

APPENDICES

Appendix A. ATSDR Glossary of Environmental Health Terms

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency with headquarters in Atlanta, Georgia, and 10 regional offices throughout the United States. ATSDR's mission is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. ATSDR is not a regulatory agency—unlike the U.S. Environmental Protection Agency (EPA), which is the federal agency that develops and enforces environmental laws to protect the environment and human health.

This glossary defines words used by ATSDR in communications with the public. It is not a complete dictionary of environmental health terms. If you have questions or comments, call ATSDR's toll-free telephone number, 1-800-CDC-INFO (1-800-232-4636).

Absorption

The process of taking in. For a person or an animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines, or lungs.

Acute

Occurring over a short time [compare with chronic].

Acute exposure

Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with intermediate duration exposure and chronic exposure].

Adverse health effect

A change in body function or cell structure that might lead to disease or health problems.

Aerobic

Requiring oxygen [compare with anaerobic].

Ambient

Surrounding (for example, ambient air).

Analyte

A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

Analytic epidemiologic study

A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

Background level

An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

Biota

Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

Cancer

Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.

Cancer risk

A theoretical risk for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

Cancer risk evaluation guide (CREG)

Estimated contaminant concentrations that would be expected to cause no more than one excess cancer in a million (10^{-6}) persons exposed over a 70-year life span. ATSDR's CREGs are calculated from EPA's cancer potency factors.

Cancer slope factor (CSF)

An estimate of possible increases in cancer cases in a population. The relative potency of carcinogens is calculated by multiplying estimated chronic-exposure doses (defined in this document as a 30-year exposure averaged over 70 years) by EPA's CSFs.

Carcinogen

A substance that causes cancer.

CERCLA [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980]

Chronic

Occurring over a long time [compare with acute].

Chronic exposure

Contact with a substance that occurs over a long time (more than 1 year) [compare with acute exposure and intermediate duration exposure].

Comparison value (CV)

Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process [compare with screening guideline].

Completed exposure pathway [see exposure pathway].

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

CERCLA, also known as Superfund, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous substances. This law was later amended by the Superfund Amendments and Reauthorization Act (SARA).

Concentration

The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

Contaminant

A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

Dermal

Referring to the skin. For example, dermal absorption means passing through the skin.

Dermal contact

Contact with (touching) the skin [see route of exposure].

Detection limit

The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

Disease registry

A system of ongoing registration of all cases of a particular disease or health condition in a defined population.

DOE

United States Department of Energy.

Dose (for chemicals that are not radioactive)

The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An “exposure dose” is how much of a substance is encountered in the environment. An “absorbed dose” is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

Dose-response relationship

The relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response).

Environmental media

Soil, water, air, biota (plants and animals), or any other parts of the environment that can contain contaminants.

Environmental media evaluation guide (EMEG)

A media-specific comparison value that is used to select contaminants of concern. Levels below the EMEG are not expected to cause adverse noncarcinogenic health effects.

EPA

United States Environmental Protection Agency.

Epidemiology

The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

Exposure

Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [acute exposure], of intermediate duration, or long-term [chronic exposure].

Exposure assessment

The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

Exposure pathway

The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

Feasibility study

A study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

Geographic information system (GIS)

A mapping system that uses computers to collect, store, manipulate, analyze, and display data. For example, GIS can show the concentration of a contaminant within a community in relation to points of reference such as streets and homes.

Groundwater

Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with surface water].

Half-life ($t_{1/2}$)

The time it takes for half the original amount of a substance to disappear. In the environment, the half-life is the time it takes for half the original amount of a substance to disappear when it is changed to another chemical by bacteria, fungi, sunlight, or other chemical processes. In the human body, the half-life is the time it takes for half the original amount of the substance to disappear, either by being changed to another substance or by leaving the body. In the case of radioactive material, the half life is the amount of time necessary for one half the initial number of radioactive atoms to change or transform into another atom (that is normally not radioactive). After two half lives, 25 percent of the original number of radioactive atoms remain.

Hazard

A source of potential harm from past, current, or future exposures.

Hazardous waste

Potentially harmful substances that have been released or discarded into the environment.

