

BACKGROUND

The administrative rule for Water Quality Standards in Hawaii (State WQS) dates to January 1968, when Chapter 37-A, Public Health Regulations, first became effective. These regulations were authorized under the Federal Water Pollution Control Act Amendments of 1965. After the enactment of the Federal Water Pollution Control Act Amendments of 1972, commonly known as the Clean Water Act (CWA), Hawaii made additional amendments to State WQS. Much of the existing content of State WQS is based on regulations from the 1968 and 1974 State WQS. Subsequent amendments to State WQS were adopted in 1979 to satisfy the CWA Section 208 Basin Plan requirements. Later amendments included site-specific standards for the Kona Coast on the west side of the island of Hawaii. Some phrases and terms from the first Federal Water Pollution Control Act of 1948 have been retained in the existing CWA and State WQS; for example, the current designated uses have remained basically unchanged since 1948.

In 1990, the Hawaii Department of Health (HDOH) amended State WQS to include numeric standards for toxic chemicals for the protection of beneficial uses of State surface waters by preventing direct impacts from toxic pollutants to aquatic life, and indirect impacts to human health and wildlife from the bioaccumulation of toxic pollutants in edible aquatic organisms. Prior to this amendment, regulations were limited due in part to the lack of numeric criteria or any specific limitations for toxic pollutants. Except for a few changes, the State WQS adopted in 1990 have remained relatively unchanged.

Under the CWA, a State is required to evaluate and adopt new or revised criteria for parameters for which the U.S. Environmental Protection Agency (EPA) has published new or updated CWA section 304(a) criteria recommendations. If a State does not adopt new or revised criteria for which EPA has published new or updated CWA section 304(a) criteria recommendations, then it must provide, to the Regional Administrator, an explanation when submitting the results of its triennial review. A State may modify the recommended criteria to reflect site-specific conditions. EPA must approve all new WQS adopted by a State before they can be used for CWA purposes.

In its previous revision to State WQS in 2014, HDOH adopted the recreational water quality criteria that were recommended by EPA in 2012. In this triennial review of State WQS, HDOH proposes to revise numeric standards of toxic chemicals for the protection of human health. At this time, HDOH does not propose to either revise or adopt in HAR 11-54 any aquatic life standards that are intended to protect freshwater and saltwater organisms from the effects of short-term and long-term exposure to toxic pollutants. Additional time is needed for HDOH to evaluate and to adopt any, new or revised, national acute and chronic criteria that are recommended by EPA.

RATIONALE

HDOH has conducted the required triennial review of State WQS specified in the Hawaii Administrative Rules, Title 11, Chapter 54 (HAR 11-54), and reviewed new and updated CWA section 304(a) recommended water quality criteria that were published by EPA since May 30, 2000. During this triennial review, HDOH proposes to adopt EPA recommended human health criteria that are based on the latest adjusted national fish consumption rate. These recommended human health criteria for toxic pollutants are necessary to protect any designated uses related to the ingestion of water and aquatic organisms. These uses can include, but are not limited to, recreation in and on the water, consumption of fish or shellfish, and the protection of drinking water supplies.

In 2015, EPA updated its national recommended water quality criteria for human health for ninety-four toxic pollutants. The EPA 2015 Final Updated Human Health Ambient Water Quality Criteria¹ contains the latest scientific information to determine the risk associated with the consumption of these ninety-four pollutants, including updated body weight, drinking water consumption rate, fish consumption rate, bioaccumulation factors, toxicity values, and relative source contributions. The latest water quality criteria for these toxic pollutants are incorporated into the current EPA “National Recommended Water Quality Criteria Table for the protection of Human Health”² or “Human Health Criteria Table” (as it is commonly called).

Water quality criteria developed under the CWA section 304(a) are based on data and scientific judgments on the relationship between pollutant concentrations and human health effects. The criteria recommended by EPA represent specific levels of pollutants or conditions in a water body that are not expected to cause adverse effects to human health. Adopting the updated section 304(a) criteria ensures that the WQS of a State reflect current science and protect applicable designated uses. New scientific risk information obtained since EPA last published its recommended criteria may lead to updated recommended criteria that may be more stringent or less stringent than the existing WQS of a State. HDOH proposes **to adopt EPA recommended ambient water quality criteria and to update State WQS for the protection of human health.**

First, HDOH proposes to adopt the recommended numeric criteria of the ninety-four pollutants that are listed in the 2015 Final Updated Human Health Ambient Water Quality Criteria. Of these ninety-four pollutants, fifty-six are already included in HAR 11-54 and thirty-eight are not. Second, HDOH proposes to adopt the recommended numeric criteria of sixteen additional pollutants that were updated by EPA prior to 2015. Of these sixteen additional pollutants, fourteen are already included in HAR 11-54 and two are not. Overall, HDOH proposes **to update existing standards for a total of seventy pollutants (i.e., fifty-six from 2015 plus fourteen before 2015), and to add recommended criteria for a total of forty pollutants (i.e., thirty-eight from 2015 plus two before 2015); all updated and added pollutants are listed in the current EPA Human Health Criteria Table.**

¹ <https://www.epa.gov/wqc/2015-epa-updated-ambient-water-quality-criteria-protection-human-health>

² <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table>

All criteria listed in the EPA current Human Health Criteria Table are single numeric values except for benzene. Specifically, the water quality criterion, recommended for benzene, is expressed as a numeric range of 16-58 micrograms per liter. This range reflects the use of two toxicity values in the equations for deriving the criteria values.³ These toxicity values are expressed as Cancer Slope Factors (CSF) for carcinogenic compounds and reflect the information obtained from EPA Integrated Risk Information System (IRIS). The CSF is used to assess the risk associated with exposure to a carcinogen and is represented by the 95% confidence limit on the increased risk of cancer from a lifetime of exposure to a carcinogenic chemical by ingestion.

For benzene, the CSF used to determine the recommended criteria is based on EPA 2000 IRIS assessment and is represented by a CSF range from 0.015 per mg/kg-day to 0.055 per mg/kg-day. Using the lower CSF in the calculation, the ambient water quality criteria for benzene is 58 micrograms per liter. Using the upper CSF, the criteria is calculated to be 16 micrograms per liter. HDOH proposes to use the more conservative calculation in which the upper CSF is used to provide a higher level of public health protection and proposes a numeric standard of 16 micrograms per liter for benzene in the protection of human health.

In addition to the above water quality criteria, HDOH proposes **to adopt the recommended fish tissue residue water quality criterion for methylmercury** as specified in EPA-823-R-01-001, *Water Quality Criterion for the Protection of Human Health: Methylmercury*, Final, January 2001. The methylmercury criterion specified by EPA is a fish (or shellfish) tissue residue water quality criterion rather than a water column-based water quality criterion. As such, HDOH proposes to adopt the fish tissue residue water quality standard that is expressed as milligrams of methylmercury per kilogram of fish rather than micrograms per liter of water. The proposed standard of 0.3 mg of methylmercury per kilogram of fish or shellfish is the first EPA-recommended criterion that specifies a tissue value rather than a water column value. The reasons for proposing a fish tissue-based criterion are 1) the representation of the dominant human exposure route for methylmercury, and 2) the integration of spatial and temporal complexities, that occur in aquatic systems and that affect bioaccumulation.

NUMERIC STANDARDS FOR TOXIC POLLUTANTS

In summary, there are seventy proposed updates to current fish consumption standards in HAR 11-54. There are forty proposed chemicals to be added: thirty-nine new chemicals and their respective water column criteria from the current EPA Human Health Criteria Table, plus methylmercury and the fish tissue criterion from EPA 2001 Recommended Water Quality Criterion for the Protection of Human Health from Methylmercury. As mentioned earlier, no revisions to aquatic life toxicity standards are proposed at this time.

For seventy chemicals currently specified in HAR 11-54, the table below shows the proposed revisions to the toxic chemical list in HAR 11-54-4(c)(3). Thirty-one of these seventy chemicals have names that need updating to be consistent with the ones listed in the current EPA Human Health Criteria Table. All chemical names and standards currently specified in HAR 11-54 are

³ <https://www.regulations.gov/document?D=EPA-HQ-OW-2014-0135-0165>

listed in italics. The abbreviation “*ns*” (shown in italics) means “no standards” in the current version of HAR 11-54. For thirty-one chemicals, the proposed new chemical names reflect the pollutant names in the current EPA Human Health Criteria Table. All proposed standards reflect the fish consumption criteria in the current EPA Human Health Criteria Table; all fish consumption standards are expressed in micrograms per liter ($\mu\text{g/L}$).

