark et al., 2010
				LOEC	300000	6051	5	Clark et al., 2010
					300000	6051	5	Clark, 2010
					300000	6051	5	Clark, 2010
					300000	6051	5	Clark, 2010
			Aquatic community	PNEC	0.17	0.034		OSPAR Agreement, 2014-05
					17.00	3.43		EU Risk Assessment Report, 2008
2921-88-2	Chlorpyrifos-ethyl	Amphibia	*Duttaphrynus melanostictus*	NOEC	100000	20169	14	Wijesinghe et al., 2011
				LOEC	500000	100844	14	Wijesinghe et al., 2011
				LC50	1245000	251101	14	Wijesinghe et al., 2011
					3003000	605668	14	Wijesinghe et al., 2011
			Pseudacris sierra	NOEC	100000	20169	63	Dimitrie, 2010
					100000	20169	63	Dimitrie, 2010
					288000	58086	63	Dimitrie, 2010
					288000	58086	63	Dimitrie, 2010
					288000	58086	63	Dimitrie, 2010
					288000	58086	63	Dimitrie, 2010
					500000	100844	63	Dimitrie, 2010
					500000	100844	63	Dimitrie, 2010
					500000	100844	63	Dimitrie, 2010
				LOEC	100000	20169	63	Dimitrie, 2010
					100000	20169	63	Dimitrie, 2010
					194000	39127	63	Dimitrie, 2010
					194000	39127	63	Dimitrie, 2010
					325000	65548	63	Dimitrie, 2010
					325000	65548	63	Dimitrie, 2010
					325000	65548	63	Dimitrie, 2010
					737000	148644	63	Dimitrie, 2010
					737000	148644	63	Dimitrie, 2010
					737000	148644	63	Dimitrie, 2010
				LC50	595100	120024	63	Dimitrie, 2010
					734200	148079	63	Dimitrie, 2010
					734200	148079	63	Dimitrie, 2010
			Rana boylii	NOEC	50000	10084	85	Sparling and Fellers, 2009
					50000	10084	85	Sparling and Fellers, 2009
					50000	10084	85	Sparling and Fellers, 2009
					200000	40338	85	Sparling and Fellers, 2009
					200000	40338	85	Sparling and Fellers, 2009
					200000	40338	85	Sparling and Fellers, 2009
					200000	40338	85	Sparling and Fellers, 2009
				LOEC	200000	40338	85	Sparling and Fellers, 2009
					200000	40338	85	Sparling and Fellers, 2009
					200000	40338	85	Sparling and Fellers, 2009
				LC50	66500	13412	85	Sparling and Fellers, 2009
					108700	21923	85	Sparling and Fellers, 2009
			Rhinella arenarum	NOEC	2000000	40338	2	Sotomayor et al., 2012
					4000000	80675	2	Sotomayor et al., 2012
					4000000	80675	2	Sotomayor et al., 2012
					8000000	161350	2	Sotomayor et al., 2012
					14000000	282363	2	Sotomayor et al., 2012
				LOEC	4000000	80675	2	Sotomayor et al., 2012
					8000000	161350	2	Sotomayor et al., 2012
					8000000	161350	2	Sotomayor et al., 2012
					10000000	201688	2	Sotomayor et al., 2012
				EC50	4600000	92776	2	Sotomayor et al., 2012
				LC50	23300000	469932	2	Sotomayor et al., 2012
		Crustacea	*Americamysis bahia*	LOEC	10.00	2.02	35	U.S. EPA, 2013
			Carcinus maenas	NOEC	1560	31.46	2	Ghedira et al., 2009
					1560	31.46	2	Ghedira et al., 2009
					3120	62.93	2	Ghedira et al., 2009
					3120	62.93	3	Ghedira et al., 2009
					7810	158	2	Ghedira et al., 2009
				LOEC	3120	62.93	2	Ghedira et al., 2009
					3120	62.93	2	Ghedira et al., 2009
					3120	62.93	3	Ghedira et al., 2009
					7810	158	2	Ghedira et al., 2009
			Ceriodaphnia dubia	NOEC	50.00	10.08	10	Sherrard et al., 2002
					50.00	10.08	10	Sherrard et al., 2002
					60.00	12.10	10	Sherrard et al., 2002
				LOEC	60.00	12.10	10	Sherrard et al., 2002
					70.00	14.12	10	Sherrard et al., 2002
				EC50	48.00	0.97	2	Woods et al., 2002
					80.00	1.61	2	Brooke, 1995
					140	2.82	2	Brooke, 1995
					370	7.46	2	Brooke, 1995
				LC50	70.00	14.12	10	Sherrard et al., 2002
			Daphnia magna	NOEC	10.00	2.02	21	Li and Tan, 2011
					10.00	2.02	21	Palma et al., 2009
					17.00	3.43	21	Liu et al., 2012
					24.00	0.48	2	U.S. EPA, 2013
					50.00	10.08	21	Li and Tan, 2011
					135	2.72	2	Brooke, 1995
					192	38.72	21	Liu et al., 2012
					300	6.05	1	Loureiro et al., 2010
					724	146	21	Liu et al., 2012
					724	146	21	Liu et al., 2012
					821	166	21	Liu et al., 2012
					1000	202	21	Li and Tan, 2011
					1720	34.69	2	U.S. EPA, 2013
					2000	403	21	Li and Tan, 2011
					2000	403	21	Li and Tan, 2011
				LOEC	1.00	0.020	1	Ha and Choi, 2009
					7.50	1.51	21	Palma et al., 2009
					19.00	3.83	21	Liu et al., 2012
					19.00	3.83	21	Liu et al., 2012
					22.00	4.44	21	Liu et al., 2012
					22.00	4.44	21	Liu et al., 2012
					22.00	4.44	21	Liu et al., 2012
					23.00	4.64	21	Liu et al., 2012
					23.00	4.64	21	Liu et al., 2012
					23.00	4.64	21	Liu et al., 2012
					26.00	5.24	21	Liu et al., 2012
					26.00	5.24	21	Liu et al., 2012
					28.00	5.65	21	Liu et al., 2012
					28.00	5.65	21	Liu et al., 2012
					30.00	6.05	21	Palma et al., 2009
					50.00	10.08	21	Li and Tan, 2011
					80.00	16.14	21	U.S. EPA, 2013
					100	2.02	1	Ha and Choi, 2009

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
2921-88-2	Chlorpyrifos-ethyl	Crustacea	*Daphnia magna*	LOEC	100	20.17	21	Li and Tan, 2011
					130	26.22	21	Liu et al., 2012
					400	8.07	2	Loureiro et al., 2010
					500	101	21	Li and Tan, 2011
					500	101	21	Li and Tan, 2011
					1170	236	21	Liu et al., 2012
				EC50	32.40	0.65	2	Antunes et al., 2010
					106	21.38	21	Palma et al., 2009
					170	34.29	4	Rubach et al., 2011
					190	38.32	21	Palma et al., 2009
					250	5.04	2	Brooke, 1995
					250	50.42	4	Rubach et al., 2011
					400	8.07	2	Brooke, 1995
					480	96.81	4	Rubach et al., 2011
					900	18.15	2	Matsumoto et al., 2009
					953	19.22	1	Ha and Choi, 2009
					1400	28.24	2	Matsumoto et al., 2009
					1720	34.69	2	U.S. EPA, 2013
					6910	1394	4	Rubach et al., 2011
					7120	144	2	Liu et al., 2012
					450000	9076	1	Loureiro et al., 2010
					580000	11698	2	Loureiro et al., 2010
				LC50	820	165	4	Rubach et al., 2011
					4370	881	4	Rubach et al., 2011
					27430	5532	4	Rubach et al., 2011
					889000	179300	4	Rubach et al., 2011
			Gammarus pulex	NOEC	850	17.14	1	Maltby and Hills, 2008
					850	171	6	Maltby and Hills, 2008
					1280	25.82	1	Maltby and Hills, 2008
					1280	258	6	Maltby and Hills, 2008
				LOEC	3700	74.62	1	Maltby and Hills, 2008
					3700	746	6	Maltby and Hills, 2008
					5550	112	1	Maltby and Hills, 2008
					5550	1119	6	Maltby and Hills, 2008
					35000	7059	105	Van Wijngaarden et al., 1995
				EC50	230	46.39	4	Rubach et al., 2011
					240	48.41	4	Rubach et al., 2011
					380	76.64	4	Rubach et al., 2011
					3100	625	4	Rubach et al., 2011
				LC50	230	46.39	4	Rubach et al., 2011
					230	46.39	4	Rubach et al., 2011
					430	86.73	4	Rubach et al., 2011
					3100	625	4	Rubach et al., 2011
					3400	68.57	2	Ashauer et al., 2007
			Hyalella azteca	NOEC	14.00	2.82	10	Deanovic et al., 2013
					66.00	13.31	10	Deanovic et al., 2013
					66.00	13.31	10	Deanovic et al., 2013
					66.00	13.31	10	Deanovic et al., 2013
					66.00	13.31	10	Deanovic et al., 2013
				LOEC	14.00	2.82	10	Deanovic et al., 2013
					66.00	13.31	10	Deanovic et al., 2013
					128	25.82	10	Deanovic et al., 2013
					133	26.82	10	Deanovic et al., 2013
				LC50	51.00	10.29	4	Ding et al., 2012
					103	20.77	10	Deanovic et al., 2013
					105	21.18	10	Deanovic et al., 2013
			Hyalella curvispina	LOEC	65.00	1.31	3	Mugni et al., 2010
					120	2.42	1	Mugni et al., 2010
				LC50	60.00	1.21	2	Mugni et al., 2012
					170	3.43	2	Mugni et al., 2012
			Macrobrachium rosenbergii	NOEC	313	6.30	2	Satapornvanit et al., 2009
				LOEC	625	12.61	2	Satapornvanit et al., 2009
				EC50	293	5.91	2	Satapornvanit et al., 2009
				LC50	300	6.05	2	Satapornvanit et al., 2009
					700	14.12	2	Satapornvanit et al., 2009
			Neocaridina denticulata	EC50	171000	34489	4	Rubach et al., 2011
					237000	47800	4	Rubach et al., 2011
					327000	65952	4	Rubach et al., 2011
					410000	82692	4	Rubach et al., 2011
				LC50	457000	92171	4	Rubach et al., 2011
					477000	96205	4	Rubach et al., 2011
					660000	133114	4	Rubach et al., 2011
					1103000	222461	4	Rubach et al., 2011
		Fish	*Carassius auratus*	NOEC	408000	82289	15	Wang et al., 2012
				LOEC	25500	5143	15	Wang et al., 2012
			Channa punctata	NOEC	68000	13715	35	Ali et al., 2009
					15000000	302531	4	Malla et al., 2009a
					25000000	504219	4	Malla et al., 2009b
				LOEC	68000	13715	35	Ali et al., 2009
					15000000	302531	4	Malla et al., 2009a
					25000000	504219	4	Malla et al., 2009b
				LC50	811980	16377	4	Ali et al., 2009
			Clarias gariepinus	NOEC	9200	186	4	Ogueji, 2008
				LC50	920000	18555	4	Ogueji, 2008
			Cnesterodon decemmaculatus	NOEC	1000	20.17	4	Mugni et al., 2012
					5000	101	4	Mugni et al., 2012
			Cyprinodon variegatus	LC50	1000000	20169	2	Mayer, 1987
			Cyprinus carpio	NOEC	1160	234	40	Xing et al., 2012a
					1160	234	40	Xing et al., 2012a
					116000	23396	40	Xing et al., 2012b
					120000	2420	4	Halappa and David, 2009a
					200000	4034	4	Halappa and David, 2009b
				LOEC	11600	2340	40	Xing et al., 2012a
					11600	2340	40	Xing et al., 2012a
				LC50	160000	3227	4	Halappa and David, 2009a
			Danio rerio	NOEC	6000	121	0.08	Langer-Jaesrich et al., 2010
					48000	968	1	Tilton et al., 2011b
					65100	1313	1	Tilton et al., 2011a
					100000	2017	1	Sledge et al., 2011
					100000	2017	1	Sledge et al., 2011
					100000	2017	2	Sledge et al., 2011
					100000	2017	2	Sledge et al., 2011
					100000	2017	3	Sledge et al., 2011
					100000	2017	3	Sledge et al., 2011
					100000	20169	11	Kienle et al., 2009
					110000	2219	1	Tilton et al., 2011b
					126450	2550	1	Tilton et al., 2011a
					500000	100844	11	Kienle et al., 2009
					1000000	20169	0.08	Kienle et al., 2009

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
2921-88-2	Chlorpyrifos-ethyl	Fish	*Danio rerio*	NOEC	1000000	20169	0.08	Kienle et al., 2009
					1500000	30253	4	Perez et al., 2013a
				LOEC	10000	2017	11	Kienle et al., 2009
					48000	968	1	Tilton et al., 2011b
					100000	2017	3	Sledge et al., 2011
					110000	2219	1	Tilton et al., 2011b
					126450	2550	1	Tilton et al., 2011a
					240000	4841	1	Tilton et al., 2011b
					250000	50422	11	Kienle et al., 2009
					2000000	40338	4	Perez et al., 2013a
				EC50	750000	15127	4	Perez et al., 2013a
				LC50	430000	86726	11	Kienle et al., 2009
					1600000	32270	4	Perez et al., 2013a
			Fundulus heteroclitus	NOEC	5000	101	1	Clark and Di Giulio 2012
					10000	202	1	Clark and Di Giulio 2012
				LOEC	10000	202	1	Clark and Di Giulio 2012
			Heteropneustes fossilis	NOEC	440000	88743	28	Srivastav et al., 2011
					2000000	403375	7	Tripathi and Shasmal, 2011
					2000000	403375	7	Tripathi and Shasmal, 2011
					4000000	806750	7	Tripathi and Shasmal, 2011
				LOEC	440000	88743	28	Srivastav et al., 2011
					440000	88743	28	Srivastav et al., 2011
					2000000	403375	7	Tripathi and Shasmal, 2011
					2000000	403375	7	Tripathi and Shasmal, 2011
					4000000	806750	7	Tripathi and Shasmal, 2011
					4000000	806750	7	Tripathi and Shasmal, 2011
					6000000	1210125	7	Tripathi and Shasmal, 2010
					6000000	1210125	7	Tripathi and Shasmal, 2010
					6000000	1210125	7	Tripathi and Shasmal, 2010
			Oncorhynchus kisutch	NOEC	1550	31.26	4	Laetz et al., 2009
			Oncorhynchus mykiss	LOEC	100000	2017	4	Patra et al., 2009
			Oreochromis mossambicus	NOEC	45000	9076	30	Saradhamani and Kumari, 2011
				LOEC	45000	9076	30	Saradhamani and Kumari, 2011
				LC50	52000	1049	4	Mani and Konar, 1986
			Oreochromis niloticus	NOEC	500	10.08	1	Liwag et al., 2009
					2640	532	28	Gawish et al., 2011
					5000	1008	30	Oruc, 2010
					5000	1008	30	Oruc, 2012
					5280	1065	28	Gawish et al., 2011
					5280	1065	28	Gawish et al., 2011
					10000	202	2	Silva and Pathiratne, 2008
					12000	242	4	Ozkan et al., 2011
					12000	242	4	Ozkan et al., 2012
					15000	3025	30	Oruc, 2010
					15000	3025	30	Oruc, 2010
					15000	3025	30	Oruc, 2012
					24000	484	4	Ozkan et al., 2012
					24000	484	4	Ozkan et al., 2012
					3380000	68170	4	Giron-Perez et al., 2006
					3380000	68170	4	Giron-Perez et al., 2006
				LOEC	2640	532	28	Gawish et al., 2011
					2640	532	28	Gawish et al., 2011
					2640	532	28	Gawish et al., 2011
					5000	1008	30	Oruc, 2010
					5000	1008	30	Oruc, 2010
					5000	1008	30	Oruc, 2012
					5000	1008	30	Oruc, 2012
					5280	1065	28	Gawish et al., 2011
					10000	202	2	Silva and Pathiratne, 2008
					10000	2017	30	Oruc, 2010
					10000	2017	30	Oruc, 2012
					12000	242	4	Ozkan et al., 2012
					12000	242	4	Ozkan et al., 2012
					24000	484	4	Ozkan et al., 2011
					24000	484	4	Ozkan et al., 2012
					211000	4256	4	Giron-Perez et al., 2006
					211000	4256	4	Giron-Perez et al., 2006
				LC50	22390	452	1	Liwag et al., 2009
					26400	532	4	Gawish et al., 2011
					98670	1990	4	Oruc, 2010
					1023000	20633	4	Giron-Perez et al., 2006
			Pimephales promelas	NOEC	26000	5244	10	Sherrard et al., 2002
					50000	10084	10	Sherrard et al., 2002
					75000	15127	10	Sherrard et al., 2002
				LOEC	1090	220	238	U.S. EPA, 2013
					75000	15127	10	Sherrard et al., 2002
					100000	20169	10	Sherrard et al., 2002
				LC50	122200	2465	4	Jarvinen et al., 1988
					150000	30253	10	Sherrard et al., 2002
			Tandanus tandanus	NOEC	2330	46.99	0.9	Huynh and Nugegoda, 2012
					2330	46.99	0.9	Huynh and Nugegoda, 2012
					2330	46.99	0.9	Huynh and Nugegoda, 2012
					11700	236	0.9	Huynh and Nugegoda, 2012
					11700	236	0.9	Huynh and Nugegoda, 2012
				LOEC	2330	46.99	0.9	Huynh and Nugegoda, 2012
					2330	46.99	0.9	Huynh and Nugegoda, 2012
					2330	46.99	0.9	Huynh and Nugegoda, 2012
					11700	236	0.9	Huynh and Nugegoda, 2012
					11700	236	0.9	Huynh and Nugegoda, 2012
					11700	236	0.9	Huynh and Nugegoda, 2012
					11700	236	0.9	Huynh and Nugegoda, 2012
		Insecta	*Aedes albopictus*	LC50	1100000	22186	1	Cheng et al., 2009b
					1400000	28236	1	Cheng et al., 2009a
					2130000	42959	1	Liu et al., 2013
			Culex pipiens	LC50	1800	36.30	1	Wood et al., 1984
					2060	41.55	1	Vasquez et al., 2009
					3200	64.54	1	Vasquez et al., 2009
					3540	71.40	1	Vasquez et al., 2009
					3620	73.01	1	Wirth, 1998
					8290	167	1	Vasquez et al., 2009
					14400	290	1	Vasquez et al., 2009
					22500	454	1	Wirth, 1998
					28000	565	1	Wood et al., 1984
					39300	793	1	Wirth and Georghiou, 1996
					52000	1049	1	Vasquez et al., 2009
					72600	1464	1	Vasquez et al., 2009
					73000	1472	1	Emtithal and Thanaa, 2012
					109000	2198	1	Emtithal and Thanaa, 2012
					173000	3489	1	Emtithal and Thanaa, 2012

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
2921-88-2	Chlorpyrifos-ethyl	Insecta	*Culex pipiens*	LC50	173000	3489	1	Emtithal and Thanaa, 2012
					240000	4841	1	Wood et al., 1984
					262000	5284	1	Emtithal and Thanaa, 2012
					411000	8289	1	Emtithal and Thanaa, 2012
					742000	14965	1	Emtithal and Thanaa, 2012
					1450000	29245	1	Emtithal and Thanaa, 2012
					1793000	36163	1	Emtithal and Thanaa, 2012
			Aedes aegypti	LC50	7100	143	1	U.S. EPA, 2013
					1100000	22186	1	Cheng et al., 2009a
					1300000	26219	1	Cheng et al., 2009b
			Aedes triseriatus	NOEC	1000000	20169	1	Beehler et al., 1991
			Anax imperator	EC50	1630	329	4	Rubach et al., 2011
					1660	335	4	Rubach et al., 2011
					3130	631	4	Rubach et al., 2011
					3430	692	4	Rubach et al., 2011
					5160	1041	4	Rubach et al., 2011
					5270	1063	4	Rubach et al., 2011
					6160	1242	4	Rubach et al., 2011
					7000	1412	4	Rubach et al., 2011
				LC50	1980	399	4	Rubach et al., 2011
					2350	474	4	Rubach et al., 2011
					3290	664	4	Rubach et al., 2011
					6930	1398	4	Rubach et al., 2011
					7000	1412	4	Rubach et al., 2011
					7640	1541	4	Rubach et al., 2011
					8580	1730	4	Rubach et al., 2011
			Anopheles sinensis	LC50	4700000	94793	1	Chang et al., 2009
			Chaoborus obscuripes	EC50	180	36.30	4	Rubach et al., 2011
					320	64.54	4	Rubach et al., 2011
					440	88.74	4	Rubach et al., 2011
					860	173	4	Rubach et al., 2011
				LC50	300	60.51	4	Rubach et al., 2011
					610	123	4	Rubach et al., 2011
					1130	228	4	Rubach et al., 2011
					2470	498	4	Rubach et al., 2011
			Chironomus dilutus	NOEC	265	53.45	96	LeBlanc et al., 2012
				LOEC	796	161	96	LeBlanc et al., 2012
				EC50	250	50.42	4	Ding et al., 2012
				LC50	290	58.49	4	Ding et al., 2012
					634	128	96	LeBlanc et al., 2012
			Chironomus riparius	NOEC	10.00	2.02	28	Agra and Soares, 2009
					10.00	2.02	28	Agra and Soares, 2009
					50.00	10.08	28	Agra and Soares, 2009
					100	20.17	28	Agra and Soares, 2009
					100	20.17	28	Agra and Soares, 2009
					100	20.17	28	Agra and Soares, 2009
					1000	202	28	Langer-Jaesrich et al., 2010
					200000	4034	1	Park et al., 2012
					1000000	20169	0.08	Kienle et al., 2009
					1000000	20169	0.08	Kienle et al., 2009
					1000000	20169	1	Park et al., 2012
				LOEC	50.00	10.08	28	Agra and Soares, 2009
					50.00	10.08	28	Agra and Soares, 2009
					100	20.17	28	Agra and Soares, 2009
					200000	4034	1	Park et al., 2012
					200000	4034	1	Park et al., 2012
					1000000	20169	1	Park et al., 2012
					2000000	40338	1	Park et al., 2012
				EC50	100	2.02	2	Perez et al., 2013b
					120	2.42	2	Perez et al., 2013b
					130	2.62	2	Perez et al., 2013b
					150	3.03	2	Perez et al., 2013b
					150	3.03	2	Perez et al., 2013b
					160	3.23	2	Perez et al., 2013b
					160	32.27	4	Belden and Lydy, 2006
					170	3.43	2	Perez et al., 2013b
			Cloeon dipterum	EC50	310	62.52	4	Rubach et al., 2011
					410	82.69	4	Rubach et al., 2011
					760	153	4	Rubach et al., 2011
					880	177	4	Rubach et al., 2011
				LC50	360	72.61	4	Rubach et al., 2011
					580	117	4	Rubach et al., 2011
					810	163	4	Rubach et al., 2011
					1110	224	4	Rubach et al., 2011
			Culex quinquefasciatus	LC50	910	18.35	1	Wirth, 1998
					1600	32.27	1	Chandre et al., 1997
					6000	121	1	Liu et al., 2004
					200000	4034	1	Liu et al., 2004
					280000	5647	1	Khayrandish and Wood, 1993
					450000	9076	1	Khayrandish and Wood, 1993
					620000	12505	1	Khayrandish and Wood, 1993
					900000	18152	1	Liu et al., 2004
					1020000	20572	1	Khayrandish and Wood, 1993
					1060000	21379	1	Khayrandish and Wood, 1993
					1600000	32270	1	Khayrandish and Wood, 1993
					4300000	86726	1	Liu et al., 2004
					11700000	235974	1	Khayrandish and Wood, 1993
			Molanna angustata	EC50	1860	375	4	Rubach et al., 2011
					1860	375	4	Rubach et al., 2011
				LC50	34200	6898	4	Rubach et al., 2011
					34200	6898	4	Rubach et al., 2011
			Notonecta maculata	EC50	2780	561	4	Rubach et al., 2011
					6060	1222	4	Rubach et al., 2011
					9070	1829	4	Rubach et al., 2011
					19500	3933	4	Rubach et al., 2011
				LC50	7970	1607	4	Rubach et al., 2011
					11600	2340	4	Rubach et al., 2011
					16000	3227	4	Rubach et al., 2011
					23900	4820	4	Rubach et al., 2011
			Parapoynx stratiotata	EC50	2860	577	4	Rubach et al., 2011
					2940	593	4	Rubach et al., 2011
					3870	781	4	Rubach et al., 2011
					5880	1186	4	Rubach et al., 2011
				LC50	27200	5486	4	Rubach et al., 2011
					29400	5930	4	Rubach et al., 2011
					31600	6373	4	Rubach et al., 2011
					55100	11113	4	Rubach et al., 2011
		Invertebrates	*Brachionus calyciflorus*	NOEC	100000	2017	3	Ke et al., 2009
				LOEC	1000000	20169	3	Ke et al., 2009

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
2921-88-2	Chlorpyrifos-ethyl	Mollusca	*Coretus corneus*	EC50	5000	101	2	Cacciatore et al., 2013
					6000	121	2	Cacciatore et al., 2013
					7000	141	2	Cacciatore et al., 2013
			Lamellidens marginalis	LOEC	5000000	1008438	30	Amanullah et al., 2010
			Potamopyrgus antipodarum	LOEC	35000	7059	105	Van Wijngaarden et al., 1995
			Theodoxus fluviatilis	NOEC	1543	31.11	1	Lundqvist et al., 2012
					1543	31.11	1	Lundqvist et al., 2012
					1543	31.11	1	Lundqvist et al., 2012
		Plants	*Lemna minor*	NOEC	500000	100844	7	Prasertsup and Ariyakanon, 2011
					500000	100844	7	Prasertsup and Ariyakanon, 2011
				LOEC	1000000	201688	7	Prasertsup and Ariyakanon, 2011
					1000000	201688	7	Prasertsup and Ariyakanon, 2011
		Polyp	*Hydra vulgaris*	LC50	1000000	201688	4	Demetrio et al., 2012
					1500000	302531	4	Demetrio et al., 2012
115-32-2	Dicofol	Crustacea	*Daphnia magna*	NOEC	100000	1273	21	Haeba et al., 2008
				LOEC	100000	1273	21	Haeba et al., 2008
				EC50	200000	2545	2	Haeba et al., 2008
					380000	4836	1	Haeba et al., 2008
		Fish	*Danio rerio*	EC50	3827265	4870	5	Padilla et al., 2012
206-44-0	Fluoranthene	Algae	*Selenastrum capricornutum*	NOEC	41700	335	4	Brooke, 1993
				EC50	41700	335	4	Brooke, 1993
		Crustacea	*Daphnia magna*	NOEC	17000	136	21	Brooke, 1993
					35300	283	21	Brooke, 1993
					70500	56.61	2	Brooke, 1993
				LOEC	35300	283	21	Brooke, 1993
					73200	588	21	Brooke, 1993
				EC50	117000	93.94	2	Brooke, 1993
			Gammarus pseudolimnaeus	LC50	108000	867	4	Brooke, 1993
			Hyalella azteca	LC50	43800	352	4	Brooke, 1993
		Fish	*Lepomis macrochirus*	EC50	43500	34.93	4	Brooke, 1993
				LC50	117000	93.94	4	Brooke, 1993
			Oncorhynchus mykiss	LC50	90500	72.67	4	Brooke, 1993
			Pimephales promelas	NOEC	10400	83.50	32	Brooke, 1993
					10400	83.50	32	Brooke, 1993
				LOEC	21700	174	32	Brooke, 1993
					21700	174	32	Brooke, 1993
				LC50	212000	170	4	Brooke, 1993
		Insecta	*Aedes aegypti*	NOEC	50000	40.15	1	Tetreau et al., 2014
				LOEC	500	0.40	1	Tetreau et al., 2014
					500	0.40	1	Tetreau et al., 2014
			Chironomus tentans	EC50	2000	1.61	2	Cho, 2005
		Plants	*Lemna minor*	NOEC	166000	133	4	Brooke, 1993
				EC50	166000	133	4	Brooke, 1993
		Polyp	*Hydra americana*	LC50	70100	563	4	Brooke, 1993
		Worm	*Lumbriculus variegatus*	NOEC	178000	1429	4	Brooke, 1993
				LC50	178000	1429	4	Brooke, 1993
			Aquatic community	PNEC	6.30	0.051		OSPAR Agreement, 2014-05
					10.00	0.080		EU Risk Assessment Report, 2008
91-20-3	Naphtalene	Crustacea	*Daphnia magna*	NOEC	480000	9681	2	U.S. EPA, 2013
				EC50	1600000	32270	2	U.S. EPA, 2013
		Fish	*Danio rerio*	LC50	4438000	89509	2	Schirmer and Knoebel, 2012
					4903000	98887	2	Schirmer and Knoebel, 2012
					4903000	98887	3	Schirmer and Knoebel, 2012
					7499000	151245	2	Schirmer and Knoebel, 2012
					7499000	151245	4	Schirmer and Knoebel, 2012
					8464000	170708	4	Schirmer and Knoebel, 2012
					8804000	177566	2	Schirmer and Knoebel, 2012
					8920000	179905	2	Scholz S., 2012
					11430000	230529	3	Schirmer and Knoebel, 2012
					11430000	230529	4	Schirmer and Knoebel, 2012
					11930000	240613	2	Schirmer and Knoebel, 2012
					12220000	246462	2	Schirmer and Knoebel, 2012
					12220000	246462	3	Schirmer and Knoebel, 2012
					12330000	248681	2	Schirmer and Knoebel, 2012
					14020000	282766	2	Schirmer and Knoebel, 2012
					14020000	282766	3	Schirmer and Knoebel, 2012
			Lepomis macrochirus	NOEC	1400000	28236	4	U.S. EPA, 2013
				LC50	3200000	64540	4	U.S. EPA, 2013
			Oncorhynchus kisutch	NOEC	400000	8068	4	U.S. EPA, 2013
					670000	135131	40	U.S. EPA, 2013
				LOEC	670000	135131	40	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	860000	17345	4	U.S. EPA, 2013
					100000000	2016875	4	U.S. EPA, 2013
				LC50	2000000	40338	4	U.S. EPA, 2013
					100000000	2016875	4	U.S. EPA, 2013
			Aquatic community	PNEC	2000	403		EU Risk Assessment Report, 2008
					2000	403		OSPAR Agreement, 2014-05
84852-15-3	Nonylphenol technical mixture	Fish	*Danio rerio*	NOEC	2500	79.91	3	Jin et al., 2010
					10000	320	2	Jin et al., 2009
					12500	400	3	Jin et al., 2010
					100000	3197	2	Jin et al., 2009
					1000000	31965	2	Kammann et al., 2009
					1000000	31965	2	Kammann et al., 2009
					1200000	38358	2	Kammann et al., 2009
					1400000	44751	2	Kammann et al., 2009
					1500000	47948	2	Kammann et al., 2009
					2000000	63931	2	Kammann et al., 2009
				LOEC	10000	320	2	Jin et al., 2009
					12500	400	3	Jin et al., 2010
					100000	3197	2	Jin et al., 2009
				EC50	2000000	63931	2	Kammann et al., 2009
					2100000	67127	2	Kammann et al., 2009
					4400000	140647	2	Kammann et al., 2009
			Oncorhynchus mykiss	NOEC	2300	73.52	4	Shelley et al., 2012
					18000	575	4	Shelley et al., 2012
					18000	575	4	Shelley et al., 2012
					18000	575	4	Shelley et al., 2012
					18000	575	4	Shelley et al., 2012
				LOEC	18000	575	4	Shelley et al., 2012
					18000	575	4	Shelley et al., 2012
122-34-9	Simazine	Algae	*Anabaena flosaquae*	EC50	36000	7261	5	U.S. EPA, 2013
			Chlorella pyrenoidosa	EC50	82000	16538	4	Ma et al., 2002b
			Navicula pelliculosa	NOEC	30000	6051	5	U.S. EPA, 2013
				EC50	90000	18152	5	U.S. EPA, 2013
			Selenastrum capricornutum	NOEC	30000	6051	5	U.S. EPA, 2013
					32000	645	3	Perez et al., 2011b
				LOEC	100000	2017	3	Perez et al., 2011b
				EC50	100000	20169	5	U.S. EPA, 2013
					241000	4861	3	Perez et al., 2011b

