# Appendix B - Tables

**Table 2: TEQs for PAHs**

Analytical results are multiplied by the following factors and then added together to obtain one number to be compared with the screening value for Benzo[a]pyrene, the EPA adds half the detection level for all carcinogenic PAHs, if any carcinogenic PAHs are detected.

| PAH | Toxicity Equivalency Factor |
|---|---|
| Dibenz[a,h]anthracene | 5 |
| Benzo[a]pyrene | 1 |
| Benzo[a]anthracene | 0.1 |
| Benzo[b]fluoranthene | 0.1 |
| Benzo[k]fluoranthene | 0.1 |
| Indeno[1,2,3-c,d]pyrene | 0.1 |
| Anthracene | 0.01 |
| Benzo[g,h,i]perylene | 0.01 |
| Chrysene | 0.01 |
| Acenaphthene | 0.001 |
| Acenaphthylene | 0.001 |
| Fluoranthene | 0.001 |
| Fluorene | 0.001 |
| Phenanthrene | 0.001 |
| Pyrene | 0.001 |

Source: ATSDR 1995.

**Table 3: TEQs for Dioxins/Furans**

Analytical results are multiplied by the following factors and then added together to obtain one number to be compared with the screening value for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), the EPA adds half the detection level for all congeners, if any congeners are detected.

| Dioxin/Furan | Toxicity Equivalency Factor |
|---|---|
| 2,3,7,8-TCDD | 1 |
| 1,2,3,7,8-PeCDD | 1 |
| 1,2,3,4,7,8-HxCDD | 0.1 |
| 1,2,3,6,7,8-HxCDD | 0.1 |
| 1,2,3,7,8,9-HxCDD | 0.1 |
| 1,2,3,4,6,7,8-HpCDD | 0.01 |
| OCDD | 0.0001 |
| 2,3,7,8-TCDF | 0.1 |
| 1,2,3,7,8-PeCDF | 0.05 |
| 2,3,4,7,8-PeCDF | 0.5 |
| 1,2,3,4,7,8-HxCDF | 0.1 |
| 1,2,3,6,7,8-HxCDF | 0.1 |
| 1,2,3,7,8,9-HxCDF | 0.1 |
| 2,3,4,6,7,8-HxCDF | 0.1 |
| 1,2,3,4,6,7,8-HpCDF | 0.01 |
| 1,2,3,4,7,8,9-HpCDF | 0.01 |
| OCDF | 0.0001 |

Source: WHO 1998.

## Table 4: DEP intervals sampled and analyses performed

| Study/Location (MV samples) | Samples analyzed for **As, Cd, Ni, Pb** | Samples analyzed for **Ba, Ca, Fe, K, Mg, Mn, Na and VOCs** | Samples analyzed for **SVOCs (PAHs) and PCBs** | Samples analyzed for **dioxins** |
|---|---|---|---|---|
| DEP **Surface Soil** inside fill area, ***west*** | 2, 3, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 29, 31, 36, 43 | 43 | Scrape 18, Scrape 42, 43 | |
| DEP **Surface Soil** outside fill area, ***west*** | 1, 4, 5, 8, 11, 14, 17, 20, 23, 26, 28, 30, 32, 33, 34, 35, | | | |
| DEP **Subsurface Soil** inside fill area, ***west*** | 2, 3, 3, 6, 6, 7, 9, 10, 12, 12, 13, 15, 15, 16, 16, 18, 19, 19, 19A, 21, 22, 24, 25, 25, 27, 29, 31, 36, 36A, 37, 38, 39, 40, 41, 42, 44, 45, 46 | 19/19A, 36, 36A, 37, 38, 39, 40, 41, 42, 44, 45, 46 | 3, 6, 9, 12, 13, 15, 16, 19A, 21, 22, 24, 25, 29, 36, 36A, 37, 38, 39, 40, 41, 42, 44, 45, 46, | 38, 42, 44 |
| DEP **Subsurface Soil** outside fill area, ***west*** | 1, 4, 5, 8, 11, 14, 17, 20, 23, 26, 28, 30, 32, 33, 34, 35, | | 14, 17, 20, 23, 26, 33, | |
| DEP **Surface soil** inside fill area, ***east*** | 49 | 49 | 49 | |
| DEP **Surface soil** outside fill area, ***east*** | 48, 50, 51, 52, 53, 54 | 48, 50, 51, 52, 53, 54 | 48, 50, 51, 52, 53, 54 | 48, 50, 52 |
| DEP **Subsurface** soil inside fill area, ***east*** | | | | |
| DEP **Subsurface** soil outside fill area, ***east*** | 47 | 47 | 47 | 47 |

SVOCs = semivolatile organic chemicals PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyls

Source: DEP 2002a

## Table 5: EPA's contractor, Weston, intervals sampled and analyses performed

| Study/Location (MA samples) | Samples analyzed for **TAL metals** and **cyanide, VOCs, SVOCs (PAHs), pesticides,** and **PCBs** | Samples analyzed for **dioxins** |
|---|---|---|
| EPA **Surface Soil** | MA-01-SS (bkg), MA-02 through 024-SS; MA-17-SS and MA-18-SS, had duplicates run | MA-01-SS (bkg), MA-04-22, MA-05-SS, MA-08-SS, MA-10-SS, MA-12-SS, MA-17-SS, MA-20-SS, MA-23-SS |
| EPA **Subsurface Soil** | MA-01-SB (bkg), MA-02 through 024-SB; MA-17-SB and MA-18-SB, had duplicates run | |

SVOCs = semivolatile organic chemicals PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyls

Source: Weston 2003

## Table 6: Dr. Flowers intervals sampled and analyses performed

| Study/Location (M samples) | Samples analyzed for **RCRA metals (arsenic, barium, cadmium, chromium, lead, selenium, and silver**) and mercury | Samples analyzed for **arsenic and lead** |
|---|---|---|
| Flowers **Surface soil samples** | | M138 through M239<br>Control locations E5 through E22 and C1 through C25 |
| Flowers **Subsurface samples** | M101 through M137 (reported arsenic, lead and mercury)<br>Control locations E1-E4 | |