<i>Current chemical name</i> [Proposed new chemical name]	(Fish Consumption) <i>Current standard</i> ($\mu\text{g/L}$)	(Fish Consumption) Proposed standard ($\mu\text{g/L}$)
<i>Acenaphthene</i>	<i>ns</i>	90
<i>Acrolein</i>	250	400
<i>Acrylonitrile</i>	0.21	7.0
<i>Aldrin</i>	0.000026	0.00000077
<i>Antimony</i>	15,000	640 *
<i>Arsenic</i>	<i>ns</i>	0.14 *
<i>Benzene</i>	13	16
<i>Benzidine</i>	0.00017	0.011
<i>Carbon Tetrachloride</i>	2.3	5
<i>Chlordane</i>	0.00016	0.00032
<i>Chloroethers-ethyl(bis-2)</i> [Bis(2-Chloroethyl) Ether]	0.44	2.2
<i>Chloroethers-isopropyl)</i> [Bis(2-Chloro-1-Methylethyl) Ether]	1,400	4,000
<i>Chloroethers-methyl(bis)</i> [Bis(Chloromethyl) Ether]	0.00060	0.017
<i>Chloroform</i>	5.1	2,000
<i>Chlorophenol(2)</i> [2-Chlorophenol]	<i>ns</i>	800
<i>Cyanide</i>	<i>ns</i>	400

* Proposed standards are recommended criteria that were updated by EPA prior to 2015.

Current chemical name [Proposed new chemical name]	(Fish Consumption) Current standard (µg/L)	(Fish Consumption) Proposed standard (µg/L)
<i>DDT</i> [p,p'-Dichlorodiphenyltrichloroethane (DDT)]	0.000008	0.000030
<i>DDT metabolite TDE</i> [p,p'-Dichlorodiphenyldichloroethane (DDD)]	ns	0.00012
<i>Dichloro-benzidine</i> [3-3'-Dichlorobenzidine]	0.007	0.15
<i>Dichloro-ethane(1,2)</i> [1,2-Dichloroethane]	79	650
<i>Dichloro-phenol(2,4)</i> [2,4-Dichlorophenol]	ns	60
<i>Dichloro-propene(1,3)</i> [1,3-Dichloropropene]	4.6	12
<i>Dieldrin</i>	0.000025	0.0000012
<i>Dinitro-o-cresol(4,6)</i> [2-Methyl-4,6-Dinitrophenol]	250	30
<i>Dioxin</i> [2,3,7,8-TCDD (Dioxin)]	5.0x10 ⁻⁹	5.1x10 ⁻⁹ *
<i>Diphenyl-hydrazine(1,2)</i> [1,2-Diphenylhydrazine]	0.018	0.2
<i>Endrin</i>	ns	0.03
<i>Ethylbenzene</i>	1,070	130
<i>Fluoranthene</i>	18	20
<i>Heptachlor</i>	0.00009	0.0000059
<i>Hexachlorobenzene</i>	0.00024	0.000079
<i>Hexachlorobutadiene</i>	16	0.01

* Proposed standards are recommended criteria that were updated by EPA prior to 2015.

Current chemical name [Proposed new chemical name]	(Fish Consumption) Current standard (µg/L)	(Fish Consumption) Proposed standard (µg/L)
<i>Hexachloro-cyclohexane-alpha</i> [alpha-Hexachlorocyclohexane (HCH)]	0.010	0.00039
<i>Hexachloro-cyclohexane-beta</i> [beta-Hexachlorocyclohexane (HCH)]	0.018	0.014
<i>Hexachlorocyclohexane (HCH)-Technical</i>	0.014	0.010
<i>Hexachlorocyclopentadiene</i>	ns	4
<i>Hexachloroethane</i>	2.9	0.1
<i>Isophorone</i>	170,000	1,800
<i>Lindane</i> [gamma-Hexachlorocyclohexane (HCH)]	0.020	4.4
<i>Methoxychlor</i>	ns	0.02
<i>Nickel</i>	33	4,600 *
<i>Nitrobenzene</i>	ns	600
<i>Nitrosamines</i>	0.41	1.24 *
<i>Nitrosodibutylamine-N</i> [Nitrosodibutylamine]	0.19	0.22 *
<i>Nitrosodiethylamine-N</i> [Nitrosodiethylamine]	0.41	1.24 *
<i>Nitrosodimethylamine-N</i> [N-Nitrosodimethylamine]	5.3	3.0 *
<i>Nitrosodiphenylamine-N</i> [N-Nitrosodiphenylamine]	5.3	6.0 *
<i>Nitrosopyrrolidine-N</i> [Nitrosopyrrolidine]	30	34 *
<i>Pentachlorobenzene</i>	28	0.1
<i>Pentachlorophenol</i>	ns	0.04
<i>Phenol</i>	ns	300,000
<i>Phenol 2,4-dimethyl</i> [2,4-Dimethylphenol]	ns	3,000

* Proposed standards are recommended criteria that were updated by EPA prior to 2015.

Current chemical name [Proposed new chemical name]	(Fish Consumption) Current standard (µg/L)	(Fish Consumption) Proposed standard (µg/L)
<i>Phthalate esters dibutyl</i> [Di-n-Butyl Phthalate]	50,000	30
<i>Phthalate esters diethyl</i> [Diethyl Phthalate]	590,000	600
<i>Phthalate esters di-2-ethylhexyl</i> [Bis(2-Ethylhexyl) Phthalate]	16,000	0.37
<i>Phthalate esters dimethyl</i> [Dimethyl Phthalate]	950,000	2,000
<i>Polychlorinated Biphenyls (PCBs)</i>	0.000079	0.000064 *
<i>Selenium</i>	ns	4,200 *
<i>Tetrachloro-benzene(1,2,4,5)</i> [1,2,4,5-Tetrachlorobenzene]	16	0.03
<i>Tetrachloro-ethane(1,1,2,2)</i> [1,1,2,2-Tetrachloroethane]	3.5	3
<i>Tetrachloroethylene</i>	2.9	29
<i>Thallium</i>	16	0.47 *
<i>Toluene</i>	140,000	520
<i>Toxaphene</i>	0.00024	0.00071
<i>Trichloro-ethane(1,1,1)</i> [1,1,1-Trichloroethane]	340,000	200,000
<i>Trichloro-ethane(1,1,2)</i> [1,1,2-Trichloroethane]	14	8.9
<i>Trichloroethylene</i>	26	7
<i>Trichloro-phenol(2,4,6)</i> [2,4,6-Trichlorophenol]	1.2	2.8
<i>Vinyl Chloride</i>	170	1.6
<i>Zinc</i>	ns	26,000 *

* Proposed standards are recommended criteria that were updated by EPA prior to 2015.

As shown in the above table, HDOH proposes to update the names of thirty-one toxic chemicals to reflect the names as listed in the current EPA Human Health Criteria Table. The updated names are synonyms of the same toxic chemicals. By adopting the naming convention used by

EPA, HDOH hopes to reduce ambiguity and potential confusion in the application of State WQS. HDOH also proposes to update the name of two chemicals, Pentachloroethanes and Tetrachlorophenol(2,3,5,6), which are not included in the current EPA Human Health Criteria Table. First, Pentachloroethane is incorrectly listed in the plural (i.e., Pentachloroethanes) to represent all isomers of this chemical when there is a single isomer. The name of this chemical in HAR 11-54 is updated to Pentachloroethane. Second, the chemical Tetrachlorophenol(2,3,5,6) does not follow the naming convention that the EPA uses for isomers. The name of this chemical in HAR 11-54 is updated to 2,3,5,6-Tetrachlorophenol.

For forty chemicals not currently specified in HAR 11-54, the table below shows the proposed additions to the toxic chemical list in HAR 11-54-4(c)(3). All proposed additions have no current fish consumption standards in HAR 11-54. The proposed new chemical names and standards reflect the pollutant names and fish consumption criteria in the current EPA Human Health Criteria Table. All proposed fish consumption standards are expressed in micrograms per liter ($\mu\text{g/L}$) except for methylmercury which is expressed in milligrams of methylmercury per kilogram of fish (mg/kg). As mentioned earlier, no aquatic life standards are updated for these proposed new chemicals at this time.

Proposed new chemical name	(Fish Consumption) No current standard ($\mu\text{g/L}$)	(Fish Consumption) Proposed new standard ($\mu\text{g/L}$ except Methylmercury +)
1,1-Dichloroethylene	<i>blank</i>	20,000
1,2,4-Trichlorobenzene	<i>blank</i>	0.076
1,2-Dichlorobenzene	<i>blank</i>	3,000
1,2-Dichloropropane	<i>blank</i>	31
1,3-Dichlorobenzene	<i>blank</i>	10
1,4-Dichlorobenzene	<i>blank</i>	900
2,4,5-Trichlorophenol	<i>blank</i>	600
2,4-Dinitrophenol	<i>blank</i>	300
2,4-Dinitrotoluene	<i>blank</i>	1.7
2-Chloronaphthalene	<i>blank</i>	1,000
3-Methyl-4-Chlorophenol	<i>blank</i>	2,000
alpha-Endosulfan	<i>blank</i>	30
Anthracene	<i>blank</i>	400
Benzo(a)anthracene	<i>blank</i>	0.0013
Benzo(a)pyrene	<i>blank</i>	0.00013
Benzo(b)fluoranthene	<i>blank</i>	0.0013
Benzo(k)fluoranthene	<i>blank</i>	0.013