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
122-34-9	Simazine	Algae	*Selenastrum capricornutum*	EC50	252000	5083	3	Perez et al., 2011b
					392000	7906	3	Perez et al., 2011b
					748500	150963	4	Ma et al., 2006
			Skeletonema costatum	NOEC	250000	50422	5	U.S. EPA, 2013
				EC50	600000	121013	5	U.S. EPA, 2013
		Algae		NOEC	50000	10084	84	Vervliet-Scheebaum et al., 1993
		Algae		LOEC	500000	100844	84	Vervliet-Scheebaum et al., 1993
		Crustacea	*Daphnia magna*	LOEC	2500000	504219	21	U.S. EPA, 2013
			Procambarus sp.	LC50	100000000	2016875	2	U.S. EPA, 2013
		Fish	*Carassius auratus*	NOEC	2500000	504219	365	U.S. EPA, 2013
				LC50	32000000	645400	4	U.S. EPA, 2013
			Cyprinodon variegatus	NOEC	4300000	86726	4	U.S. EPA, 2013
				LC50	4300000	86726	4	U.S. EPA, 2013
			Cyprinus carpio	NOEC	60.00	12.10	36	Velisek et al., 2012b
					60.00	12.10	60	Stara et al., 2012
					60.00	12.10	60	Stara et al., 2012
					60.00	12.10	90	Velisek et al., 2012a
					60.00	12.10	90	Velisek et al., 2012a
					2000	403	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					60000	12101	36	Velisek et al., 2012b
					600000	121013	36	Velisek et al., 2012b
					2000000	403375	60	Stara et al., 2012
					2000000	403375	60	Stara et al., 2012
					3000000	605063	36	Velisek et al., 2012b
					3000000	605063	36	Velisek et al., 2012b
					4000000	806750	60	Stara et al., 2012
					4000000	806750	60	Stara et al., 2012
					4000000	806750	60	Stara et al., 2012
				LOEC	60.00	12.10	60	Stara et al., 2012
					60.00	12.10	60	Stara et al., 2012
					60.00	12.10	90	Velisek et al., 2012a
					1000	202	90	Velisek et al., 2012a
					1000	202	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					4000	807	90	Velisek et al., 2012a
					60000	12101	36	Velisek et al., 2012b
					600000	121013	36	Velisek et al., 2012b
					2000000	403375	60	Stara et al., 2012
					2000000	403375	60	Stara et al., 2012
					3000000	605063	36	Velisek et al., 2012b
					4000000	806750	60	Stara et al., 2012
					4000000	806750	60	Stara et al., 2012
			Danio rerio	NOEC	6000	1210	28	Plhalova et al., 2011
					60000	12101	28	Plhalova et al., 2011
					10000000	201688	4	Sun et al., 2010b
				LOEC	60000	12101	28	Plhalova et al., 2011
				EC50	800000	16135	4	Sun et al., 2010b
			Lepomis macrochirus	NOEC	2500000	504219	365	U.S. EPA, 2013
					5600000	112945	4	U.S. EPA, 2013
			Morone saxatilis	NOEC	1000000	20169	4	U.S. EPA, 2013
				LC50	3000000	60506	4	U.S. EPA, 2013
			Oncorhynchus mykiss	NOEC	6000000	121013	4	U.S. EPA, 2013
					10000000	201688	4	U.S. EPA, 2013
					22000000	443713	4	U.S. EPA, 2013
					28600000	576826	4	U.S. EPA, 2013
					34300000	691788	4	U.S. EPA, 2013
				LC50	2500000	504219	28	U.S. EPA, 2013
					10000000	201688	4	U.S. EPA, 2013
					40500000	816834	4	U.S. EPA, 2013
					44600000	899526	4	U.S. EPA, 2013
					60000000	1210125	4	U.S. EPA, 2013
					70500000	1421897	4	U.S. EPA, 2013
					82000000	1653838	4	U.S. EPA, 2013
			Pimephales promelas	NOEC	2500000	50422	4	U.S. EPA, 2013
				LOEC	2500000	504219	120	U.S. EPA, 2013
				LC50	6400000	129080	4	U.S. EPA, 2013
		Mollusca	*Crassostrea virginica*	NOEC	1000000	201688	7	U.S. EPA, 2013
					3700000	746244	4	U.S. EPA, 2013
				EC50	1000000	201688	7	U.S. EPA, 2013
		Plants	*Lemna gibba*	NOEC	50000	10084	14	U.S. EPA, 2013
				EC50	140000	28236	14	U.S. EPA, 2013
			Elodea canadensis	NOEC	83000	16740	84	Vervliet-Scheebaum et al., 1993
					83000	16740	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					8470000	1708293	84	Vervliet-Scheebaum et al., 1993
				LOEC	83000	16740	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					8470000	1708293	84	Vervliet-Scheebaum et al., 1993
					8470000	1708293	84	Vervliet-Scheebaum et al., 1993
			Myriophyllum spicatum	NOEC	50000	10084	84	Vervliet-Scheebaum et al., 1993
					83000	16740	84	Vervliet-Scheebaum et al., 1993
					83000	16740	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					8470000	1708293	84	Vervliet-Scheebaum et al., 1993
					8470000	1708293	84	Vervliet-Scheebaum et al., 1993
				LOEC	500000	100844	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					1110000	223873	84	Vervliet-Scheebaum et al., 1993
					8470000	1708293	84	Vervliet-Scheebaum et al., 1993

ANTIBIOTIC ACTIVITY

I.1 AMINOGLYCOSIDES

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
1263-89-4	Aminosidine	Crustacea	*Artemia franciscana*	LC50	846500000	84650000	3	Migliore et al., 1996
				LC50	2220000000	222000000	2	Migliore et al., 1996
128-46-1	Dihydrostreptomycin	Algae	*Selenastrum capricornutum*	NOEC	39000	7800		Eguchi et al., 2004
				EC50	107000	21400		Eguchi et al., 2004
1404-04-2	Neomycin	Bacteria	*Vibrio fisheri*	EC50	1000000000	100000000	0.01	Park and Choi, 2008
				EC50	1000000000	100000000	0.03	Park and Choi, 2008
		Crustacea	*Daphnia magna*	NOEC	30000	30000	21	Park and Choi, 2008
				LOEC	100000	100000	21	Park and Choi, 2008
				EC50	90000	90000	21	Park and Choi, 2008
				EC50	42100000	4210000	2	Park and Choi, 2008
				EC50	116600000	11660000	1	Park and Choi, 2008
			Moina macrocopa	NOEC	500000	500000	8	Park and Choi, 2008
				LOEC	1600000	1600000	8	Park and Choi, 2008
				EC50	740000	740000	8	Park and Choi, 2008
				EC50	34100000	3410000	2	Park and Choi, 2008
				EC50	61900000	6190000	1	Park and Choi, 2008
		Fish	*Oryzias latipes*	LC50	80800000	8080000	4	Park and Choi, 2008
				LC50	138800000	13880000	2	Park and Choi, 2008
			Aquatic community	PNEC	300	300		Park and Choi, 2008
57-92-1	Streptomycin	Algae	*Chlorella vulgaris*	EC50	20080000	160640000	4	Qian et al., 2010
			Microcystis aeruginosa	EC50	7000	56000	7	Halling-Sorensen, 2000
				EC50	34000	27200	1	Grinten et al., 2010
				EC50	280000	2240000	4	Qian et al., 2010
			Selenastrum capricornutum	EC50	133000	106400	3	Halling-Sorensen, 2000
				EC50	1500000	1200000	1	Grinten et al., 2010
		Bacteria	*Bacillus cereus*	EC50	2900000	23200000	1	Grinten et al., 2010
			Bacillus pumilus	EC50	2900000	23200000	1	Grinten et al., 2010
			Micrococcus luteus	EC50	2900000	23200000	1	Grinten et al., 2010
			Vibrio fisheri	EC50	400000	320000	0.02	Grinten et al., 2010
				EC50	8210000	65680000	1	Backhaus and Grimme, 1999
			Yersinia ruckeri	EC50	2900000	23200000	1	Grinten et al., 2010
		Crustacea	*Daphnia magna*	EC50	487000000	389600000	2	Wollenberger et al., 2000
				EC50	947000000	757600000	1	Wollenberger et al., 2000

I.2 MACROLIDES & β-LACTAMS

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
26787-78-0	Amoxicillin	Algae	*Microcystis aeruginosa*	EC50	3700	2220	7	Holten Lützhoft et al., 1999
			Rhodomonas salina	EC50	3108000	1864800	7	Holten Lützhoft et al., 1999
			Selenastrum capricornutum	NOEC	250000000	150000000	7	Holten Lützhoft et al., 1999
		Bacteria	*Vibrio fisheri*	EC50	1320000000	79200000	0.01	Park and Choi, 2008
					3597000000	215820000	0.01	Park and Choi, 2008
		Crustacea	*Daphnia magna*	EC50	1000000000	60000000	1	Park and Choi, 2008
					1000000000	60000000	2	Park and Choi, 2008
			Moina macrocopa	EC50	1000000000	60000000	1	Park and Choi, 2008
					1000000000	60000000	2	Park and Choi, 2008
		Fish	*Oryzias latipes*	LC50	1000000000	60000000	2	Park and Choi, 2008
					1000000000	60000000	4	Park and Choi, 2008
		Plants	*Lemna gibba*	LOEC	1000000	60000		Park and Choi, 2008
				EC50	3700	222		Park and Choi, 2008
			Aquatic community	PNEC	3.70	2.22		Jones et al., 2002
					250000	150000		Jones et al., 2002
69-53-4	Ampicillin	Algae	*Chlorella vulgaris*	NOEC	1000000000	60000000		Eguchi et al., 2004
				EC50	1000000000	60000000		Eguchi et al., 2004
			Selenastrum capricornutum	NOEC	1000000000	60000000		Eguchi et al., 2004
				EC50	1000000000	60000000		Eguchi et al., 2004
		Bacteria	*Vibrio fisheri*	EC50	163000000	97800000	1	Backhaus and Grimme, 1999
					1056000000	63360000	0.003	Park and Choi, 2008
					2627000000	157620000	0.01	Park and Choi, 2008
		Crustacea	*Daphnia magna*	EC50	1000000000	60000000	1	Park and Choi, 2008
					1000000000	60000000	2	Park and Choi, 2008
			Moina macrocopa	EC50	1000000000	60000000	1	Park and Choi, 2008
					1000000000	60000000	2	Park and Choi, 2008
		Fish	*Oryzias latipes*	LC50	1000000000	60000000	2	Park and Choi, 2008
					1000000000	60000000	4	Park and Choi, 2008
			Aquatic community	PNEC	163000	97800		Park and Choi, 2008
1405-87-4	Bacitracin	Crustacea	*Artemia franciscana*	LC50	21820000	81825	2	Ferreira et al., 2007
			Artemia nauplii	EC50	21820000	81825	2	Migliore et al., 1996
					34060000	127725	1	Migliore et al., 1996
61-33-6	Benzylpenicillin	Algae	*Microcystis aeruginosa*	EC50	6000	3600	7	Halling-Sorensen, 2000
			Selenastrum capricornutum	NOEC	100000000	6000000	3	Halling-Sorensen, 2000
114-07-8	Erythromycin	Algae	*Chlorella vulgaris*	NOEC	12500000	375000		Eguchi et al., 2004
				EC50	33800000	1014000		Eguchi et al., 2004
			Selenastrum capricornutum	NOEC	10300	309		Eguchi et al., 2004
				EC50	20000	600	3	Isidori et al., 2005

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
					36600	1098		Eguchi et al., 2004
		Bacteria	*Vibrio fisheri*	EC50	100000000	3000000	0.02	Isidori et al., 2005
		Crustacea	*Ceriodaphnia dubia*	EC50	220000	66000	7	Isidori et al., 2005
					10230000	306900	2	Isidori et al., 2005
			Daphnia magna Straus	EC50	22450000	673500	1	Isidori et al., 2005
			Thamnocephalus platyurus	LC50	17680000	530400	1	Isidori et al., 2005
		Fish	*Danio rerio*	LC50	1000000000	30000000	4	Isidori et al., 2005
		Invertebrates	*Brachionus calyciflorus*	EC50	940000	28200	2	Isidori et al., 2005
				LC50	27530000	825900	1	Isidori et al., 2005
		Plants	*Lemna gibba*	LOEC	1000000	300000	7	Brain et al., 2004
			Lemna minor	EC50	5620000	168600	7	Pomati et al., 2004
			Aquatic community	PNEC	103	3.09	3	Yang et al., 2011
					22700	6810		Jones et al., 2002
154-21-2	Lincomycin	Algae	*Selenastrum capricornutum*	EC50	70000	525	3	Isidori et al., 2005
		Bacteria	*Vibrio fisheri*	EC50	100000000	750000	0.02	Isidori et al., 2005
		Crustacea	*Artemia franciscana*	LC50	283100000	2123250	3	Ferreira et al., 2007
			Artemia nauplii	EC50	283100000	2123250	3	Migliore et al., 1996
			Ceriodaphnia dubia	EC50	7200000	540000	7	Isidori et al., 2005
					13980000	104850	2	Isidori et al., 2005
			Daphnia magna Straus	EC50	23180000	173850	1	Isidori et al., 2005
			Thamnocephalus platyurus	LC50	30000000	225000	1	Isidori et al., 2005
		Fish	*Danio rerio*	LC50	1000000000	7500000	4	Isidori et al., 2005
		Invertebrates	*Brachionus calyciflorus*	EC50	680000	5100	2	Isidori et al., 2005
				LC50	24940000	187050	1	Isidori et al., 2005
		Plants	*Lemna gibba*	LOEC	100000	7500	7	Brain et al., 2004
					100000	7500	7	Brain et al., 2004
					100000	7500	7	Brain et al., 2004
					300000	22500	7	Brain et al., 2004
					1000000	75000	7	Brain et al., 2004
303-81-1	Novobiocin	Polyp	*Hydra attenuata*	NOEC	50000000	937500	4	Quinn et al., 2007
				LOEC	100000000	1875000	4	Quinn et al., 2007
				EC50	13530000	253688	4	Quinn et al., 2007
				LC50	100000000	1875000	4	Quinn et al., 2007
87-08-1	Phenoxymethylpenicillin		Aquatic community	PNEC	177000	53100		Jones et al., 2002
8025-81-8	Spiramycin	Algae	*Microcystis aeruginosa*	EC50	5000	250	7	Halling-Sorensen, 2000
			Selenastrum capricornutum	EC50	2300000	11500	3	Halling-Sorensen, 2000
55297-95-5	Tiamulin	Algae	*Microcystis aeruginosa*	EC50	3000	18.00	7	Halling-Sorensen, 2000
			Selenastrum capricornutum	EC50	165000	99	3	Halling-Sorensen, 2000
		Crustacea	*Daphnia magna*	EC50	5400000	32400	21	Wollenberger et al., 2000
					40000000	24000	2	Wollenberger et al., 2000
					81000000	48600	1	Wollenberger et al., 2000
1401-69-0	Tylosin	Algae	*Microcystis aeruginosa*	EC50	34000	1275	7	Halling-Sorensen, 2000
					290000	1088	1	Grinten et al., 2010
			Selenastrum capricornutum	NOEC	64000	240	3	Yang et al., 2008
					206000	773		Eguchi et al., 2004
				LOEC	64000	240	3	Yang et al., 2008
				EC50	8900	33.38	1	Grinten et al., 2010
					210000	788	3	Yang et al., 2008
					411000	1541		Eguchi et al., 2004
					950000	3563		Yang et al., 2008
					1380000	5175	3	Halling-Sorensen, 2000
					1380000	5175		Yang et al., 2008
		Bacteria	*Bacillus cereus*	EC50	3100000	116250	1	Grinten et al., 2010
			Bacillus pumilus	EC50	1090000	40875	1	Grinten et al., 2010
			Micrococcus luteus	EC50	570000	21375	1	Grinten et al., 2010
			Vibrio fisheri	EC50	1800000	6750	0.02	Grinten et al., 2010
			Yersinia ruckeri	EC50	3100000	116250	1	Grinten et al., 2010
		Crustacea	*Daphnia magna*	LOEC	700000000	2625000	1	Wollenberger et al., 2000
				EC50	680000000	2550000	2	Wollenberger et al., 2000
		Plants	*Lemna gibba*	LOEC	300000	11250	7	Brain et al., 2004
					1000000	37500	7	Brain et al., 2004
					1000000	37500	7	Brain et al., 2004

I.3 SULFONAMIDES

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
80-32-0	Sulfachlorpyridazine	Algae	*Chlorella vulgaris*	EC50	2000000000	100000000	2	Pro et al., 2003
		Bacteria	*Vibrio fisheri*	EC50	26400000	1320000	0.01	Kim et al., 2007
		Crustacea	*Daphnia magna*	LC50	233500000	116750000	4	Kim et al., 2007
					375300000	18765000	2	Kim et al., 2007
		Fish	*Oryzias latipes*	LC50	535700000	26785000	4	Kim et al., 2007
					589300000	29465000	2	Kim et al., 2007
		Plants	*Lemna gibba*	EC50	2330000	1165000	7	Pro et al., 2003
68-35-9	Sulfadiazine	Algae	*Chlorella vulgaris*	EC50	1226000	61300	2	Baran et al., 2006
			Microcystis aeruginosa	EC50	135000	67500	7	Holten Lützhoft et al., 1999
			Rhodomonas salina	EC50	403000000	201500000		Holten Lützhoft et al., 1999
			Selenastrum capricornutum	NOEC	1000000	50000		Eguchi et al., 2004
				EC50	2190000	109500		Eguchi et al., 2004
					7800000	3900000		Holten Lützhoft et al., 1999
		Crustacea	*Daphnia magna*	LOEC	150000000	7500000	1	Wollenberger et al., 2000
				EC50	13700000	6850000	21	Wollenberger et al., 2000
					212000000	10600000	2	Liguoro et al., 2009
					221000000	11050000	2	Wollenberger et al., 2000
		Fish	*Danio rerio*	NOEC	100000	5000	2	Lin et al., Manuscript Draft
				LOEC	1000	50.00	0.3	Lin et al., Manuscript Draft
					1000	50.00	1	Lin et al., Manuscript Draft
					1000	50.00	4	Lin et al., Manuscript Draft
					10000000	500000	2	Lin et al., Manuscript Draft
			Aquatic community	PNEC	212000	106000	2	Yang et al., 2011
122-11-2	Sulfadimethoxine	Algae	*Chlorella vulgaris*	NOEC	20300000	2030000		Eguchi et al., 2004
				EC50	11200000	1120000		Eguchi et al., 2004
			Selenastrum capricornutum	NOEC	529000	52900		Eguchi et al., 2004
				EC50	2300000	230000		Eguchi et al., 2004
		Bacteria	*Vibrio fisheri*	EC50	500000000	50000000	0.01	Kim et al., 2007
		Crustacea	*Daphnia magna*	EC50	204500000	204500000	4	Kim et al., 2007
					248000000	24800000	2	Kim et al., 2007
					270000000	27000000	2	Liguoro et al., 2009
					639800000	63980000	1	Park and Choi, 2008
			Moina macrocopa	EC50	183900000	18390000	2	Park and Choi, 2008
					296600000	29660000	1	Park and Choi, 2008
		Fish	*Oryzias latipes*	LC50	100000000	10000000	2	Kim et al., 2007
					100000000	10000000	4	Kim et al., 2007
					500000000	50000000	2	Park and Choi, 2008
					500000000	50000000	4	Park and Choi, 2008
		Plants	*Lemna gibba*	LOEC	300000	300000	7	Brain et al., 2004
					300000	300000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
				EC50	248000	248000	7	Brain et al., 2004
					445000	445000	7	Brain et al., 2004
					2387000	2387000	7	Brain et al., 2004
					3223000	3223000	7	Brain et al., 2004
					3552000	3552000	7	Brain et al., 2004
			Aquatic community	PNEC	248	248		Park and Choi, 2008
57-68-1	Sulfamethazine	Algae	*Selenastrum capricornutum*	NOEC	1000000	50000	3	Yang et al., 2008
				LOEC	8000000	400000	3	Yang et al., 2008
				EC50	8700000	435000	3	Yang et al., 2008
		Bacteria	*Vibrio fisheri*	EC50	344700000	17235000	0.01	Kim et al., 2007
		Crustacea	*Daphnia magna*	NOEC	1563000	781500	21	Liguoro et al., 2009
				LOEC	3125000	1562500	21	Liguoro et al., 2009
				EC50	4250000	2125000	21	Liguoro et al., 2009
					147500000	73750000	4	Jung et al., 2008
					185300000	9265000	2	Jung et al., 2008
					202000000	10100000	2	Liguoro et al., 2009
					215900000	10795000	2	Park and Choi, 2008
					506300000	25315000	1	Park and Choi, 2008
				LC50	158800000	79400000	4	Kim et al., 2007
					174400000	8720000	2	Kim et al., 2007
			Moina macrocopa	EC50	110700000	5535000	2	Park and Choi, 2008
					310900000	15545000	1	Park and Choi, 2008
		Fish	*Oryzias latipes*	LC50	100000000	5000000	2	Kim et al., 2007
					100000000	5000000	4	Kim et al., 2007
					500000000	25000000	2	Park and Choi, 2008
					500000000	25000000	4	Park and Choi, 2008
		Plants	*Lemna gibba*	LOEC	1000000	500000	7	Brain et al., 2004
				EC50	1277000	638500	7	Brain et al., 2004
			Aquatic community	PNEC	1277	639		Park and Choi, 2008
					202000	101000	2	Yang et al., 2011
723-46-6	Sulfamethoxazole	Algae	*Chlorella vulgaris*	EC50	1570000	157000	2	Baran et al., 2006
			Cyclotella meneghiniana	NOEC	1250000	1250000	4	Ferrari et al., 2004
				EC50	2400000	2400000	4	Ferrari et al., 2004
			Microcystis aeruginosa	EC50	550000	55000	1	Grinten et al., 2010
			Selenastrum capricornutum	NOEC	90000	90000	4	Ferrari et al., 2004
					500000	50000	3	Yang et al., 2008
					614000	61400		Eguchi et al., 2004
				LOEC	800000	80000	3	Yang et al., 2008
				EC50	146000	146000	4	Ferrari et al., 2004
					146000	146000	4	Yang et al., 2008
					520000	52000	3	Isidori et al., 2005
					520000	52000	3	Yang et al., 2008
					1500000	150000		Yang et al., 2008
					1530000	153000		Eguchi et al., 2004
					1900000	190000	3	Yang et al., 2008
					9000000	900000	1	Grinten et al., 2010
			Synechococcus leopoliensis	NOEC	5900	5900	4	Ferrari et al., 2004
				EC50	26800	26800	4	Ferrari et al., 2004
		Amphibia	*Xenopus laevis*	NOEC	100000000	10000000	4	Richards and Cole, 2006
				LOEC	100000000	10000000	4	Richards and Cole, 2006
		Bacteria	*Bacillus cereus*	EC50	1500000	1500000	1	Grinten et al., 2010
			Bacillus pumilus	EC50	52000	52000	1	Grinten et al., 2010
			Micrococcus luteus	EC50	1500000	1500000	1	Grinten et al., 2010
			Vibrio fisheri	EC50	1500000	150000	0.02	Grinten et al., 2010
					23300000	2330000	0.02	Isidori et al., 2005
					78100000	7810000	0.01	Kim et al., 2007

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
					84000000	8400000	0.02	Ferrari et al., 2004
			Yersinia ruckeri	EC50	1500000	1500000	1	Grinten et al., 2010
		Crustacea	*Ceriodaphnia dubia*	NOEC	250000	250000	7	Ferrari et al., 2004
				EC50	210000	210000	7	Isidori et al., 2005
					15510000	1551000	2	Isidori et al., 2005
					100000000	10000000	2	Ferrari et al., 2004
			Daphnia magna	EC50	25200000	2520000	1	Isidori et al., 2005
					100000000	10000000	2	Ferrari et al., 2004
					123100000	12310000	2	Park and Choi, 2008
					177600000	177600000	4	Jung et al., 2008
					200000000	20000000	1	Park and Choi, 2008
					205200000	20520000	2	Jung et al., 2008
				LC50	177300000	177300000	4	Kim et al., 2007
					189200000	18920000	2	Kim et al., 2007
			Moina macrocopa	EC50	70400000	7040000	2	Park and Choi, 2008
					84900000	8490000	1	Park and Choi, 2008
			Thamnocephalus platyurus	LC50	35360000	3536000	1	Isidori et al., 2005
		Fish	*Danio rerio*	NOEC	1000	100	1	Lin et al., Manuscript Draft
					8000000	800000	10	Ferrari et al., 2004
				LOEC	1000	100	0.3	Lin et al., Manuscript Draft
					1000	100	2	Lin et al., Manuscript Draft
					100000	10000	1	Lin et al., Manuscript Draft
					10000000	1000000	4	Lin et al., Manuscript Draft
				LC50	1000000000	100000000	4	Isidori et al., 2005
			Oryzias latipes	LC50	562500000	56250000	4	Kim et al., 2007
					750000000	75000000	2	Kim et al., 2007
		Invertebrates	*Brachionus calyciflorus*	NOEC	25000000	2500000	2	Ferrari et al., 2004
				LC50	9630000	963000	2	Isidori et al., 2005
					26270000	2627000	1	Isidori et al., 2005
		Plants	*Lemna gibba*	LOEC	30000	30000	7	Brain et al., 2004
					100000	100000	7	Brain et al., 2004
					100000	100000	7	Brain et al., 2004
					100000	100000	7	Brain et al., 2004
					300000	300000	7	Brain et al., 2004
				EC50	81000	81000	7	Brain et al., 2004
					249000	249000	7	Brain et al., 2004
					682000	682000	7	Brain et al., 2004
					985000	985000	7	Brain et al., 2004
					4963000	4963000	7	Brain et al., 2004
		Polyp	*Hydra attenuata*	NOEC	5000000	5000000	4	Quinn et al., 2007
				LOEC	10000000	10000000	4	Quinn et al., 2007
				LC50	100000000	100000000	4	Quinn et al., 2007
			Aquatic community	PNEC	30.00	30.00		Park and Choi, 2008
					146	146	4	Kim et al., 2007
					189000	189000	2	Yang et al., 2011
144-83-2	Sulfapyridine	Polyp	*Hydra attenuata*	NOEC	1000000	800000	4	Quinn et al., 2007
				LOEC	5000000	4000000	4	Quinn et al., 2007
				EC50	21610000	17288000	4	Quinn et al., 2007
				LC50	100000000	80000000	4	Quinn et al., 2007
			Aquatic community	PNEC	10000	8000	4	Yang et al., 2011
72-14-0	Sulfathiazole	Algae	*Chlorella vulgaris*	EC50	16340000	408500	2	Baran et al., 2006
		Bacteria	*Vibrio fisheri*	EC50	1000000000	25000000	0.01	Kim et al., 2007
		Crustacea	*Daphnia magna*	NOEC	11000000	2750000	21	Park and Choi, 2008
				LOEC	35000000	8750000	21	Park and Choi, 2008
				EC50	78900000	19725000	4	Jung et al., 2008
					135700000	3392500	2	Jung et al., 2008
					616700000	15417500	1	Park and Choi, 2008
				LC50	85400000	21350000	4	Kim et al., 2007
					149300000	3732500	2	Kim et al., 2007
			Moina macrocopa	EC50	391100000	9777500	2	Park and Choi, 2008
					430100000	10752500	1	Park and Choi, 2008
		Fish	*Oryzias latipes*	LC50	500000000	12500000	2	Kim et al., 2007
					500000000	12500000	4	Kim et al., 2007
			Aquatic community	PNEC	100	25.00		Park and Choi, 2008
738-70-5	Trimethoprim	Algae	*Microcystis aeruginosa*	EC50	6900000	3450000	1	Grinten et al., 2010
					112000000	560000000	7	Holten Lützhoft et al., 1999
					112000000	56000000		Halling-Sorensen et al., 2000
			Rhodomonas salina	EC50	16000000	80000000		Holten Lützhoft et al., 1999
			Selenastrum capricornutum	NOEC	16000000	8000000	3	Yang et al., 2008
					25500000	12750000		Eguchi et al., 2004
				LOEC	40000000	20000000	3	Yang et al., 2008
				EC50	9000000	4500000	1	Grinten et al., 2010
					40000000	20000000	3	Yang et al., 2008
					80300000	40150000		Eguchi et al., 2004
					80300000	40150000		Yang et al., 2008
					110000000	55000000		Halling-Sorensen et al., 2000
					130000000	650000000		Holten Lützhoft et al., 1999
					130000000	65000000		Yang et al., 2008
		Amphibia	*Xenopus laevis*	NOEC	100000000	50000000	4	Richards and Cole, 2006
				LOEC	100000000	50000000	4	Richards and Cole, 2006
		Bacteria	*Bacillus cereus*	EC50	350000	1750000	1	Grinten et al., 2010
			Bacillus pumilus	EC50	28000	140000	1	Grinten et al., 2010
			Micrococcus luteus	EC50	350000	1750000	1	Grinten et al., 2010
			Vibrio fisheri	EC50	280000	140000	0.02	Grinten et al., 2010
					176700000	88350000	0.01	Kim et al., 2007
			Yersinia ruckeri	EC50	350000	1750000	1	Grinten et al., 2010
		Bacteria			17800000	8900000		Halling-Sorensen et al., 2000
		Crustacea	*Ceriodaphnia dubia*	EC50	123000000	61500000		Park and Choi, 2008
			Daphnia magna	NOEC	6000000	30000000	21	Park and Choi, 2008
				LOEC	20000000	100000000	21	Park and Choi, 2008
				EC50	92000000	46000000	2	Park and Choi, 2008
					120700000	603500000	4	Kim et al., 2007
					123000000	61500000	2	Halling-Sorensen et al., 2000
					149000000	74500000	2	Liguoro et al., 2009
					149000000	74500000	2	Yang et al., 2011
					155600000	77800000	1	Park and Choi, 2008
					167400000	83700000	2	Kim et al., 2007
			Moina macrocopa	EC50	54800000	27400000	2	Park and Choi, 2008
					144800000	72400000	1	Park and Choi, 2008
		Fish	*Brachydanio rerio*	NOEC	100000000	50000000	3	Halling-Sorensen et al., 2000
			Oryzias latipes	LC50	100000000	50000000	2	Kim et al., 2007
					100000000	50000000	4	Kim et al., 2007
		Polyp	*Hydra attenuata*	NOEC	100000000	500000000	4	Quinn et al., 2007
				LOEC	100000000	500000000	4	Quinn et al., 2007
				LC50	100000000	500000000	4	Quinn et al., 2007
			Aquatic community	PNEC	60000	300000		Park and Choi, 2008
					120700	603500	4	Kim et al., 2007
					149000	745000	2	Yang et al., 2011
					178000	890000		Halling-Sorensen et al., 2000