Source: Flowers 2004

**Table 7. Soil Concentrations for Contaminants of Concern, samples taken by Weston Solutions, Inc. for the EPA**

| Contaminants of Concern | Screening Value (mg/kg) ATSDR: Child/Adult | DEP: | Highest Soil Concentration (mg/kg) | Location of Highest Concentration | Number Soil Samples Above Screening Value |
|---|---|---|---|---|---|
| arsenic | 0.5 CREG | 2.1 draft SCTL** | 19 | MA-17-SB | 8/46, 5/46 |
| barium | 4,000/50,000 RMEG | 120 SCTL*** | 340 | MA-17-SB | 0/46, 4/46 |
| copper | | 150 SCTL*** | 520 | MA-17-SB | 1/46 |
| dieldrin | 0.04 CREG | 0.06 SCTL | 0.13 | MA-17D-SS | 1/46, 1/46 |
| dioxin TEQ | 0.00005/0.0007 EMEG | 0.000007 SCTL | 0.000038J | MA-12-SS | 0/46, 3/46 |
| lead | | 400 SCTL | 800 | MA-17D-SS | 1/46 |
| n-nitroso di-n-propylamine | 0.1 CREG | | 0.18J | MA-12-SB | 1/46 |
| PAH TEQ | 0.1 CREG | | 0.6 | MA-18D-SS/24-SB | 6/46 |
| PCBs (Arochlor-1260) | 0.4 CREG | | 4.1 | MA-17D-SS | 2/46 |
| vanadium | Int. EMEG 200/2,000 | 51 SCTL | 1,100 | MA-17-SB | 1/46, 2/46 |

CREG—ATSDR's Cancer Risk Evaluation Guide for 1 excess cancer case in 1 million people (ATSDR 1992a).
Int. EMEG—Environmental Media Evaluation Guide for exposures lasting 15-364 days.
mg/kg—milligrams per kilogram
PAHs—polycyclic aromatic hydrocarbons
PCBs—polychlorinated biphenyls, neither ATSDR nor FDEP has a screening value for Arochlor 1260 alone.
RMEG—ATDR's Reference Dose Environmental Media Evaluation Guide
SCTL—FDEP's Soil Target Cleanup Level for residential land uses.
**DEP's 1x $10^{-6}$ excess Cancer Risk Evaluation Guide for arsenic is 0.8 mg/kg. DEP is proposing to increase the $1x10^{-6}$ excess cancer risks to 2.1 mg/kg. DEP bases this factor on primate and hog bioavailability studies that give factors of 1/3 and 1/4 for actual bodily uptake of arsenic from ingested sources.
***DEP's direct exposure Residential Soil Target Cleanup Level, based on acute toxicity considerations (for barium, this value is based on soluble barium salts).

**Table 8. Soil Concentrations for Contaminants of Concern, Dr. Flowers for Levin et al.**

| *Contaminants of Concern* | *Screening Value (mg/kg)* *ATSDR:* | *DEP:* | *Highest Soil Concentration (mg/kg)* | *Location of Highest Concentration* | *Number Soil Samples Above Screening Value* |
|---|---|---|---|---|---|
| arsenic | 0.5 CREG | 2.1 *draft SCTL*** | 53 | M149 | 89/166, 31/166 |
| lead | | 400 SCTL**** | 610 | E22 | 3/166 |
| mercury | | 3 SCTL**** | 25 | M132 | 1/41 |

CREG—ATSDR's Cancer Risk Evaluation Guide for 1 excess cancer case in 1 million people (ATSDR 1992a).
mg/kg—milligrams per kilogram
PAHs—polycyclic aromatic hydrocarbons
PCBs—polychlorinated biphenyls, neither ATSDR nor FDEP has a screening value for Arochlor 1260 alone.
RMEG—Reference Dose Environmental Media Evaluation Guide
SCTL—FDEP's Soil Target Cleanup Level for residential land use.
**DEP's 1x $10^{-6}$ excess Cancer Risk Evaluation Guide for arsenic is 0.8 mg/kg. DEP is proposing to increase the $1x10^{-6}$ excess cancer risks to 2.1 mg/kg. DEP bases this factor on primate and hog bioavailability studies that give factors of 1/3 and 1/4 for actual bodily uptake of arsenic from ingested sources.
***DEP's direct exposure Residential Soil Target Cleanup Level, based on acute toxicity considerations (for barium, this value is based on soluble barium salts).

***Arsenic values measured above 20 mg/kg—M211 (33 mg/kg), E14 (43 mg/kg), M202 (47 mg/kg), and M140 (53 mg/kg ).***
***Lead values measured above 400 mg/kg—E14 (470 mg/kg), M235 (560 mg/kg), and E22 (610 mg/kg).***

**Table 9. Soil Concentrations for Contaminants of Concern, initial data collected by Florida DEP**

| *Contaminants of Concern* | *Screening Value (mg/kg)* *ATSDR:* | *DEP:* | *Highest Soil Concentration (mg/kg)* | *Location of Highest Concentration* | *Number Soil Samples Above Screening Value* |
|---|---|---|---|---|---|
| arsenic | 0.5 CREG | 2.1 draft SCTL** | 10.6 | MV19 | 38/95, 9/95 |
| barium | 4,000/50,000 RMEG | 120*** SCTL | 304 | MV40 3-4’ | 0/42, 2/42 |
| *PAHs* | 0.1 CREG* | | 3.5 | MV36A | 7/42 |
| *PCBs* | 0.4 CREG* | | 6.9 | MV6 | 2/42 |

CREG—ATSDR’s Cancer Risk Evaluation Guide for 1 excess cancer case in 1 million people (ATSDR 1992a).
mg/kg—milligrams per kilogram
PAHs—polycyclic aromatic hydrocarbons
PCBs—polychlorinated biphenyls, neither ATSDR nor FDEP has a screening value for Arochlor 1260 alone.
SCTL—FDEP’s Soil Target Cleanup Level for residential land use.
**DEP’s 1x $10^{-6}$ excess Cancer Risk Evaluation Guide for arsenic is 0.8 mg/kg. DEP is proposing to increase the $1x10^{-6}$ excess cancer risks to 2.1 mg/kg. DEP bases this factor on primate and hog bioavailability studies that give factors of 1/3 and 1/4 for actual bodily uptake of arsenic from ingested sources.
***DEP’s direct exposure Residential Soil Target Cleanup Level, based on acute toxicity considerations (for barium, this value is based on soluble barium salts).