Proposed new chemical name	(Fish Consumption) No current standard (µg/L)	(Fish Consumption) Proposed new standard (µg/L except Methylmercury +)
beta-Endosulfan	<i>blank</i>	40
Bromoform	<i>blank</i>	120
Butylbenzyl Phthalate	<i>blank</i>	0.10
Chlorobenzene	<i>blank</i>	800
Chlorodibromomethane	<i>blank</i>	21
Chlorophenoxy Herbicide (2,4-D)	<i>blank</i>	12,000
Chlorophenoxy Herbicide (2,4,5-TP) [Silvex]	<i>blank</i>	400
Chrysene	<i>blank</i>	0.13
Dibenzo(a,h)anthracene	<i>blank</i>	0.00013
Dichlorobromomethane	<i>blank</i>	27
Dinitrophenols	<i>blank</i>	1,000
Endosulfan Sulfate	<i>blank</i>	40
Endrin Aldehyde	<i>blank</i>	1
Fluorene	<i>blank</i>	70
Heptachlor Epoxide	<i>blank</i>	0.000032
Indeno(1,2,3-cd)pyrene	<i>blank</i>	0.0013
Methyl Bromide	<i>blank</i>	10,000
Methylene Chloride	<i>blank</i>	1,000
Methylmercury	<i>blank</i>	0.3 mg/kg fish (+) *
N-Nitrosodi-n-Propylamine	<i>blank</i>	0.51 *
p,p'-Dichlorodiphenyldichloroethylene (DDE)	<i>blank</i>	0.000018
Pyrene	<i>blank</i>	30
Trans-1,2-Dichloroethylene	<i>blank</i>	4,000

(+) As recommended by EPA, the standard for methylmercury is expressed as a fish (or shellfish) tissue residue water quality criterion rather than a water column-based water quality criterion.⁴

* Proposed new standards are recommended criteria that were updated by EPA prior to 2015.

⁴ <https://www.epa.gov/sites/production/files/2019-02/documents/wqc-final-methylmercury-factsheet-2001.pdf>

The current version of HAR 11-54 includes numeric standards for chemicals that are mixtures of isomers, and for chemicals that belong to the same class. Specifically, there are fish consumption standards in HAR 11-54 for the following four chemicals; the first three are mixtures of isomers and the fourth is a class of chemicals:

- 1) Dichlorobenzenes,
- 2) Dinitrotoluenes,
- 3) Endosulfan, and
- 4) Polynuclear Aromatic Hydrocarbons (PAHs).

As listed in the above table, the proposed additions to the toxic chemical list of HAR 11-54-4(c)(3) include fish consumption standards for isomers of dichlorobenzene, dinitrotoluene, and endosulfan, and specific PAH chemicals. Due to the addition of fish consumption standards for isomers of specific compounds or for chemicals from the PAH class of compounds, HDOH proposes **to remove the current fish consumption standards in HAR 11-54 for dichlorobenzenes, dinitrotoluenes, endosulfan, and PAHs.**

- 1) There are three isomers of dichlorobenzene. Since HDOH is proposing to add fish consumption standards for all three isomers (1,2-, 1,3-, and 1,4-) of dichlorobenzene, the current fish consumption standard in HAR 11-54 for dichlorobenzenes (i.e., mixtures of dichlorobenzene isomers) is removed.
- 2) There are six isomers of dinitrotoluene. According to the EPA Technical Fact Sheet on Dinitrotoluene (EPA 505-F-17-010 dated September 2017), the (2,4- and 2,6-) isomers of this chemical are the two major forms. Moreover, 2,4-dinitrotoluene makes up about 76.5% (i.e., more than three-quarters) of technical grade dinitrotoluene which is a mixture of all six isomers. Since HDOH is proposing to add the fish consumption standard for 2,4-dinitrotoluene, the current fish consumption standard in HAR 11-54 for dinitrotoluenes (i.e., mixtures of dinitrotoluene isomers) is removed.
- 3) There are two isomers of endosulfan. By convention, the total endosulfan residue level in samples is the sum of the (alpha- and beta-) isomers of endosulfan plus endosulfan sulfate (i.e., the major oxidation product of endosulfan). Since HDOH is proposing to add fish consumption standards for the (alpha- and beta-) isomers of endosulfan and also for endosulfan sulfate, the current fish consumption standard in HAR 11-54 for endosulfan (i.e., mixtures of endosulfan isomers) is removed.
- 4) There are over one-hundred PAH chemicals. Only three PAH chemicals (acenaphthene, fluoranthene, and naphthalene) are specified in HAR 11-54. There are fish consumption standards in HAR 11-54 for only one of these three PAH chemicals (fluoranthene) and also for PAHs (as a class of chemicals). Since HDOH is proposing to add or update fish consumption standards for specific PAH chemicals, the current fish consumption standard in HAR 11-54 for PAHs (as a class of chemicals) is removed. Overall, HDOH is proposing to add fish consumption standards for anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)-anthracene, fluorene, indeno(1,2,3-cd)pyrene, and pyrene, to update fish consumption standards for acenaphthene and fluoranthene, and to remove the fish consumption standard for PAHs. There is no fish consumption standard in HAR 11-54 for naphthalene. However, this PAH chemical remains specified in the proposed version of HAR 11-54

since there are existing aquatic life standards in the current version of HAR 11-54. As mentioned earlier, aquatic life standards are not updated at this time.

The table below summarizes the removal of four current fish consumption standards specified in HAR 11-54. The abbreviation “ns” means “no standards.” For PAHs, there are no aquatic life standards specified in HAR 11-54. ~~Strikethrough text~~ is used to denote that PAHs (as a class of chemicals) are removed entirely from HAR 11-54.

<i>Current chemical name</i>	(Fish Consumption) Current standard (µg/L)	(Fish Consumption) Proposed standard (µg/L)
<i>Dichlorobenzenes</i>	850	ns
<i>Dinitrotoluenes</i>	3.0	ns
<i>Endosulfan</i>	52	ns
<i>Polynuclear Aromatic Hydrocarbons (PAHs)</i>	0.01	ns

Current standards in HAR 11-54 include carcinogen indicators which are represented by an asterisk next to each applicable chemical. HDOH proposes to remove all * symbols next to applicable chemicals and to transfer these carcinogen indicators to a new “Carcinogen” data column. In this new data column, the X symbol is used to indicate a carcinogen. For each of the following seven chemicals, currently specified in HAR 11-54, the carcinogen indicator is added based on the carcinogenicity of 10⁻⁶ risk specified in the current EPA Human Health Criteria Table:

- 1) 1,2-Diphenylhydrazine, currently listed in HAR 11-54 as *Diphenyl-hydrazine(1,2)*,
- 2) 1,3-Dichloropropene, currently listed in HAR 11-54 as *Dichloro-propene(1,3)*,
- 3) Arsenic,
- 4) Bis(2-Ethylhexyl) Phthalate, currently listed in HAR 11-54 as *Phthalate esters di-2-ethylhexyl*,
- 5) Copper,
- 6) Isophorone, and
- 7) Pentachlorophenol.

For each of the following four chemicals, currently specified in HAR 11-54, the carcinogen indicator is removed based on no carcinogenicity risk specified in the current EPA Human Health Criteria Table:

- 1) Beryllium,
- 2) Chloroform,
- 3) Dichlorobenzenes, and
- 4) gamma-Hexachlorocyclohexane (HCH), currently listed in HAR 11-54 as *Lindane*.

Since each of the three isomers (1,2-, 1,3-, and 1,4-) of dichlorobenzene has no carcinogenicity risk specified in the current EPA Human Health Criteria Table, the carcinogen indicator is removed for Dichlorobenzenes.

Current standards in HAR 11-54 do not include Chemical Abstracts Service (CAS) numbers whereas recommended criteria from EPA include CAS numbers. A CAS number is a unique numerical identifier assigned, by the CAS organization, to a chemical substance described in the open scientific literature. There are clear advantages to the use of CAS numbers:

- Easy identification of chemicals by reducing any possible confusion due to the various synonyms and isomers that chemical compounds may have.
- Convenient search of databases for specific chemical information, including analytical detection methods.

For most chemicals, the corresponding CAS numbers are obtained from the current EPA National Recommended Water Quality Criteria Tables for the protection of Human Health⁵ and Aquatic Life.⁶ For naphthalene, the CAS number is obtained from EPA 2002 National Recommended Water Quality Criteria.⁷ For applicable chemicals, HDOH proposes to include CAS numbers in HAR 11-54. CAS numbers are not assigned to the following eleven chemicals:

- 1) 2,3,5,6-Tetrachlorophenol (updated name in proposed rule revisions to HAR 11-54),
- 2) Dichlorobenzenes,
- 3) Dichloropropanes,
- 4) Dinitrotoluenes,
- 5) Endosulfan,
- 6) Nitrophenols,
- 7) Nitrosamines (specified in the current EPA Human Health Criteria Table),
- 8) Pentachloroethane (updated name in proposed rule revisions to HAR 11-54),
- 9) Polychlorinated Biphenyls (specified in the current EPA Human Health Criteria Table),
- 10) Tetrachloroethanes, and
- 11) Tributyltin (specified in the current EPA Aquatic Life Criteria Table).

Nitrosamines, polychlorinated biphenyls, and tributyltin are currently listed in either the EPA Human Health Criteria Table or the EPA Aquatic Life Criteria Table without CAS numbers. The remaining eight chemicals (i.e., 2,3,5,6-tetrachlorophenol, dichlorobenzenes, dichloropropanes, dinitrotoluenes, endosulfan, nitrophenols, pentachloroethane, and tetrachloroethanes) are not currently listed in these two EPA Criteria Tables. However, these eight chemicals remain specified in the proposed version of HAR 11-54 since there are aquatic life standards in the current version of HAR 11-54. As mentioned earlier, aquatic life standards are not updated at this time, and they will be evaluated in subsequent triennial reviews.