Health consultation

A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical [compare with public health assessment].

Health education

Programs designed with a community to help it know about health risks and how to reduce these risks.

Indeterminate public health hazard

The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

Incidence

The number of new cases of disease in a defined population over a specific time period [contrast with prevalence].

Ingestion

The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see route of exposure].

Inhalation

The act of breathing. A hazardous substance can enter the body this way [see route of exposure].

Lowest-observed-adverse-effect level (LOAEL)

The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

Metabolism

The conversion or breakdown of a substance from one form to another by a living organism.

Metabolite

Any product of metabolism.

mg/kg

Milligram per kilogram.

mg/m³

Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

Migration

Moving from one location to another.

Minimal risk level (MRL)

An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see reference dose].

Mortality

Death. Usually the cause (a specific disease, a condition, or an injury) is stated.

MRL [see minimal risk level]

National Priorities List for Uncontrolled Hazardous Waste Sites (National Priorities List or NPL)

EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States. The NPL is updated on a regular basis.

No apparent public health hazard

A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

No-observed-adverse-effect level (NOAEL)

The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

No public health hazard

A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

Noncancer

Used in this document to mean health end points other than cancer, such as developmental, reproductive, immunological, and other systemic effects.

NPL [see National Priorities List for Uncontrolled Hazardous Waste Sites]

Pica

A craving to eat nonfood items, such as dirt, paint chips, and clay. Some children exhibit pica-related behavior.

Plume

A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.

Point of exposure

The place where someone can come into contact with a substance present in the environment [see exposure pathway].

Population

A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).

ppb

Parts per billion.

ppm

Parts per million.

Prevention

Actions that reduce exposure or other risks, keep people from getting sick, or keep disease from getting worse.

Public availability session

An informal, drop-by meeting at which community members can meet one-on-one with ATSDR staff members to discuss health and site-related concerns.

Public comment period

An opportunity for the public to comment on agency findings or proposed activities contained in draft reports or documents. The public comment period is a limited time period during which comments will be accepted.

Public health action

A list of steps to protect public health.

Public health advisory

A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

Public health assessment (PHA)

An ATSDR document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health [compare with health consultation].

Public health hazard

A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or radionuclides that could result in harmful health effects.

Public health hazard categories

Public health hazard categories are statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard.

Public health surveillance

The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs.

Public meeting

A public forum with community members for communication about a site.

Radionuclide

Any radioactive isotope (form) of any element.

RCRA [see Resource Conservation and Recovery Act (1976, 1984)]

Reference dose (RfD)

An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

Reference dose media evaluation guide (RMEG)

Lifetime exposure level at which adverse, noncarcinogenic health effects would not be expected to occur.

Registry

A systematic collection of information on persons exposed to a specific substance or having specific diseases [see exposure registry and disease registry].

Remedial investigation

The CERCLA process of determining the type and extent of hazardous material contamination at a site.

Resource Conservation and Recovery Act (1976, 1984) (RCRA)

This Act regulates management and disposal of hazardous wastes currently generated, treated, stored, disposed of, or distributed.

RfD [see reference dose]

Risk

The probability that something will cause injury or harm.

Risk-based concentration (RBC)

A contaminant concentration that is not expected to cause adverse health effects over long-term exposure.

Route of exposure

The way people come into contact with a hazardous substance. Three routes of exposure are breathing [inhalation], eating or drinking [ingestion], or contact with the skin [dermal contact].

Safety factor [see uncertainty factor]

SARA [see Superfund Amendments and Reauthorization Act]

Sample

A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population [see population]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

Sample size

The number of units chosen from a population or an environment.

Screening Guideline

Used in this document as noncancer and cancer health guideline values (e.g., minimal risk levels, reference doses, and cancer slope factors) that are compared to calculated exposure doses [see minimal risk level, reference dose, and cancer slope factor]. Estimated exposure doses that are less than screening guideline values are not a public health hazard [compare with comparison value].

Solvent

A liquid capable of dissolving or dispersing another substance (for example, acetone or mineral spirits).

Source of contamination

The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an exposure pathway.