**Table 10. Soil Concentrations for Contaminants of Concern, combined studies**

| *Contaminants of Concern* | *Screening Value (mg/kg)* *ATSDR:* | *DEP:* | *Highest Soil Concentration (mg/kg)* | *Location of Highest Concentration* | *Number Soil Samples Above Screening Value* |
|---|---|---|---|---|---|
| arsenic | 0.5 CREG | 2.1 *draft SCTL*** | 53 | M149 (Flowers) | 135/307, 45/307 |
| barium | 4,000/50,000 RMEG | 120*** SCTL | 340 | MA-17-SB (EPA) | 0/88, 6/88 |
| copper | 2,000 20,000 Int. EME | 150*** SCTL | 520 | MA-17-SB (EPA) | 1/46 |
| dieldrin | 0.04 CREG | 0.06 SCTL | 0.13 | MA-17D-SS (EPA) | 1/46, 1/46 |
| dioxin TEQ | 0.00005/0.0007 EMEG | 0.000007 SCTL | 0.000038J | MA-12-SS (EPA) | 0/46, 3/46 |
| lead | | 400 SCTL | 800 | MA-17D-SS (EPA) | 3/307 |
| mercury | | 3 SCTL | 25 | M132 (Flowers) | 1/183 |
| n-nitroso di-n-propylamine | 0.1 CREG | 0.003 SCTL | 0.18J | MA-12-SB (EPA) | 1/88 |
| PAHs TEQ | 0.1 CREG | | 3.5 | MV36A (FDEP) | 13/88 |
| PCBs (Arochlor-1260) | (ATSDR—Arochlor mixtures—DEP) 0.4 CREG | 0.5 SCTL | 6.9 | MV6 (FDEP) | 4/88 |
| vanadium | Int. EMEG 200/2,000 | 67*** SCTL | 1,100 | MA-17-SB (EPA) | 1/46, 2/46 |

CREG—ATSDR's Cancer Risk Evaluation Guide for 1 excess cancer case in 1 million people (ATSDR 1992a).
Int. EMEG—Environmental Media Evaluation Guide for exposures lasting 15-364 days.
mg/kg—milligrams per kilogram
PAHs—polycyclic aromatic hydrocarbons
PCBs—polychlorinated biphenyls, neither ATSDR nor FDEP has a screening value for Arochlor 1260 alone.
RMEG—Reference Dose Environmental Media Evaluation Guide
SCTL—FDEP's Soil Target Cleanup Level for residential land use.
**DEP's 1x $10^{-6}$ excess Cancer Risk Evaluation Guide for arsenic is 0.8 mg/kg. DEP is proposing to increase the $1x10^{-6}$ excess cancer risks to 2.1 mg/kg. DEP bases this factor on primate and hog bioavailability studies that give factors of 1/3 and 1/4 for actual bodily uptake of arsenic from ingested sources.
***DEP's direct exposure Residential Soil Target Cleanup Level, based on acute toxicity considerations (for barium, this value is based on soluble barium salts).

## Model Parameters and Assumptions for Tables 11 and 12

**Exposure Medium:** **Soil**
Exposure Point: **On-site soil and dust**
Scenario Time frame: Current and Future
Land Use Conditions: Residential

**Receptor Population:** **Residents**
These doses were calculated using Risk Assistant software and accepted values for soil consumption, dust inhalation exposure and dermal exposure parameters (EPA, 1997).

The following doses were calculated using the following values:
Adult body weight- 70 kg
Child body weight- 15 kg
Adult soil consumption- 100 mg/day
Child soil consumption- 200 mg/day
* The air concentration is given in milligrams per cubic meter because the values for inhalation studies in most of the Toxicological Profiles are given in these units. The air concentration is not a dose; therefore, it is the same for adults and children.
mg/kg = milligram per kilogram of soil
mg/kg/day = milligrams per kilogram body weight per day

**Table 11. Estimated dose from exposure to on-site surface soil, doses calculated from highest measured levels.**

| Contaminant of Concern (maximum concentration) (mg/kg) | Oral MRL (mg/kg/day) | Soil/dust-Ingestion (mg/kg/day) | | Inhalation MRL ($mg/m^3$) | Soil/dust-Inhalation ($mg/m^3$) |
|---|---|---|---|---|---|
| | | Child | Adult | | Child and Adult |
| arsenic (53) | 0.005 Prov. Acute<br>0.0003 Chr | 0.0007 | 0.00008 | - | 0.000003 |
| barium (340) | - | 0.005 | 0.0005 | - | 0.00002 |
| copper (520) | 0.02 Acute<br>0.02Int. | 0.007 | 0.0007 | - | 0.00003 |
| dieldrin (0.13) | 0.0001 Int. | 0.000002 | 0.0000002 | - | 0.000000007 |
| dioxin TEQ (0.000038) | 0.0000002 Acute<br>0.00000002 Int.<br>0.000000001 Chr. | 0.0000000005 | 0.00000000005 | - | 0.000000000002 |
| mercury (25) | - | 0.0003 | 0.00004 | - | 0.000001 |
| n-nitroso di-n-propylamine (0.18) | 0.095 Acute | 0.000002 | 0.0000003 | - | 0.00000001 |
| PAHs TEQ (3.5) | - | 0.00005 | 0.000005 | - | 0.0000002 |
| PCBs Arochlor-1260 (6.9 0) | 0.00003 Int.<br>0.00002 Chr. | 0.00009 | 0.00001 | - | 0.0000004 |
| Vanadium 1100 | 0. 003 Int. | 0.02 | 0.002 | 0.0002 Acute | 0.00006 |

**MRL**—Minimal Risk Level. An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure. **Chr**—Chronic exposure length of more than 365 days. **Int**—Intermediate exposure length of more than 14 and less than 365 days. **Acute**—Exposure length of less than 14 days. **mg/kg**—milligrams per kilogram **mg/kg/day**—milligram chemical per kilogram body weight per day **PAHs TEQ**—polycyclic aromatic hydrocarbons **mg/m3**—microgram of chemical per cubic meter of air. **MD**—Missing Data to allow calculation of estimate.