⁵ <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table>

⁶ <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>

⁷ <https://www.epa.gov/sites/production/files/2018-12/documents/national-recommended-hh-criteria-2002.pdf>

For both carcinogen indicators and CAS numbers, the table below shows the proposed additions to the toxic chemical list in HAR 11-54-4(c)(3). The following algorithm is used to list the chemicals in this table:

- Chemicals are sorted alphabetically.
- Chemicals are sorted alphabetically by their actual names. For example, Chlorophenoxy Herbicide (2,4,5-TP), where TP is an acronym of trichlorophenoxy, is listed after the (2,4,6-) isomer of trichlorophenol.
- Chemicals with isomers are listed together. For example, Dichlorobenzenes (i.e., mixtures of isomers of dichlorobenzene) and the (1,2-, 1,3-, and 1,4-) isomers of dichlorobenzene are sequentially listed as a group.
- Isomers of a chemical, which is not specified in HAR 11-54, are listed “as if” this chemical is specified. For example, Trichlorophenols (i.e., mixtures of isomers of trichlorophenol) are not specified in HAR 11-54, and the (2,4,5- and 2,4,6-) isomers of trichlorophenol are sequentially listed after trichloroethylene.
- Chemicals, which are formed by adding or bonding atoms (such as carbon, hydrogen, oxygen, or methyl group) to a parent chemical, are listed together. For example, benzo(a)anthracene, which is formed by adding four carbon atoms to anthracene, and dibenzo(a,h)anthracene by adding eight carbon atoms are sequentially listed after anthracene.
- Chemicals formed by adding or bonding atoms to a parent chemical, which is not specified in HAR 11-54, are listed “as if” this chemical is specified. For example, chloromethyl is not specified in HAR 11-54, and Bis(Chloromethyl) Ether, which is formed from the bonding of an oxygen atom and two compounds of chloromethyl, is listed after chloroform.

A total of one hundred thirty-five chemicals are specified in this table. Of this total, thirty-one chemicals have proposed new names and forty chemicals are proposed additions. In this table, the proposed new names are listed in upright script and the current names are listed in italics.

Current chemical name or Proposed new chemical name	Carcinogen	Chemical Abstracts Service (CAS) #
<i>Acenaphthene</i>	-	83-32-9
<i>Acrolein</i>	-	107-02-8
<i>Acrylonitrile</i>	X	107-13-1
<i>Aldrin</i>	X	309-00-2
<i>Aluminum</i>	-	7429-90-5
Anthracene	-	120-12-7
Benzo(a)anthracene	X	56-55-3
Dibenzo(a,h)anthracene	X	53-70-3
<i>Antimony</i>	-	7440-36-0
<i>Arsenic</i>	X	7440-38-2
<i>Benzene</i>	X	71-43-2
<i>Benzidine</i>	X	92-87-5
<i>Beryllium</i>	-	7440-41-7
Bromoform	X	75-25-2
Butylbenzyl Phthalate	X	85-68-7
<i>Cadmium</i>	-	7440-43-9
<i>Carbon Tetrachloride</i>	X	56-23-5
<i>Chlordane</i>	X	57-74-9
<i>Chlorine</i>	-	7782-50-5
Chlorobenzene	-	108-90-7
Chlorodibromomethane	X	124-48-1
Bis(2-Chloroethyl) Ether	X	111-44-4
<i>Chloroform</i>	-	67-66-3
Bis(Chloromethyl) Ether	X	542-88-1
2-Chloronaphthalene	-	91-58-7
2-Chlorophenol	-	95-57-8
3-Methyl-4-Chlorophenol	-	59-50-7
<i>Chlorpyrifos</i>	-	2921-88-2
<i>Chromium (VI)</i>	-	18540-29-9
Chrysene	X	218-01-9
<i>Copper</i>	X	7440-50-8
<i>Cyanide</i>	-	57-12-5

<i>Current chemical name or Proposed new chemical name</i>	Carcinogen	Chemical Abstracts Service (CAS) #
<i>Demeton</i>	-	8065-48-3
Di-n-Butyl Phthalate	-	84-74-2
<i>Dichlorobenzenes *</i>	-	-
1,2-Dichlorobenzene	-	95-50-1
1,3-Dichlorobenzene	-	541-73-1
1,4-Dichlorobenzene	-	106-46-7
3,3'-Dichlorobenzidine	X	91-94-1
Dichlorobromomethane	X	75-27-4
p,p'-Dichlorodiphenyldichloroethane (DDD)	X	72-54-8
p,p'-Dichlorodiphenyldichloroethylene (DDE)	X	72-55-9
p,p'-Dichlorodiphenyltrichloroethane (DDT)	X	50-29-3
1,2-Dichloroethane	X	107-06-2
1,1-Dichloroethylene	-	75-35-4
Trans-1,2-Dichloroethylene	-	156-60-5
2,4-Dichlorophenol	-	120-83-2
Chlorophenoxy Herbicide (2,4-D)	-	94-75-7
<i>Dichloropropanes *</i>	-	-
1,2-Dichloropropane	X	78-87-5
1,3-Dichloropropene	X	542-75-6
<i>Dieldrin</i>	X	60-57-1
Diethyl Phthalate	-	84-66-2
Dimethyl Phthalate	-	131-11-3
2,4-Dimethylphenol	-	105-67-9
Dinitrophenols	-	25550-58-7
2,4-Dinitrophenol	-	51-28-5
2-Methyl-4,6-Dinitrophenol	-	534-52-1
<i>Dinitrotoluenes *</i>	X	-
2,4-Dinitrotoluene	X	121-14-2
1,2-Diphenylhydrazine	X	122-66-7

* Chemicals are not listed in current EPA Human Health and Aquatic Life Criteria Tables.

<i>Current chemical name or Proposed new chemical name</i>	Carcinogen	Chemical Abstracts Service (CAS) #
<i>Endosulfan</i> *	-	-
alpha-Endosulfan	-	959-98-8
beta-Endosulfan	-	33213-65-9
Endosulfan Sulfate	-	1031-07-8
<i>Endrin</i>	-	72-20-8
Endrin Aldehyde	-	7421-93-4
<i>Ethylbenzene</i>	-	100-41-4
Bis(2-Ethylhexyl) Phthalate	X	117-81-7
<i>Fluoranthene</i>	-	206-44-0
Benzo(b)fluoranthene	X	205-99-2
Benzo(k)fluoranthene	X	207-08-9
Fluorene	-	86-73-7
<i>Guthion</i>	-	86-50-0
<i>Heptachlor</i>	X	76-44-8
Heptachlor Epoxide	X	1024-57-3
<i>Hexachlorobenzene</i>	X	118-74-1
<i>Hexachlorobutadiene</i>	X	87-68-3
<i>Hexachlorocyclohexane (HCH)- Technical</i>	X	608-73-1
alpha-Hexachlorocyclohexane (HCH)	X	319-84-6
beta-Hexachlorocyclohexane (HCH)	X	319-85-7
gamma-Hexachlorocyclohexane (HCH) [Lindane]	-	58-89-9
<i>Hexachlorocyclopentadiene</i>	-	77-47-4
<i>Hexachloroethane</i>	X	67-72-1
<i>Isophorone</i>	X	78-59-1
<i>Lead</i>	-	7439-92-1

* Chemicals are not listed in current EPA Human Health and Aquatic Life Criteria Tables.

Current chemical name or Proposed new chemical name	Carcinogen	Chemical Abstracts Service (CAS) #
<i>Malathion</i>	-	121-75-5
<i>Mercury</i>	-	7439-97-6
<i>Methoxychlor</i>	-	72-43-5
Methyl Bromide	-	74-83-9
Methylene Chloride	X	75-09-2
Bis(2-Chloro-1-Methylethyl) Ether	-	108-60-1
Methylmercury	-	22967-92-6
<i>Mirex</i>	-	2385-85-5
<i>Naphthalene</i> *	-	91-20-3
<i>Nickel</i>	-	7440-02-0
<i>Nitrobenzene</i>	-	98-95-3
<i>Nitrophenols</i> *	X	-
<i>Nitrosamines</i>	X	-
Nitrosodibutylamine	X	924-16-3
Nitrosodiethylamine	X	55-18-5
N-Nitrosodimethylamine	X	62-75-9
N-Nitrosodiphenylamine	X	86-30-6
N-Nitrosodi-n-Propylamine	X	621-64-7
Nitrosopyrrolidine	X	930-55-2
<i>Parathion</i>	-	56-38-2
<i>Pentachlorobenzene</i>	-	608-93-5
Pentachloroethane *	-	-
<i>Pentachlorophenol</i>	X	87-86-5
<i>Phenol</i>	-	108-95-2
<i>Polychlorinated Biphenyls (PCBs)</i>	X	-
Pyrene	-	129-00-0
Benzo(a)pyrene	X	50-32-8
Indeno(1,2,3-cd)pyrene	X	193-39-5
<i>Selenium</i>	-	7782-49-2
<i>Silver</i>	-	7440-22-4

* Chemicals are not listed in the current EPA Human Health and Aquatic Life Criteria Tables.