I.4 TETRACYCLINES

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
56-75-7	Chloramphenicol	Algae	*Tetraselmis suecica*	NOEC	2500000	25000	1	Seoane et al., 2014
				LOEC	2500000	25000	1	Seoane et al., 2014
				EC50	11160000	1116000	4	Seoane et al., 2014
		Bacteria	*Vibrio fisheri*	EC50	64300	6430	1	Backhaus and Grimme, 1999
57-62-5	Chlortetracycline	Algae	*Microcystis aeruginosa*	EC50	50000	200000	7	Halling-Sorensen, 2000
			Selenastrum capricornutum	NOEC	500000	200000	3	Yang et al., 2008
				LOEC	1000000	400000	3	Yang et al., 2008
				EC50	1800000	720000	3	Yang et al., 2008
					3100000	1240000	3	Halling-Sorensen, 2000
					3100000	1240000		Yang et al., 2008
		Amphibia	*Xenopus laevis*	NOEC	100000000	40000000	4	Richards and Cole, 2006
				LOEC	100000000	40000000	4	Richards and Cole, 2006
		Bacteria	*Vibrio fisheri*	EC50	13000000	5200000	0.01	Park and Choi, 2008
					20000000	8000000	0.003	Park and Choi, 2008
		Crustacea	*Daphnia magna*	EC50	225000000	90000000	2	Park and Choi, 2008
					380100000	152040000	1	Park and Choi, 2008
			Moina macrocopa	EC50	272000000	108800000	2	Park and Choi, 2008
					515000000	206000000	1	Park and Choi, 2008
		Fish	*Oryzias latipes*	LC50	78900000	31560000	4	Park and Choi, 2008
					88400000	35360000	2	Park and Choi, 2008
		Plants	*Lemna gibba*	LOEC	100000	400000	7	Brain et al., 2004
					300000	1200000	7	Brain et al., 2004
					300000	1200000	7	Brain et al., 2004
					300000	1200000	7	Brain et al., 2004
				EC50	219000	876000	7	Brain et al., 2004
					318000	1272000	7	Brain et al., 2004
					630000	2520000	7	Brain et al., 2004
					650000	2600000	7	Brain et al., 2004
					1620000	6480000	7	Brain et al., 2004
			Aquatic community	PNEC	50.00	200		Park and Choi, 2008
564-25-0	Doxycycline	Plants	*Lemna gibba*	LOEC	300000	1200000	7	Brain et al., 2004
					300000	1200000	7	Brain et al., 2004
					300000	1200000	7	Brain et al., 2004
					1000000	4000000	7	Brain et al., 2004
				EC50	316000	1264000	7	Brain et al., 2004
					473000	1892000	7	Brain et al., 2004
					1844000	7376000	7	Brain et al., 2004
					2616000	10464000	7	Brain et al., 2004
79-57-2	Oxytetracycline	Algae	*Chlorella vulgaris*	NOEC	3580000	358000		Eguchi et al., 2004
				EC50	6400000	640000	2	Kolodziejska et al., 2013
					6400000	640000	2	Pro et al., 2003
					7050000	705000	3	Kolodziejska et al., 2013
					7050000	705000		Eguchi et al., 2004
			Isochrysis galbana	EC50	6430000	6430000	4	Seoane et al., 2014
			Microcystis aeruginosa	EC50	207000	207000	7	Holten Lützhoft et al., 1999
					5400000	540000	1	Grinten et al., 2010
			Phaeodactylum tricornutum	EC50	1730000	1730000	4	Seoane et al., 2014
			Rhodomonas salina	EC50	1600000	160000		Holten Lützhoft et al., 1999
			Scenedesmus vacuolatus	EC50	40400000	4040000	1	Kolodziejska et al., 2013
			Selenastrum capricornutum	NOEC	183000	18300		Eguchi et al., 2004
				EC50	170000	17000	3	Isidori et al., 2005
					170000	17000	3	Kolodziejska et al., 2013
					342000	34200	3	Kolodziejska et al., 2013
					342000	34200		Eguchi et al., 2004
					470000	47000	2	Kolodziejska et al., 2013
					600000	60000	1	Grinten et al., 2010
					3100000	3100000	4	Kolodziejska et al., 2013
					4500000	450000	3	Kolodziejska et al., 2013
					4500000	450000		Holten Lützhoft et al., 1999
			Tetraselmis chuii	NOEC	3600000	360000	3	Ferreira et al., 2007
				LOEC	5300000	530000	3	Ferreira et al., 2007
				EC50	11180000	11180000	4	Ferreira et al., 2007
					11180000	11180000	4	Kolodziejska et al., 2013
					13160000	1316000	3	Ferreira et al., 2007
					13160000	1316000	3	Kolodziejska et al., 2013
			Tetraselmis suecica	NOEC	7500000	750000	1	Seoane et al., 2014
				LOEC	5000000	500000	1	Seoane et al., 2014
					5000000	500000	1	Seoane et al., 2014
				EC50	17250000	17250000	4	Seoane et al., 2014
		Bacteria	*Bacillus cereus*	EC50	81000	81000	1	Grinten et al., 2010
			Bacillus pumilus	EC50	150000	150000	1	Grinten et al., 2010
			Micrococcus luteus	EC50	150000	150000	1	Grinten et al., 2010
			Vibrio fisheri	EC50	100000	10000	0.02	Grinten et al., 2010
					21000000	2100000	0.02	Kolodziejska et al., 2013
					64500000	6450000	0.02	Isidori et al., 2005
					64500000	6450000	0.02	Kolodziejska et al., 2013
					66000000	6600000	0.01	Kolodziejska et al., 2013
					87000000	8700000	0.01	Kolodziejska et al., 2013
					87000000	8700000	0.01	Park and Choi, 2008
					108000000	10800000	0.02	Kolodziejska et al., 2013
					132300000	13230000	0.02	Kolodziejska et al., 2013
					235400000	23540000	0.003	Kolodziejska et al., 2013
					235400000	23540000	0.003	Park and Choi, 2008
			Yersinia ruckeri	EC50	150000	150000	1	Grinten et al., 2010

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
		Crustacea	*Artemia parthenogenetica*	NOEC	637000000	637000000	2	Ferreira et al., 2007
				LOEC	828000000	828000000	2	Ferreira et al., 2007
				EC50	805990000	80599000	2	Kolodziejska et al., 2013
					870470000	87047000	1	Kolodziejska et al., 2013
				LC50	805990000	80599000	2	Ferreira et al., 2007
					870470000	87047000	1	Ferreira et al., 2007
			Ceriodaphnia dubia	EC50	180000	180000	7	Isidori et al., 2005
					180000	180000	7	Kolodziejska et al., 2013
					18650000	1865000	2	Isidori et al., 2005
					18650000	1865000	2	Kolodziejska et al., 2013
			Daphnia magna	LOEC	100000000	10000000	2	Kolodziejska et al., 2013
					100000000	10000000	2	Wollenberger et al., 2000
				EC50	22640000	2264000	1	Isidori et al., 2005
					22640000	2264000	1	Kolodziejska et al., 2013
					46200000	46200000	21	Kolodziejska et al., 2013
					46200000	46200000	21	Wollenberger et al., 2000
					86000000	8600000	2	Kolodziejska et al., 2013
					114000000	11400000	2	Kolodziejska et al., 2013
					621200000	62120000	2	Kolodziejska et al., 2013
					621200000	62120000	2	Park and Choi, 2008
					831600000	83160000	1	Kolodziejska et al., 2013
					831600000	83160000	1	Park and Choi, 2008
			Macrobrachium lanchesteri	LC50	300000000	30000000	2	Rico et al., 2014b
			Moina macrocopa	EC50	126700000	12670000	2	Kolodziejska et al., 2013
					126700000	12670000	2	Park and Choi, 2008
					137100000	13710000	1	Kolodziejska et al., 2013
					137100000	13710000	1	Park and Choi, 2008
			Thamnocephalus platyurus	LC50	25000000	2500000	1	Isidori et al., 2005
		Fish	*Danio rerio*	LC50	1000000000	100000000	4	Isidori et al., 2005
			Morone saxatilis	LC50	125000000	12500000	2	Carraschi et al., 2011
			Oryzias latipes	LC50	110100000	11010000	4	Park and Choi, 2008
					215400000	21540000	2	Park and Choi, 2008
			Piaractus mesopotamicus	LC50	7600000	760000	2	Carraschi et al., 2011
			Salvelinus namaycush	LC50	200000000	20000000	1	Carraschi et al., 2011
		Insecta	*Micronectinae sp.*	LC50	647000000	64700000	2	Rico et al., 2014b
		Invertebrates	*Brachionus calyciflorus*	LC50	1870000	187000	2	Isidori et al., 2005
					34210000	3421000	1	Isidori et al., 2005
		Mollusca	*Melanoides tuberculata*	EC50	958000000	95800000	2	Rico et al., 2014b
			Physella acuta	EC50	791000000	79100000	2	Rico et al., 2014b
		Plants	*Lemna gibba*	LOEC	100000	100000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
				EC50	1010000	1010000	7	Brain et al., 2004
					1010000	1010000	7	Kolodziejska et al., 2013
					1152000	1152000	7	Brain et al., 2004
					1179000	1179000	7	Brain et al., 2004
					1401000	1401000	7	Brain et al., 2004
			Lemna minor	EC50	2100000	2100000	7	Kolodziejska et al., 2013
					3260000	3260000		Kolodziejska et al., 2013
					4920000	4920000	7	Kolodziejska et al., 2013
					4920000	4920000	7	Pro et al., 2003
		Polyp	*Hydra attenuata*	NOEC	50000000	50000000	4	Quinn et al., 2007
				LOEC	100000000	100000000	4	Quinn et al., 2007
				EC50	40130000	40130000	4	Quinn et al., 2007
				LC50	100000000	100000000	4	Quinn et al., 2007
		Worm	*Limnodrilus hoffmeisteri*	EC50	217000000	21700000	2	Rico et al., 2014b
			Aquatic community	PNEC	170	170		Park and Choi, 2008
					230	230		Jones et al., 2002
					2180	2180		Rico et al., 2014b
					4500	4500		Jones et al., 2002
					117000	117000		Rico et al., 2014b
					7000000	7000000		Carraschi et al., 2011
60-54-8	Tetracycline	Algae	*Microcystis aeruginosa*	EC50	90000	90000	7	Halling-Sorensen, 2000
			Selenastrum capricornutum	NOEC	500000	50000	3	Yang et al., 2008
				LOEC	1000000	100000	3	Yang et al., 2008
				EC50	1000000	100000	3	Yang et al., 2008
					2200000	220000	3	Halling-Sorensen, 2000
					2200000	220000		Yang et al., 2008
		Bacteria	*Vibrio fisheri*	EC50	25100	25100	1	Backhaus and Grimme, 1999
		Crustacea	*Daphnia magna*	NOEC	340000000	34000000	2	Wollenberger et al., 2000
				EC50	44800000	44800000	21	Wollenberger et al., 2000
		Plants	*Lemna gibba*	LOEC	100000	100000	7	Brain et al., 2004
					300000	300000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
					1000000	1000000	7	Brain et al., 2004
				EC50	723000	723000	7	Brain et al., 2004
					1114000	1114000	7	Brain et al., 2004
					2592000	2592000	7	Brain et al., 2004
					4569000	4569000	7	Brain et al., 2004
			Lemna minor	EC50	1060000	1060000	7	Pomati et al., 2004
56-75-7	Thiamphenicol	Algae	*Chlorella vulgaris*	NOEC	198000000	495000		Eguchi et al., 2004
				EC50	522000000	1305000		Eguchi et al., 2004
			Selenastrum capricornutum	NOEC	4060000	10150		Eguchi et al., 2004
				EC50	8860000	22150		Eguchi et al., 2004

I.5 QUINOLONES

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
85721-33-1	Ciprofloxacin	Algae	*Anabaena flosaquae*	EC50	10200	5100		Ebert et al., 2011
					36300	18150		Ebert et al., 2011
			Chlorella vulgaris	EC50	23000000	11500000	3	Andrieu et al., 2005
			Desmodesmus subspicatus	NOEC	8042000	4021000		Ebert et al., 2011
			Microcystis aeruginosa	EC50	5000	2500		Halling-Sorensen et al., 2000
					17000	85000	5	Robinson et al., 2005
			Selenastrum capricornutum	NOEC	5000000	2500000	3	Yang et al., 2008
				LOEC	5000000	2500000	3	Yang et al., 2008
				EC50	1100000	550000		Yang et al., 2008
					2970000	1485000		Halling-Sorensen et al., 2000
					2970000	1485000		Yang et al., 2008
					6700000	3350000	3	Yang et al., 2008
					18700000	9350000	3	Robinson et al., 2005
		Amphibia	*Xenopus laevis*	NOEC	100000000	50000000	4	Richards and Cole, 2006
				LOEC	100000000	50000000	4	Richards and Cole, 2006
		Bacteria	*Bacteria*	EC50	610000	305000		Halling-Sorensen et al., 2000
		Crustacea	*Daphnia magna*	NOEC	60000000	30000000	2	Halling-Sorensen et al., 2000
				EC50	1200000	600000		Andrieu et al., 2005
			Moina macrocopa	EC50	71000000	35500000	2	Andrieu et al., 2005
		Fish	*Brachydanio rerio*	NOEC	100000000	50000000	3	Halling-Sorensen et al., 2000
			Gambusia holbrooki	EC50	60000000	30000000		Andrieu et al., 2005
		Plants	*Lemna gibba*	LOEC	300000	1500000	7	Brain et al., 2004
					300000	1500000	7	Brain et al., 2004
					1000000	5000000	7	Brain et al., 2004
					1000000	5000000	7	Brain et al., 2004
					1000000	5000000	7	Brain et al., 2004
				EC50	697000	3485000	7	Brain et al., 2004
					698000	3490000	7	Brain et al., 2004
					992000	4960000	7	Brain et al., 2004
					1279000	6395000	7	Brain et al., 2004
					1762000	8810000	7	Brain et al., 2004
			Lemna minor	NOEC	10000	5000		Ebert et al., 2011
				EC50	62500	31250		Ebert et al., 2011
					203000	1015000	7	Robinson et al., 2005
			Myriophyllum spicatum	NOEC	980000	490000		Ebert et al., 2011
			Aquatic community	PNEC	50.00	250		Halling-Sorensen et al., 2000
					1200	6000		Andrieu et al., 2005
					60000	300000		Andrieu et al., 2005
93106-60-6	Enrofloxacin	Algae	*Anabaena flosaquae*	NOEC	19100	7640		Ebert et al., 2011
				EC50	173000	69200		Ebert et al., 2011
					465000	186000		Ebert et al., 2011
			Chlorella vulgaris	EC50	111000000	44400000	3	Andrieu et al., 2005
			Desmodesmus subspicatus	NOEC	500000	200000		Ebert et al., 2011
					1140000	456000		Ebert et al., 2011
				EC50	28369	11348		Ebert et al., 2011
					5568000	2227200		Ebert et al., 2011
			Microcystis aeruginosa	EC50	49000	196000	5	Robinson et al., 2005
			Selenastrum capricornutum	EC50	3100000	1240000	3	Robinson et al., 2005
		Archea	*Archaeal amoA gene*	NOEC	1000	4000	7	Rico et al., 2014
		Bacteria	*Bacterial amoA gene*	NOEC	10000	40000	7	Rico et al., 2014
			Bacterial OTUs	NOEC	100000	400000	7	Rico et al., 2014
			nifH gene	NOEC	100000	400000	7	Rico et al., 2014
			Vibrio fisheri	EC50	326800000	130720000	0.01	Park and Choi, 2008
					425000000	170000000	0.003	Park and Choi, 2008
		Crustacea	*Alonella sp.*	NOEC	100000	400000	7	Rico et al., 2014
			Ceriodaphnia reticulata	NOEC	1000	4000	7	Rico et al., 2014
			Daphnia magna	NOEC	5000000	20000000	21	Park and Choi, 2008
				LOEC	15000000	60000000	21	Park and Choi, 2008
				EC50	11470000	45880000	21	Park and Choi, 2008
					53300000	21320000		Andrieu et al., 2005
					56700000	22680000	2	Park and Choi, 2008
					131700000	52680000	1	Park and Choi, 2008
			Macrobrachium lanchesteri	LC50	202000000	80800000	2	Rico et al., 2014b
			Moina macrocopa	EC50	69000000	27600000	2	Andrieu et al., 2005
					200000000	80000000	2	Park and Choi, 2008
					285700000	114280000	1	Park and Choi, 2008
		Fish	*Lepomis macrochirus*	EC50	79500000	31800000		Andrieu et al., 2005
			Oryzias latipes	LC50	100000000	40000000	2	Park and Choi, 2008
					100000000	40000000	4	Park and Choi, 2008
		Insecta	*Micronectinae sp.*	LC50	408000000	163200000	2	Rico et al., 2014b
		Mollusca	*Melanoides tuberculata*	EC50	520000000	208000000	2	Rico et al., 2014b
			Physa acuta	EC50	281000000	112400000	2	Rico et al., 2014b
		Plants	*Lemna minor*	NOEC	30000	12000		Ebert et al., 2011
				EC50	107000	42800		Ebert et al., 2011
					114000	456000	7	Robinson et al., 2005
			Myriophyllum spicatum	NOEC	11650000	4660000		Ebert et al., 2011
		Worm	*Limnodrilus hoffmeisteri*	EC50	360000000	144000000	2	Rico et al., 2014b
			Aquatic community	PNEC	49.00	196		Park and Choi, 2008
					490	1960		Rico et al., 2014b

CAS	Compound	Organism		Measured endpoint	Concentration (ng/L)	Final TEQs (ng/L)	Exposure time (days)	Reference
93106-60-6	Enrofloxacin		Aquatic community	PNEC	53300	213200		Andrieu et al., 2005
					57500	230000		Rico et al., 2014b
					79500	318000		Andrieu et al., 2005
42835-25-6	Flumequine	Algae	*Microcystis aeruginosa*	EC50	159000	159000	7	Holten Lützhoft et al., 1999
					1960000	1960000	5	Robinson et al., 2005
					8800000	880000	1	Grinten et al., 2010
			Rhodomonas salina	EC50	18000000	18000000		Holten Lützhoft et al., 1999
			Selenastrum capricornutum	EC50	5000000	500000	3	Robinson et al., 2005
					5000000	5000000		Holten Lützhoft et al., 1999
					16000000	1600000	1	Grinten et al., 2010
		Bacteria	*Bacillus cereus*	EC50	1200000	1200000	1	Grinten et al., 2010
			Bacillus pumilus	EC50	1200000	1200000	1	Grinten et al., 2010
			Micrococcus luteus	EC50	1200000	1200000	1	Grinten et al., 2010
			Vibrio fisheri	EC50	800000	80000	0.02	Grinten et al., 2010
			Yersinia ruckeri	EC50	200000	200000	1	Grinten et al., 2010
		Crustacea	*Artemia franciscana*	LC50	307700000	30770000	2	Ferreira et al., 2007
			Artemia nauplii	EC50	96350000	9635000	3	Migliore et al., 1996
					307700000	30770000	2	Migliore et al., 1996
					476800000	47680000	1	Migliore et al., 1996
		Plants	*Lemna minor*	EC50	2470000	2470000	7	Robinson et al., 2005
70458-96-7	Norfloxacin	Algae	*Chlorella vulgaris*	NOEC	4020000	804000		Eguchi et al., 2004
				EC50	10400000	2080000		Eguchi et al., 2004
			Scenedesmus obliquus	EC50	38590000	7718000	2	Nie et al., 2009
			Selenastrum capricornutum	NOEC	2000000	400000	3	Yang et al., 2008
					4010000	802000		Eguchi et al., 2004
				LOEC	16000000	3200000	3	Yang et al., 2008
				EC50	1800000	360000	3	Yang et al., 2008
					16600000	3320000		Eguchi et al., 2004
					16600000	3320000		Yang et al., 2008
		Bacteria	*Vibrio fisheri*	EC50	11500	23000	1	Backhaus and Grimme, 1999
					23300	46600	1	Backhaus and Grimme, 1999
		Plants	*Lemna gibba*	LOEC	1000000	2000000	7	Brain et al., 2004
					1000000	2000000	7	Brain et al., 2004
					1000000	2000000	7	Brain et al., 2004
					1000000	2000000	7	Brain et al., 2004
					1000000	2000000	7	Brain et al., 2004
				EC50	913000	1826000	7	Brain et al., 2004
					1049000	2098000	7	Brain et al., 2004
					1072000	2144000	7	Brain et al., 2004
					1130000	2260000	7	Brain et al., 2004
					1146000	2292000	7	Brain et al., 2004
			Aquatic community	PNEC	20000	40000	3	Yang et al., 2011
14698-29-4	Oxolinic acid	Algae	*Microcystis aeruginosa*	EC50	180000	360000	7	Holten Lützhoft et al., 1999
			Rhodomonas salina	EC50	10000000	20000000		Holten Lützhoft et al., 1999
			Selenastrum capricornutum	EC50	16000000	32000000		Holten Lützhoft et al., 1999
		Crustacea	*Daphnia magna*	EC50	4600000	920000	2	Wollenberger et al., 2000
					5900000	1180000	1	Wollenberger et al., 2000
98105-99-8	Sarafloxacin	Algae	*Microcystis aeruginosa*	EC50	15000	30000	7	Holten Lützhoft et al., 1999
			Rhodomonas salina	EC50	24000000	48000000		Holten Lützhoft et al., 1999
			Selenastrum capricornutum	EC50	16000000	32000000		Holten Lützhoft et al., 1999
3380-34-5	Triclosan	Algae	*Selenastrum capricornutum*	NOEC	200	2.00	3	Yang et al., 2008
				LOEC	400	4.00	3	Yang et al., 2008
				EC50	530	5.30	3	Yang et al., 2008
					1400	14.00		Yang et al., 2008
		Crustacea	*Daphnia magna*	EC50	390000	3900	2	Ishibashi et al., 2004
		Fish	*Lepomis macrochirus*	LC50	370000	3700	4	Ishibashi et al., 2004
			Oryzias latipes	LC50	399000	39900	14	Ishibashi et al., 2004
					602000	6020	4	Ishibashi et al., 2004
			Pimephales promelas	LC50	260000	2600	4	Ishibashi et al., 2004

APPENDIX SI-III

Lowest toxicity values found for TWO REP groups

REP1: >0.1

Activity	Bioassay	Endpoint	CAS	Compound	Organism	Original data		TEQs		Reference
Estrogenic activity	ERa CALUX	PNEC	57-63-6	17a-Ethinyl estradiol		0.04	ng/L	0.05	ng EEQ/L	James et al., 2014
		NOEC	50-28-2	17a-Ethinyl estradiol	*Rutilus rutilus (Roach)*	0.04	ng/L	0.06	ng EEQ/L	Hogan et al., 2008
		LOEC	57-63-6	17a-Ethinyl estradiol	*Danio rerio* (Zebrafish)	0.5	ng/L	0.02	ng EEQ/L	Colman et al., 2009
		EC50	57-63-6	17a-Ethinyl estradiol	*Danio rerio* (Zebrafish)	1.1	ng/L	0.17	ng EEQ/L	Wenzel et al., 2001
		LC50	57-63-6	17a-Ethinyl estradiol	*Danio rerio* (Zebrafish)	100	ng/L	1.6	ng EEQ/L	Wenzel et al., 2001
Anti-androgenic	antiAR CALUX	PNEC	50-32-8	Benzo [a] pyrene		0.00017	µg/L	0.00017	µg FEQ/L	OSPAR Agreement, 2014-05
		NOEC	115-29-7	Endosulfan	*Mesocyclops longisetus* (Copepod)	0.004	µg/L	0.001	µg FEQ/L	Gutierrez et al., 2013
		LOEC	115-29-7	Endosulfan	*Mesocyclops longisetus* (Copepod)	0.004	µg/L	0.0003	µg FEQ/L	Gutierrez et al., 2013
		EC50	298-00-0	Parathion-methyl	*Daphnia magna* (Water flea)	0.14	µg/L	0.0014	µg FEQ/L	Nendza and Wenzel, 2006
		LC50	115-29-7	Endosulfan	*Mesocyclops longisetus* (Copepod)	0.016	µg/L	0.00005	µg FEQ/L	Gutierrez et al., 2013
Dioxin and dioxin-like	DR CALUX	PNEC					pg/L		pg TEQ/L	
		NOEC	1746-01-6	2,3,7,8-TCDD	*Oryzias latipes* (Japanese medaka)	3400	pg/L	340	pg TEQ/L	Kim and Cooper, 1998
		LOEC	1746-01-6	2,3,7,8-TCDD	*Gobiocypris rarus* (Rare minnow)	2	pg/L	0.4	pg TEQ/L	Wu et al., 2001
		EC50	1746-01-6	2,3,7,8-TCDD	*Oryzias latipes* (Japanese medaka)	1200	pg/L	12	pg TEQ/L	Chen and Cooper, 1999
		LC50	1746-01-6	2,3,7,8-TCDD	*Oryzias latipes* (Japanese medaka)	8100	pg/L	8.1	pg TEQ/L	Kim and Cooper, 1999
Glucocorticoid	GR CALUX	PNEC	50-24-8	Prednisolone		139000	ng/L	27800	ng DEQ/L	Escher et al., 2011
		NOEC	50-02-2	Dexamethasone	*Danio rerio* (Zebrafish)	39246	ng/L	3925	ng DEQ/L	Gustafson et al., 2012
		LOEC	50-02-2	Dexamethasone	*Pimephales promelas* (Fathead Minnow)	100	ng/L	20	ng DEQ/L	Lalone et al., 2012
		EC50	50-24-8	Prednisolone	*Ceriodaphnia dubia* (Water Flea)	230000	ng/L	4600	ng DEQ/L	DellaGreca et al., 2004
		LC50	50-02-2	Dexamethasone	*Pimephales promelas* (Fathead Minnow)	254000	ng/L	2540	ng DEQ/L	Overturf et al., 2012
PPARγ receptor	PPARγ CALUX	PNEC								
		NOEC	688-73-3	Tributyltin hydride	*Lymnaea stagnalis* (Great Pond Snail)	19	ng/L	15	ng REQ/L	Giusti et al., 2013
		LOEC	302-79-4	Retinoic acid	*Danio rerio* (Zebrafish)	300	ng/L	1.9	ng REQ/L	Teixido et al., 2013
		EC50	302-79-4	Retinoic acid	*Danio rerio* (Zebrafish)	424	ng/L	1.3	ng REQ/L	Selderslaghs et al., 2012
		LC50	302-79-4	Retinoic acid	*Danio rerio* (Zebrafish)	15322	ng/L	4.8	ng REQ/L	Teixido et al., 2013
Toxic PAHs	PAH CALUX	PNEC	50-32-8	Benzo [a] pyrene		0.17	ng/L	0.17	ng BEQ/L	OSPAR Agreement, 2014-05
		NOEC	57465-28-8	PCB126	*Oryzias latipes* (Japanese medaka)	150	ng/L	47	ng BEQ/L	Kim and Cooper, 1998
		LOEC	50-32-8	Benzo [a] pyrene	*Daphnia magna* (Water flea)	20	ng/L	0.4	ng BEQ/L	Ha and Choi, 2009
		EC50	57465-28-8	PCB126	*Oryzias latipes* (Japanese medaka)	170	ng/L	5.4	ng BEQ/L	Kim and Cooper, 1999
		LC50	57465-28-8	PCB126	*Oryzias latipes* (Japanese medaka)	250	ng/L	0.8	ng BEQ/L	Kim and Cooper, 1999
Oxidative stress	Nrf2 CALUX	PNEC	10605-21-7	Carbendazim		0.57	µg/L	0.02	µg CEQ/L	Oekotoxzentrum, Centre Ecotox
		NOEC	302-79-4	Retinoic acid	*Danio rerio* (Zebrafish)	0.6	µg/L	0.01	µg CEQ/L	Teixido et al., 2013
		LOEC	50471-44-8	Vinclozolin	*Marisa cornuarietis* (Giant ramshorn snail)	0.03	µg/L	0.001	µg CEQ/L	Tillmann et al., 2001
		EC50	302-79-4	Retinoic acid	*Danio rerio* (Zebrafish)	0.42	µg/L	0.0007	µg CEQ/L	Selderslaghs et al., 2012
		LC50	10108-64-2	Cadmium chloride	*Oncorhynchus mykiss* (Rainbow Trout)	0.84	µg/L	0.001	µg CEQ/L	Mebane et al., 2008
Pregnane X receptor	PXR CALUX	PNEC	207-08-9	Benzo(k)fluoranthene		0.17	ng/L	0.03	ng NEQ/L	OSPAR Agreement, 2014-05
		NOEC	2921-88-2	Chlorpyrifos-ethyl	*Daphnia magna* (Water flea)	24	ng/L	0.48	ng NEQ/L	U.S. EPA, 2013
		LOEC	2921-88-2	Chlorpyrifos-ethyl	*Daphnia magna* (Water flea)	1	ng/L	0.004	ng NEQ/L	Ha and Choi, 2009
		EC50	2921-88-2	Chlorpyrifos-ethyl	*Daphnia magna* (Water flea)	32	ng/L	0.07	ng NEQ/L	Antunes et al., 2010
		LC50	2921-88-2	Chlorpyrifos-ethyl	*Hyalella curvispina* (Scud)	60	ng/L	0.01	ng NEQ/L	Mugni et al., 2012
Antibiotic activity	Aminoglycosides	PNEC	1404-04-2	Neomycin	*Daphnia magna* (Water flea)	300	ng/L	300	ng NEQ/L	Park and Choi, 2008
		NOEC	128-46-1	Dihydrostreptomycin	*Selenastrum capricornutum* (Green algae)	39000	ng/L	7800	ng NEQ/L	Eguchi et al., 2004
		LOEC	1404-04-2	Neomycin	*Daphnia magna* (Water flea)	100000	ng/L	20000	ng NEQ/L	Park and Choi, 2008
		EC50	128-46-1	Dihydrostreptomycin	*Selenastrum capricornutum* (Green algae)	107000	ng/L	2140	ng NEQ/L	Eguchi et al., 2004
		LC50	1404-04-2	Neomycin	*Oryzias latipes* (japanese medaka)	80800000	ng/L	80800	ng NEQ/L	Park and Choi, 2008
	Macrolides & β-Lactam	PNEC	26787-78-0	Amoxicillin	*Microcystis aeruginosa*	3.7	ng/L	2.22	ng PEQ/L	Jones et al., 2002
		NOEC	114-07-8	Erythromycin	*Selenastrum capricornutum* (Green algae)	10300	ng/L	309	ng PEQ/L	Eguchi et al., 2004
		LOEC	26787-78-0	Amoxicillin	*Lemna gibba* (Inflated Duckweed)	1000000	ng/L	12000	ng PEQ/L	Park and Choi, 2008
		EC50	26787-78-0	Amoxicillin	*Microcystis aeruginosa*	3700	ng/L	22.2	ng PEQ/L	Park and Choi, 2008
		LC50	114-07-8	Erythromycin	*Brachionus calyciflorus* (Rotifer)	940000	ng/L	282	ng PEQ/L	Isidori et al., 2005
	Sulphonamides	PNEC	72-14-0	Sulfathiazole	*Lemna gibba* (Inflated Duckweed)	100	ng/L	25	ng SEQ/L	Park and Choi, 2008
		NOEC	723-46-6	Sulfamethoxazole	*Danio rerio* (Zebrafish)	1000	ng/L	100	ng SEQ/L	Lin et al., Manuscript Draft
		LOEC	68-35-9	Sulfadiazine	*Danio rerio* (Zebrafish)	1000	ng/L	10	ng SEQ/L	Lin et al., Manuscript Draft
		EC50	723-46-6	Sulfamethoxazole	*Synechococcus leopoliensis*	26800	ng/L	2680	ng SEQ/L	Ferrari et al., 2004
		LC50	723-46-6	Sulfamethoxazole	*Brachionus calyciflorus* (Rotifer)	9630000	ng/L	9630	ng SEQ/L	Isidori et al., 2005
	Tetracyclines	PNEC	79-57-2	Oxytetracycline	*Selenastrum capricornutum* (Green algae)	170	ng/L	170	ng OEQ/L	Park and Choi, 2008
		NOEC	79-57-2	Oxytetracycline	*Selenastrum capricornutum* (Green algae)	183000	ng/L	18300	ng OEQ/L	Eguchi et al., 2004
		LOEC	56-75-7	Chloramphenicol	*Tetraselmis suecica*	2500000	ng/L	5000	ng OEQ/L	Seoane et al., 2014
		EC50	56-75-7	Chloramphenicol	*Vibrio fisheri*	64300	ng/L	643	ng OEQ/L	Backhaus and Grimme, 1999
		LC50	79-57-2	Oxytetracycline	*Brachionus calyciflorus* (Rotifer)	1870000	ng/L	1870	ng OEQ/L	Isidori et al., 2005
	Quinolones	PNEC	93106-60-6	Enrofloxacin	*Microcystis aeruginosa*	49	ng/L	196	ng FEQ/L	Park and Choi, 2008
		NOEC	3380-34-5	Triclosan	*Selenastrum capricornutum* (Green algae)	200	ng/L	2	ng FEQ/L	Yang et al., 2008
		LOEC	3380-34-5	Triclosan	*Selenastrum capricornutum* (Green algae)	400	ng/L	0.8	ng FEQ/L	Yang et al., 2008
		EC50	3380-34-5	Triclosan	*Selenastrum capricornutum* (Green algae)	530	ng/L	0.53	ng FEQ/L	Yang et al., 2008
		LC50	3380-34-5	Triclosan	*Pimephales promelas* (Fathead Minnow)	260000	ng/L	2.6	ng FEQ/L	Ishibashi et al., 2004