Special populations

People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Statistics

A branch of mathematics that deals with collecting, reviewing, summarizing, and interpreting data or information. Statistics are used to determine whether differences between study groups are meaningful.

Substance

A chemical.

Superfund [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Superfund Amendments and Reauthorization Act (SARA)]

Superfund Amendments and Reauthorization Act (SARA)

In 1986, SARA amended the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from substance exposures at hazardous waste sites and to perform activities including health education, health studies, surveillance, health consultations, and toxicological profiles.

Surface water

Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with groundwater].

Surveillance [see public health surveillance]

Survey

A systematic collection of information or data. A survey can be conducted to collect information from a group of people or from the environment. Surveys of a group of people can be conducted by telephone, by mail, or in person. Some surveys are done by interviewing a group of people [see prevalence survey].

TEF/TEQ

The toxic equivalency factor (TEF) approach compares the relative potency of individual congeners with that of tetrachlorodibenzo-p-dioxin (TCDD), the best-studied member of this chemical class. The concentration or dose of each dioxin-like congener is multiplied by its TEF to arrive at a toxic equivalent (TEQ), and the TEQs are added to give the total toxic equivalency. The total toxic equivalency is then compared to reference exposure levels for TCDD expected to be without significant risk for producing health hazards.

Toxicological profile

An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

Toxicology

The study of the harmful effects of substances on humans or animals.

Tumor

An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive. Tumors perform no useful body function. Tumors can be either benign (not cancer) or malignant (cancer).

Uncertainty factor

Mathematical adjustments for reasons of safety when knowledge is incomplete. For example, factors used in the calculation of doses that are not harmful (adverse) to people. These factors are applied to the lowest-observed-adverse-effect-level (LOAEL) or the no-observed-adverse-effect-level (NOAEL) to derive a minimal risk level (MRL). Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans, and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all, the information from animal or human studies to decide whether an exposure will cause harm to people [also sometimes called a safety factor].

Urgent public health hazard

A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

Volatile organic compounds (VOCs)

Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

Other glossaries and dictionaries:

Environmental Protection Agency (<http://www.epa.gov/ocepat/terms/>)

National Library of Medicine (NIH) (<http://www.nlm.nih.gov/medlineplus/mplusdictionary.html>)

Appendix B
Off-Site Chemicals Without Comparison Values

Table B-1. Chemicals Detected in Off-Site Soil

| <i>Substance Name</i> | <i>Average Concentration (ppm)</i> | <i>Highest Dose (mg/kg/day)</i> | <i>Surrogate Screening Guideline</i> | <i>Surrogate Screening Guideline Source</i> | <i>Does the Dose/Concentration Exceed the Screening Guideline?</i> |
|--------------------------------|------------------------------------|---------------------------------|--------------------------------------|---|--|
| Inorganics | | | | | |
| Thorium | 28 | 3.4E-04 | 0.6–18 ppm | ATSDR/NCRP | Yes |
| Organics | | | | | |
| 4-Aminobiphenyl | 3.4 | 3.4E-04 | 5 ppm | FDA 21CFR74 | No |
| 1-Bromo-4-phenoxy benzene | 1.2 | 4.2E-05 | 10 ppm | ATSDR-benzene | No |
| bis(2-Chloroethoxy)methane | 1.2 | 1.5E-05 | 100 ppm | PADEP | No |
| P-Chloro-m-cresol | 0.51 | 1.5E-05 | 1,000 ppm | Anbesol Teething Gel | No |
| alpha-Chloronaphthalene | 4.1 | 6.3E-06 | 8.0E-02 mg/kg/day | EPA RfD for beta-chloronaphthalene | No |
| 4-Chlorophenyl phenyl ether | 1.1 | 5.0E-05 | 0.8 ppm | TCEQ-TRRP for soil | Yes |
| Dibenz(a,j)acridine | 4.1 | 1.4E-05 | 1.4E-04 mg/kg/day | Calculated from CalEPA TEF and EPA oral slope factor (benzo(a)pyrene) | No |
| p(Dimethylamino)azobenzene | 4.1 | 5.0E-05 | 2.2E-05 mg/kg/day | Calculated from CalEPA oral unit risk factor | Yes |
| 7,12-Dimethylbenz(a)anthracene | 4.1 | 5.0E-05 | 4.0E-07 mg/kg/day | Calculated from CalEPA oral unit risk factor | Yes |
| Endosulfan sulfate | 0.022 | 5.0E-05 | 100 ppm | CEMEG (endosulfan) | No |
| Endrin ketone | 0.022 | 2.7E-07 | 20 ppm | CEMEG (endrin) | No |
| Ethyl methanesulfonate | 4.1 | 2.7E-07 | 100 ppm | PADEP | No |
| 2-Fluorophenol | 1.4 | 5.0E-05 | 1.6 ppm | TCEQ-TRRP for soil as 2-chlorophenol | No |
| Methyl methanesulfonate | 4.1 | 1.7E-05 | 100 ppm | PADEP as ethyl methanesulfonate | No |
| 3-Methylcholanthrene | 4.1 | 5.0E-05 | 4.5E-06 mg/kg/day | Calculated from CalEPA oral unit risk factor | Yes |
| beta-Naphthylamine | 6.9 | 5.0E-05 | 2.7 ppm | TCEQ—media-specific concentration residential soil | Yes |