<i>Current chemical name or Proposed new chemical name</i>	Carcinogen	Chemical Abstracts Service (CAS) #
1,2,4,5-Tetrachlorobenzene	-	95-94-3
2,3,7,8-TCDD (Dioxin)	X	1746-01-6
<i>Tetrachloroethanes</i> *	-	-
1,1,2,2-Tetrachloroethane	X	79-34-5
<i>Tetrachloroethylene</i>	X	127-18-4
2,3,5,6-Tetrachlorophenol *	-	-
<i>Thallium</i>	-	7440-28-0
<i>Toluene</i>	-	108-88-3
<i>Toxaphene</i>	X	8001-35-2
<i>Tributyltin (TBT)</i>	-	-
1,2,4-Trichlorobenzene	X	120-82-1
1,1,1-Trichloroethane	-	71-55-6
1,1,2-Trichloroethane	X	79-00-5
<i>Trichloroethylene</i>	X	79-01-6
2,4,5-Trichlorophenol	-	95-95-4
2,4,6-Trichlorophenol	X	88-06-2
Chlorophenoxy Herbicide (2,4,5-TP) [Silvex]	-	93-72-1
<i>Vinyl Chloride</i>	X	75-01-4
<i>Zinc</i>	-	7440-66-6

* Chemicals are not listed in the current EPA Human Health and Aquatic Life Criteria Tables.

Finally, HDOH proposes to move the amended toxicity table from sub-section HAR 11-54-4(c) to a newly created Appendix E of HAR 11-54 in order to accommodate the landscape format of this amended table. This new toxicity table includes both current standards from HAR 11-54 and new criteria recommended by EPA. A total of one hundred thirty-five chemicals are listed in Appendix E dated **Month DD, 2021**, entitled “Numeric Standards for Toxic Pollutants Applicable to All Waters.” This placeholder (i.e., Month DD, 2021) for the actual date will be appropriately modified to reflect the next compilation date of all proposed amendments to the current version of HAR 11-54.

The following major amendments are proposed for section HAR 11-54-4. Along with these major amendments, minor amendments are also proposed to add missing punctuation marks, to correct miscellaneous formatting and typographical errors, to spell out numbers, to convert "State" in "State waters" to lower case, to replace "U.S. Environmental Agency" with the acronym "EPA" and "per cent" with "percent" for consistency, to clarify unclear specifications, to update incorrect references, and to hyphenate two or more words that are used together as compound adjectives.

§11-54-4 Basic water quality criteria applicable to all waters.

- (a) All waters shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including:
- (1) Materials that will settle to form objectionable sludge or bottom deposits;
 - (2) Floating debris, oil, grease, scum, or other floating materials;
 - (3) Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to produce objectionable color, [~~turbidity~~]turbidity, or other conditions in the receiving waters;
 - (4) High or low temperatures, biocides, pathogenic organisms, toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water;
 - (5) Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life; and
 - (6) Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works; highways; subdivisions; recreational, commercial, or

industrial developments; or the cultivation and management of agricultural lands.

(b) The director is authorized to impose by order the penalties and fines and corrective measures as specified in chapters 342D and 342E, HRS, against any person who discharges or otherwise causes or allows water pollutants to enter [State]state waters and cause violation of this chapter, unless that person acted in compliance with a permit or variance issued by the director pursuant to [chapters]chapter 342D, HRS, for that person's discharges. Each day that the person has caused each water quality standard not to be met shall constitute a separate offense.

(c) To ensure compliance with [paragraph (a) (4)]section 11-54-4(a) (4), all [State]state waters are subject to monitoring and to the following standards for acute and chronic toxicity and the protection of human health.

(1) As used in this section:

"Acute Toxicity" means the degree to which a pollutant, discharge, or water sample causes a rapid adverse impact to aquatic organisms. The acute toxicity of a discharge or receiving water is measured using the methods in section 11-54-10, unless other methods are specified by the director.

"Chronic Toxicity" means the degree to which a pollutant, discharge, or water sample causes a long-term adverse impact to aquatic organisms, such as a reduction in growth or reproduction. The chronic toxicity of a discharge or receiving water is measured using the methods in section 11-54-10, unless other methods are specified by the director.

"Dilution" means, for discharges through submerged outfalls, the average and minimum values calculated using the models in the EPA publication, Initial Mixing Characteristics of Municipal Ocean

Discharges (EPA/600/3-85/073, November, 1985), or in the EPA publication, Expert System for Hydrodynamic Mixing Zone Analysis of Conventional and Toxic Submerged Single Port Discharges (Cormix 1) (EPA/600/3-90/012), February, 1990.

"In-Stream Waste Concentration" (IWC) means the concentration of a toxicant in the receiving water, or for a discharge, the concentration of the effluent after minimum dilution authorized by the department. A discharge of one hundred divided by the minimum dilution is the IWC when the dilution is authorized by the director. A discharge of one hundred ~~[per cent]~~percent effluent is the IWC when dilution is not authorized by the director.

"No Observed Effect Concentration" (NOEC), means the highest ~~[per cent]~~percent concentration of a discharge or water sample, in dilution water, which causes no observable adverse effect in a chronic toxicity test. For example, ~~[an]~~a NOEC of ~~[100 per cent]~~one hundred percent indicates that an undiluted discharge or water sample causes no observable adverse effect to the organisms in a chronic toxicity test.

"Test of Significant Toxicity" (TST) means the alternative statistical method for analyzing and interpreting valid whole effluent toxicity test data as described in the EPA publications, National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document, EPA 833-R-10-003 (June 2010), and National Pollutant Discharge Elimination System Test of Significant Toxicity Technical Document, EPA 833-R-10-004 (June 2010).

- (2) Narrative toxicity and human health standards.

- (A) Acute Toxicity Standards: All [State]state waters shall be free from pollutants in concentrations which exceed the acute standards listed in [~~paragraph (3)~~]Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter. All [State]state waters shall also be free from acute toxicity as measured using the toxicity tests listed in section 11-54-10, or other methods specified by the director.
- (B) Chronic Toxicity Standards: All [State]state waters shall be free from pollutants in concentrations which on average during any [~~twenty-four~~] twenty-four-hour period exceed the chronic standards listed in [~~paragraph (3)~~]Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter. All [State]state waters shall also be free from chronic toxicity as measured using the toxicity tests listed in section 11-54-10, or other methods specified by the director.
- (C) Human Health Standards: All [State]state waters shall be free from pollutants in concentrations which, on average during any [~~thirty~~]thirty-day period, exceed the "fish consumption" standards for non-carcinogens in [~~paragraph (3)~~]Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter. All [State]state waters shall also be free from pollutants in concentrations, which on average during

any [12] twelve-month period, exceed the "fish consumption" standards for pollutants identified as carcinogens in [paragraph (3)] Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter.

[(3) Numeric standards for toxic pollutants applicable to all waters. The freshwater standards apply where the dissolved inorganic ion concentration is less than 0.5 parts per thousand; saltwater standards apply above 0.5 parts per thousand. Values for metals refer to the dissolved fraction. All values are expressed in micrograms per liter.

Pollutant	Freshwater		Saltwater		Fish Consumption
	Acute	Chronic	Acute	Chronic	
Acenaphthene	570	ns	320	ns	ns
Acrolein	23	ns	18	ns	250
Acrylonitrile*	2,500	ns	ns	ns	0.21
Aldrin*	3.0	ns	1.3	ns	0.000026
Aluminum	750	260	ns	ns	ns
Antimony	3,000	ns	ns	ns	15,000
Arsenic	360	190	69	36	ns
Benzene*	1,800	ns	1,700	ns	13
Benzidine*	800	ns	ns	ns	0.00017
Beryllium*	43	ns	ns	ns	0.038

Pollutant	Freshwater		Saltwater		Fish Consumption
	Acute	Chronic	Acute	Chronic	
Cadmium	3+	3+	43	9.3	ns
Carbon tetra- chloride*	12,000	ns	16,000	ns	2.3
Chlordane*	2.4	0.0043	0.09	0.004	0.00016
Chlorine	19	11	13	7.5	ns
Chloroethers-					
ethyl (bis-2)*	ns	ns	ns	ns	0.44
isopropyl	ns	ns	ns	ns	1,400
methyl (bis)*	ns	ns	ns	ns	0.00060
Chloroform*	9,600	ns	ns	ns	5.1
Chlorophenol (2)	1,400	ns	ns	ns	ns
Chlorpyrifos	0.083	0.041	0.011	0.0056	ns
Chromium (VI)	16	11	1,100	50	ns
Copper	6+	6+	2.9	2.9	ns
Cyanide	22	5.2	1	1	ns
DDT*	1.1	0.001	0.013	0.001	0.000008
metabolite TDE*	0.03	ns	1.2	ns	ns
Demeton	ns	0.1	ns	0.1	ns
Dichloro-					
benzenes*	370	ns	660	ns	850
benzidine*	ns	ns	ns	ns	0,007
ethane (1,2)*	39,000	ns	38,000	ns	79
phenol (2,4)	670	ns	ns	ns	ns
propanes	7,700	ns	3,400	ns	ns
propene (1,3)	2,000	ns	260	ns	4.6