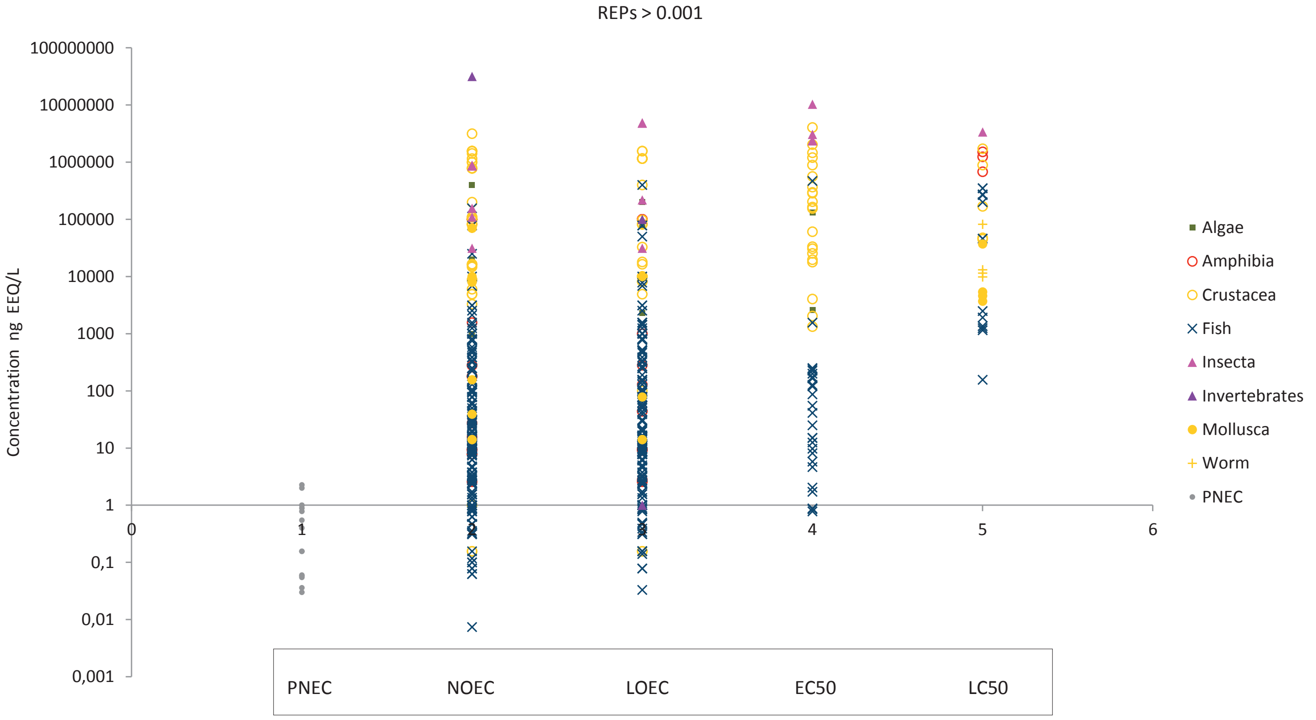
REP2: >0.001

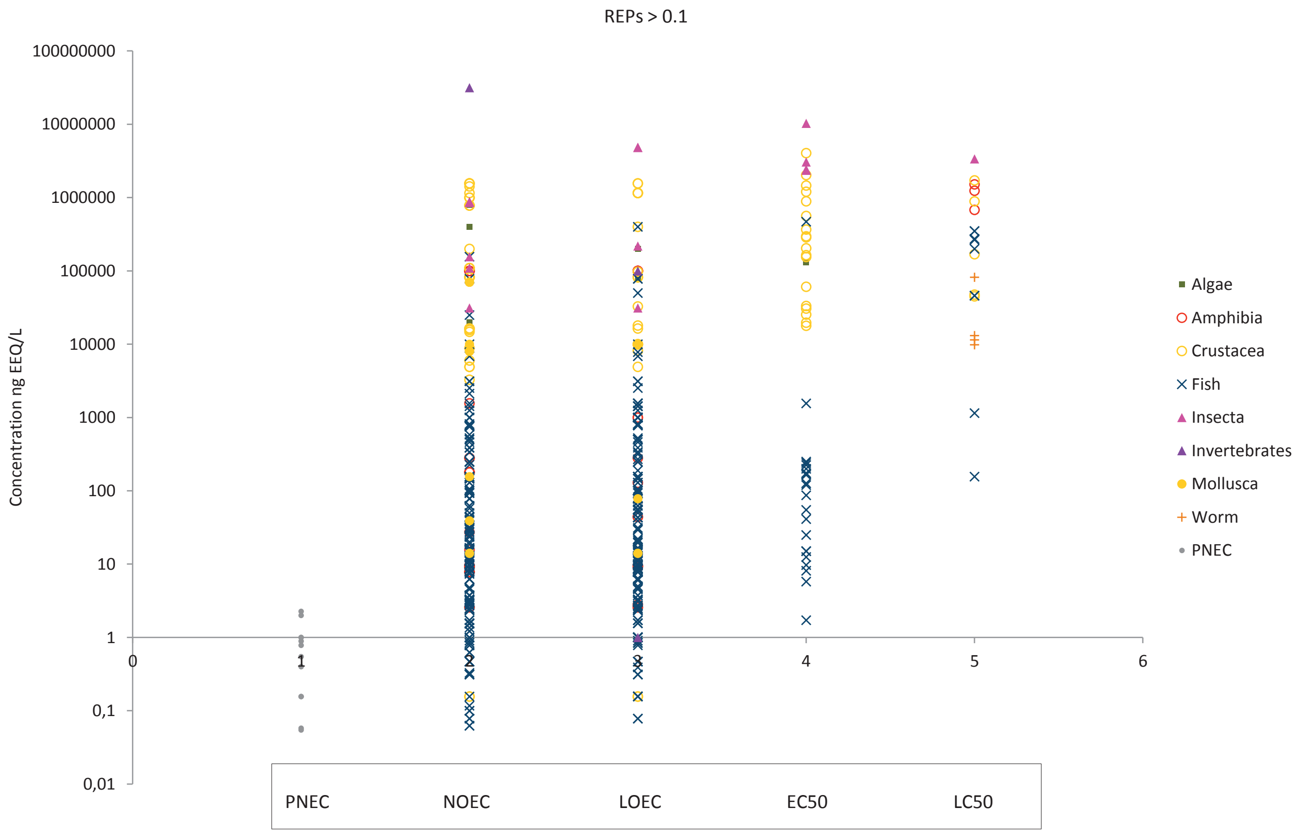
Activity	Bioassay	Endpoint	CAS	Compound	Organism	Original data		TEQs		Reference
		PNEC	53-16-7	Estrone		3	ng/L	0.03	ng EEQ/L	Johnson et al., 2007
		NOEC	53-16-7	Estrone	*Oncorhynchus mykiss* (Rainbow Trout)	0.74	ng/L	0.007	ng EEQ/L	Thorpe et al., 2003
Estrogenic activity	ERa CALUX	LOEC	53-16-7	Estrone	*Oncorhynchus mykiss* (Rainbow Trout)	3.3	ng/L	0.007	ng EEQ/L	Thorpe et al., 2003
		EC50	53-16-7	Estrone	*Danio rerio* (Zebrafish)	78	ng/L	0.08	ng EEQ/L	Holbech et al., 2006
		LC50	57-63-6	17a-Ethinyl estradiol	*Danio rerio* (Zebrafish)	100	ng/L	1.6	ng EEQ/L	Wenzel et al., 2001
		PNEC	50-32-8	Benzo [a] pyrene		0.00017	µg/L	0.00017	µg FEQ/L	OSPAR Agreement, 2014-05
		NOEC	115-29-7	Endosulfan	*Mesocyclops longisetus* (Copepod)	0.004	µg/L	0.001	µg FEQ/L	Gutierrez et al., 2013
Anti-androgenic	antiAR CALUX	LOEC	115-29-7	Endosulfan	*Mesocyclops longisetus* (Copepod)	0.004	µg/L	0.0003	µg FEQ/L	Gutierrez et al., 2013
		EC50	10605-21-7	Carbendazim	*Daphnia magna* (Water Flea)	3.5	µg/L	0.00007	µg FEQ/L	Ferreira et al., 2008
		LC50	115-29-7	Endosulfan	*Mesocyclops longisetus* (Copepod)	0.016	µg/L	0.00005	µg FEQ/L	Gutierrez et al., 2013
		PNEC	207-08-9	Benzo(k)fluoranthene		170	pg/L	0.85	pg TEQ/L	OSPAR Agreement, 2014-05
		NOEC	1746-01-6	2,3,7,8-TCDD	*Oryzias latipes* (Japanese medaka)	3400	pg/L	340	pg TEQ/L	Kim and Cooper, 1998
Dioxin and dioxin-like	DR CALUX	LOEC	1746-01-6	2,3,7,8-TCDD	*Gobiocypris rarus* (Rare minnow)	2	pg/L	0.4	pg TEQ/L	Wu et al., 2001
		EC50	1746-01-6	2,3,7,8-TCDD	*Oryzias latipes* (Japanese medaka)	1200	pg/L	12	pg TEQ/L	Chen and Cooper, 1999
		LC50	1746-01-6	2,3,7,8-TCDD	*Oryzias latipes* (Japanese medaka)	8100	pg/L	8.1	pg TEQ/L	Kim and Cooper, 1999
		PNEC	50-24-8	Prednisolone		139000	ng/L	27800	ng DEQ/L	Escher et al., 2011
		NOEC	52-39-1	Aldosterone	*Xenopus laevis* (African Clawed Frog)	36044	ng/L	288	ng DEQ/L	Lorenz et al., 2009
Glucocorticoid	GR CALUX	LOEC	50-02-2	Dexamethasone	*Pimephales promelas* (Fathead Minnow)	100	ng/L	20	ng DEQ/L	Lalone et al., 2012
		EC50	50-24-8	Prednisolone	*Ceriodaphnia dubia* (Water Flea)	230000	ng/L	4600	ng DEQ/L	DellaGreca et al., 2004
		LC50	50-02-2	Dexamethasone	*Pimephales promelas* (Fathead Minnow)	254000	ng/L	2540	ng DEQ/L	Overturf et al., 2012
		PNEC	53-70-3	dibenzo[a,h]anthracene		0.14	ng/L	0.00014	ng REQ/L	OSPAR Agreement, 2014-05
		NOEC	688-73-3	Tributyltin hydride	*Lymnaea stagnalis* (Great Pond Snail)	19	ng/L	15	ng REQ/L	Giusti et al., 2013
PPARγ receptor	PPARγ CALUX	LOEC	302-79-4	Retinoic acid	*Danio rerio* (Zebrafish)	300	ng/L	1.9	ng REQ/L	Teixido et al., 2013
		EC50	53-70-3	dibenzo[a,h]anthracene	*Daphnia magna* (Water Flea)	400	ng/L	0.004	ng REQ/L	Newsted and Giesy, 1987
		LC50	302-79-4	Retinoic acid	*Danio rerio* (Zebrafish)	15322	ng/L	4.8	ng REQ/L	Teixido et al., 2013
		PNEC	50-32-8	Benzo(a)pyrene		0.17	ng/L	0.17	ng BEQ/L	OSPAR Agreement, 2014-05
		NOEC	57465-28-8	PCB126	*Oryzias latipes* (Japanese medaka)	150	ng/L	47	ng BEQ/L	Kim and Cooper, 1998
Toxic PAHs	PAH CALUX	LOEC	1746-01-6	2,3,7,8-TCDD	*Gobiocypris rarus* (Rare minnow)	0.002	ng/L	0.08	ng BEQ/L	Wu et al., 2001
		EC50	1746-01-6	2,3,7,8-TCDD	*Oryzias latipes* (Japanese medaka)	1.2	ng/L	2.4	ng BEQ/L	Chen and Cooper, 1999
		LC50	57465-28-8	PCB126	*Oryzias latipes* (Japanese medaka)	250	ng/L	0.8	ng BEQ/L	Kim and Cooper, 1999
		PNEC	50-28-2	17β-estradiol		0.0004	µg/L	0.00003	µg CEQ/L	Oekotoxzentrum, Centre Ecotox
		NOEC	50-28-2	17β-estradiol	*Oryzias latipes* (Japanese medaka)	0.001	µg/L	0.000006	µg CEQ/L	Lee et al., 2012
Oxidative stress	Nrf2 CALUX	LOEC	50-28-2	17β-estradiol	*Oryzias latipes* (Japanese medaka)	0.01	µg/L	0.00001	µg CEQ/L	Lee et al., 2012
		EC50	50-28-2	17β-estradiol	*Oncorhynchus mykiss* (Rainbow Trout)	0.015	µg/L	0.00009	µg CEQ/L	Thorpe et al., 2000
		LC50	50-28-2	17β-estradiol	*Pimephales promelas* (Fathead Minnow)	1.2	µg/L	0.0007	µg CEQ/L	Kramer et al., 1998
		PNEC	207-08-9	Benzo(k)fluoranthene		0.17	ng/L	0.03	ng NEQ/L	OSPAR Agreement, 2014-05
		NOEC	2921-88-2	Chlorpyrifos-ethyl	*Daphnia magna* (Water Flea)	24	ng/L	0.48	ng NEQ/L	U.S. EPA, 2013
Pregnane X receptor	PXR CALUX	LOEC	2921-88-2	Chlorpyrifos-ethyl	*Daphnia magna* (Water Flea)	1	ng/L	0.004	ng NEQ/L	Ha and Choi, 2009
		EC50	2921-88-2	Chlorpyrifos-ethyl	*Daphnia magna* (Water Flea)	32	ng/L	0.07	ng NEQ/L	Antunes et al., 2010
		LC50	2921-88-2	Chlorpyrifos-ethyl	*Hyalella curvispina* (Scud)	60	ng/L	0.01	ng NEQ/L	Mugni et al., 2012
		PNEC	1404-04-2	Neomycin	*Daphnia magna* (Water Flea)	300	ng/L	300	ng NEQ/L	Park and Choi, 2008
		NOEC	128-46-1	Dihydrostreptomycin	*Selenastrum capricornutum* (Green algae)	39000	ng/L	7800	ng NEQ/L	Eguchi et al., 2004
	Aminoglycosides	LOEC	1404-04-2	Neomycin	*Daphnia magna* (Water Flea)	100000	ng/L	20000	ng NEQ/L	Park and Choi, 2008
		EC50	128-46-1	Dihydrostreptomycin	*Selenastrum capricornutum* (Green algae)	107000	ng/L	2140	ng NEQ/L	Eguchi et al., 2004
		LC50	1404-04-2	Neomycin	*Oryzias latipes* (Japanese medaka)	80800000	ng/L	80800	ng NEQ/L	Park and Choi, 2008
		PNEC	26787-78-0	Amoxicillin	*Microcystis aeruginosa*	3.7	ng/L	2.22	ng PEQ/L	Jones et al., 2002
		NOEC	1401-69-0	Tylosin	*Selenastrum capricornutum*	64000	ng/L	240	ng PEQ/L	Yang et al., 2008
	Macrolides & β-Lactam	LOEC	1401-69-0	Tylosin	*Selenastrum capricornutum*	64000	ng/L	240	ng PEQ/L	Yang et al., 2008
		EC50	55297-95-5	Tiamulin	*Microcystis aeruginosa*	3000	ng/L	18	ng PEQ/L	Halling-Sorensen, 2000
		LC50	1405-87-4	Bacitracin	*Artemia franciscana*	21820000	ng/L	81825	ng PEQ/L	Ferreira et al., 2007
		PNEC	72-14-0	Sulfathiazole	*Lemna gibba* (Inflated Duckweed)	100	ng/L	25	ng SEQ/L	Park and Choi, 2008
		NOEC	723-46-6	Sulfamethoxazole	*Danio rerio* (Zebrafish)	1000	ng/L	100	ng SEQ/L	Lin et al., Manuscript Draft
Antibiotic activity	Sulphonamides	LOEC	68-35-9	Sulfadiazine	*Danio rerio* (Zebrafish)	1000	ng/L	10	ng SEQ/L	Lin et al., Manuscript Draft
		EC50	723-46-6	Sulfamethoxazole	*Synechococcus leopoliensis*	26800	ng/L	2680	ng SEQ/L	Ferrari et al., 2004
		LC50	723-46-6	Sulfamethoxazole	*Brachionus calyciflorus* (Rotifer)	9630000	ng/L	9630	ng SEQ/L	Isidori et al., 2005
		PNEC	79-57-2	Oxytetracycline	*Selenastrum capricornutum* (Green algae)	170	ng/L	170	ng OEQ/L	Park and Choi, 2008
		NOEC	15318-45-3	Thiamphenicol	*Selenastrum capricornutum* (Green algae)	4060000	ng/L	10150	ng OEQ/L	Eguchi et al., 2004
	Tetracyclines	LOEC	56-75-7	Chloramphenicol	*Tetraselmis suecica*	2500000	ng/L	5000	ng OEQ/L	Seoane et al., 2014
		EC50	56-75-7	Chloramphenicol	*Vibrio fisheri*	64300	ng/L	643	ng OEQ/L	Backhaus and Grimme, 1999
		LC50	79-57-2	Oxytetracycline	*Brachionus calyciflorus* (Rotifer)	1870000	ng/L	1870	ng OEQ/L	Isidori et al., 2005
		PNEC	93106-60-6	Enrofloxacin	*Microcystis aeruginosa*	49	ng/L	196	ng FEQ/L	Park and Choi, 2008
		NOEC	3380-34-5	Triclosan	*Selenastrum capricornutum* (Green algae)	200	ng/L	2	ng FEQ/L	Yang et al., 2008
	Quinolones	LOEC	3380-34-5	Triclosan	*Selenastrum capricornutum* (Green algae)	400	ng/L	0.8	ng FEQ/L	Yang et al., 2008
		EC50	3380-34-5	Triclosan	*Selenastrum capricornutum* (Green algae)	530	ng/L	0.53	ng FEQ/L	Yang et al., 2008
		LC50	3380-34-5	Triclosan	*Pimephales promelas* (Fathead Minnow)	260000	ng/L	2.6	ng FEQ/L	Ishibashi et al., 2004

APPENDIX SI-IV

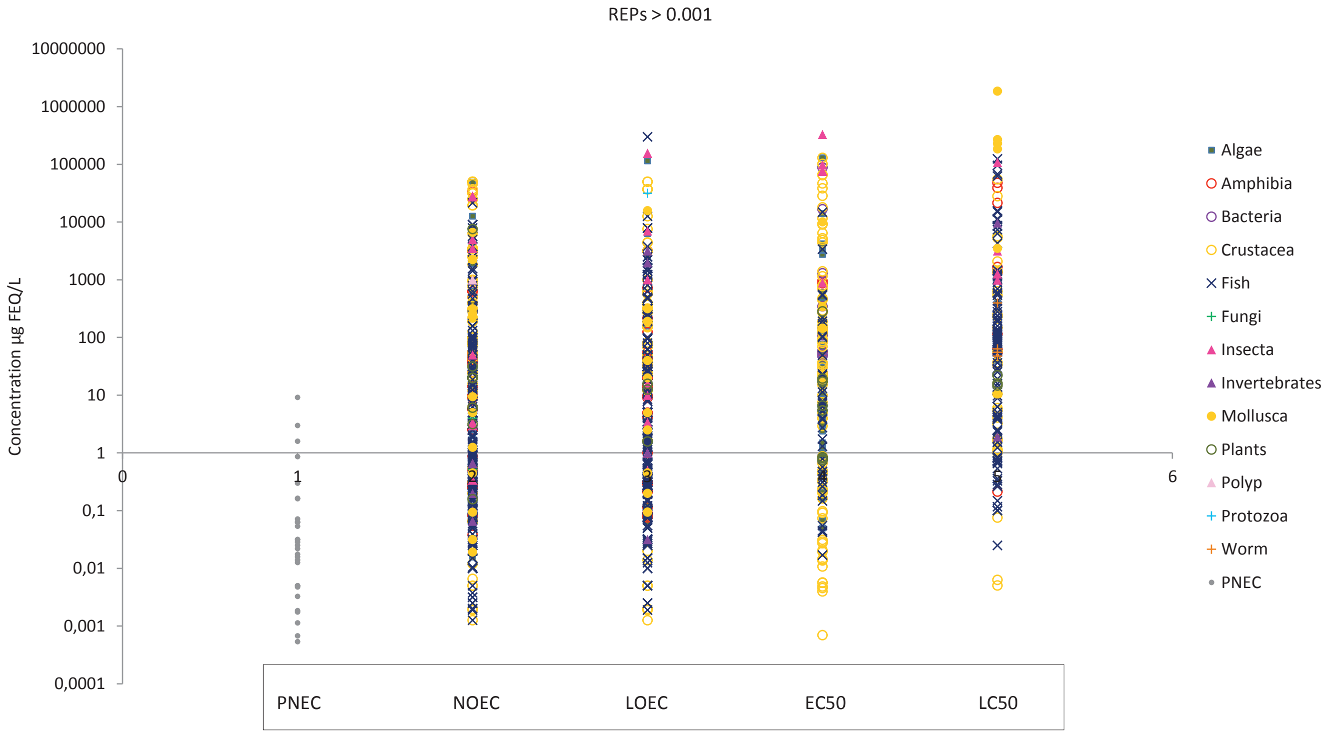
Graphic representations of the toxicity data collected for each bioassay for REP1 and REP2 groups