The average concentrations are rounded. Averages were calculated using detected concentrations only and do not take into account nondetected values.

Highest doses were calculated using the following formula:

$$\text{child dose} = (\text{average concentration} \times 0.0002 \text{ kg/day} \times 291.2 \text{ days/year} \times 6 \text{ years}) / (13 \text{ kg} \times (365 \text{ days/year} \times 6 \text{ years}))$$

CalEPA = California Environmental Protection Agency

CEMEG = chronic environmental media evaluation guide

EPA = U.S. Environmental Protection Agency

FDA = U.S. Food and Drug Administration

mg/kg/day = milligram per kilogram per day

NCRP = National Council on Radiation Protection and Measurements

PADEP = Pennsylvania Department of Environmental Protection

TCEQ = Texas Commission on Environmental Quality

TRRP = Texas Risk Reduction Program

PHA = public health assessment

ppm = parts per million

RfD = reference dose

TEF = toxic equivalency factor

URF = unit risk factors

Table B-2. Chemicals Detected in Off-Site Sediment

| <i>Substance Name</i> | <i>Average Concentration (ppm)</i> | <i>Highest Dose (mg/kg/day)</i> | <i>Surrogate Screening Guideline</i> | <i>Surrogate Screening Guideline Source</i> | <i>Does the Dose/Concentration Exceed the Screening Guideline?</i> |
|------------------------------|------------------------------------|---------------------------------|--------------------------------------|---|--|
| Inorganics | | | | | |
| Phosphate | 406 | 1.0E-04 | FDA—generally recognized as safe | | No |
| Silicon | 410 | 1.0E-04 | Biologically inert | | No |
| Thorium | 54 | 1.4E-05 | 0.6–18 ppm | ATSDR/NCRP | Yes |
| Organics | | | | | |
| Acetic acid | 0.011 | 2.8E-09 | 40,000–80,000 ppm | Vinegar | No |
| 1-Bromo-4-phenoxy benzene | 0.77 | 1.9E-07 | 0.28 ppm | TCEQ—TRRP as bromophenyl phenylether, -4 | Yes |
| Bis(2-chloroethoxy) methane | 0.77 | 1.9E-07 | 100 ppm | PADEP | No |
| Carbon-14 | 19,000 | 4.8E-03 | ATSDR—radiation dose screening PHA | | |
| Chlorine atom | 18,000 | 4.6E-03 | 32 ppm | TCEQ—TRRP for soil | Yes |
| p-Chloro-m-cresol | 0.77 | 1.9E-07 | 20 ppm | ATSDR—EMEG 4-chlorophenol | No |
| 4-Chlorophenyl phenyl ether | 0.77 | 1.9E-07 | 0.8 ppm | TCEQ—TRRP for soil | No |
| Cyclotetrasiloxane | 0.027 | 6.8E-09 | NJ value | Data QA/QC | No—presumptive evidence/ estimated value |
| Dodacane | 0.0074 | 1.9E-09 | NJ value | Data QA/QC | No—presumptive evidence/ estimated value |
| Endosulfan sulfate | 0.45 | 1.1E-07 | 100 ppm | CEMEG (endosulfan) | No |
| Endrin ketone | 0.46 | 1.2E-07 | 20 ppm | CEMEG (endrin) | No |
| Hydrocarbon | 13 | 3.3E-06 | 880 ppm | NM TPH screening guidelines | No |
| Nitrogen, kjeldahl | 1,600 | 4.0E-04 | 20,000 ppm | EMEG (ammonia) | No |
| Total combustible organics | 198,000 | 5.0E-02 | 10 ppm | EMEG (benzene) | Yes |
| Total petroleum hydrocarbons | 150 | 3.8E-05 | 880 ppm | NM TPH screening guidelines | No |