Pollutant	Freshwater		Saltwater		Fish
	Acute	Chronic	Acute	Chronic	Consumption
Dieldrin*	2.5	0.0019	0.71	0.0019	0.000025
Dinitro					
o-cresol (4,6)	ns	ns	ns	ns	250
toluenes*	110	ns	200	ns	3.0
Dioxin*	0.003	ns	ns	ns	5.0x10 ⁻⁹
Diphenyl-					
hydrazine (1,2)	ns	ns	ns	ns	0.018
Endosulfan	0.22	0.056	0.034	0.0087	52
Endrin	0.18	0.0023	0.037	0.0023	ns
Ethylbenzene	11,000	ns	140	ns	1,070
Fluoranthene	1,300	ns	13	ns	18
Guthion	ns	0.01	ns	0.01	ns
Heptachlor*	0.52	0.0038	0.053	0.0036	0.00009
Hexachloro-					
benzene*	ns	ns	ns	ns	0.00024
butadiene*	30	ns	11	ns	16
cyclohexane-					
alpha*	ns	ns	ns	ns	0.010
beta*	ns	ns	ns	ns	0.018
technical*	ns	ns	ns	ns	0.014
cyclopentadiene	2	ns	2	ns	ns
ethane*	330	ns	310	ns	2.9
Isophorone	39,000	ns	4,300	ns	170,000
Lead	29+	29+	140	5.6	ns
Lindane*	2.0	0.08	0.16	ns	0.020

Pollutant	Freshwater		Saltwater		Fish
	Acute	Chronic	Acute	Chronic	Consumption
Malathion	ns	0.1	ns	0.1	ns
Mercury	2.4	0.55	2.1	0.025	0.047
Methoxychlor	ns	0.03	ns	0.03	ns
Mirex	ns	0.001	ns	0.001	ns
Naphthalene	770	ns	780	ns	ns
Nickel	5+	5+	75	8.3	33
Nitrobenzene	9,000	ns	2,200	ns	ns
Nitrophenols*	77	ns	1,600	ns	ns
Nitrosamines*	1,950	ns	ns	ns	0.41
Nitroso					
dibutylamine-N*	ns	ns	ns	ns	0.19
diethylamine-N*	ns	ns	ns	ns	0.41
dimethylamine-N*	ns	ns	ns	ns	5.3
diphenylamine-N*	ns	ns	ns	ns	5.3
pyrrolidine-N*	ns	ns	ns	ns	30
Parathion	0.065	0.013	ns	ns	ns
Pentachloro-					
ethanes	2,400	ns	130	ns	ns
benzene	ns	ns	ns	ns	28
phenol	20	13	13	ns	ns
Phenol	3,400	ns	170	ns	ns
2,4-dimethyl	700	ns	ns	ns	ns
Phthalate esters					
dibutyl	ns	ns	ns	ns	50,000
diethyl	ns	ns	ns	ns	590,000

Pollutant	Freshwater		Saltwater		Fish Consumption
	Acute	Chronic	Acute	Chronic	
di-2-ethylhexyl	ns	ns	ns	ns	16,000
dimethyl	ns	ns	ns	ns	950,000
Polychlorinated biphenyls*	2.0	0.014	10	0.03	0.000079
Polynuclear aromatic hydrocarbons*	ns	ns	ns	ns	0.01
Selenium	20	5	300	71	ns
Silver	1+	1+	2.3	ns	ns
Tetrachloroethanes	3,100	ns	ns	ns	ns
benzene (1,2,4,5)	ns	ns	ns	ns	16
ethane (1,1,2,2)*	ns	ns	3,000	ns	3.5
ethylene*	1,800	ns	3,400	145	2.9
phenol (2,3,5,6)	ns	ns	ns	440	ns
Thallium	470	ns	710	ns	16
Toluene	5,800	ns	2,100	ns	140,000
Toxaphene*	0.73	0.0002	0.21	0.0002	0.00024
Tributyltin	ns	0.026	ns	0.01	ns
Trichloroethane (1,1,1)	6,000	ns	10,400	ns	340,000
ethane (1,1,2)*	6,000	ns	ns	ns	14
ethylene*	15,000	ns	700	ns	26
phenol (2,4,6)*	ns	ns	ns	ns	1.2
Vinyl chloride*	ns	ns	ns	ns	170
Zinc	22+	22+	95	86	ns

ns - No standard has been developed.

* ~~Carcinogen.~~

+ ~~The value listed is the minimum standard. Depending upon the receiving water CaCO₃ hardness, higher standards may be calculated using the respective formula in the U.S. Environmental Protection Agency publication Quality Criteria for Water (EPA 440/5-86-001, Revised May 1, 1987).~~

Note ~~Compounds listed in the plural in the "Pollutant" column represent complex mixtures of isomers. Numbers listed to the right of these compounds refer to the total allowable concentration of any combination of isomers of the compound, not only to concentrations of individual isomers.]~~

- [~~(4)~~] (3) The following are basic requirements applicable to discharges to [~~State~~]state waters. These standards shall be enforced through effluent limitations or other conditions in discharge permits. The director may apply more stringent discharge requirements to any discharge if necessary to ensure compliance with all standards in [~~paragraph (2)~~] Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter.
- (A) Continuous discharges through submerged outfalls.
- (i) The No Observed Effect Concentration (NOEC), expressed as [~~per cent~~]percent effluent, of continuous discharges through submerged outfalls shall not be less than [~~100~~]one hundred divided by the minimum dilution; or,
- (ii) The Test of Significant Toxicity (TST), as described in EPA 833-R-10-003 (June 2010) and EPA 833-R-10-004 (June 2010), shall be used to demonstrate no unacceptable level of chronic toxicity at the In-stream Waste Concentration (IWC). The chronic toxicity criterion is expressed using a

- regulatory management decision (b value) of 0.75 for chronic toxicity where, a 0.25 effect level (or more) at the IWC demonstrates an unacceptable level of chronic toxicity.
- (B) Continuous discharges through submerged outfalls shall not contain:
- (i) Pollutants in [~~twenty-four~~] twenty-four-hour average concentrations greater than the values obtained by multiplying the minimum dilution by the standards [~~in paragraph (3) for the prevention of chronic toxicity]~~for the prevention of chronic toxicity in Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter.
 - (ii) Non-carcinogenic pollutants in [~~thirty~~] thirty-day average concentrations greater than the values obtained by multiplying the minimum dilution by the standards [~~in paragraph (3) for fish consumption]~~for fish consumption in Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter.
 - (iii) Carcinogenic pollutants in [~~twelve~~] twelve-month average concentrations greater than the values obtained by multiplying the average dilution by the standards [~~in paragraph (3) for fish consumption]~~for fish consumption in Appendix E dated Month DD,

2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter.

- (C) Discharges without submerged outfalls.
- (i) The survival of test organisms in an undiluted acute toxicity test of any discharge shall not be less than eighty [~~per cent~~]percent;
 - (ii) Compliance with the acute toxicity NPDES effluent limit is demonstrated by using the Test of Significant Toxicity (TST) as described in EPA 833-R-10-003 (June 2010) and EPA 833-R-10-004 (June 2010). The acute toxicity criterion is expressed using a regulatory management decision (b value) of 0.80 for acute toxicity test methods listed in 11-54-10, where, in an undiluted acute toxicity test, a 0.20 effect level (or more) at the IWC demonstrates an unacceptable level of acute toxicity; or,
 - (iii) The Test of Significant Toxicity (TST), as described in EPA 833-R-10-003 (June 2010) and EPA 833-R-10-004 (June 2010), shall be used to demonstrate no unacceptable level of chronic toxicity at the IWC. The chronic toxicity criterion is expressed using a regulatory management decision (b value) of 0.75 for chronic toxicity where, a 0.25 effect level (or more) at the IWC demonstrates an unacceptable level of chronic toxicity. Toxicity is considered significant if the mean response in the IWC is greater

than 0.75 multiplied by the mean response of the control.

No discharge shall contain pollutants in concentrations greater than the standards ~~[in paragraph (3) for the prevention of acute toxicity to aquatic life]~~ for the prevention of acute toxicity to aquatic life in Appendix E dated Month DD, 2021, entitled "Numeric Standards for Toxic Pollutants Applicable to All Waters", located at the end of this chapter. The director may make a limited allowance for dilution for a discharge in this category if it meets the following criteria: the discharge velocity is greater than ~~[3]~~ three meters per second; the discharge enters the receiving water horizontally, and; the receiving water depth at the discharge point is greater than zero.

(d) The requirements of ~~[paragraph (a) (6)]~~ section 11-54-4(a) (6) shall be deemed met upon a showing that:

(1) ~~[the]~~ The land on which the erosion occurred or is occurring is being managed in accordance with soil conservation practices acceptable to the applicable soil and water conservation district and the director, and ~~[that]~~ a comprehensive conservation program is being actively pursued~~[7]~~; or ~~[that]~~

(2) ~~[the]~~ The discharge has received the best degree of treatment or control, and ~~[that]~~ the severity of impact of the residual soil reaching the receiving body of water is deemed to be acceptable.