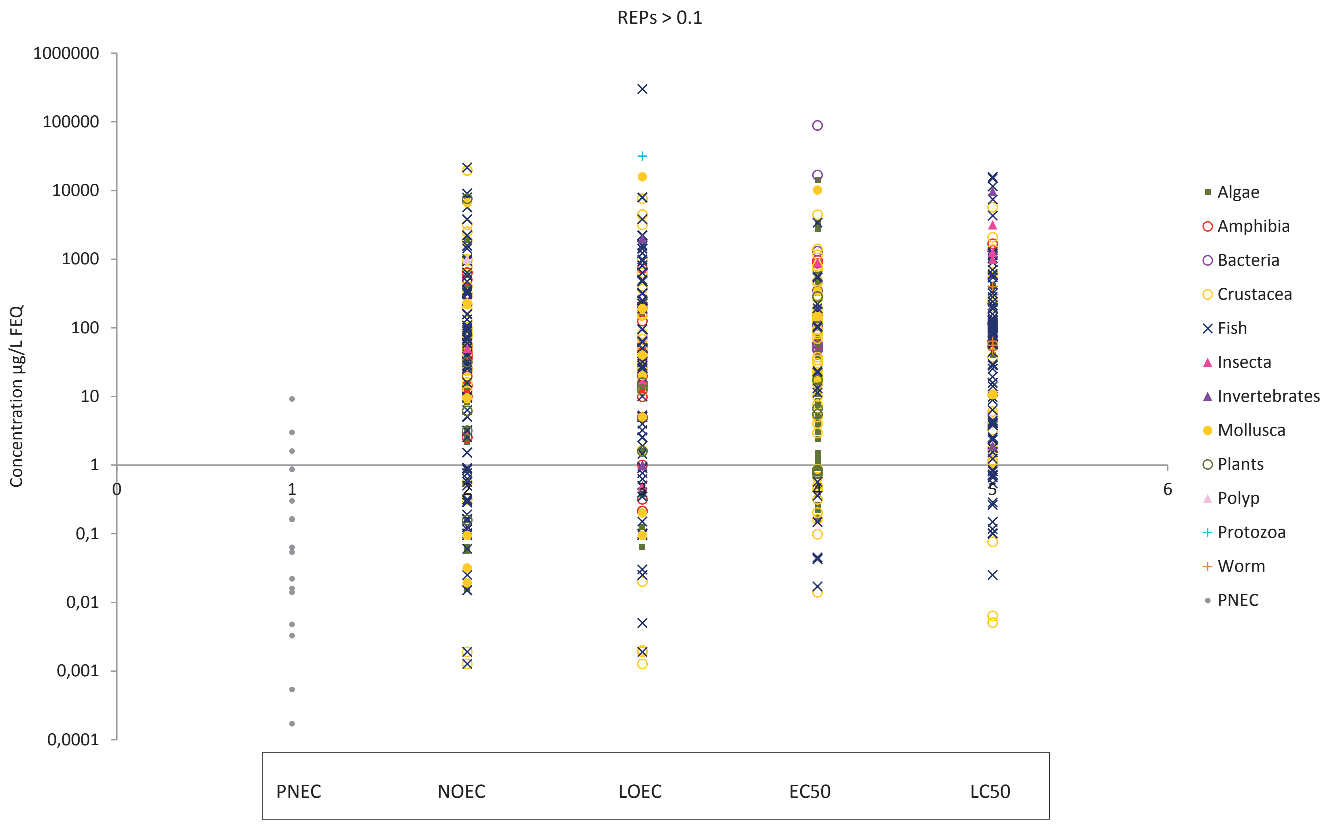
A: ER CALUX





B: ANTI-AR CALUX





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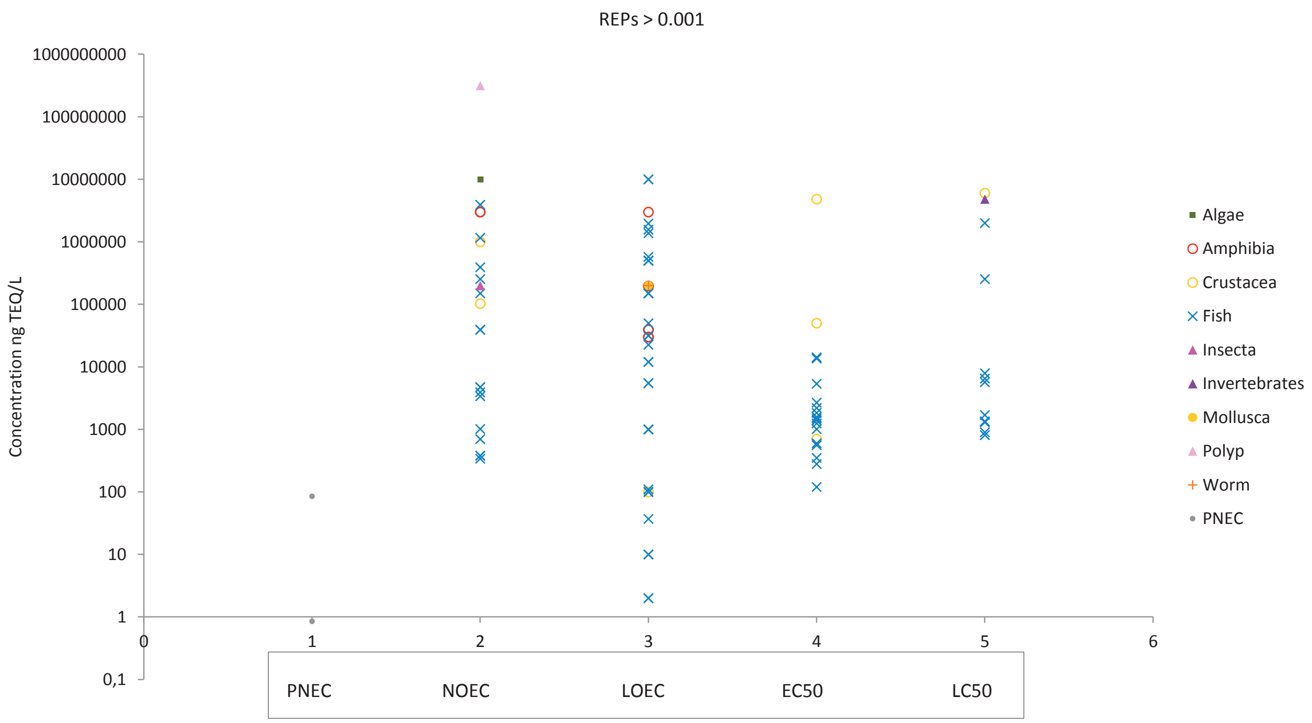
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1000000
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10000
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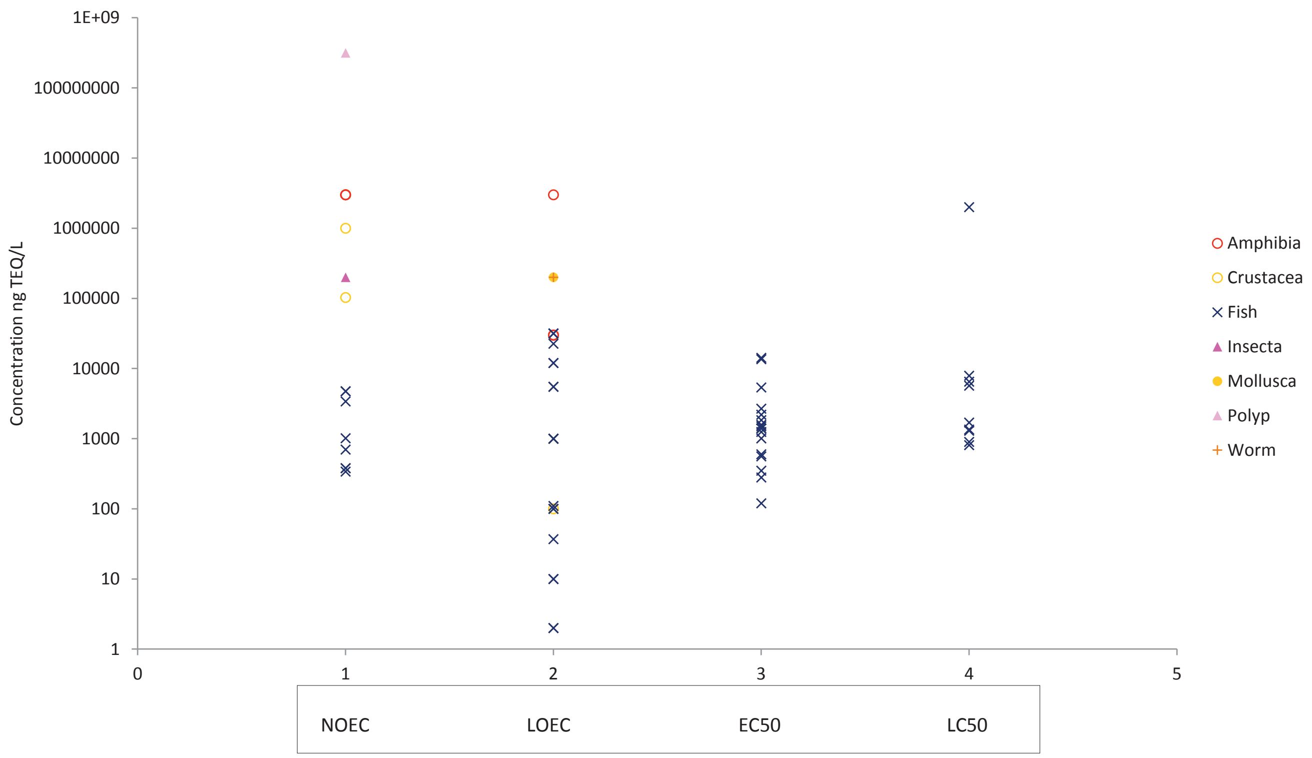
0
1
2
3
4
5
6
PNEC
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Crustacea
Fish
Insecta
Invertebrates
Mollusca
Polyp
Worm
PNEC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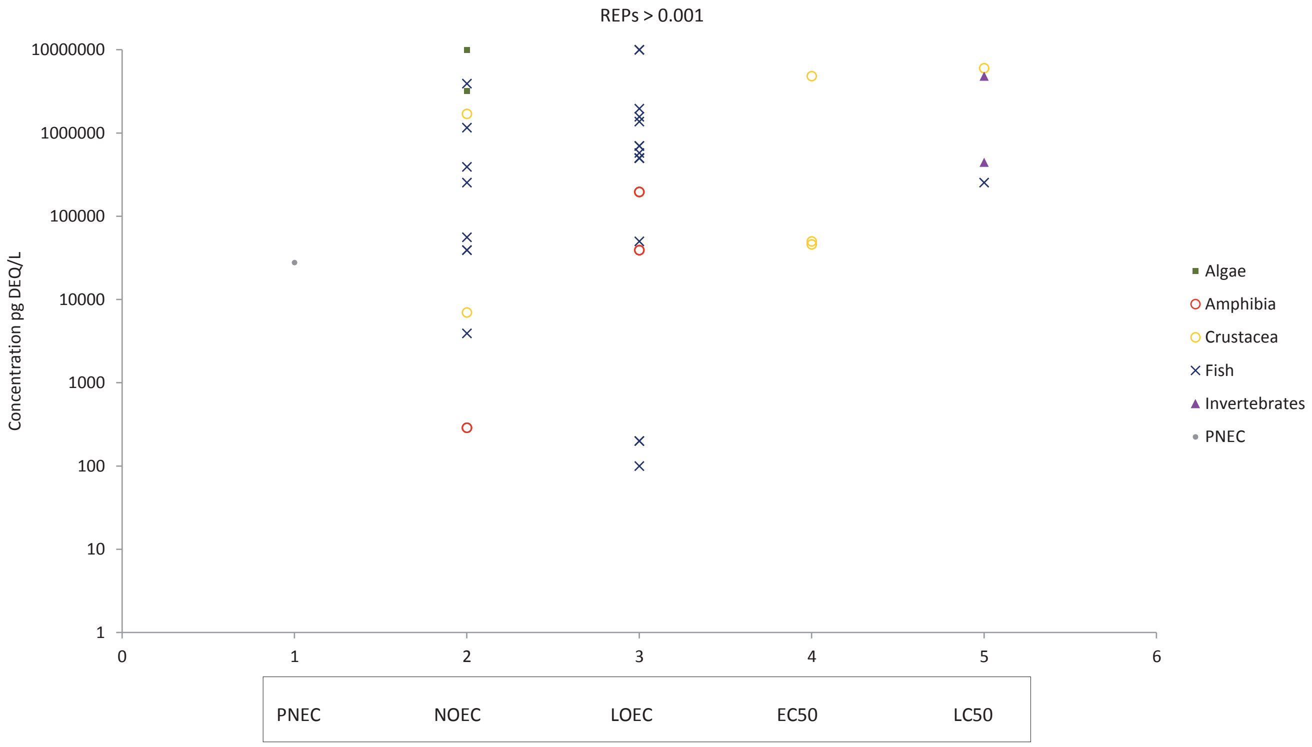
NOEC
LOEC
EC50
LC50
Amphibia
Crustacea
Fish
Insecta
Mollusca
Polyp
Worm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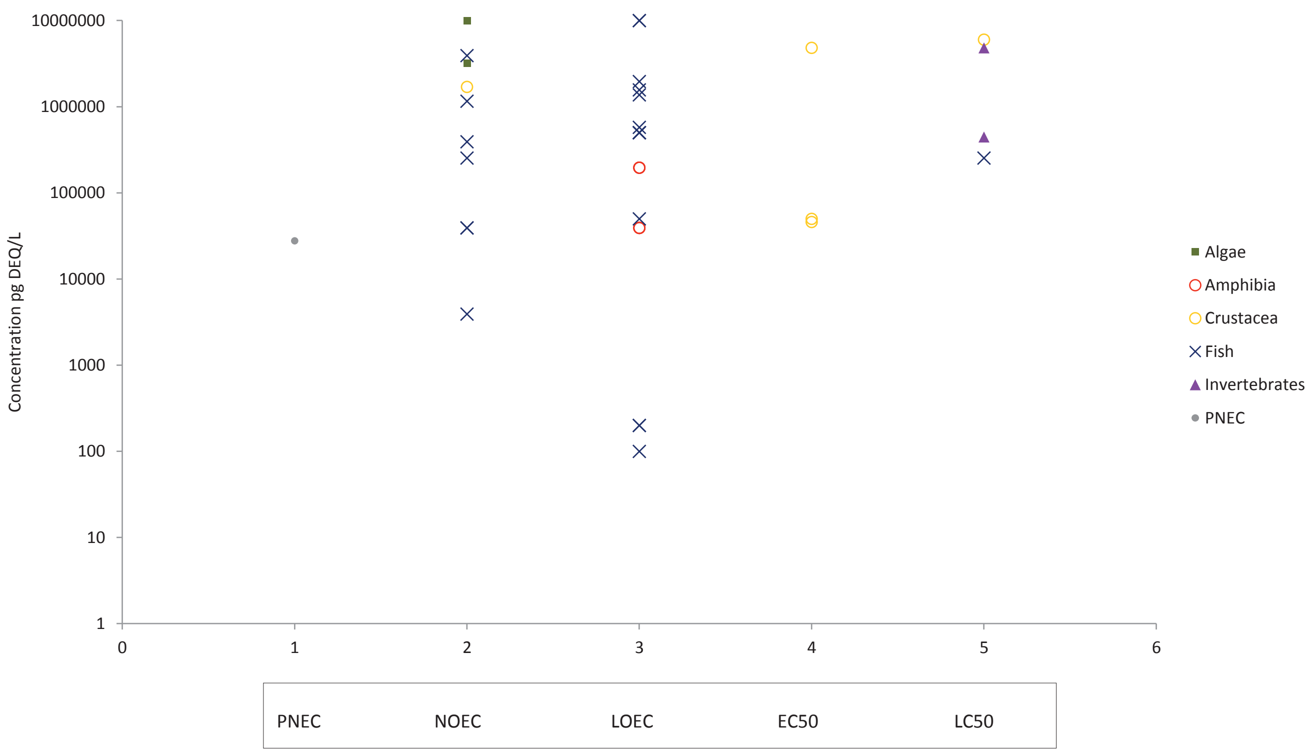
5
6
PNEC
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Crustacea
Fish
Invertebrates
PNEC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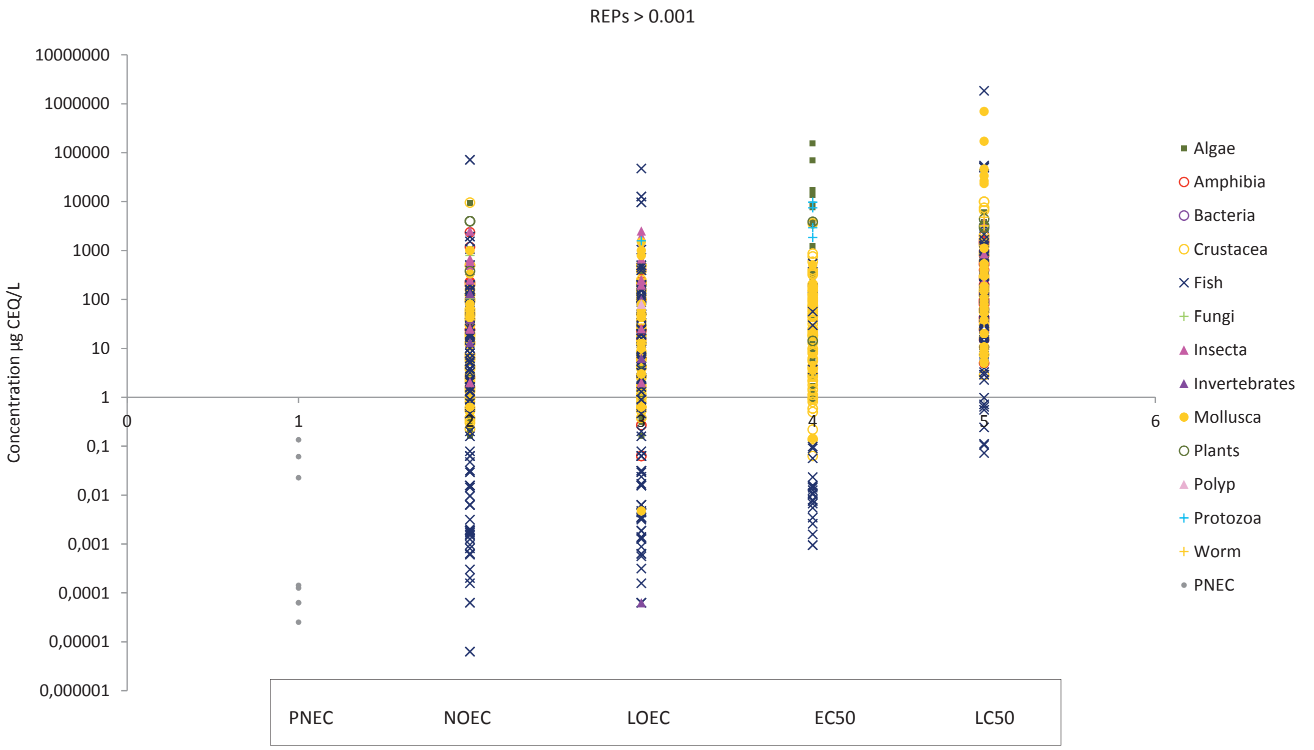
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Crustacea
Fish
Invertebrates
PNEC

D: GR CALUX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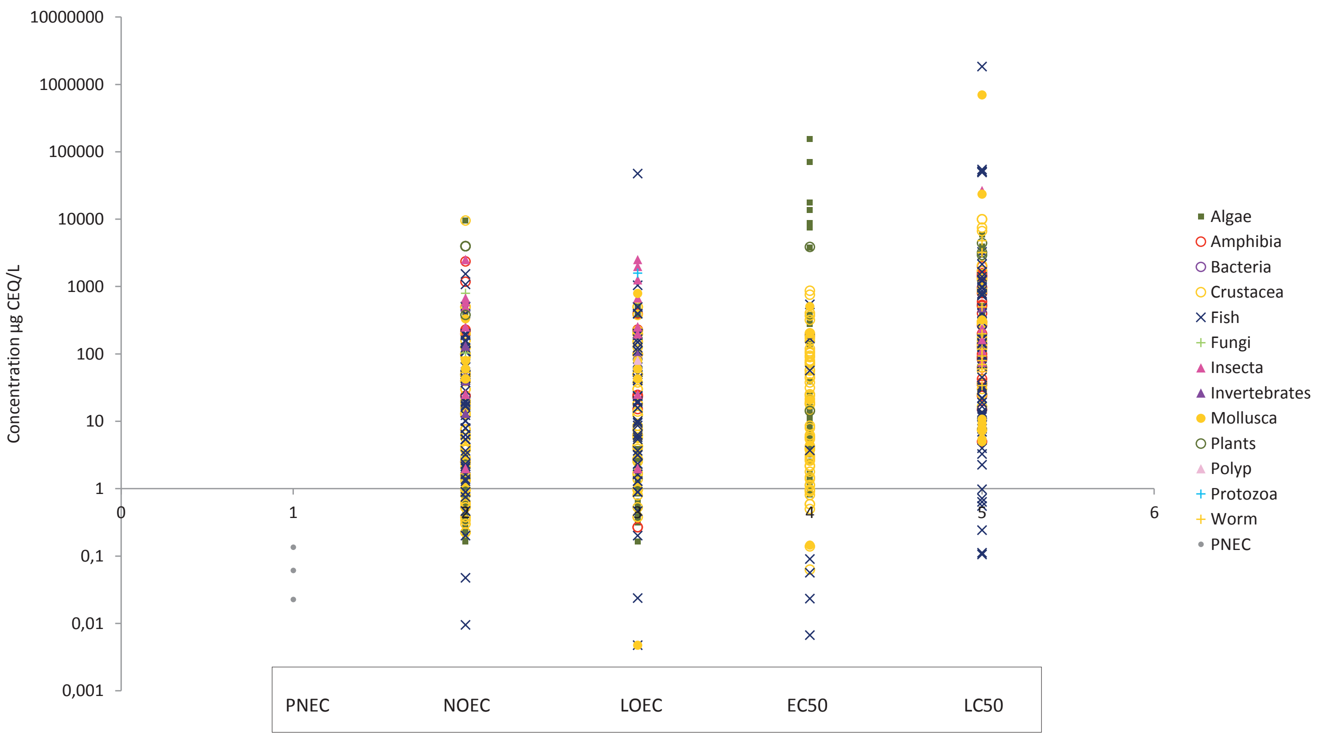
4
5
6
PNEC
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Bacteria
Crustacea
Fish
Fungi
Insecta
Invertebrates
Mollusca
Plants
Polyp
Protozoa
Worm
PNEC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5
6
PNEC
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Bacteria
Crustacea
Fish
Fungi
Insecta
Invertebrates
Mollusca
Plants
Polyp
Protozoa
Worm
PNEC

E: NRF2 CALUX


REPs > 0.001
Concetration ng BEQ/L
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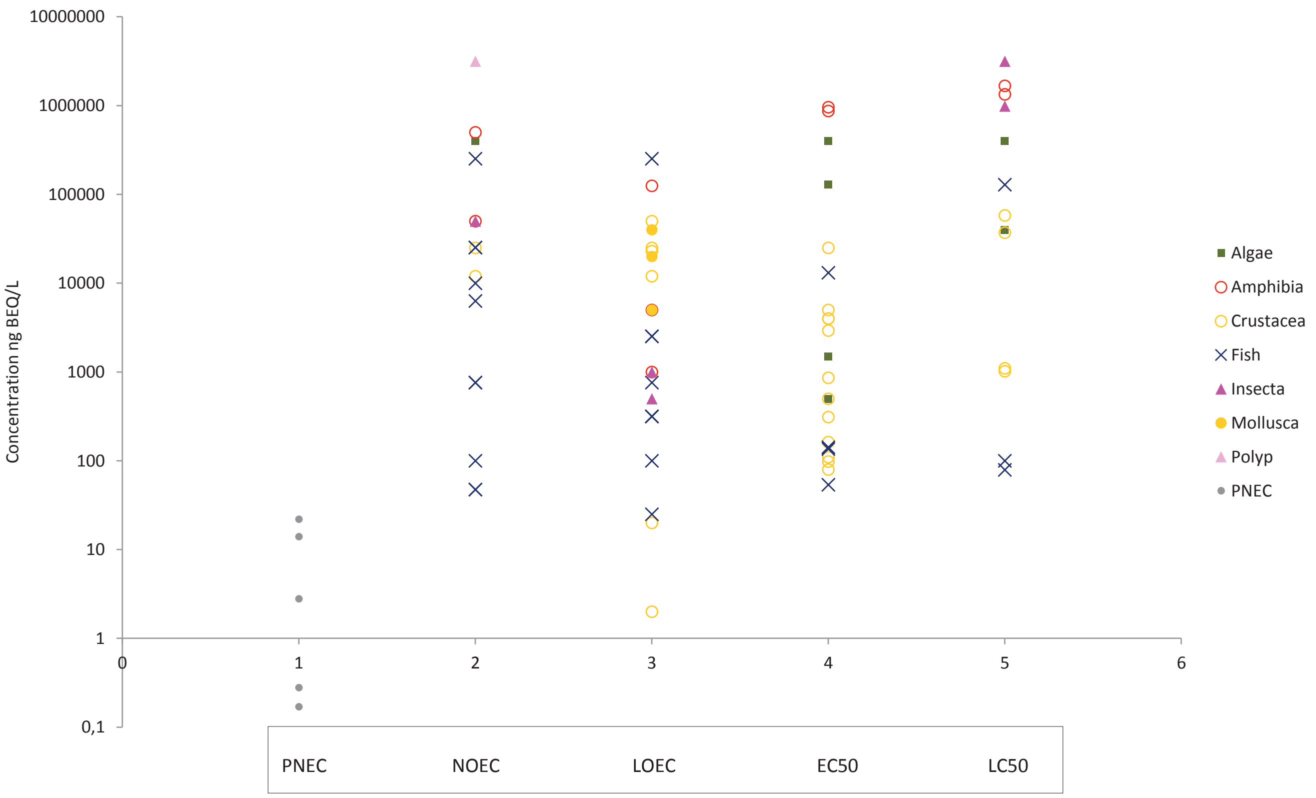
1000000
100000
10000
1000
100
10
1
0,1
0
1
2
3
4
5
6
PNEC
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Crustacea
Fish
Insecta
Invertebrates
Mollusca
Polyp
Worm
PNEC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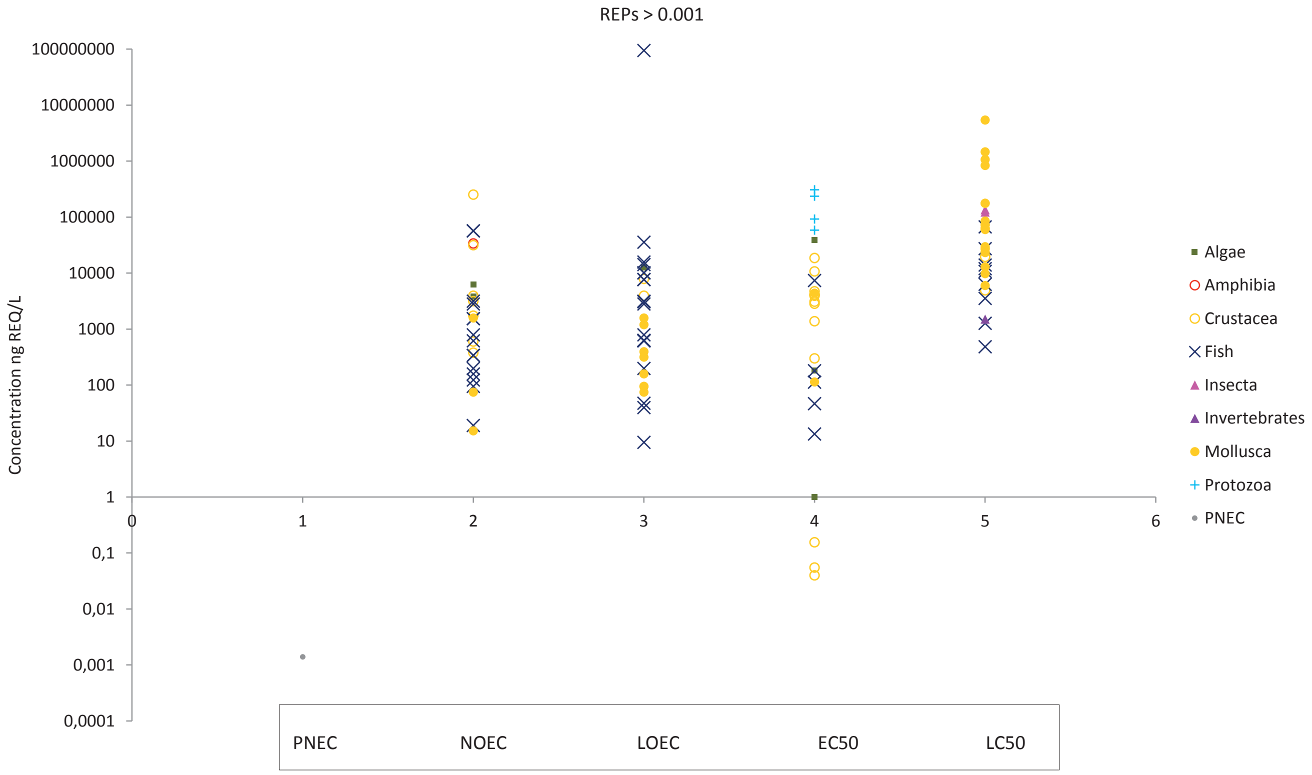
6
PNEC
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Crustacea
Fish
Insecta
Mollusca
Polyp
PNEC

F: PAH CALUX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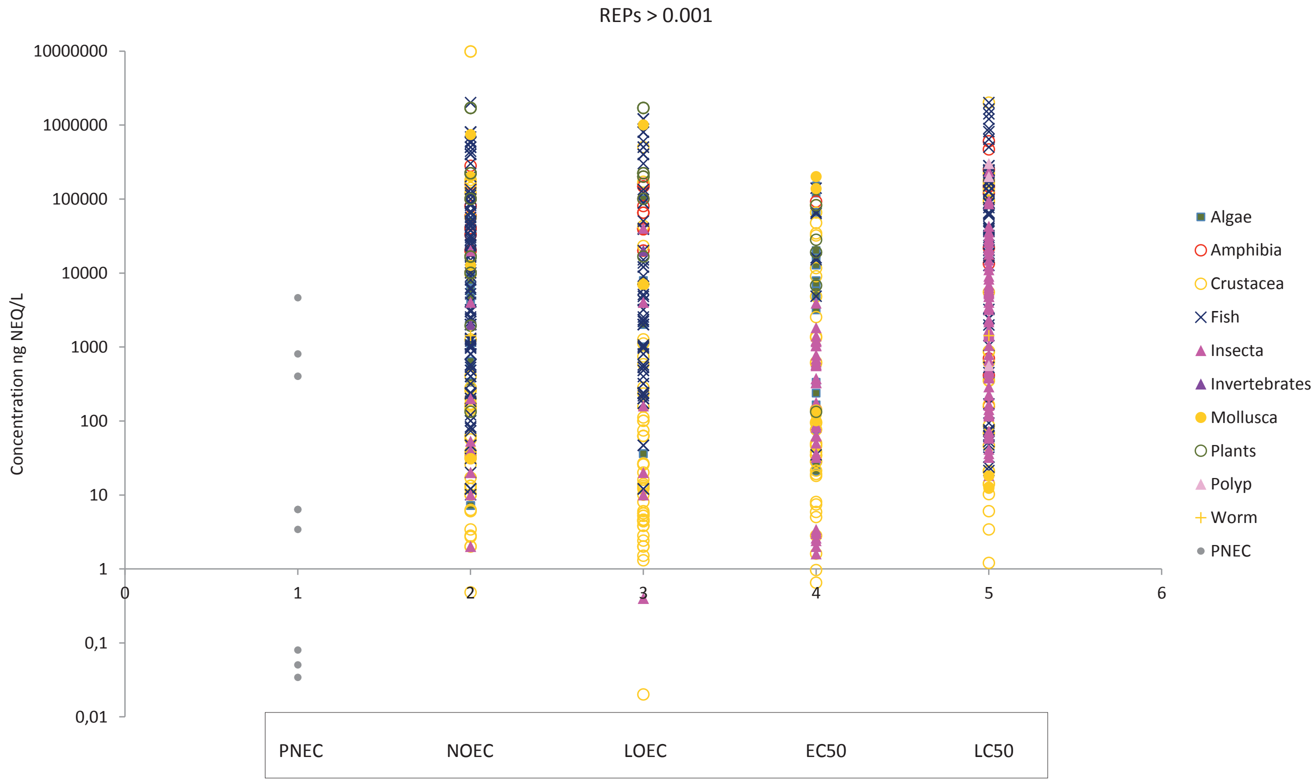
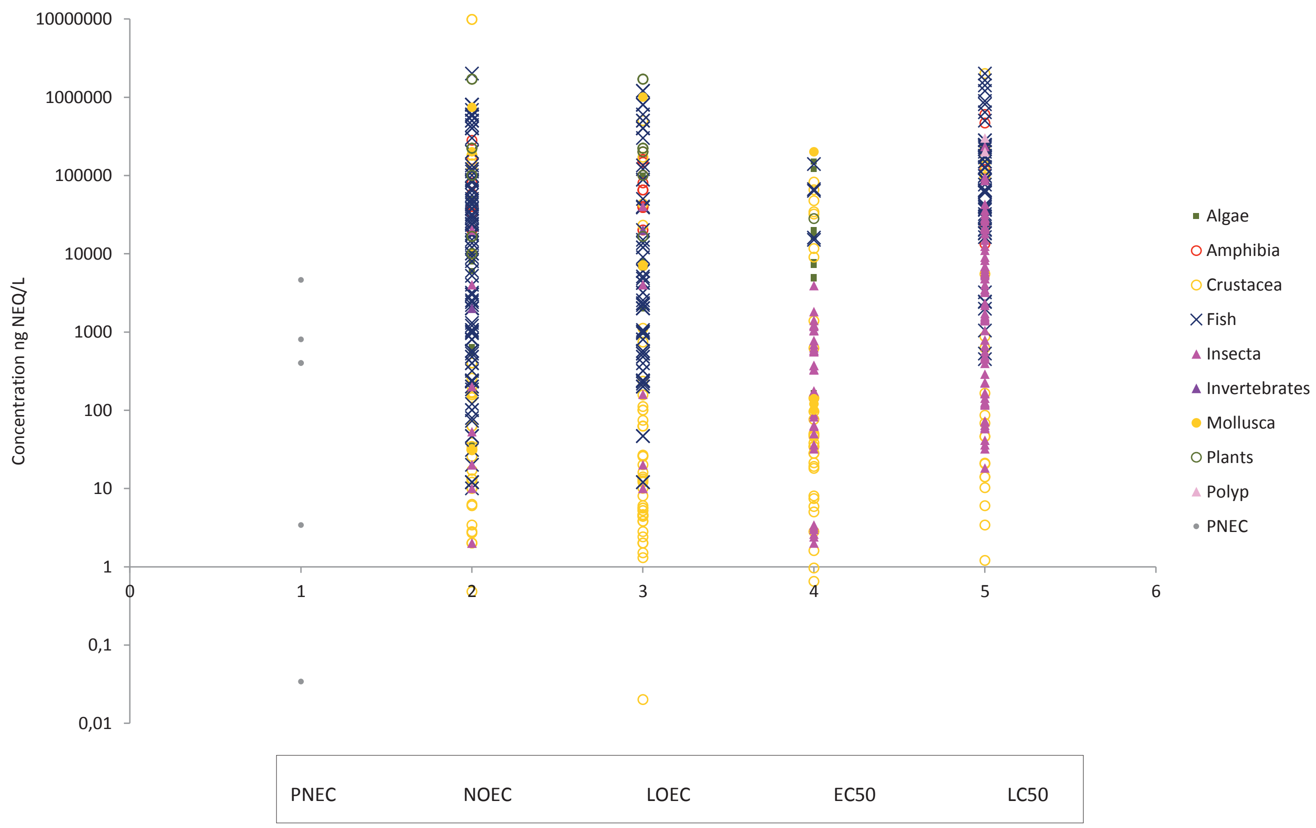
0
1
2
3
4
5
6
PNEC
NOEC
LOEC
EC50
LC50
Algae
Amphibia
Crustacea
Fish
Insecta
Invertebrates
Mollusca
Protozoa
PNEC