**Table 12. Comparison of doses calculated from highest measured values to most sensitive effects (effects occurring at the lowest doses in animal and human medical studies). Shaded doses are above sensitive dose or minimum risk level.**

| Chemical | Doses are in mg/kg/day | | | Soil |
|---|---|---|---|---|
| | children's dose | adult's dose | children's theoretical increased cancer risk | adult's theoretical increased cancer risk |
| Arsenic | Ing 0.0007<br>Inh 0.000004 | Ing 0.00008<br>Inh 0.000004 | Ing 5:100,000<br>Inh 2:1,000,000 | Ing 5:100,000<br>Inh 4:1,000,000 |
| ATSDR 2000<br>(Update) | Child ingestion dose (0.0007) is 31 times less than the Lowest Observable Adverse Effect Level dose (0.022) associated with gastrointestinal irritation, diarrhea, nausea, skin pigmentation changes, and hyperkeratosis (dark raised spots on the skin that are possibly precancerous); persons in this study continuously ingested arsenic in their drinking water. While this level is 1.75 times greater than the (0.0004) No Observable Adverse Effect Level (NOAEL), for these health effects (same study) and 2.3 times greater than the MRL (0.0003) calculated from another NOAEL (0.0008) for adverse skin effects from long-term ingestion of arsenic in drinking water. ATSDR scientists divided this second NOEL dose (0.0008) by 3 to account for human diversity in calculating the MRL. Since the MRL was based on a NOEL, it is unlikely daily exposure at this level would cause noncancer health effects.<br>Adult ingestion dose is 5 times less than the (0.0004) dose referenced for children, we would not expect skin or gastrointestinal health effects for most adults.<br>Inhalation dose (0.000004) is 175 times less than the amount associated with increased risk of stillbirth in humans (0.0007) and 1,750 time less than the dose causing dermatitis (0.007) in humans inhaling arsenic. Dermatitis is skin inflammation that may cause redness, pain, and occasionally itching.<br>Associated cancers: From lowest to highest dose cancer effect levels, chronic arsenic exposures in people have been linked to lung cancer, basal and squamous cell skin cancers, liver cancer (haemangioendothelioma), urinary tract cancers (bladder, kidney, ureter, and all urethral cancers), and intraepidermal cancers. Intraepidermal is the name for the early pre-invasive form of squamous cell skin cancer. Pre-invasive means that the cancer cells are confined to the outermost layer of skin, the epidermis. At this stage, the cancer cells are unlikely to have spread to the lymph nodes, but they can spread along the skin surface. If left untreated, these cells can develop into an invasive cancer and spread into the lymphatic system. | | | |
| Barium | Ing 0.005<br>Inh 0.00002 | Ing 0.0005<br>Inh 0.00002 | No slope. | No slope. |
| ATSDR 1992c<br>TP-91/03 | Child ingestion dose (0.005) is 108 times less that the dose (0.54) associated with increased blood pressure in rats exposed 7 days a week for 16 months in their drinking water. However, one person drinking water with barium (0.21 mg/kg/day) for 4 weeks, seven days a week did not experience cardiac effects.<br>Adult ingestion dose is 1,080 times less than the (0.54) sensitive dose health effects described above for children.<br>Inhalation dose Case reports and animal studies for establishing the health effects of barium inhalation exposure are inadequate. Nonetheless, (0.00002) is 3,000 times less than the dose that caused increased blood pressure and cardiac irregularities in guinea pigs exposed for an unspecified period to aerosolized barium chloride solution.<br>Cancer association: Animal studies and human medical case studies are insufficient for evaluating the carcinogenicity of barium via inhalation or ingestion. Animal studies involving dermal exposure to barium hydroxide from tobacco indicates barium hydroxide promotes tumor growth. | | | |

| Chemical | Doses are in mg/kg/day | | | Soil |
|---|---|---|---|---|
| | children's dose | adult's dose | children's theoretical increased cancer risk | adult's theoretical increased cancer risk |
| Copper | Ing 0.007<br>Inh 0.00003 | Ing 0.0007<br>Inh 0.00003 | No slope. | No slope. |
| ATSDR 2003b<br>(Update) | Child ingestion dose (0.007) is 2.4 times less than the Lowest Observed Adverse Effect Level (0.017) for the copper dose causing nausea in a person who drank copper sulfate in water, one time.<br>Adult ingestion dose (0.0007) is 0.0006 mg/kg/day below the (0.0013) No Observed Adverse Effect Level dose referenced for children, so nausea would not be expected.<br>Inhalation dose (0.00003) is 4000 times less than the copper inhalation dose (0.12) associated with decreased lung bactericidal activity and 4,333 times less than the copper inhalation dose (0.13) for decreased average survival time. For both studies, mice were exposed 5 days a week for 1 to 2 weeks, 3 hours a day.<br>Cancer association: Animal studies and occupational epidemiological studies are insufficient for evaluating the carcinogenicity of copper via inhalation or dermal exposure. Animal studies involving ingestion are limited and the significance has not been determined. | | | |
| Dieldrin | Ing 0.000002<br>Inh 0.000000007 | Ing 0.0000002<br>Inh 0.000000007 | Ing 1:1,000,000<br>Inh <1:1,000,000 | Ing <1:1,000,000<br>Inh <1:1,000,000 |
| ATSDR 2002b<br>(Update) | Child ingestion dose (0.000002) is 5,000 times less the No Observed Adverse Effect Level dose (0.01) associated with learning deficits in monkeys exposed 55–109 days, once per day, 5 days a week, in food (50,000 times < learning deficit level).<br>Adult ingestion dose (0.0000002) is 50,000 times less the (0.01) No Observed Adverse Effect Level dose health effects described above for children.<br>Inhalation dose Information ATSDR located regarding the effects dieldrin inhalation exposures in animals was extremely limited. Many studies involved simultaneous inhalation and dermal exposure. In human case reports and occupational studies, doses were not precisely known.<br>Associated cancers: Chronic exposure studies in mice have linked dieldrin ingestion to liver cancer. | | | |