The average concentrations are rounded. Averages were calculated using detected concentrations only and do not take into account nondetected values.

Highest doses were calculated using the following formula:

$$\text{child dose} = (\text{average concentration} \times 0.0001 \text{ kg/day} \times 12 \text{ days/year} \times 6 \text{ years}) / (13 \text{ kg} \times (365 \text{ days/year} \times 6 \text{ years}))$$

CEMEG = chronic environmental media evaluation guide

EMEG = environmental media evaluation guide

FDA = U.S. Food and Drug Administration

mg/kg/day = milligram per kilogram per day

NCRP = National Council on Radiation Protection and Measurements

PADEP = Pennsylvania Department of Environmental Protection

TCEQ = Texas Commission on Environmental Quality

NM = New Mexico

PHA = public health assessment

ppm = parts per million

QA/QC = quality assurance/quality control

TPH = total petroleum hydrocarbons

TRRP = Texas Risk Reduction Program

Table B-3. Chemicals Detected in Off-Site Surface Water

| <i>Substance Name</i> | <i>Average Concentration (ppb)</i> | <i>Highest Dose (mg/kg/day)</i> | <i>Surrogate Screening Guideline</i> | <i>Surrogate Screening Guideline Source</i> | <i>Does the Dose/Concentration Exceed the Screening Guideline?</i> |
|------------------------------|------------------------------------|---------------------------------|---|---|--|
| Inorganics | | | | | |
| Bicarbonate, dissolved | 180,000 | 2.3E-01 | 500,000 ppb | Alkalinity EPA—SMCL | No |
| Cesium | 0.61 | 7.7E-07 | 1 ppb | ATSDR background | No |
| Chloride | 119,000 | 5.1E-01 | 250,000 ppb | EPA—SMCL | No |
| Silicon | 2,100 | 2.7E-03 | Biologically inert | | No |
| Sulfate | 625,000 | 3.1E+00 | 250,000 ppb | EPA—SMCL | No |
| Sulfide | 4,000 | 5.1E-03 | 500 ppb | Rotten egg odor in water | Yes, as hydrogen sulfide |
| Sulfur | 8,200 | 1.0E-02 | 250,000 ppb | EPA—SMCL as sulfate | No |
| Organics | | | | | |
| bis(2-Chloroethoxy)methane* | 10 | 1.3E-05 | 5 ppb | NYSDEC groundwater quality standard | Yes |
| Bromide* | 59 | 1.8E-04 | 300,000 ppb | Secondary MCL for chloride | No |
| 1-Bromo-4-phenoxy benzene* | 10 | 1.3E-05 | 5 ppb | Benzene MCL | Yes |
| 4-Chlorophenyl phenyl ether* | 10 | 1.3E-05 | 0.061 ppb | TCEQ TRRP residential ground water (2 liters/day) | Yes |
| Orthophosphate* | 287 | 4.0E-04 | Food grade chemical—added to drinking water to reduce lead leaching FDA—generally recognized as safe | | No |
| p-Chloro-m-cresol* | 10 | 1.3E-05 | 1 ppb | NYSDEC groundwater quality standard | Yes |
| Thorium* | 0.87 | 1.1E-06 | ATSDR—Radiation Dose Screening PHA | | |
| Tetraoxo-sulfate(1-) | 21,000 | 2.7E-02 | 250,000 ppb | EPA—SMCL as sulfate | No |
| Total petroleum hydrocarbons | 1,050 | 1.3E-03 | 1,400 ppb | New Mexico TPH screening guidelines | No |

*Chemical was detected in less than 10% of the samples. The average concentration was estimated using 1/2 the detection limit for nondetected samples.

