

Methodology for determining Exceedence values from the EPA AQUIRE dataset

Methodology for Determining Acute Exceedences

The entire set of studies for a particular chemical from the U.S. EPA AQUIRE database were used as the starting dataset. Studies were included in the average calculation if they met all of the following criteria:

- * The study endpoint was mortality, with the endpoint reported as an LC50.
NOTE: Since most phytoplankton studies use the EC50 as an endpoint, they are not included in the summary ratings.
- * Results were given in units that could be converted to ug/L
- * The study reported an average toxicity endpoint. Those studies reporting only a range were excluded at this time.

There are approximately 172,000 total studies reported in the U.S. EPA AQUIRE database. After the above criteria were applied, approximately 63,000 studies remained, from which the acute summary toxicity ratings were obtained.

For each chemical/species combination, the average LC50 value of all remaining studies was then calculated, along with the population standard deviation. The group of studies averaged together were for a single chemical/species combination and included:

- * all life stages
- * all study durations
- * all study types
- * studies of both the pure active ingredient (AI) and its formulations with inerts (the AQUIRE database excludes studies conducted on mixtures of AIs)
- * studies with any water quality parameters (pH, temperature, alkalinity, salinity, etc.)

The validity of this strategy of including studies with such a wide variety of conditions into a single average value was carefully considered. For most species, the variability of the study results under different study conditions was less than an order of magnitude. Elimination of outliers further reduced the variability of the data. Since a common approach for assessing impairment is to use the lowest study result that shows toxicity, an average value of a set of studies is a conservative benchmark for impairment.

Any LC50 value for a particular chemical/species combination that was more than two standard deviations from the mean value was flagged as an outlier, and a new mean was calculated excluding outliers to give the Average Species LC50. For those who wish to independently evaluate this assessment, the raw data used to calculate the Species Summary (including outlier status) is available from the PAN Pesticide Database website at www.pesticideinfo.org. AQUIRE data is accessible from each chemical detail page in the Ecotoxicity section.

To determine an "AQUIRE Acute exceedence" for a particular chemical the lowest average species LC50 value was used.

Methodology for Determining Chronic Exceedences

The entire set of studies for a particular chemical from the U.S. EPA AQUIRE database were used as the starting dataset. Studies were included in the average calculation if they met all of the following criteria:

- * The study endpoint was NOT mortality
- * All No Effect Level (NOEL) studies were excluded
- * Results were given in units that could be converted to ug/L
- * The study reported an average toxicity endpoint. Those studies reporting only a range were excluded at this time.

Each species was assigned to an organism group (e.g. fish, aquatic insect, phytoplankton, etc). Studies were then grouped by Chemical, Organism group, Effect and measurement endpoint. For each Chemical/Organism group/Effect/measurement endpoint combination, the average value of all studies was then calculated. The group of studies averaged together for each combination included:

- * all life stages
- * all study durations
- * all study types
- * studies of both the pure active ingredient (AI) and its formulations with inerts (the AQUIRE database excludes studies conducted on mixtures of AIs)
- * studies with any water quality parameters (pH, temperature, alkalinity, salinity, etc.)

The validity of this strategy of including studies with such a wide variety of conditions into a single average value was carefully considered. For most species, the variability of the study results under different study conditions was less than an order of magnitude. Since a common approach for assessing impairment is to use the lowest study result that shows toxicity, an average value of a set of studies is a conservative benchmark for impairment.

To determine an 'AQUIRE Chronic exceedence' for a particular chemical the lowest Chemical/Organism group/Effect/measurement endpoint combination was used.

Data source for ecotoxicity information

The source data set for aquatic ecotoxicity information is the U.S. Environmental Protection Agency AQUIRE Database, which is maintained by the U.S. EPA. This database contains over 170,000 records and is a compilation of individual studies conducted on the acute and chronic toxicity of selected pesticides to a variety of aquatic organisms. These data are drawn from a variety of sources, with peer-reviewed journal articles being the primary source.

The AQUIRE dataset only includes single-ingredient toxicity tests. In some cases, a 'single ingredient' might be a pesticide product with both active and "inert" ingredients. Not included in the AQUIRE dataset are in vitro toxicity tests or tests on pesticide mixtures containing more than one active ingredient. The AQUIRE dataset is the largest aquatic ecotoxicity dataset that we know of. Other datasets on ecotoxicity are maintained by the U.S. Geological survey (approximately 10,000 records) and the U.S. EPA Office of Pesticide Programs (OPP) (approximately 10,000 records). There is some overlap between these datasets, and the U.S. EPA-OPP data is being incorporated into the AQUIRE dataset.

The AQUIRE dataset included in the PAN Pesticide Database is U.S. EPA's July 25, 2000 release; U.S. EPA makes additions to the dataset approximately four times each year. We plan to update the PAN database with new AQUIRE information in mid-2001.

References:

1. U.S. EPA Ecotox web site (<http://www.epa.gov/ecotox>). Viewed on 3/13/2001.
2. U.S. EPA OPP web site (<http://www.epa.gov/opptintr/cbep/actlocal/ped.htm>). Viewed on 3/13/2001.

3. U.S. Geological Survey Ecotoxicity web site
(<http://www.cerc.usgs.gov/data/acute/acute.html>). Viewed on 3/13/2001.