| Chemical | Doses are in mg/kg/day Soil | | | |
|---|---|---|---|---|
| | children's dose | adult's dose | children's theoretical increased cancer risk | adult's theoretical increased cancer risk |
| Dioxin TEQ | Ing 0.0000000005<br>Inh 0.000000000002 | Ing<br>Inh 0.000000000002 | No slope. | No slope. |
| ATSDR 1998b (Update) | Child ingestion dose (0.0000000005) is 40,000 times less than the dose (0.00000012) associated with reproductive effects (moderate endometriosis) and altered social behavior in a dioxin rhesus monkey study. The results of oral animal studies suggest that the effects that occur at the lowest levels of dioxin doses are immune, endocrine, and developmental effects. People's ingestion exposures are mainly known from low levels of food contamination.<br>Adult ingestion dose (0.00000000005) is 400,000 times less than the (0.00000012) sensitive dose health effects described above for children.<br>Inhalation of dioxins has not been studied in animals. People's occupational and accidental exposures to dioxin involve primarily inhalation and dermal exposure, but health effects are known primarily from associations with the levels stored in fat. The lowest levels of exposure are associated with hormone changes that can result in changes in sex ratios in children (more females are born). Higher levels are associated with immunosuppression, changes in the liver, abnormal glucose tolerance, and increased risk of diabetes. The highest exposure levels are associated with nervous system effects, chloracne, respiratory effects, and increased risk of cancer.<br>Cancers Statistically significant increases in risks for all cancers were found in workers highly exposed to dioxins with longer latency periods. Although the estimated Standardized Mortality Ratios are low†, they are consistent across studies with the highest dioxin exposures. The evidence linking doses with site-specific cancers is weaker, with some data suggesting a possible relationship between soft-tissue sarcoma, non-Hodgkin's lymphoma, or respiratory cancer. | | | |
| Lead ATSDR 1999a | 2.5-6.7 µg/dl (modeled) | 1.9-6.3 µg/dl (modeled) | | |

† Standardized Mortality / Morbidity Ratio (SMR) is a widely used method of reporting death or disease which adjusts for differences in age and sex across regions. It is a measure of premature mortality. Instead of giving an adjusted rate, the SMR gives a ratio that is a direct comparison with a standard (e.g. the entire state).

| Chemical | Doses are in mg/kg/day | | | Soil |
|---|---|---|---|---|
| | children's dose | adult's dose | children's theoretical increased cancer risk | adult's theoretical increased cancer risk |
| Mercury | Ing 0.0003<br>Inh 0.000001 | Ing 0.00004<br>Inh 0.000001 | No slope. | No slope. |
| ATSDR 1999b (Update) | Child ingestion dose (0.0003) is 1,866 times less than the dose (0.56) associated with kidney symptoms† in mice exposed for 10 weeks ad. lib. via drinking water.<br>Adult ingestion dose (0.00004) is 14,000 times less than the (0.56) sensitive dose health effects described above for children.<br>Inhalation dose (0.000001) is 14,000 times less than the dose (0.014) associated with impaired performance on neurobehavioral tests in persons exposed 0.7-24 years.<br>Cancer association: Animal studies and human epidemiological studies for evaluating the carcinogenicity of mercury via inhalation or dermal exposure were not located. Animal studies involving ingestion exposure were equivocal. | | | |
| N-nitroso di-n-propylamine | Ing 0.04<br>Inh 0.0002 | Ing 0.005<br>Inh 0.0002 | Ing ~8:100,000<br>Inh <1:1,000,000 | Ing ~8:1,000,000<br>Inh <1:1,000,000 |
| ATSDR 1989 | Child ingestion dose (0.04) is 65 times less than the dose (2.6) associated with esophagus and forestomach tumors in rats exposed 300 weeks, 5 days a week, via drinking water.<br>Adult ingestion dose (0.005) is 520 times less than the (2.6) sensitive dose health effects described above for children.<br>Inhalation dose No studies were located regarding the effects in humans or animals following inhalation exposure to N-nitroso di-n-propylamine.<br>Cancer association: Animal studies and human epidemiological studies for evaluating the carcinogenicity of N-nitroso di-n-propylamine via inhalation or dermal exposure were not located. Animal studies involving ingestion exposure indicated forestomach and pulmonary tumors in mice, and esophagus, forestomach, liver, nasal, and esophagus tumors in rats from lowest to highest cancer effect dose. | | | |

† The mouse kidney symptoms were increased granular IgG deposits, slight glomerular endocapillary cell hyperplasia; slight tubular atrophy, inflammation, and fibrosis.