The average concentrations are rounded. Unless otherwise noted, averages were calculated using detected concentrations only and do not take into account nondetected values.

Highest doses were calculated using the following formula:

$$\text{child dose} = ((\text{average concentration}/1,000) \times 0.5 \text{ liters/day} \times 12 \text{ days/year} \times 6 \text{ years}) / (13 \text{ kg} \times (365 \text{ days/year} \times 6 \text{ years}))$$

EPA = U.S. Environmental Protection Agency

FDA = U.S. Food and Drug Administration

MCL = maximum contaminant level

mg/kg/day = milligram per kilogram per day

NYSDEC = New York State Department of

Environmental Conservation

ppb = parts per billion

SMCL = secondary maximum contaminant level

TCEQ = Texas Commission on Environmental Quality

TPH = total petroleum hydrocarbons

TRRP = Texas Risk Reduction Program

Table B-4. Chemicals Detected in Fish Collected Off-Site

| <i>Substance Name</i> | <i>Location</i> | <i>Average Concentration (ppm)</i> | <i>Highest Dose (mg/kg/day)</i> | <i>Surrogate Screening Guideline</i> | <i>Surrogate Screening Guideline Source</i> | <i>Does the Dose/Concentration Exceed the Screening Guideline?</i> |
|---|-----------------|------------------------------------|---------------------------------|--------------------------------------|---|--|
| Inorganics | | | | | | |
| Lead | Clinch River | 0.44 | 6.8E-04 | 2.0 ppm | FDA 21CFR173 | No |
| | WBR | 0.32 | 4.9E-04 | 2.0 ppm | FDA 21CFR173 | No |
| Organics | | | | | | |
| Endosulfan sulfate | Clinch River | 0.075 | 1.2E-04 | 8.1 ppm | RBC (endosulfan) | No |
| Endrin ketone | Clinch River | 0.079 | 1.2E-04 | 0.41 ppm | RBC (endrin) | No |
| | WBR | 0.066 | 1.0E-04 | | | No |
| Endrin aldehyde | Clinch River | 0.011 | 1.7E-05 | 0.41 ppm | RBC (endrin) | No |
| | WBR | 0.021 | 3.2E-05 | | | No |
| 2,2',3,4',5',6-Hexachloro-1,1'-biphenyl | Clinch River | 0.031 | 4.8E-05 | 2.0E-05 mg/kg/day | CMRL (Aroclor 1254) | Yes for noncancer (No for cancer) |
| | WBR | 0.019 | 2.9E-05 | | | Yes for noncancer (No for cancer) |
| 3,3',4,4',5,5'-Hexachloro-1,1'-biphenyl | WBR | 0.01 | 1.5E-05 | 2.0E-05 mg/kg/day | CMRL (Aroclor 1254) | No for cancer and noncancer |
| Nonachlor, cis- | Clinch River | 0.027 | 4.2E-05 | 0.0006 mg/kg/day | CMRL (chlordane) | No |
| | WBR | 0.017 | 2.6E-05 | | | No |
| Nonachlor, trans- | Clinch River | 0.047 | 7.2E-05 | 0.0006 mg/kg/day | CMRL (chlordane) | No |
| | WBR | 0.033 | 5.1E-05 | | | No |
| Nonachlor, trans- | Clinch River | 0.006 | 9.2E-06 | 0.0006 mg/kg/day | CMRL (chlordane) | No |
| | WBR | 0.0092 | 1.4E-05 | | | No |

The average concentrations are rounded. Averages were calculated using detected concentrations only and do not take into account nondetected values.