(e) In order to reduce a risk to public health or safety arising out of any violation or probable violation of this chapter, the director may post or order posted any ~~[State]~~ state waters. Posting is the placement, erection, or use of a sign or signs warning people to stay out of, avoid drinking, avoid contact with, or avoid using the water. This posting authority shall not limit the director's authority to

post or order posting in any other appropriate case or to take any enforcement action.

(f) Pesticide Application.

(1) As used in this section:

"Declared pest emergency situation" means an event defined by a public declaration by the President of the United States, state governor or, with the concurrence of the director, county mayor of a pest problem determined to require control through application of a pesticide beginning less than ten days after identification of the need for pest control.

"Pest" means [any]

(A) Any insect, rodent, nematode, fungus, weed[7]; or

~~[(A)]~~ (B) Any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except viruses, bacteria, or other micro-organisms on or in living man or other living animals) which the Administrator of the EPA declares to be a pest under 7 U.S.C. [~~§136w(e)(1)~~] section 136w(c)(1).

"Pesticide" means

(A) Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest;

(B) Any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant; and

(C) Any nitrogen stabilizer[7].

~~[except]~~ Except that the term "pesticide" shall not include any article that is a "new animal drug" within the meaning of 21 U.S.C. [~~321(w)~~] section 321(v), that has been determined by the Secretary of Health and Human Services not to be a new animal drug by a regulation establishing conditions of use for the article, or that is an animal

feed within the meaning of 21 U.S.C.

~~[321(x)]~~ section 321(w) bearing or containing a new animal drug.

The term "pesticide" does not include liquid chemical sterilant products (including any sterilant or subordinate disinfectant claims on such products) for use on a critical device or a semi-critical device, as defined in ~~[section 201 of]~~ 21 U.S.C. ~~[§321]~~ section 321. For purposes of the preceding sentence, the term "critical device" includes any device which is introduced directly into the human body, either into or in contact with the bloodstream or normally sterile areas of the body and the term "semi-critical device" includes any device which contacts intact mucous membranes but which does not ordinarily penetrate the blood barrier or otherwise enter normally sterile areas of the body. The term "pesticide" applies to insecticides, herbicides, fungicides, rodenticides, and various other substances used to control pests. The definition encompasses all uses of pesticides authorized under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) including uses authorized under 7 U.S.C. sections ~~[3]~~ 136a (~~[registration]~~ Registration of pesticides), ~~[5]~~ 136c (~~[experimental]~~ Experimental use permits), ~~[18]~~ 136p (~~[emergency exemptions]~~ Exemption of Federal and State agencies), ~~[24(e)]~~ 136v(c) (~~[special local needs registrations]~~ Additional uses), and ~~[25(b)]~~ 136w(b) (~~[exemptions from FIFRA]~~ Exemption of pesticides).

Note: drugs used to control diseases of humans or animals (such as livestock, fishstock and pets) are not considered pesticides; such drugs are regulated by the Food and Drug Administration. Fertilizers,

nutrients, and other substances used to promote plant survival and health are not considered plant growth regulators and thus are not pesticides. Biological control agents, except for certain microorganisms, are exempted from regulation under FIFRA. (Biological control agents include beneficial predators such as birds or ladybugs that eat insect pests, parasitic wasps, fish, etc.).

- (2) Pesticide applications may be made to ~~[State]~~state waters if the pesticide applications are:
- (A) Registered by the ~~[U.S. Environmental Protection Agency]~~EPA and licensed by the state department of agriculture or other state agency regulating pesticides;
 - (B) Used for the purpose of controlling mosquito and other flying insect pests; controlling weed and algae pests; controlling animal pests; controlling forest canopy pests; or protecting public health or the environment in a declared pest emergency situation or as determined by the director;
 - (C) Applied in a manner consistent with the labeling of the pesticide under FIFRA;
 - (D) Applied under permits required by the director and issued pursuant to [HRS] chapter 342D, [if the director requires such permits under chapter 342D,]HRS; and
 - (E) Applied in a manner so applicable narrative and numeric state water quality criteria as required in chapter 11-54 are met. [Eff 11/12/82; am and comp 10/6/84; am and comp 04/14/88; am and comp 01/18/90; am and comp 10/29/92; am and comp 04/17/00; am and comp 10/2/04; am and comp 06/15/09; am

and comp 10/21/12; am and comp 12/6/13;
am and comp 11/15/14; am and comp
] (Auth: HRS §§342D-1,
342D-4, 342D-5, Ch. 342E) (Imp: HRS
§§342D-4, 342D-5, Ch. 342E)

See the attached “HAR 11-54 Appendix E (20202.05.04)” PDF file for the proposed additional Appendix E of HAR 11-54. Note that the proposed Appendix E is in landscape format and it is four-page long.

Appendix E
Month DD, 2021

Numeric Standards for Toxic Pollutants Applicable to All Waters

The freshwater standards apply where the dissolved inorganic ion concentration is less than 0.5 parts per thousand; saltwater standards apply above 0.5 parts per thousand. Values for metals refer to the dissolved fraction. Except for Methylmercury, all values are expressed in micrograms per liter.

Pollutant Name	Carcinogen	Chemical Abstracts Service (CAS) #	Freshwater (µg/L)		Saltwater (µg/L)		Fish Consumption (µg/L) (except Methylmercury *)
			Acute	Chronic	Acute	Chronic	
Acenaphthene	=	83-32-9	570	ns	320	ns	90
Acrolein	=	107-02-8	23	ns	18	ns	400
Acrylonitrile	X	107-13-1	2,500	ns	ns	ns	7.0
Aldrin	X	309-00-2	3.0	ns	1.3	ns	0.00000077
Aluminum	=	7429-90-5	750	260	ns	ns	ns
Anthracene	=	120-12-7	ns	ns	ns	ns	400
Benzo(a)anthracene	X	56-55-3	ns	ns	ns	ns	0.0013
Dibenzo(a,h)anthracene	X	53-70-3	ns	ns	ns	ns	0.00013
Antimony	=	7440-36-0	3,000	ns	ns	ns	640
Arsenic	X	7440-38-2	360	190	69	36	0.14
Benzene	X	71-43-2	1,800	ns	1,700	ns	16
Benzidine	X	92-87-5	800	ns	ns	ns	0.011
Beryllium	=	7440-41-7	43	ns	ns	ns	0.038
Bromoform	X	75-25-2	ns	ns	ns	ns	120
Butylbenzyl Phthalate	X	85-68-7	ns	ns	ns	ns	0.10
Cadmium	=	7440-43-9	3+	3+	43	9.3	ns
Carbon Tetrachloride	X	56-23-5	12,000	ns	16,000	ns	5
Chlordane	X	57-74-9	2.4	0.0043	0.09	0.004	0.00032
Chlorine	=	7782-50-5	19	11	13	7.5	ns
Chlorobenzene	=	108-90-7	ns	ns	ns	ns	800
Chlorodibromomethane	X	124-48-1	ns	ns	ns	ns	21
Bis(2-Chloroethyl) Ether	X	111-44-4	ns	ns	ns	ns	2.2
Chloroform	=	67-66-3	9,600	ns	ns	ns	2,000
Bis(Chloromethyl) Ether	X	542-88-1	ns	ns	ns	ns	0.017
2-Chloronaphthalene	=	91-58-7	ns	ns	ns	ns	1,000
2-Chlorophenol	=	95-57-8	1,400	ns	ns	ns	800
3-Methyl-4-Chlorophenol	=	59-50-7	ns	ns	ns	ns	2,000
Chlorpyrifos	=	2921-88-2	0.083	0.041	0.011	0.0056	ns
Chromium (VI)	=	18540-29-9	16	11	1,100	50	ns
Chrysene	X	218-01-9	ns	ns	ns	ns	0.13
Copper	X	7440-50-8	6+	6+	2.9	2.9	ns
Cyanide	=	57-12-5	22	5.2	1	1	400