| Chemical | Doses are in mg/kg/day | | | Soil |
|---|---|---|---|---|
| | children's dose | adult's dose | children's theoretical increased cancer risk | adult's theoretical increased cancer risk |
| PAHs TEQ | Ing 0.00005<br>Inh 0.0000002 | Ing 0.000005<br>Inh 0.0000002 | Ing 1:100,000<br>Inh ~6:1,000,000 | Ing 2:100,000<br>Inh ~6:1,000,000 |
| ATSDR 1995 (Update) | Child ingestion dose (0.00005) is 52,000 times less than the dose (2.6) associated with stomach cancer in mice exposed to benzo[a]pyrene ad lib in food for 30 to 197 days.<br>Adult ingestion dose (0.000005) is 520,000 times less than the (2.6) sensitive dose health effects described above for children.<br>Inhalation dose (0.0000002) is 500 times less than the dose (0.0001) associated with reduced lung function, abnormal chest x-ray, cough, bloody vomit, and throat and chest irritation, in persons exposed from 6 months to 6 years.<br>Cancer and occupational studies; Worker exposures to high levels of PAHs show cancers (skin, bladder, lung and gastrointestinal) are the most significant endpoint of PAH toxicity. Long-term worker PAH exposures have been linked with skin and eye irritation, photosensitivity, respiratory irritation (with cough and bronchitis), leukoplakia†, precancerous skin growths enhanced by exposure to sunlight, erythemaΔ, skin burns, acneiform lesions, mild hepatoxicity, and haematuria‡. Also several PAH compounds are immunotoxic, and some suppress selective compounds of the immune system. Workers' dermal exposure studies indicate that although direct contact may be of concern at high exposure levels, they do not suggest that lower levels are likely to cause significant irritation (Goodfellow et al. 2001). | | | |

† Leukoplakia is a common, is a common, potentially pre-cancerous disease of the mouth that involves the formation of white spots on the mucous membranes of the tongue and inside of the mouth. Despite the increased risk associated with having leukoplakia, many people with this condition never get oral cancer
Δ Erythema nodosum is an inflammation of subcutaneous fat tissue.
‡ Haematuria is passage of blood in the urine.

| Chemical | Doses are in mg/kg/day<br>children's dose | adult's dose | children's theoretical increased cancer risk | Soil<br>adult's theoretical increased cancer risk |
|---|---|---|---|---|
| PCBs | Ing 0.00009<br>Inh 0.000003 | Ing 0.00001<br>Inh 0.000003 | Ing 2:100,000<br>Inh. No slope. | Ing 8:1,000,000<br>Inh. No slope. |
| ATSDR 2000b (Update) | Child ingestion dose (0.00009) is 55 times less than the dose (0.005) associated with elevated and separated toenails, and immune system effects (reduced IgM and IgG antibody responses to sheep red blood cells) in studies of rhesus monkeys given Arochlor-1254 in capsules for longer than a year. Nonetheless this child ingestion dose is greater than the intermediate oral exposure minimum risk level of 0.00003 set by dividing 0.0075 by an uncertainty factor of 300 (10 for extrapolation from a lowest observed adverse effect level to a no observed adverse effect level, 3 for extrapolation from animals to humans, and 10 for human variability). It is also higher than the chronic oral exposure minimum risk level of 0.00002 set by dividing 0.005 by an uncertainty factor of 300 (10 for extrapolation from a lowest observed adverse effect level to a no observed adverse effect level, 3 for extrapolation from animals to humans, and 10 for human variability).<br>Adult ingestion dose (0.00001) is 500 times less than the (0.005) sensitive dose health effects described above for children.<br>Inhalation dose (0.000003) is 3,000 times less than the dose (0.009) associated with epithelial hyperplasia in the urinary bladder and endocrine symptoms (increased thyroid serum T3 and T4 hormones) in rats exposed 30 days, for 7 days a week 23 hours a day to Arochlor-1242).<br>Associated cancer Chronic oral PCB exposures have been linked with liver cancer in 6 rat studies and thyroid follicular cell adenoma in 3 other rat studies. | | | |
| Vanadium | Ing 0.02<br>Inh 0.00006 | Ing 0.002<br>Inh 0.00006 | No slope. | No slope. |
| ATSDR 1992b TP-91/29 | Child ingestion dose (0.02) is 15 times less than the no observed adverse effect level dose (0.3) causing mild bleeding in the kidneys of rats exposed to sodium metavanadate for 3 months. Nonetheless this child ingestion dose is greater than the intermediate oral exposure minimum risk level of 0.003 set by dividing 0.3 by an uncertainty factor of 100 (10 for extrapolation from animals to humans, and 10 for human variability).<br>Adult ingestion dose (0.002) is 150 times less than the (0.3) sensitive dose health effects described above for children.<br>Inhalation dose (0.00006) is 1,000 times less than the dose (0.06) associated with bronchial irritation (mucous formation and coughing) in two persons exposed for 8 hours to vanadium as vanadium pentoxide. The onset of coughing and mucus formation was delayed 7 to 24 hours. Pulmonary function test were normal. Other effects in workers chronically exposed to vanadium dusts included eye irritation, skin rashes, and weight loss.<br>Cancer: Animal studies and human medical case studies are insufficient for evaluating the carcinogenicity of vanadium via inhalation or ingestion. | | | |

**Table 13. Estimated Blood Lead Concentrations In Children Ingesting On-Site Surface Soil (micrograms per deciliter - µg/dl)**

| Media | Conc. * | | Time | Slope† | | Low | High |
|---|---|---|---|---|---|---|---|
| | low | high | | low | high | | |
| Air (out) * | 0.1 | 0.2 | 0.33 | 2.46 | 3.04 | 0.08118 | 0.20064 |
| Air (in) * | 0.3 | 0.6 | 0.33 | 2.46 | 3.04 | 0.24354 | 0.60192 |
| Food* | 5 | 5 | 0.33 | 0.24 | 0.24 | 0.396 | 0.396 |
| Water* | 4 | 4 | 0.33 | 0.16 | 0.16 | 0.2112 | 0.2112 |
| Soil | 800 | 800 | 0.33 | 0.002 | 0.016 | 0.528 | 4.224 |
| Dust | 800 | 800 | 0.33 | 0.004 | 0.004 | 1.056 | 1.056 |
| **Total** | | | | | | **2.51592** | **6.68976** |