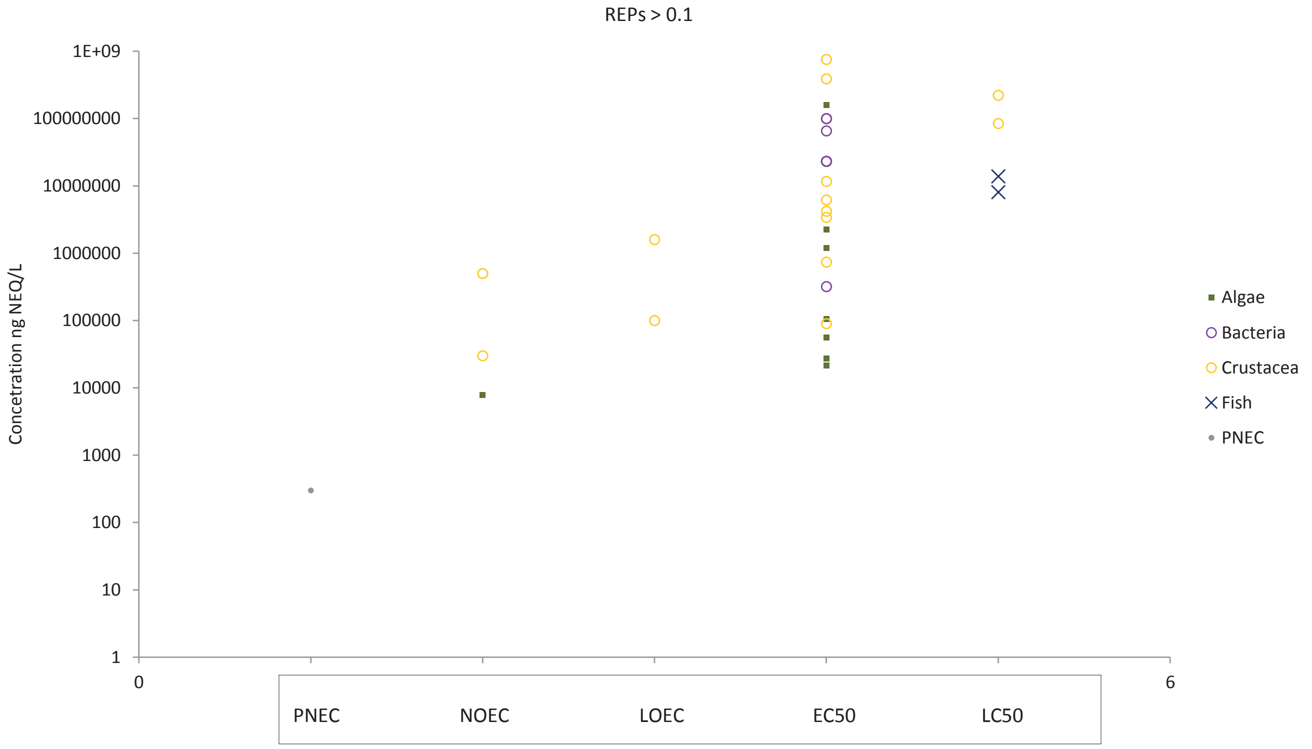

Concentration ng REQ/L
100000000
10000000
1000000
100000
10000
1000
100
10
1
0
1
2
3
4
5
NOEC
LOEC
EC50
LC50
Algae
Crustacea
Fish
Insecta
Invertebrates
Mollusca
Protozoa

G: PPARG CALUX





H: PXR CALUX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10
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Concetration ng NEQ/L
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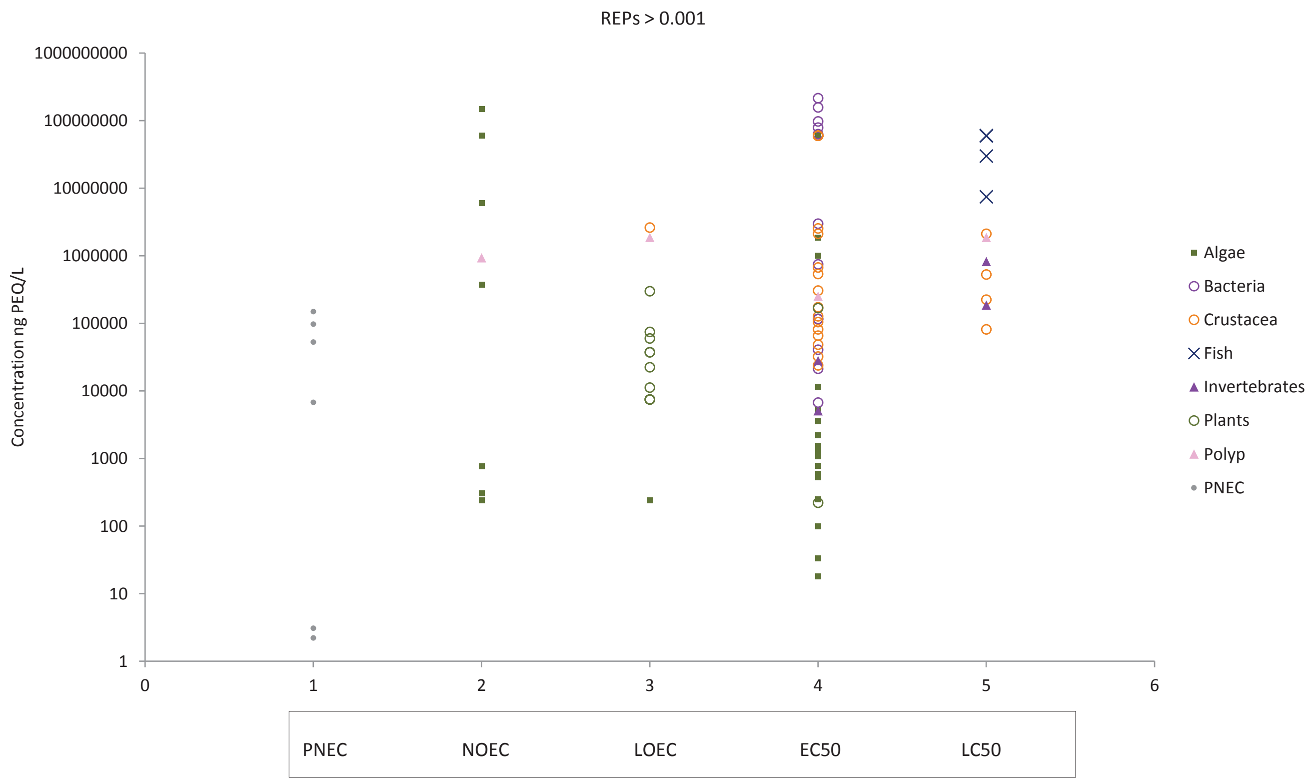
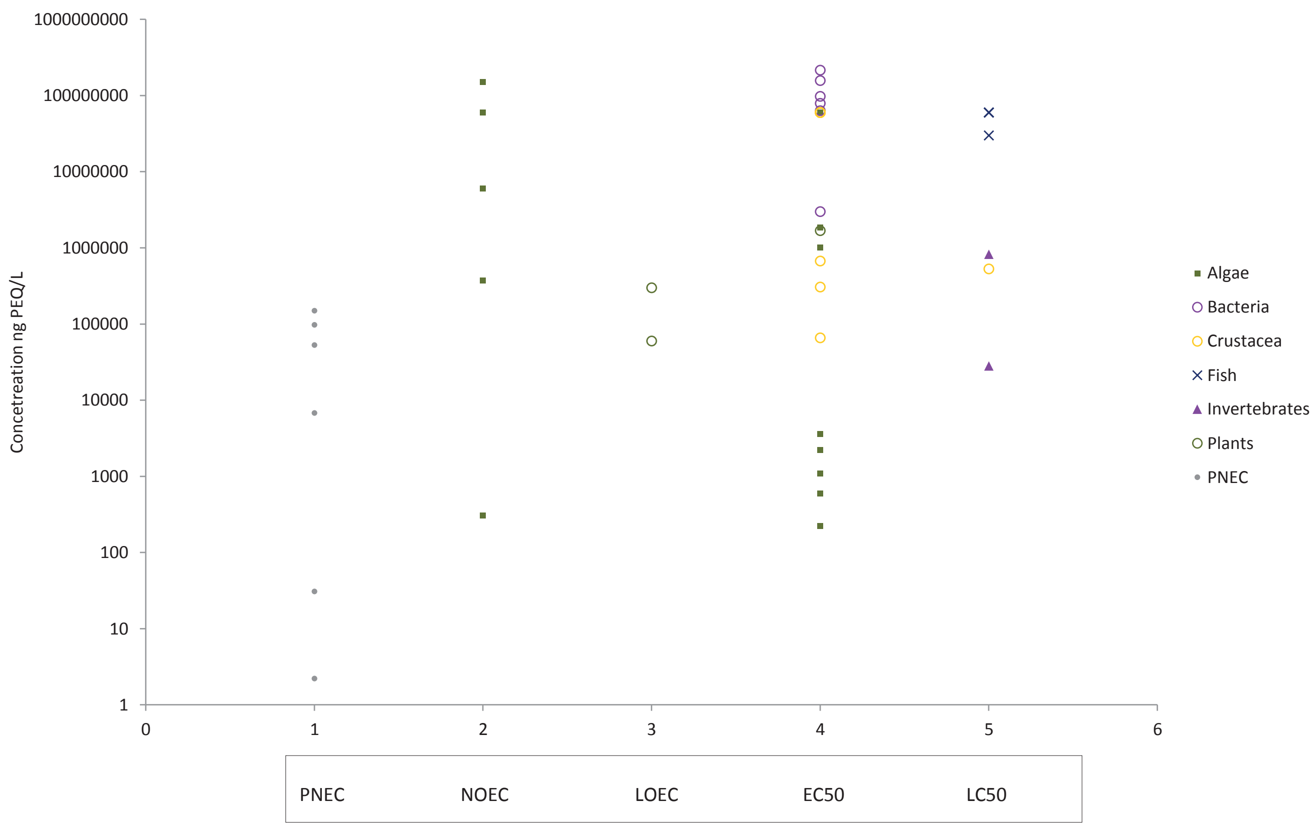
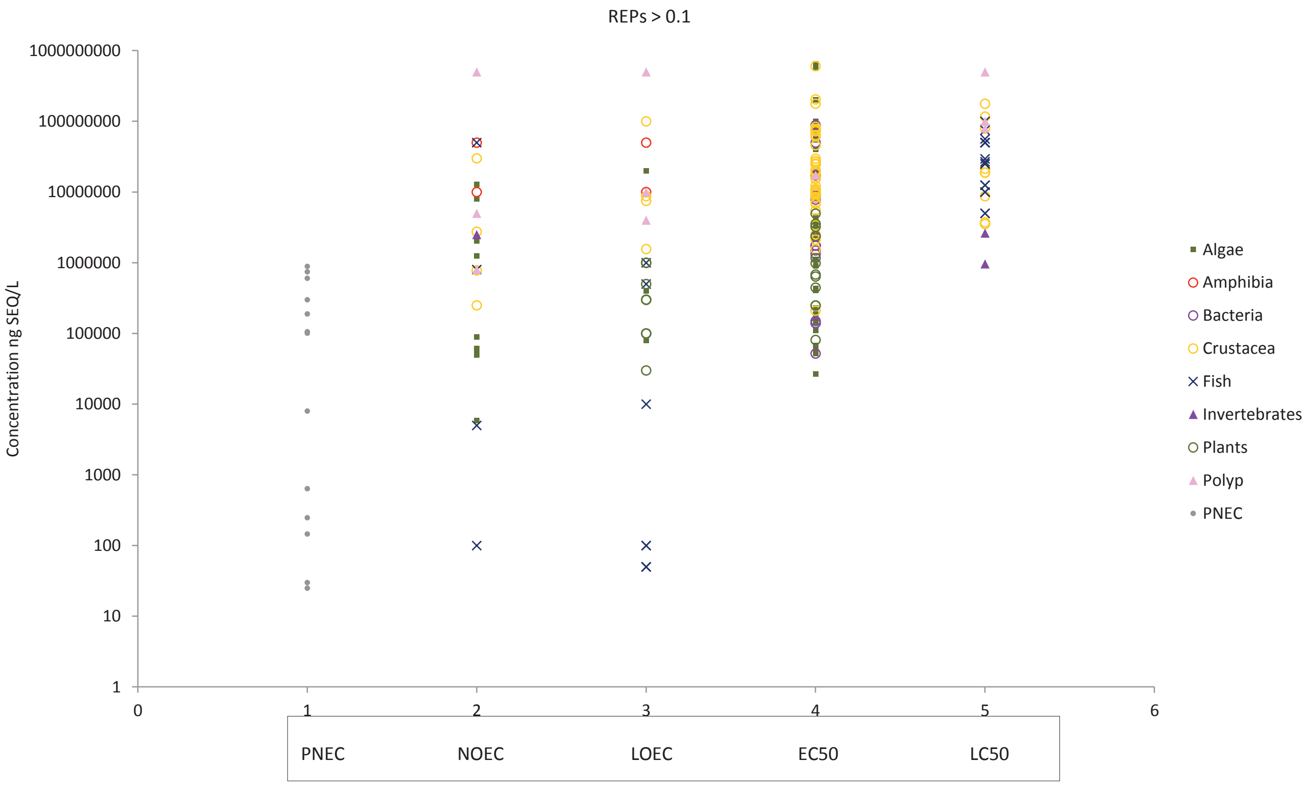
PNEC
NOEC
LOEC
EC50
LC50
Algae
Bacteria
Crustacea
Fish
PNEC