Highest doses were calculated using the following formula:

$$\text{subsistence child dose} = (\text{average concentration} \times 0.02 \text{ kg/day} \times 365 \text{ days/year} \times 6 \text{ years}) / (13 \text{ kg} \times (365 \text{ days/year} \times 6 \text{ years}))$$

CMRL = chronic minimal risk level

FDA = U.S. Food and Drug Administration

mg/kg/day = milligram per kilogram per day

PCB = polychlorinated biphenyl

ppm = parts per million

RBC = risk-based concentration

WBR = Watts Bar Reservoir

Table B-5. Chemicals Detected in Off-Site Game

| <i>Substance Name</i> | <i>Average Concentration (ppm)</i> | <i>Highest Dose (mg/kg/day)</i> | <i>Surrogate Screening Guideline</i> | <i>Surrogate Screening Guideline Source</i> | <i>Does the Dose/Concentration Exceed the Screening Guideline?</i> |
|-----------------------|------------------------------------|---------------------------------|--------------------------------------|---|--|
| Organics | | | | | |
| Nonachlor, cis | 0.0055 | 4.2E-07 | 0.0006 mg/kg/day | CMRL (chlordane) | No |
| Nonachlor, trans | 0.0051 | 3.9E-07 | 0.0006 mg/kg/day | CMRL (chlordane) | No |

The average concentrations are rounded. Averages were calculated using detected concentrations only and do not take into account nondetected values.

Highest doses were calculated using the following formula:

$$\text{child dose} = (\text{average concentration} \times 0.001 \text{ kg/day} \times 365 \text{ days/year} \times 6 \text{ years}) / (13 \text{ kg} \times (365 \text{ days/year} \times 6 \text{ years}))$$

CMRL = chronic minimal risk level

mg/kg/day = milligram per kilogram per day

ppm = parts per million

Screening guidelines are available for all chemicals detected in vegetation and air.

Table B-6. Chemicals Detected in Scarborough

| <i>Substance Name</i> | <i>Average Concentration (ppm)</i> | <i>Highest Dose (mg/kg/day)</i> | <i>Surrogate Screening Guideline</i> | <i>Surrogate Screening Guideline Source</i> | <i>Does the Dose/Concentration Exceed the screening Guideline?</i> |
|-----------------------|------------------------------------|---------------------------------|--------------------------------------|---|--|
| Soil | | | | | |
| Acetic acid | 0.012 | 1.4E-07 | 40,000–80,000 ppm | Vinegar | No |
| alpha-Pinene | 0.045 | 5.5E-07 | 37.5 mg/kg/day lowest NOAEL | EPA: Federal Register [FR Doc. 98-31063] (11/19/1998) | No |
| Benzene ethanamine | 0.0088 | 1.1E-07 | 0.1 mg/kg/day | FDA—amphetamine pediatric dose of 10 mg/tablet | No |
| Cyclotetrasiloxane | 0.043 | 5.3E-07 | NJ value | Data QA/QC | No—presumptive evidence/estimated value |
| Sediment | | | | | |
| Acetic acid | 0.011 | 2.7E-09 | 40,000–80,000 ppm | Vinegar | No |
| Cyclotetrasiloxane | 0.027 | 6.9E-09 | NJ value | Data QA/QC | No—presumptive evidence/estimated value |
| Dodacane | 0.0074 | 1.9E-09 | NJ value | Data QA/QC | No—presumptive evidence/estimated value |

The average concentrations are rounded. Averages were calculated using detected concentrations only and do not take into account nondetected values.

Highest soil doses were calculated using the following formula:

$$\text{non-pica child dose} = (\text{average concentration} \times 0.0002 \text{ kg/day} \times 291.2 \text{ days/year} \times 6 \text{ years}) / (13 \text{ kg} \times (365 \text{ days/year} \times 6 \text{ years}))$$

Highest sediment doses were calculated using the following formula:

$$\text{child dose} = (\text{average concentration} \times 0.0001 \text{ kg/day} \times 12 \text{ days/year} \times 6 \text{ years}) / (13 \text{ kg} \times (365 \text{ days/year} \times 6 \text{ years}))$$

mg/kg/day = milligram per kilogram per day
ppm = parts per million