*Default Value from ATSDR 1999a, Appendix D.
†These slopes were for children from ATSDR 1999a, Appendix D.
ATSDR's Regression Analysis with Multiple-uptake Parameters to Estimate Blood Lead from Environmental Exposures (ATSDR 1999a, Appendix D)

**Table 14. Estimated Blood Lead Concentrations In Adults Ingesting On-Site Surface Soil (micrograms per deciliter - µg/dl)**

| Media | Conc. * | | Time | Slope† | | Low | High |
|---|---|---|---|---|---|---|---|
| | low | high | | low | high | | |
| Air (out) * | 0.1 | 0.2 | 0.33 | 1.59 | 3.56 | 0.05247 | 0.23496 |
| Air (in) * | 0.3 | 0.6 | 0.33 | 1.53 | 3.56 | 0.15147 | 0.70488 |
| Food* | 5 | 5 | 0.33 | 0.016 | 0.0195 | 0.0264 | 0.032175 |
| Water* | 4 | 4 | 0.33 | 0.03 | 0.06 | 0.0396 | 0.0792 |
| Soil | 800 | 800 | 0.33 | 0.002 | 0.016 | 0.528 | 4.224 |
| Dust | 800 | 800 | 0.33 | 0.004 | 0.004 | 1.056 | 1.056 |
| **Total** | | | | | | **1.85394** | **6.331215** |

*Default Value from ATSDR 1999a, Appendix D.
†These slopes were for adults from ATSDR 1999a, Appendix D.
ATSDR's Regression Analysis with Multiple-uptake Parameters to Estimate Blood Lead from Environmental Exposures (ATSDR 1999a, Appendix D)

# Appendix C—Cancer Study Results

## Liver Cancer Incidence Rates per 100,000 population, 1981-2000

| | Gulf County | | Florida | |
|---|---|---|---|---|
| Age Group | Number | Age-Specific Rate | Number | Age-Specific Rate |
| 0 to 4 | 0 | - | 72 | 0.4 |
| 5 to 9 | 0 | - | 14 | 0.1 |
| 10 to 14 | 0 | - | 17 | 0.1 |
| 15 to 19 | 0 | - | 18 | 0.1 |
| 20 to 24 | 0 | - | 36 | 0.2 |
| 25 to 29 | 0 | - | 51 | 0.3 |
| 30 to 34 | 0 | - | 95 | 0.5 |
| 35 to 39 | 0 | - | 162 | 0.8 |
| 40 to 44 | 1 | 6.2 | 235 | 1.3 |
| 45 to 49 | 0 | - | 433 | 2.9 |
| 50 to 54 | 0 | - | 513 | 3.8 |
| 55 to 59 | 0 | - | 613 | 4.8 |
| 60 to 64 | 3 | 23.3 | 933 | 6.9 |
| 65 to 69 | 2 | 16.2 | 1,409 | 10.1 |
| 70 to 74 | 0 | - | 1,660 | 13.2 |
| 75 to 79 | 1 | 15.1 | 1,422 | 14.6 |
| 80 to 84 | 0 | - | 894 | 14.8 |
| 85 and Up | 0 | - | 708 | 16.4 |
| TOTAL | 7 | | 9,285 | |
| **Age-adj Rate** | | **2.4** | | **2.92** |

## All Cancers Incidence Rates per 100,000 population, 1981-2000

| | Gulf County | | Florida | |
|---|---|---|---|---|
| Age Group | Number | Age-Specific Rate | Number | Age-Specific Rate |
| 0 to 4 | 4 | 28.0 | 3,548 | 20 9 |
| 5 to 9 | 2 | 12.3 | 1,961 | 11.9 |
| 10 to 14 | 4 | 22.9 | 2,005 | 12 2 |
| 15 to 19 | 3 | 18.1 | 3,073 | 18.1 |
| 20 to 24 | 6 | 41.5 | 5,276 | 29.6 |
| 25 to 29 | 7 | 41.3 | 10,136 | 51.8 |
| 30 to 34 | 7 | 43.6 | 17,237 | 87.2 |
| 35 to 39 | 14 | 87.4 | 25,542 | 131 7 |
| 40 to 44 | 26 | 161.5 | 37,155 | 213.0 |
| 45 to 49 | 54 | 371.8 | 52,829 | 358.6 |
| 50 to 54 | 68 | 485.0 | 75,075 | 558.9 |
| 55 to 59 | 99 | 703.7 | 110,087 | 861.3 |
| 60 to 64 | 159 | 1,234.9 | 162,546 | 1,198.2 |
| 65 to 69 | 212 | 1,719.7 | 239,844 | 1,724.0 |
| 70 to 74 | 191 | 2,036 0 | 264,015 | 2,102.8 |
| 75 to 79 | 144 | 2,174.6 | 228,090 | 2,338 9 |
| 80 to 84 | 85 | 2,035.4 | 150,878 | 2,494.1 |
| 85 and Up | 79 | 2,854 0 | 106,295 | 2,458.5 |
| TOTAL | 1,164 | | 1,495,592 | |
| **Age-adj Rate** | | **436.7** | | **464.87** |

Source: Department of Health
Environmental Epidemiology
Florida Cancer Data System
Age-Adjusted to U.S. 2000 Standard Million