Pollutant Name	Carcinogen	Chemical Abstracts Service (CAS) #	Freshwater (ug/L)		Saltwater (ug/L)		Fish Consumption (ug/L) (except Methylmercury *)
			Acute	Chronic	Acute	Chronic	
Demeton	=	8065-48-3	ns	0.1	ns	0.1	ns
Di-n-Butyl Phthalate	=	84-74-2	ns	ns	ns	ns	30
Dichlorobenzenes	=	=	370	ns	660	ns	ns
1,2-Dichlorobenzene	=	95-50-1	ns	ns	ns	ns	3,000
1,3-Dichlorobenzene	=	541-73-1	ns	ns	ns	ns	10
1,4-Dichlorobenzene	=	106-46-7	ns	ns	ns	ns	900
3,3'-Dichlorobenzidine	X	91-94-1	ns	ns	ns	ns	0.15
Dichlorobromomethane	X	75-27-4	ns	ns	ns	ns	27
p,p'-Dichlorodiphenyldichloroethane (DDD)	X	72-54-8	0.03	ns	1.2	ns	0.00012
p,p'-Dichlorodiphenyldichloroethylene (DDE)	X	72-55-9	ns	ns	ns	ns	0.000018
p,p'-Dichlorodiphenyltrichloroethane (DDT)	X	50-29-3	1.1	0.001	0.013	0.001	0.000030
1,2-Dichloroethane	X	107-06-2	39,000	ns	38,000	ns	650
1,1-Dichloroethylene	=	75-35-4	ns	ns	ns	ns	20,000
Trans-1,2-Dichloroethylene	=	156-60-5	ns	ns	ns	ns	4,000
2,4-Dichlorophenol	=	120-83-2	670	ns	ns	ns	60
Chlorophenoxy Herbicide (2,4-D)	=	94-75-7	ns	ns	ns	ns	12,000
Dichloropropanes	=	=	7,700	ns	3,400	ns	ns
1,2-Dichloropropane	X	78-87-5	ns	ns	ns	ns	31
1,3-Dichloropropane	X	542-75-6	2,000	ns	260	ns	12
Dieldrin	X	60-57-1	2.5	0.0019	0.71	0.0019	0.000012
Diethyl Phthalate	=	84-66-2	ns	ns	ns	ns	600
Dimethyl Phthalate	=	131-11-3	ns	ns	ns	ns	2,000
2,4-Dimethylphenol	=	105-67-9	700	ns	ns	ns	3,000
Dinitrophenols	=	25550-58-7	ns	ns	ns	ns	1,000
2,4-Dinitrophenol	=	51-28-5	ns	ns	ns	ns	300
2-Methyl-4,6-Dinitrophenol	=	534-52-1	ns	ns	ns	ns	30
Dinitrotoluenes	X	=	110	ns	200	ns	ns
2,4-Dinitrotoluene	X	121-14-2	ns	ns	ns	ns	1.7
1,2-Diphenylhydrazine	X	122-66-7	ns	ns	ns	ns	0.2
Endosulfan	=	=	0.22	0.056	0.034	0.0087	ns
alpha-Endosulfan	=	959-98-8	ns	ns	ns	ns	30
beta-Endosulfan	=	33213-65-9	ns	ns	ns	ns	40
Endosulfan Sulfate	=	1031-07-8	ns	ns	ns	ns	40
Endrin	=	72-20-8	0.18	0.0023	0.037	0.0023	0.03
Endrin Aldehyde	=	7421-93-4	ns	ns	ns	ns	1
Ethylbenzene	=	100-41-4	11,000	ns	140	ns	130
Bis(2-Ethylhexyl) Phthalate	X	117-81-7	ns	ns	ns	ns	0.37
Fluoranthene	=	206-44-0	1,300	ns	13	ns	20
Benzo(b)fluoranthene	X	205-99-2	ns	ns	ns	ns	0.0013
Benzo(k)fluoranthene	X	207-08-9	ns	ns	ns	ns	0.013
Fluorene	=	86-73-7	ns	ns	ns	ns	70
Guthion	=	86-50-0	ns	0.01	ns	0.01	ns

Pollutant Name	Carcinogen	Chemical Abstracts Service (CAS) #	Freshwater (µg/L)		Saltwater (µg/L)		Fish Consumption (µg/L) (except Methylmercury *)
			Acute	Chronic	Acute	Chronic	
Heptachlor	X	76-44-8	0.52	0.0038	0.053	0.0036	0.0000059
Heptachlor Epoxide	X	1024-57-3	ns	ns	ns	ns	0.000032
Hexachlorobenzene	X	118-74-1	ns	ns	ns	ns	0.000079
Hexachlorobutadiene	X	87-68-3	30	ns	11	ns	0.01
Hexachlorocyclohexane (HCH)-Technical	X	608-73-1	ns	ns	ns	ns	0.010
alpha-Hexachlorocyclohexane (HCH)	X	319-84-6	ns	ns	ns	ns	0.00039
beta-Hexachlorocyclohexane (HCH)	X	319-85-7	ns	ns	ns	ns	0.014
gamma-Hexachlorocyclohexane (HCH) [Lindane]	-	58-89-9	2.0	0.08	0.16	ns	4.4
Hexachlorocyclopentadiene	-	77-47-4	2	ns	2	ns	4
Hexachloroethane	X	67-72-1	330	ns	310	ns	0.1
Isophorone	X	78-59-1	39,000	ns	4,300	ns	1,800
Lead	-	7439-92-1	29+	29+	140	5.6	ns
Malathion	-	121-75-5	ns	0.1	ns	0.1	ns
Mercury	-	7439-97-6	2.4	0.55	2.1	0.025	0.047
Methoxychlor	-	72-43-5	ns	0.03	ns	0.03	0.02
Methyl Bromide	-	74-83-9	ns	ns	ns	ns	10,000
Methylene Chloride	X	75-09-2	ns	ns	ns	ns	1,000
Bis(2-Chloro-1-Methylethyl) Ether	-	108-60-1	ns	ns	ns	ns	4,000
Methylmercury	-	22967-92-6	ns	ns	ns	ns	0.3 mg/kg *
Mirex	-	2385-85-5	ns	0.001	ns	0.001	ns
Naphthalene	-	91-20-3	770	ns	780	ns	ns
Nickel	-	7440-02-0	5+	5+	75	8.3	4,600
Nitrobenzene	-	98-95-3	9,000	ns	2,200	ns	600
Nitrophenols	X	=	77	ns	1,600	ns	ns
Nitrosamines	X	=	1,950	ns	ns	ns	1.24
Nitrosodibutylamine	X	924-16-3	ns	ns	ns	ns	0.22
Nitrosodiethylamine	X	55-18-5	ns	ns	ns	ns	1.24
N-Nitrosodimethylamine	X	62-75-9	ns	ns	ns	ns	3.0
N-Nitrosodiphenylamine	X	86-30-6	ns	ns	ns	ns	6.0
N-Nitrosodi-n-Propylamine	X	621-64-7	ns	ns	ns	ns	0.51
Nitrosopyrrolidine	X	930-55-2	ns	ns	ns	ns	34
Parathion	-	56-38-2	0.065	0.013	ns	ns	ns
Pentachlorobenzene	-	608-93-5	ns	ns	ns	ns	0.1
Pentachloroethane	-	=	2,400	ns	130	ns	ns
Pentachlorophenol	X	87-86-5	20	13	13	ns	0.04
Phenol	-	108-95-2	3,400	ns	170	ns	300,000
Polychlorinated Biphenyls (PCBs)	X	=	2.0	0.014	10	0.03	0.000064
Pyrene	-	129-00-0	ns	ns	ns	ns	30
Benzo(a)pyrene	X	50-32-8	ns	ns	ns	ns	0.00013
Indeno(1,2,3-cd)pyrene	X	193-39-5	ns	ns	ns	ns	0.0013
Selenium	-	7782-49-2	20	5	300	71	4,200
Silver	-	7440-22-4	1+	1+	2.3	ns	ns

Pollutant Name	Carcinogen	Chemical Abstracts Service (CAS) #	Freshwater (µg/L)		Saltwater (µg/L)		Fish Consumption (µg/L) (except Methylmercury *)
			Acute	Chronic	Acute	Chronic	
1,2,4,5-Tetrachlorobenzene	=	95-94-3	ns	ns	ns	ns	0.03
2,3,7,8-TCDD (Dioxin)	X	1746-01-6	0.003	ns	ns	ns	5.1 x 10 ⁻⁹
Tetrachloroethanes	=	=	3,100	ns	ns	ns	ns
1,1,2,2-Tetrachloroethane	X	79-34-5	ns	ns	3,000	ns	3
Tetrachloroethylene	X	127-18-4	1,800	ns	3,400	145	29
2,3,5,6-Tetrachlorophenol	=	=	ns	ns	ns	440	ns
Thallium	=	7440-28-0	470	ns	710	ns	0.47
Toluene	=	108-88-3	5,800	ns	2,100	ns	520
Toxaphene	X	8001-35-2	0.73	0.0002	0.21	0.0002	0.00071
Tributyltin (TBT)	=	=	ns	0.026	ns	0.01	ns
1,2,4-Trichlorobenzene	X	120-82-1	ns	ns	ns	ns	0.076
1,1,1-Trichloroethane	=	71-55-6	6,000	ns	10,400	ns	200,000
1,1,2-Trichloroethane	X	79-00-5	6,000	ns	ns	ns	8.9
Trichloroethylene	X	79-01-6	15,000	ns	700	ns	7
2,4,5-Trichlorophenol	=	95-95-4	ns	ns	ns	ns	600
2,4,6-Trichlorophenol	X	88-06-2	ns	ns	ns	ns	2.8
Chlorophenoxy Herbicide (2,4,5-TP) [Silvex]	=	93-72-1	ns	ns	ns	ns	400
Vinyl Chloride	X	75-01-4	ns	ns	ns	ns	1.6
Zinc	=	7440-66-6	22+	22+	95	86	26,000

* - As recommended by the EPA, the standard for Methylmercury is expressed as a fish (or shellfish) tissue residue water quality criterion rather than a water column-based water quality criterion. (<https://www.epa.gov/sites/production/files/2019-02/documents/wqc-final-methylmercury-factsheet-2001.pdf>)

ns - No standard has been developed.

+ - The value listed is the minimum standard. Depending upon the receiving water calcium carbonate hardness, higher standards may be calculated using the respective formula in the EPA publication Quality Criteria for Water 1986 (EPA 440/5-86-001, Revised May 1, 1986).

Note - Compounds listed in the plural in the "Pollutant Name" column (except for PCBs) represent mixtures of isomers. Values listed refer to the total allowable concentration of any combination of isomers of these compounds.