I.1 AMINOGLYCOSIDES

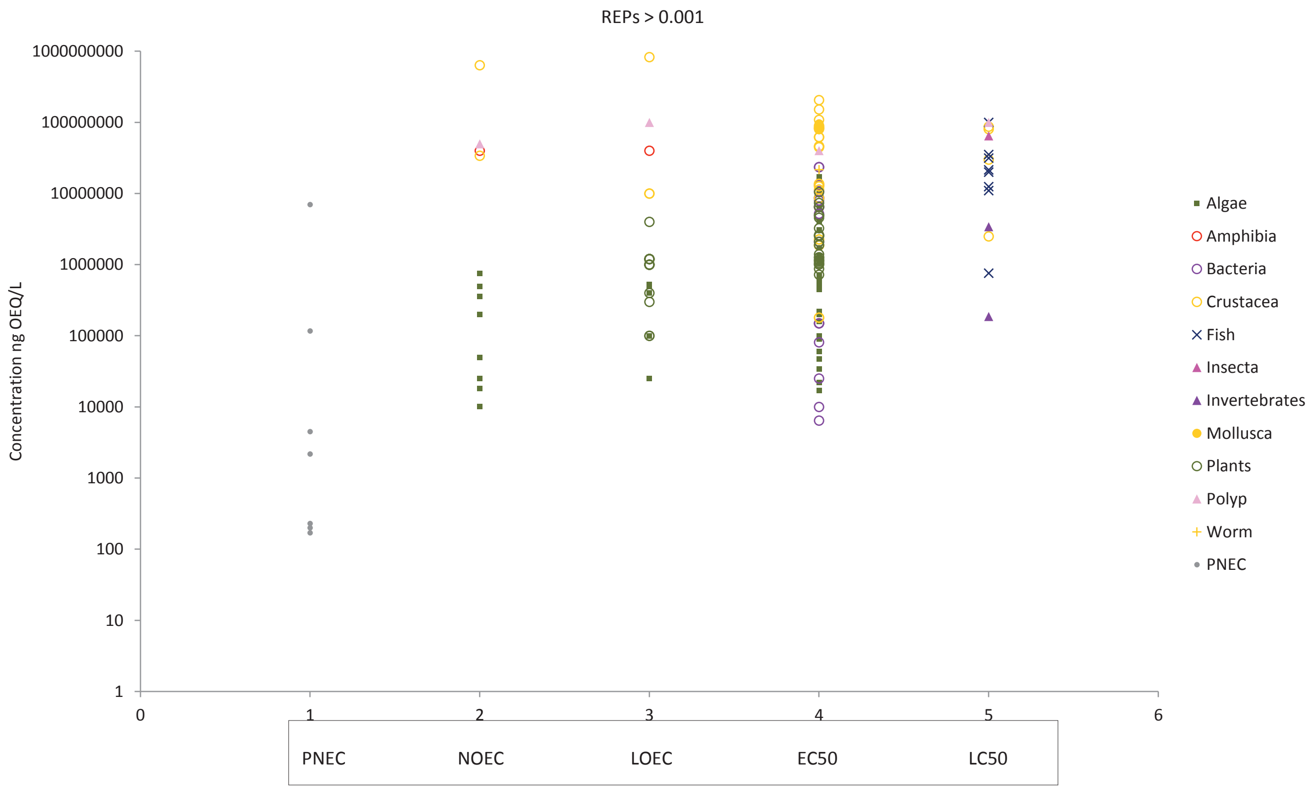


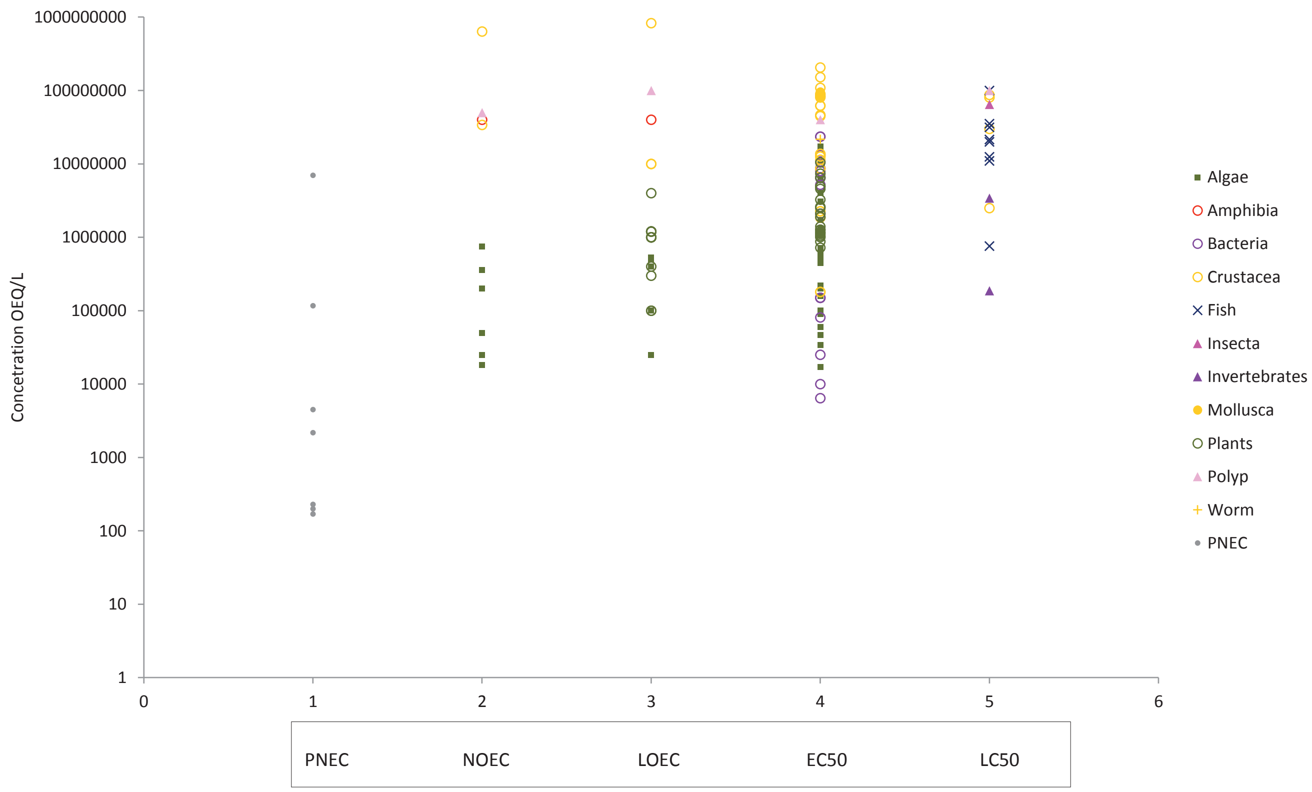


I.2 MACROLIDES & Β LACTAMS

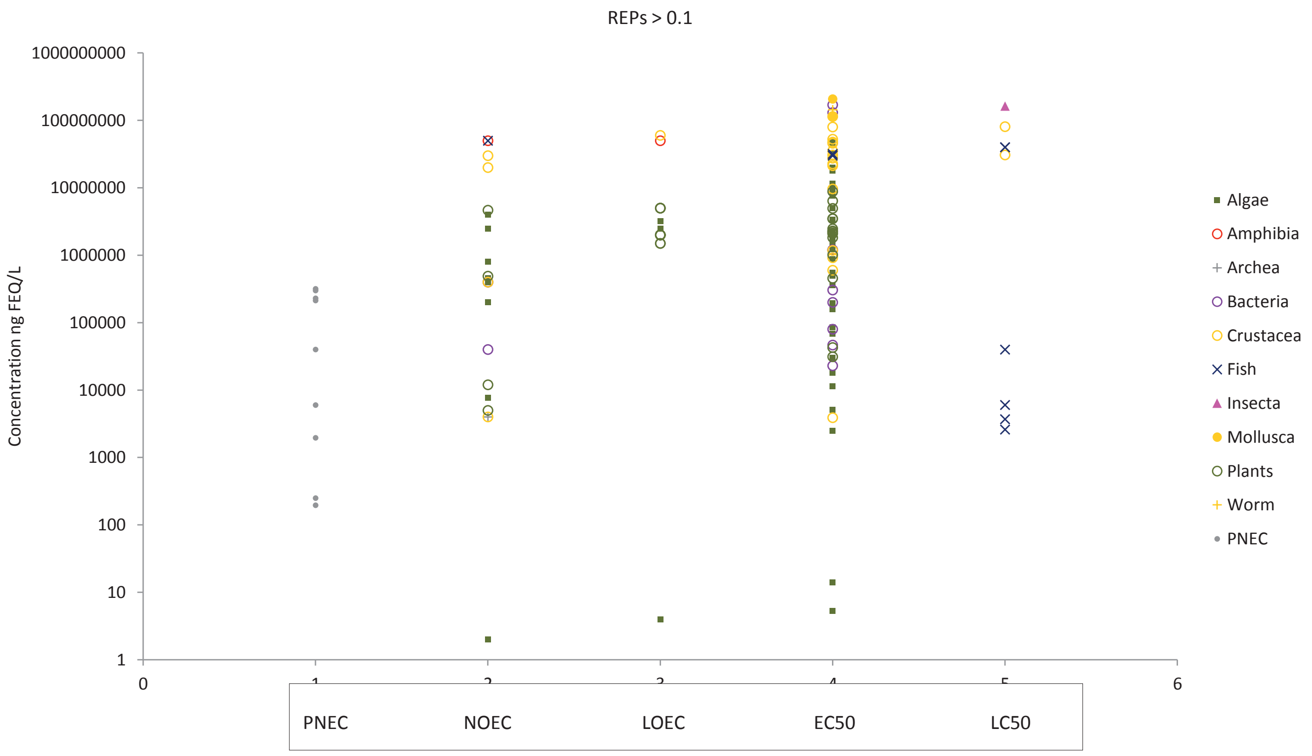


I.3 SULFONAMIDES



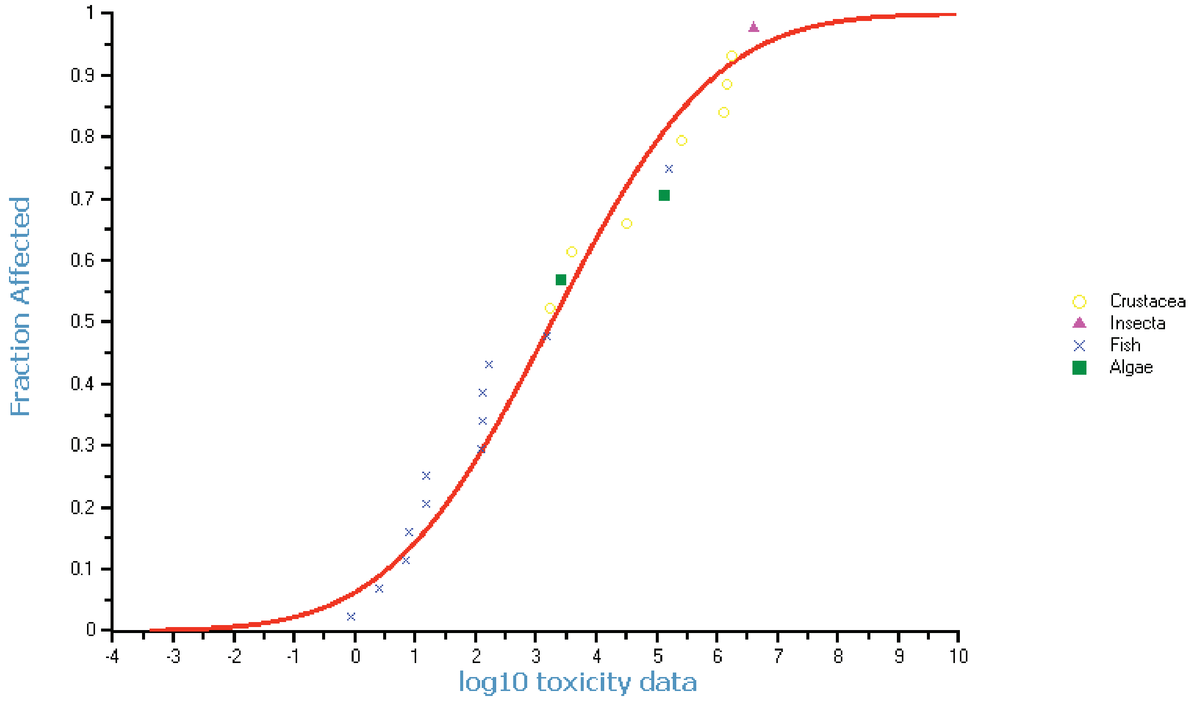


I.4 TETRACYCLINES

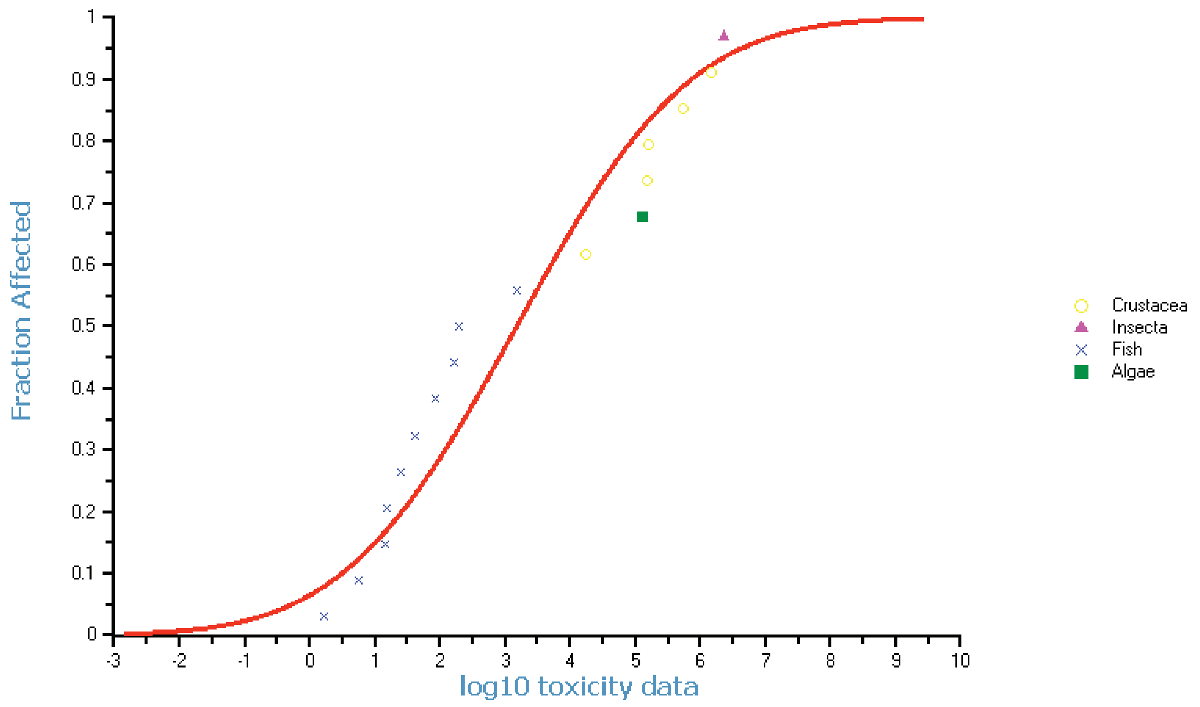


I.5 QUINOLONES

REPs > 0.001



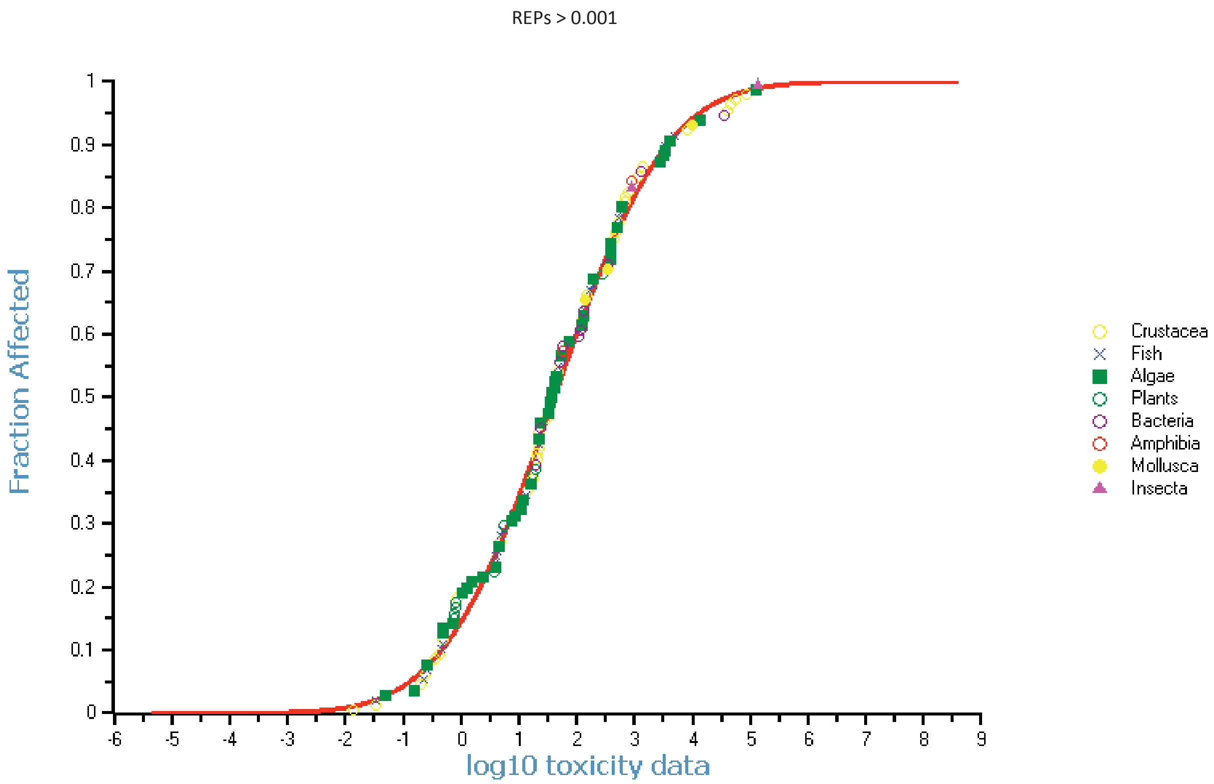
REPs > 0.1

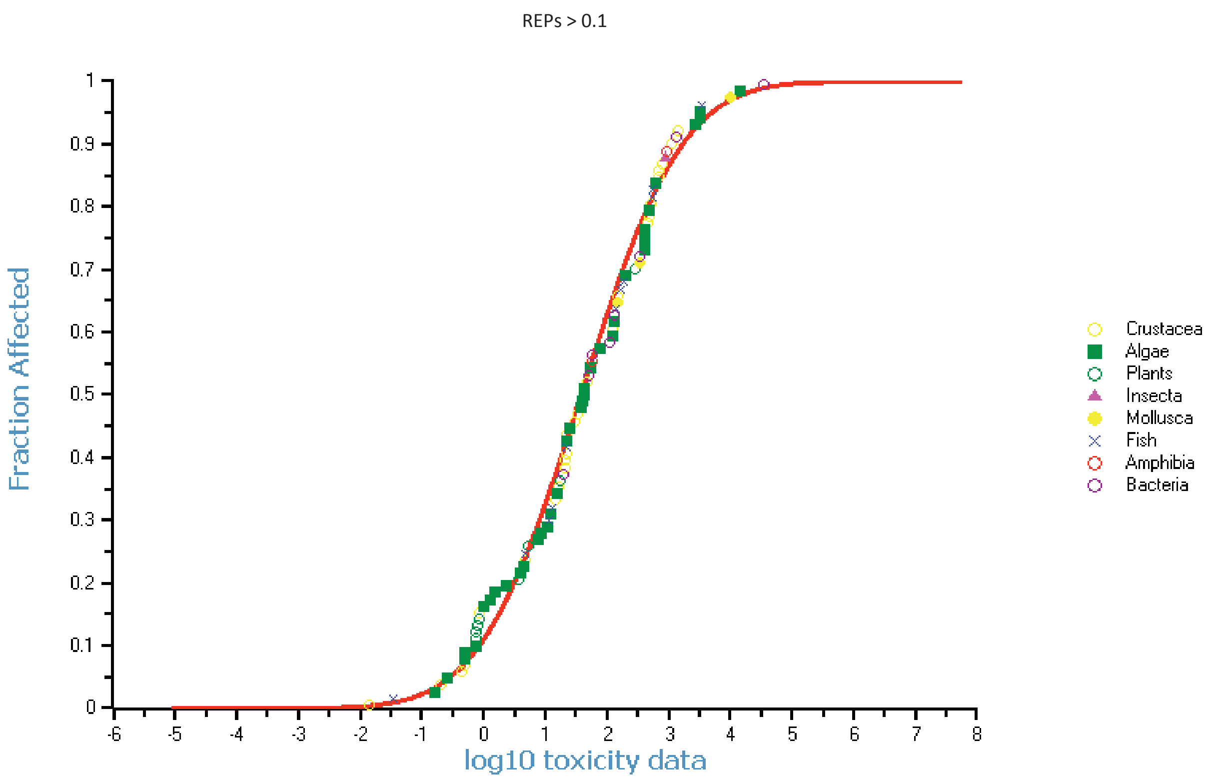


APPENDIX SI-V

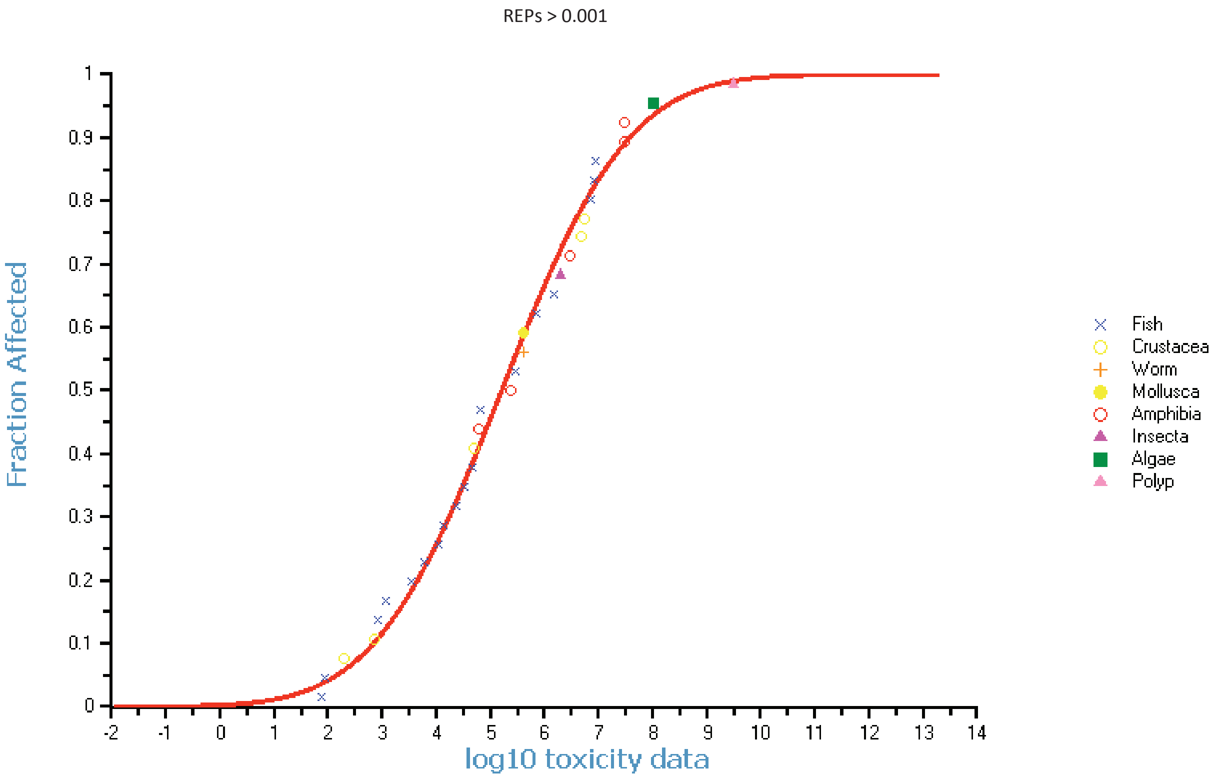
SSD analyses of all bioassays for REP1 and REP2 groups

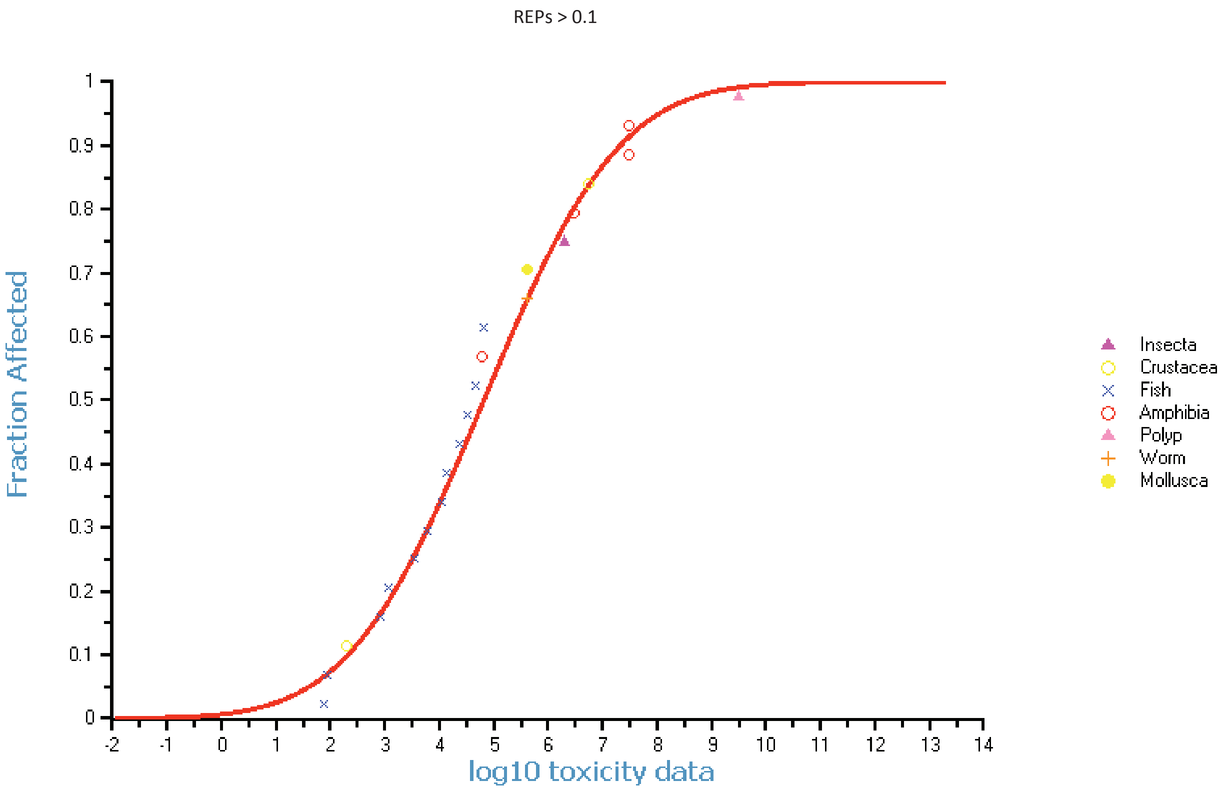
A: ER CALUX (NG EEQ/L)





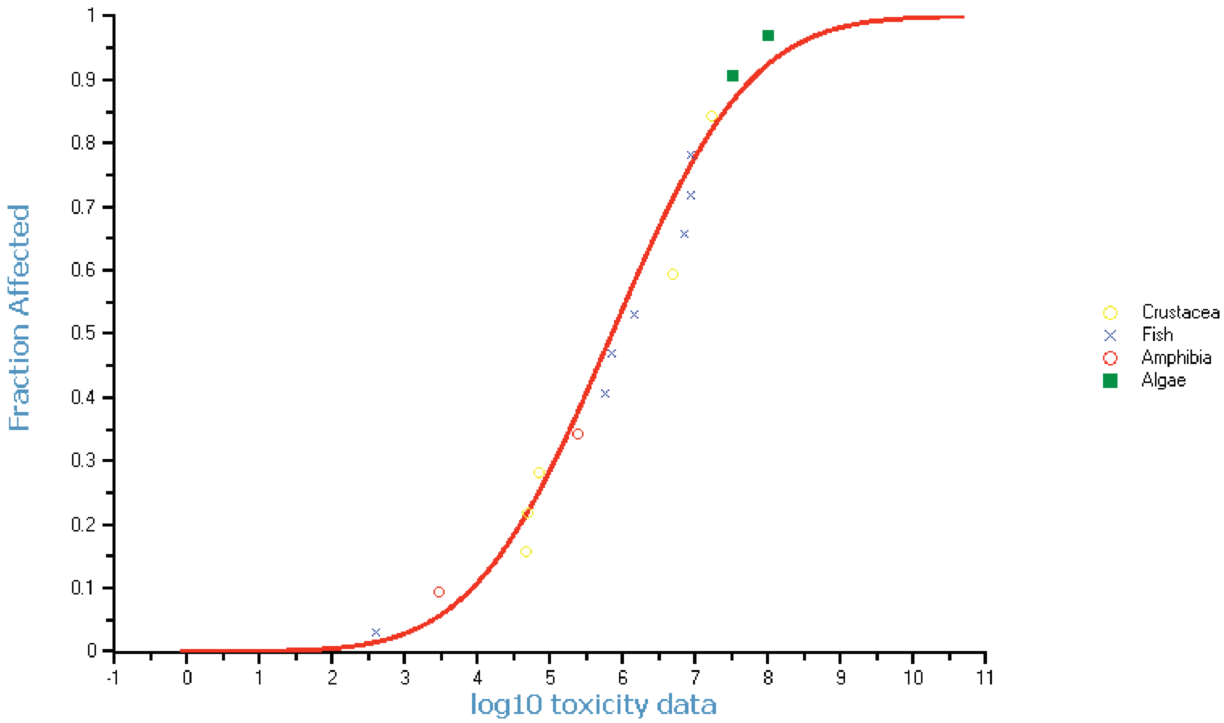
B: ANTI-AR CALUX (MG FEQ/L)



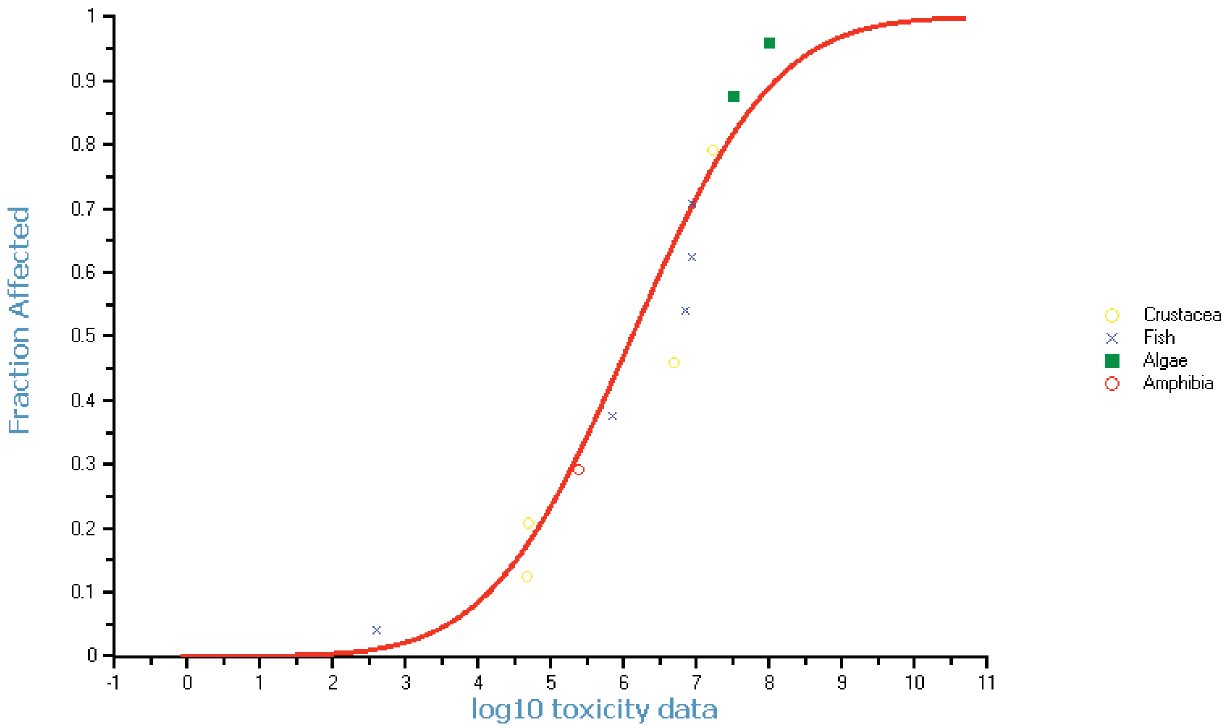


C: DR CALUX (PG TEQ/L)

REPs > 0.001

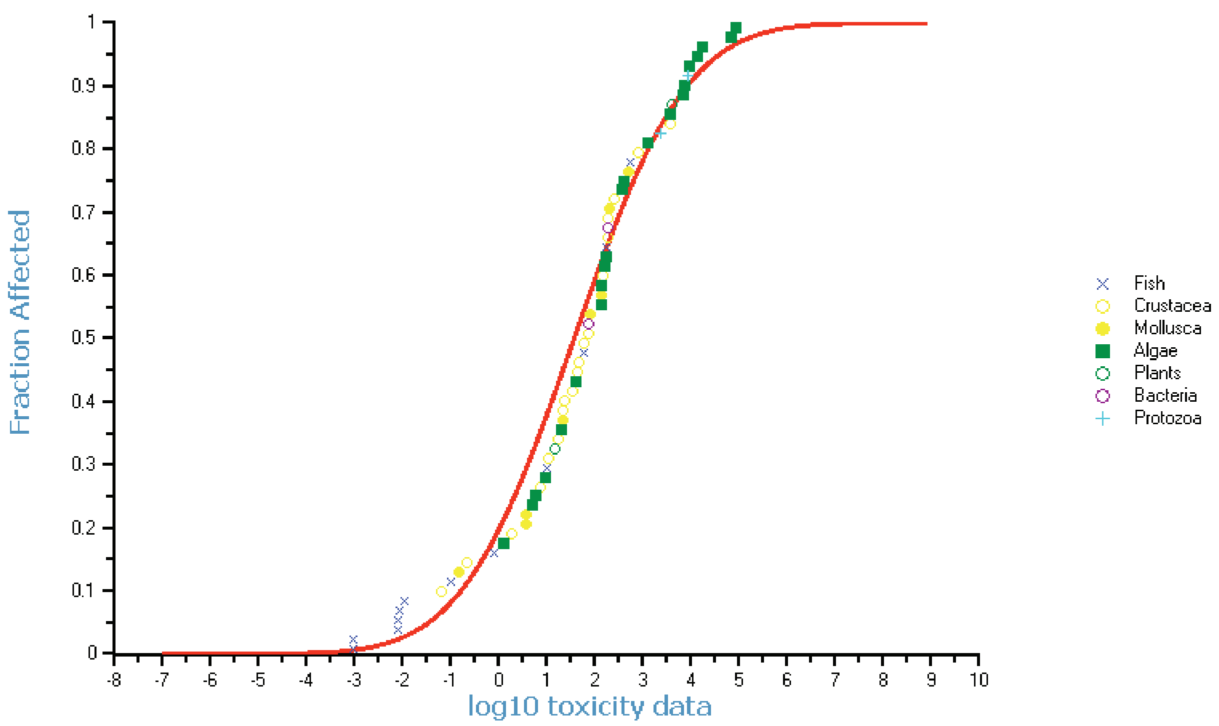


REPs > 0.1

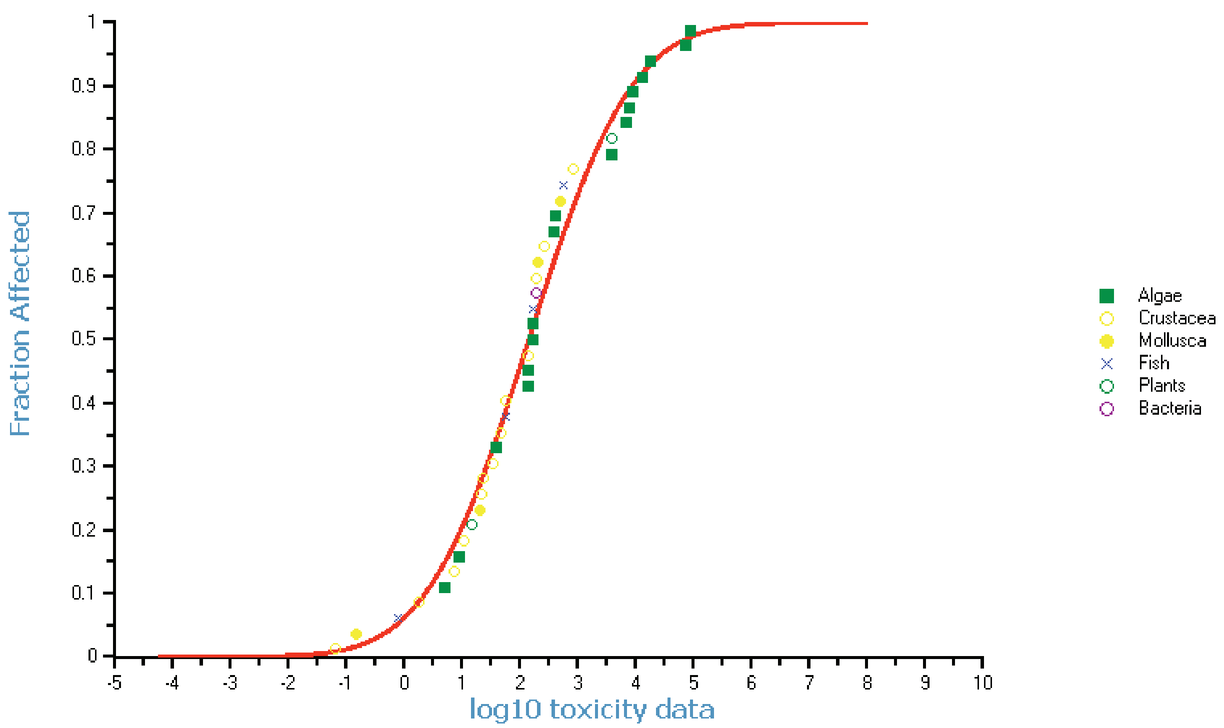


D: GR CALUX (NG DEQ/L)

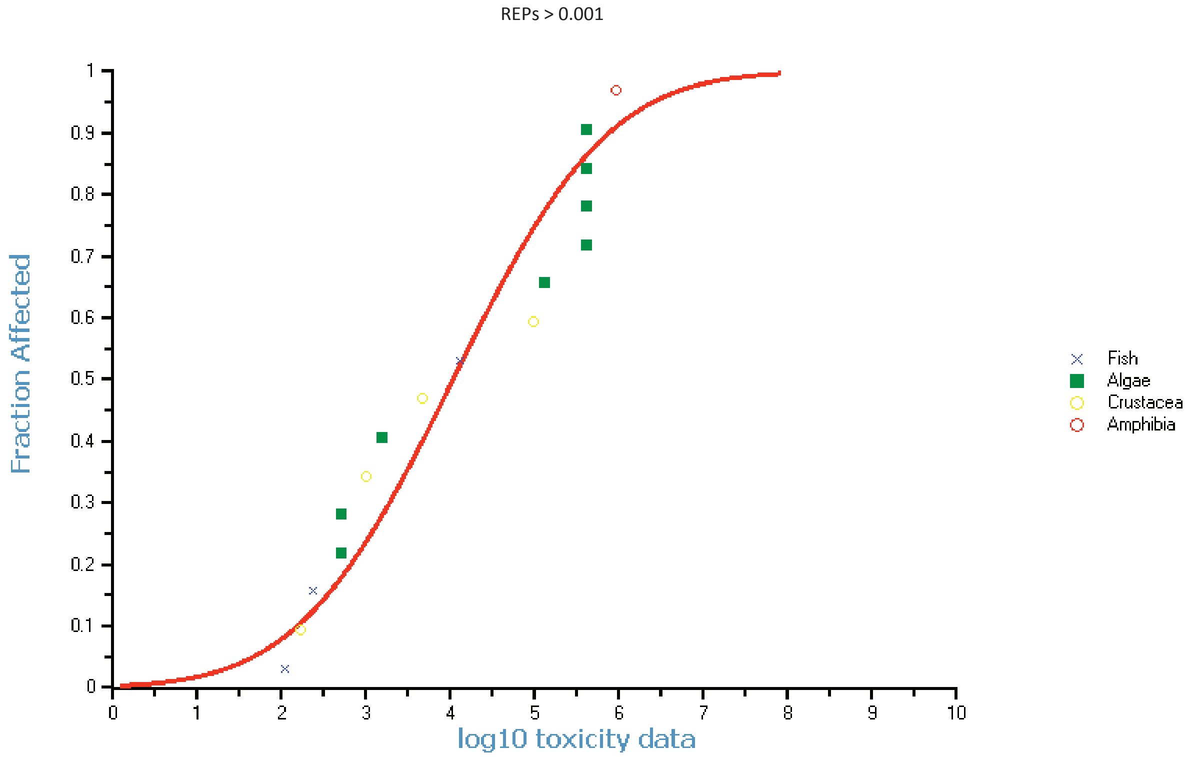
REPs > 0.001

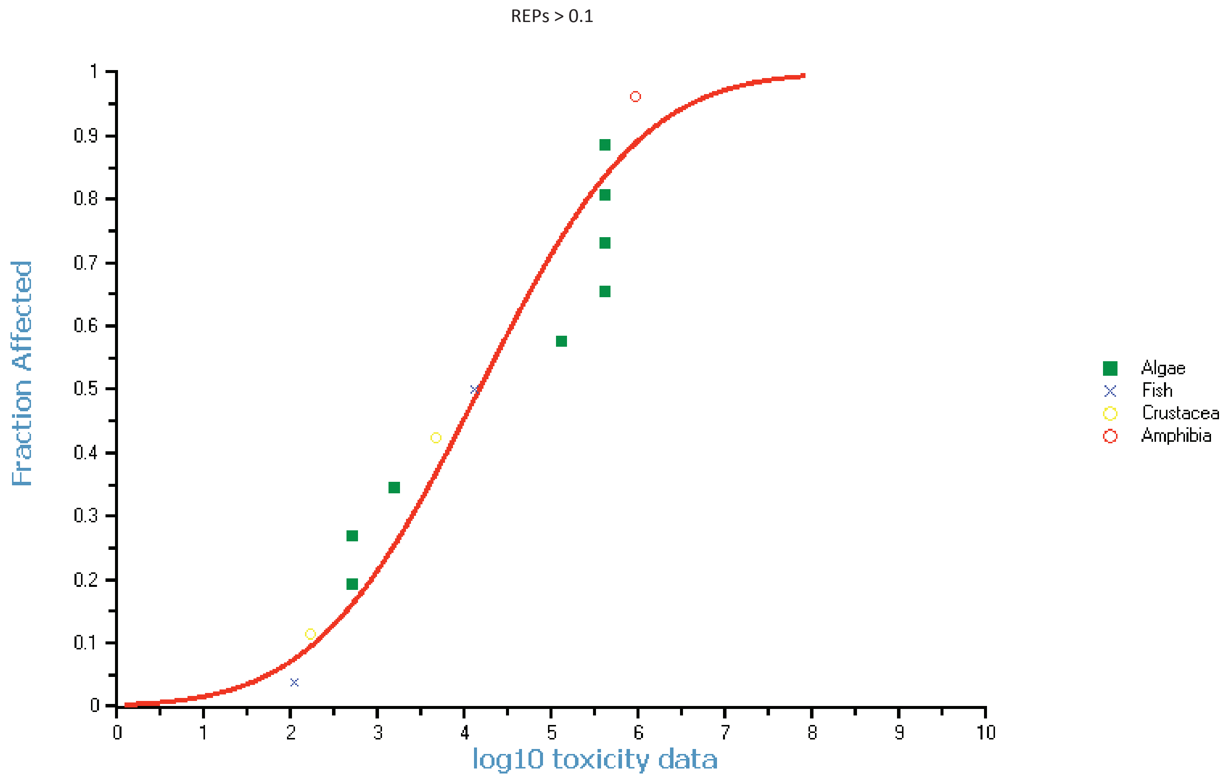


REPs > 0.1

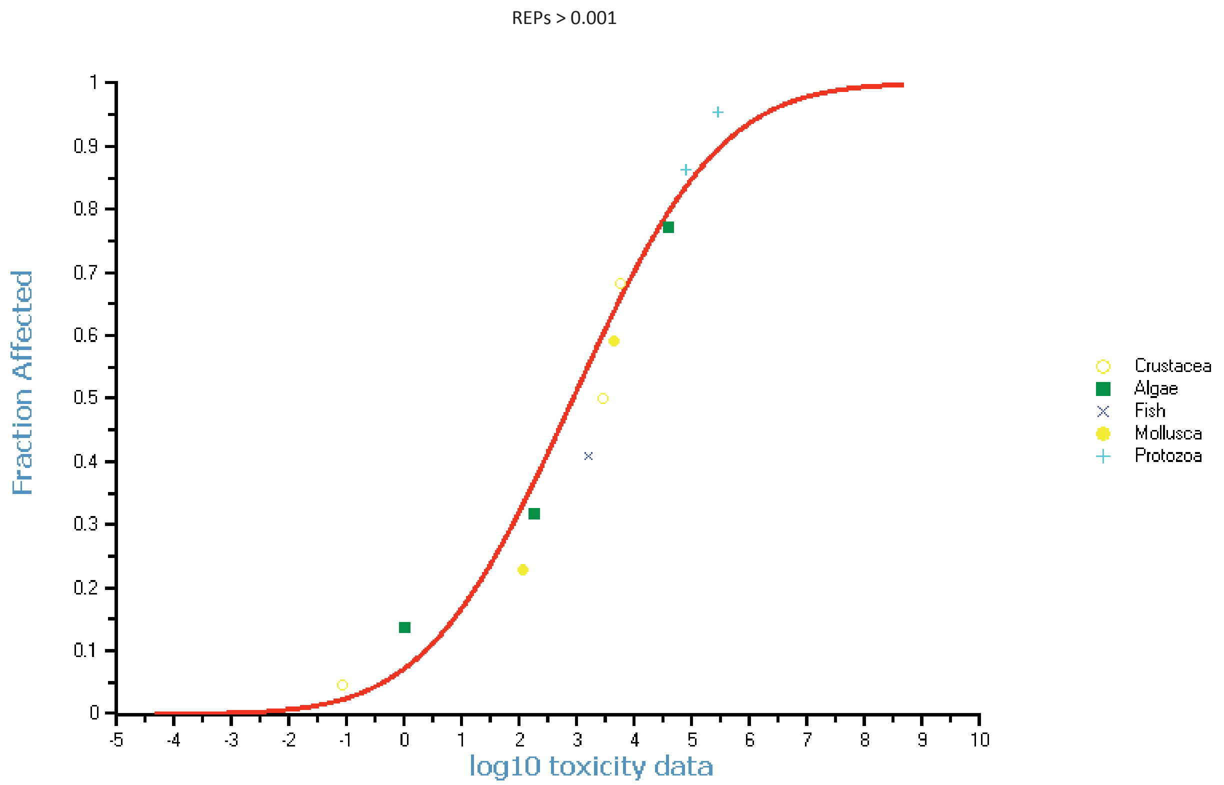


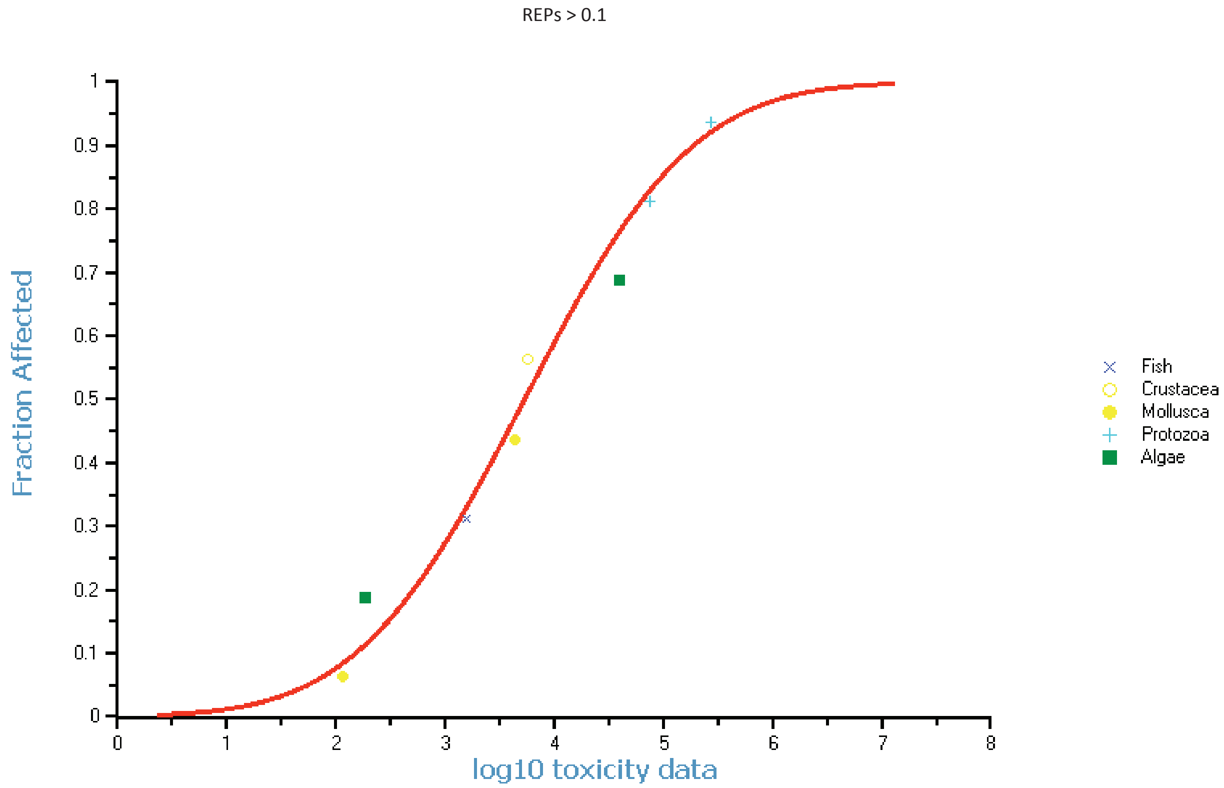
E: NRF2 CALUX (MG CEQ/L)



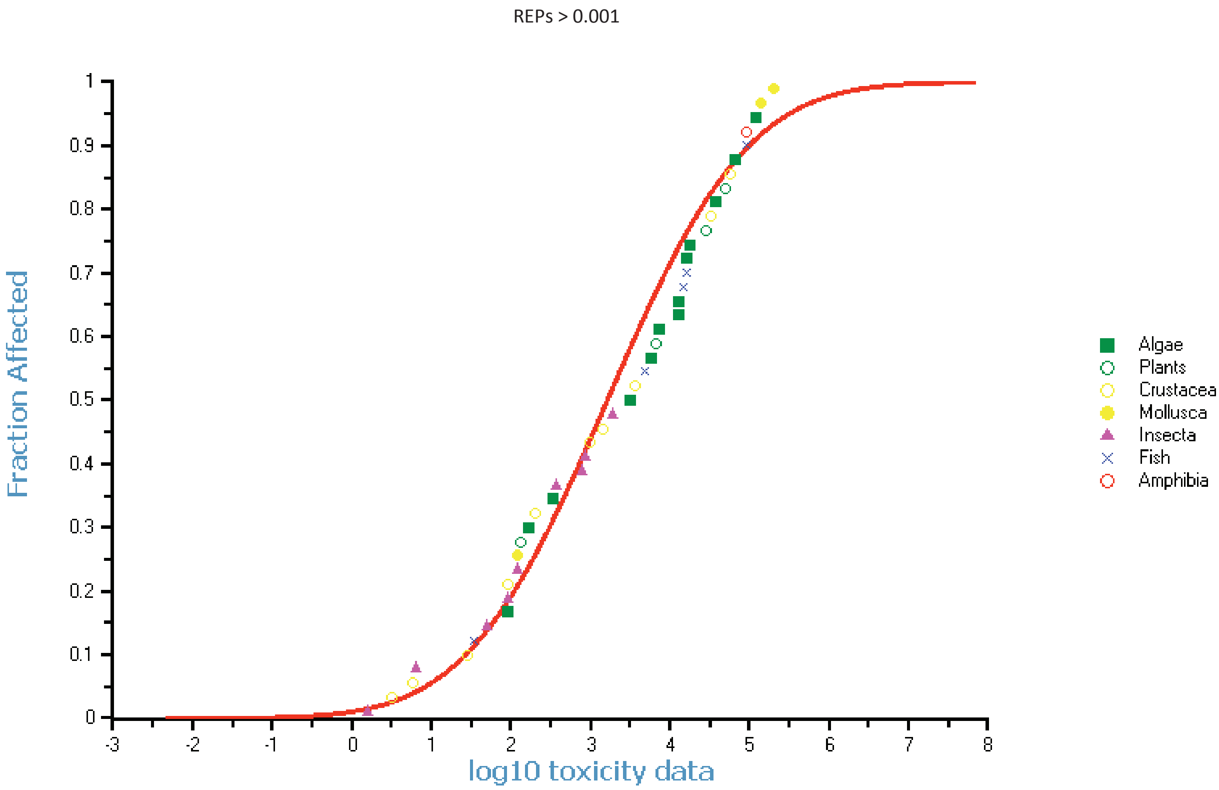


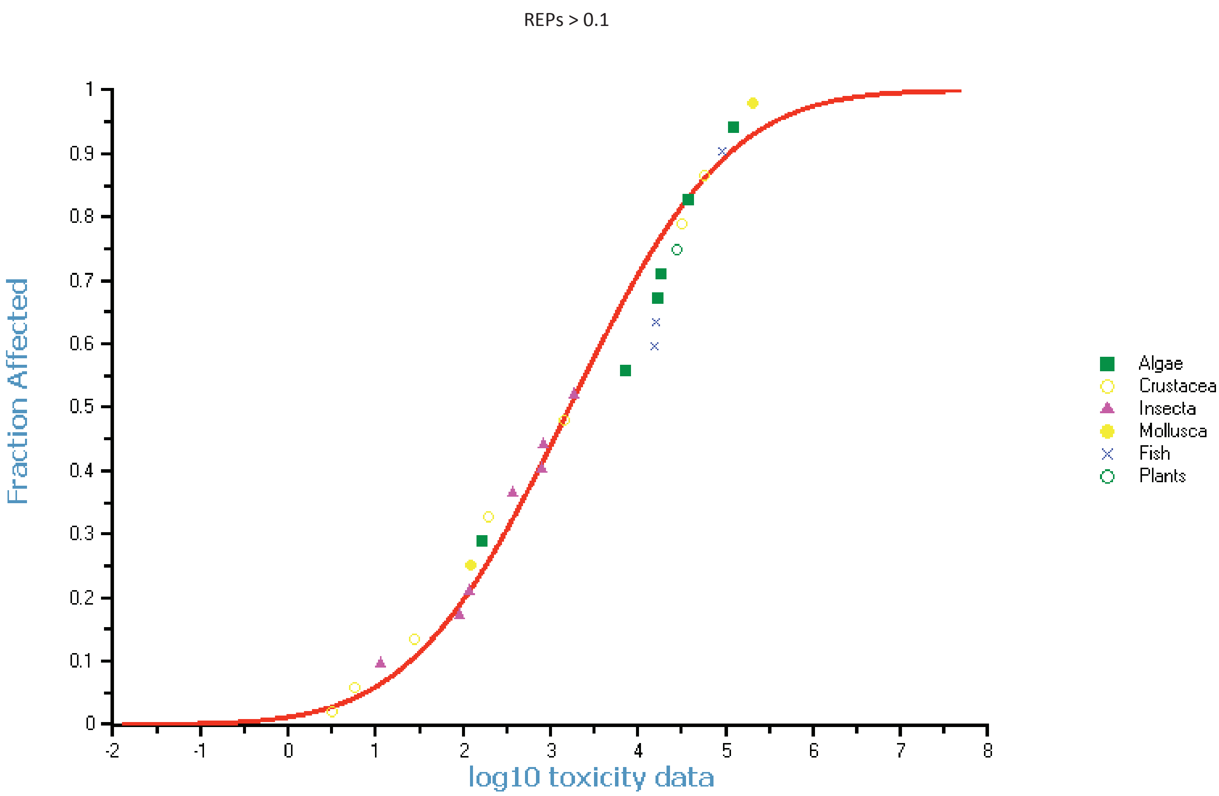
F: PAH CALUX (NG BEQ/L)





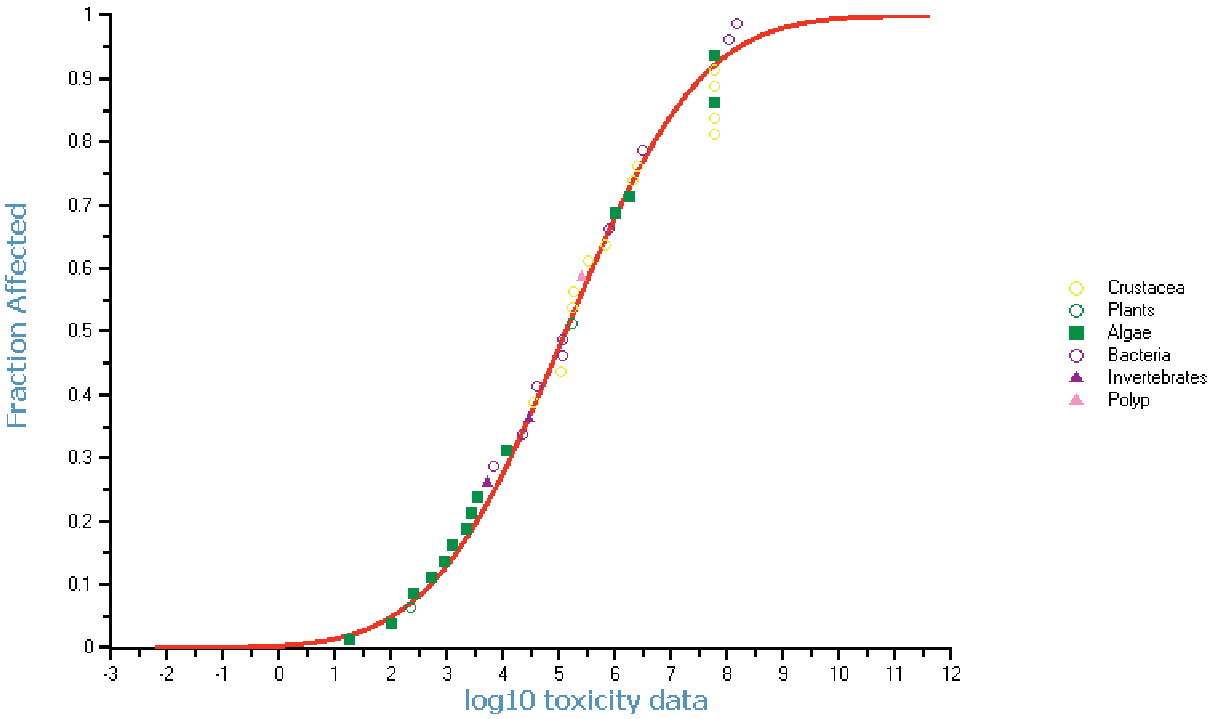
G: PPARG CALUX (NG REQ/L)



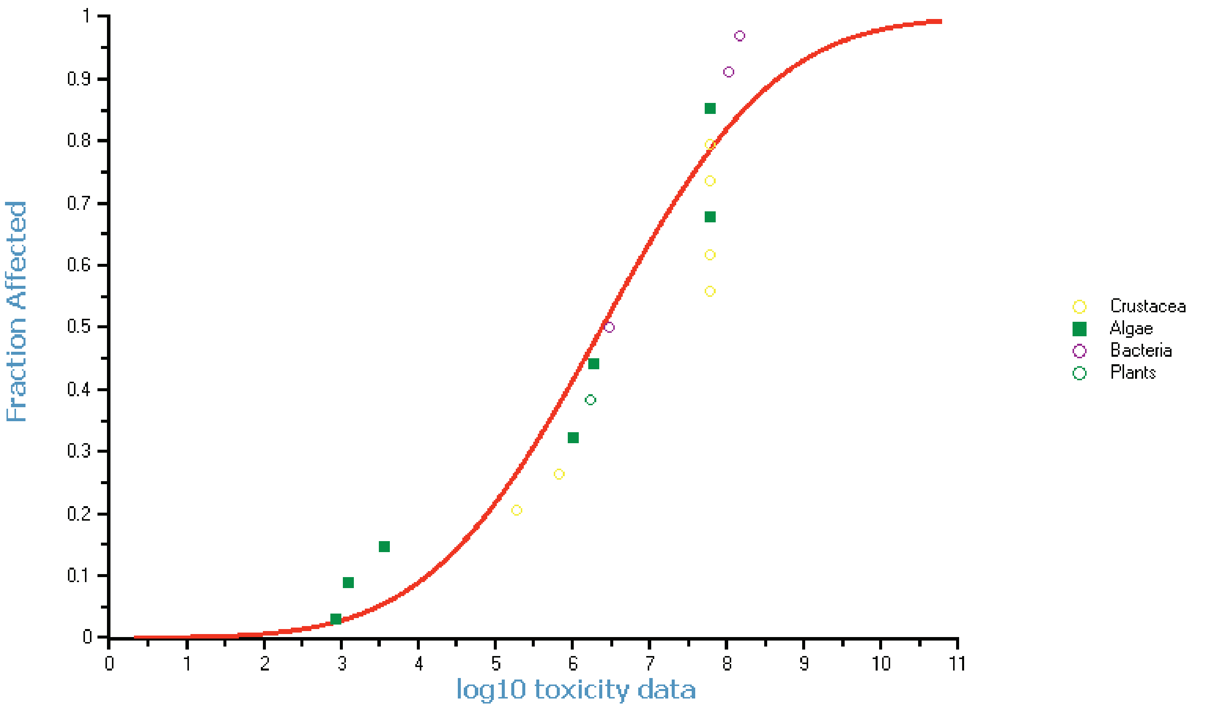


H: PXR CALUX (NG NEQ/L)

REPs > 0.001

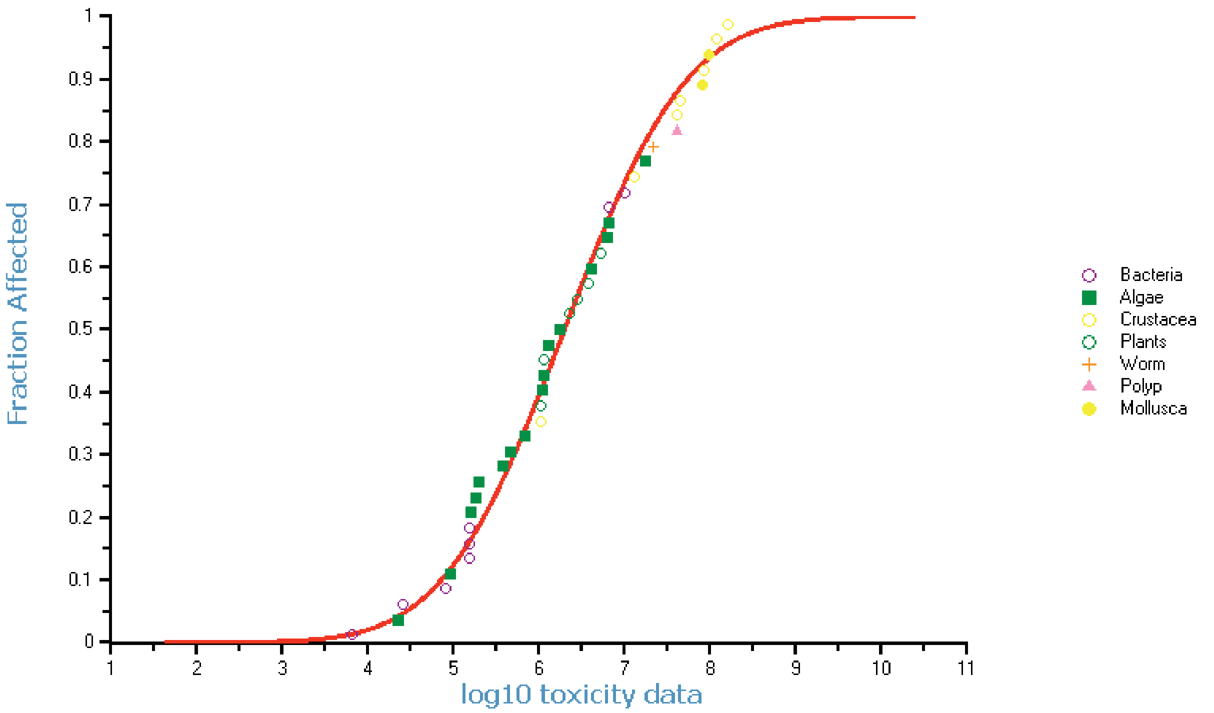


REPs > 0.1

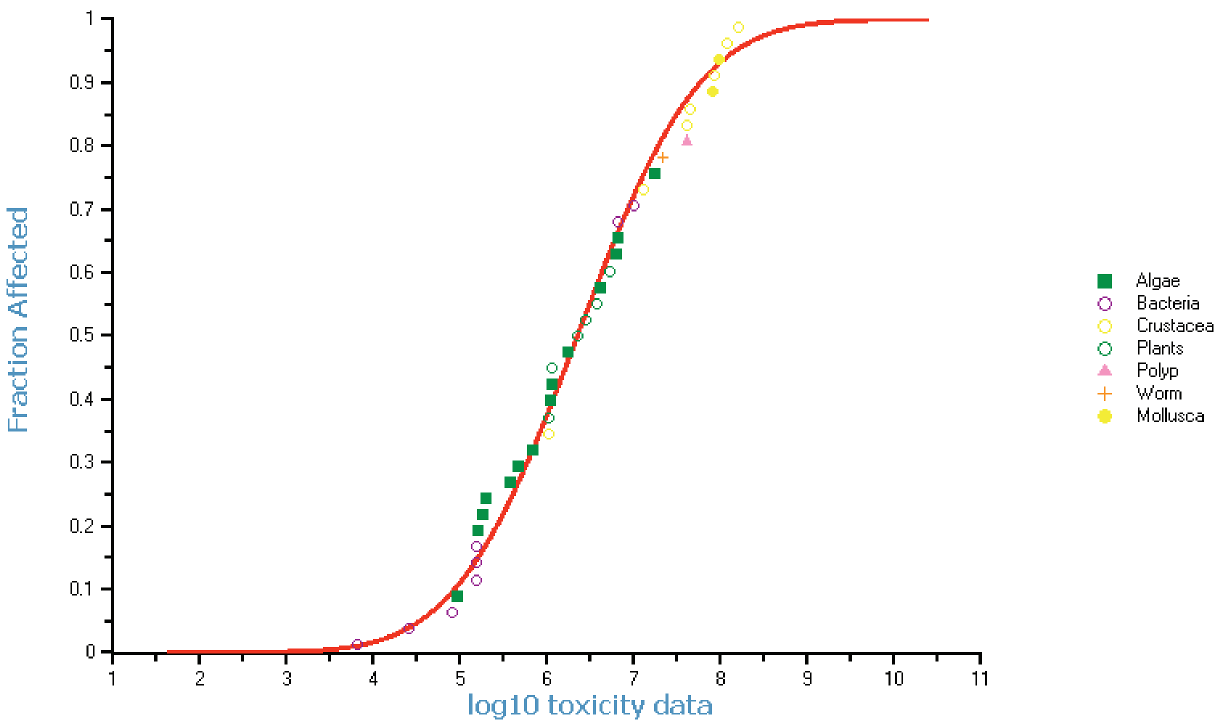


I.1 MACROLIDES & Β LACTAMS (NG PEQ/L)

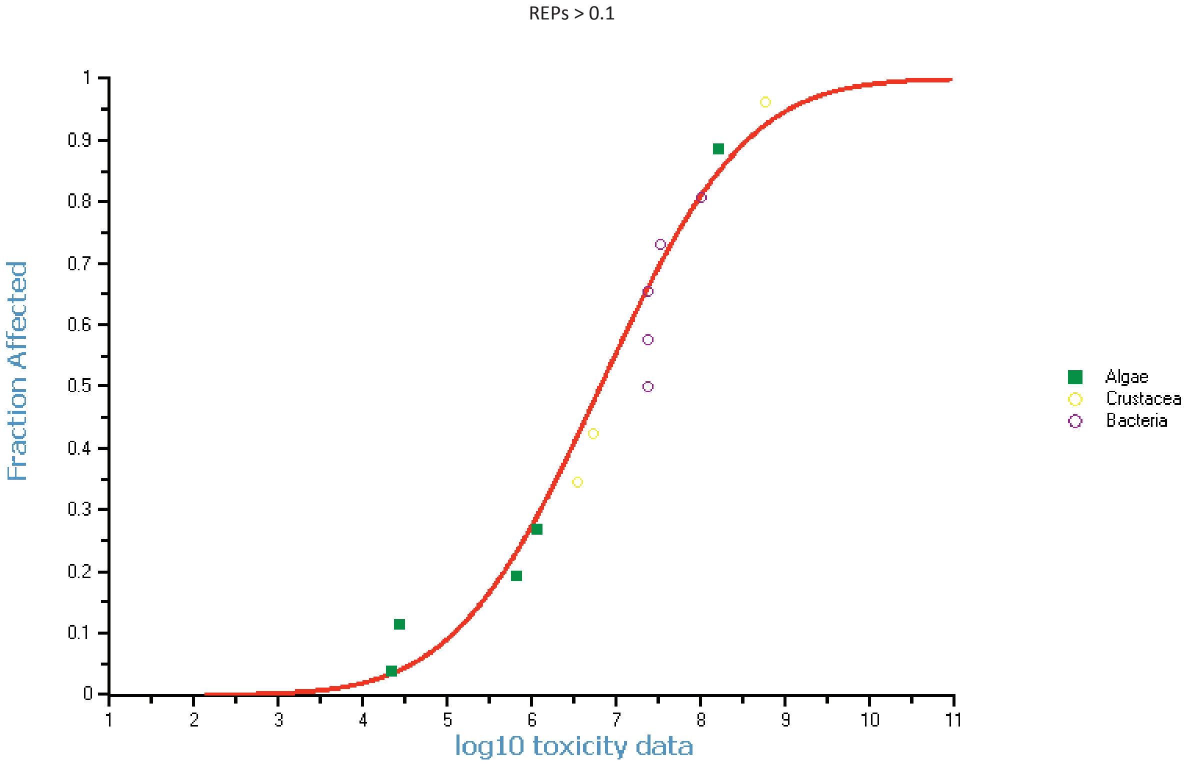
REPs > 0.001



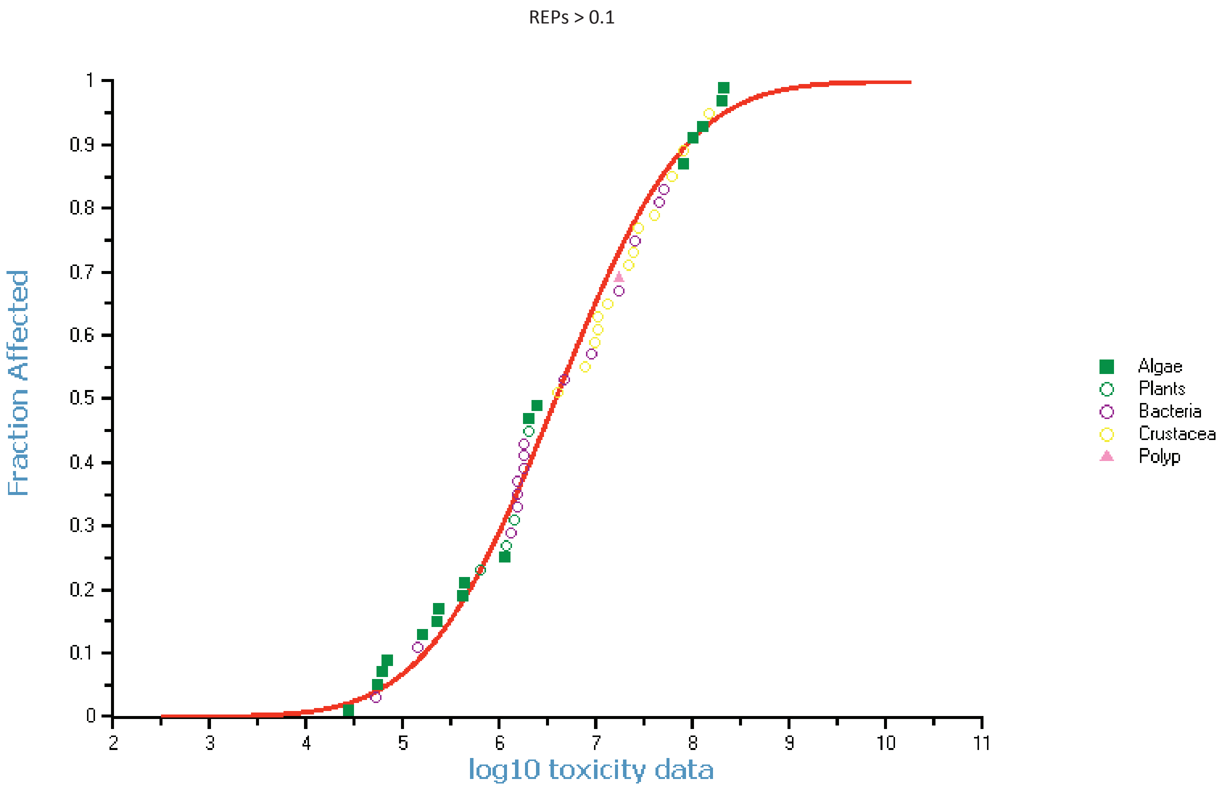
REPs > 0.1



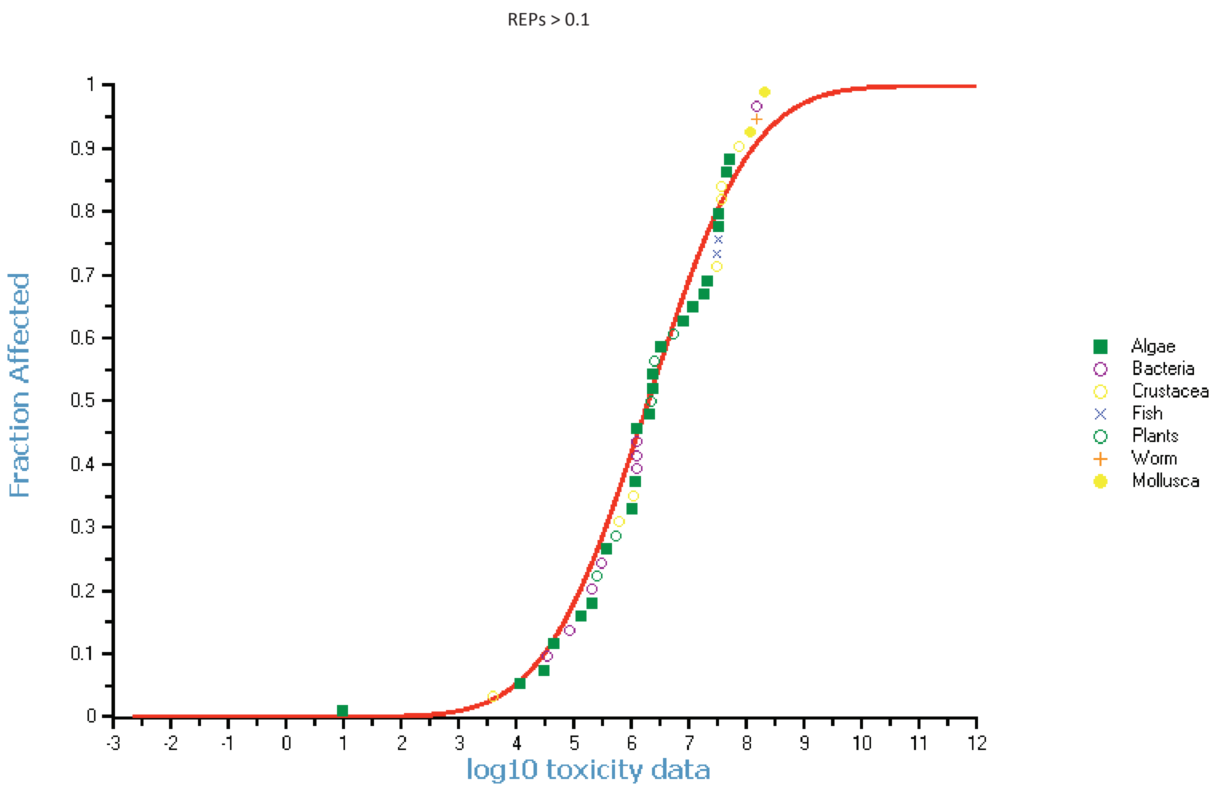
I.2 TETRACYCLINES (NG OEQ/L)



I.3 AMINOGLYCOSIDES (NG NEQ/L)



I.4 SULFONAMIDES (NG SEQ/L)



FOUNDATION FOR APPLIED WATER RESEARCH STOWA

STOWA (Acronym for Foundation for Applied Water Research) is the knowledge centre of the regional water managers (mostly the Dutch Water Authorities) in the Netherlands. Its mission is to develop, collect, distribute and implement applied knowledge, which the water managers need in order to adequately carry out the tasks that their work supports. This expertise can cover applied technical, scientific, administrative-legal or social science fields.

STOWA is a highly demand-driven operation. We carefully take stock of the knowledge requirements of the Water Authorities and ensure that these are placed with the correct knowledge providers. The initiative for this mainly lies with the users of this knowledge, the water managers, but sometimes also with knowledge institutes and business and industry. This two-way flow of knowledge promotes modernisation and innovation.

Demand-driven operation also means that we are constantly looking for the 'knowledge requirements of tomorrow' – requirements that we dearly want to put on the agenda before they become an issue – in order to ensure that we are optimally prepared for the future.

We ease the burden of the water managers by assuming the tasks of placing the invitation to tender and supervising the joint knowledge projects. STOWA ensures that water managers remain linked to these projects and also retain 'ownership' of them. In this way, we make sure that the correct knowledge requirements are met. The projects are supervised by committees, which also comprise regional water managers. The broad research lines are spread out per field of practice and accounted for by special programme committees. The water managers also have representatives on these committees.

STOWA is not only a link between the users of knowledge and knowledge providers, but also between the regional water managers. The collaboration of the water managers within STOWA ensures they are jointly responsible for the programming, that they set the course, that several Water Authorities are involved with one and the same project and that the results quickly benefit all Water Boards.

MISSION STATEMENT:

STOWA's fundamental principles are set out in our mission: Defining the knowledge needs in the field of water management and developing, collecting, making available, sharing, strengthening and implementing the required knowledge or arranging for this together with regional water managers.