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## Incidence Number, Age-Specific and Age-Adjusted Rates for Liver and All Cancers in Florida and Gulf County, 1981-1999

| | Liver | | | | All Cancers | | | |
|---|---|---|---|---|---|---|---|---|
| | Gulf | | Florida | | Gulf | | Florida | |
| | Count | Rate | Count | Rate | Count | Rate | Count | Rate |
| Age 0 to 4 | 0 | 0 | 64 | 0.40 | 4 | 27.41 | 3,364 | 20.76 |
| Age 5 to 9 | 0 | 0 | 15 | 0.10 | 2 | 12.87 | 1,784 | 11.65 |
| Age 10 to 14 | 0 | 0 | 15 | 0.10 | 1 | 6.23 | 1,872 | 12.43 |
| Age 15 to 19 | 0 | 0 | 18 | 0.12 | 3 | 18.05 | 2,866 | 18.40 |
| Age 20 to 24 | 0 | 0 | 35 | 0.21 | 6 | 35.08 | 4,985 | 29.62 |
| Age 25 to 29 | 0 | 0 | 47 | 0.27 | 6 | 33.37 | 9,571 | 54.03 |
| Age 30 to 34 | 0 | 0 | 86 | 0.47 | 8 | 45.04 | 16,430 | 89.93 |
| Age 35 to 39 | 0 | 0 | 149 | 0.84 | 11 | 69.62 | 24,089 | 136.08 |
| Age 40 to 44 | 1 | 6.51 | 196 | 1.22 | 27 | 175.64 | 34,730 | 216.31 |
| Age 45 to 49 | 0 | 0.00 | 354 | 2.51 | 48 | 356.14 | 49,093 | 348.67 |
| Age 50 to 54 | 0 | 0.00 | 421 | 3.36 | 63 | 487.73 | 69,502 | 555.48 |
| Age 55 to 59 | 0 | 0.00 | 519 | 4.32 | 94 | 725.70 | 2,572 | 854.68 |
| Age 60 to 64 | 2 | 17.10 | 818 | 6.46 | 150 | 1,282.38 | 52,729 | 1,207.07 |
| Age 65 to 69 | 2 | 17.65 | 1,222 | 9.34 | 193 | 1,703.29 | 26,923 | 1,734.96 |
| Age 70 to 74 | 0 | 0 | 1,416 | 11.84 | 177 | 2,084.31 | 47,274 | 2,067.38 |
| Age 75 to 79 | 0 | 0 | 1,226 | 13.20 | 135 | 2,156.55 | 11,647 | 2,279.02 |
| Age 80 to 84 | 0 | 0 | 737 | 12.41 | 79 | 1,975.49 | 38,666 | 2,335.83 |
| Age 85 & Up | 0 | 0 | 521 | 12.45 | 69 | 2,470.46 | 94,668 | 2,261.36 |
| Total Count | 5 | | 7,859 | | 1,076 | | 492,765 | |
| **Age-Adjusted Rate** | | **1.80** | | **2.60** | | **429.82** | | **456.69** |

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## Appendix D—Glossary of Environmental Health Terms

**Absorption**: How a chemical enters a person's blood after the chemical has been swallowed, has come into contact with the skin, or has been breathed in.

**Acute Exposure:** Contact with a chemical that happens once or only for a limited period of time. ATSDR defines acute exposures as those that might last up to 14 days.

**Additive Effect:** A response to a chemical mixture, or combination of substances, that might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

**Adverse Health Effect:** A change in body function or the structures of cells that can lead to disease or health problems.

**Antagonistic Effect**: A response to a mixture of chemicals or combination of substances that is **less** than might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

**ATSDR**: The **A**gency for **T**oxic **S**ubstances and **D**isease **R**egistry. ATSDR is a federal health agency in Atlanta, Georgia, that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

**Background Level**: A background level is an average or expected amount of a chemical in a specific environment, or an amount of chemical that occurs naturally in a specific environment.

**Biota**: Used in public health, things that humans would eat – including animals, fish and plants.

**CAP**: See **C**ommunity **A**ssistance **P**anel**.**

**Cancer**: A group of diseases, which occur when cells in the body become abnormal and grow, or multiply, out of control.

**Carcinogen**: Any substance shown to cause tumors or cancer in experimental studies is a carcinogen.

**CERCLA**: See **C**omprehensive **E**nvironmental **R**esponse, **C**ompensation, and **L**iability **A**ct.

**Chronic Exposure**: A contact with a substance or chemical that happens over a long period of time. ATSDR considers exposures of more than one year to be *chronic*.

**Completed Exposure Pathway**: See **Exposure Pathway**.

**Community Assistance Panel (CAP)**: A group of people from the community and health and environmental agencies who work together on issues and problems at hazardous waste sites.

**Comparison Value**: **(CVs)** Concentrations or the amount of substances in air, water, food, and soil that are unlikely, upon exposure, to cause adverse health effects. Health assessors use comparison values to select which substances and environmental media (air, water, food and soil) need additional evaluation while health concerns or effects are investigated.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**: **CERCLA** was put into place in 1980. It is also known as **Superfund**. This act concerns releases of hazardous substances into the environment, and the cleanup of these substances and hazardous waste sites. ATSDR was created by this act and is responsible for looking into the health issues related to hazardous waste sites.

**Concern**: A belief or worry that chemicals in the environment might cause harm to people.

**Concentration**: How much or the amount of a substance present in a certain amount of soil, water, air, or food.

**Contaminant**: See **Environmental Contaminant**.

**Delayed Health Effect**: A disease or injury that happens as a result of exposures that may have occurred far in the past.

**Dermal Contact**: A chemical getting onto your skin. (see **Route of Exposure**).

**Dose**: The amount of a substance to which a person may be exposed, usually on a daily basis. Dose is often explained as "an amount of substance(s) per body weight per day".

**Dose / Response**: The relationship between the amount of exposure (dose) and the change in body function or health that result.

**Duration**: The amount of time (days, months, years) that a person is exposed to a chemical.

**Environmental Contaminant**: A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than that found in **Background Level**, or what would be expected.

**Environmental Media**: Usually refers to the air, water, and soil in which chemicals of interest are found. Sometimes refers to the plants and animals that are eaten by humans. **Environmental Media** is the second part of an **Exposure Pathway**.

**U.S. Environmental Protection Agency (EPA)**: The federal agency that develops and enforces environmental laws to protect the environment and the public's health.

**Epidemiology**: The study of the different factors that determine how often, in how many people, and in which people will disease occur.

**Exposure**: Coming into contact with a chemical substance. (For the three ways people can come in contact with substances, see **Route of Exposure**.)

**Exposure Assessment**: The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.

**Exposure Pathway**: A description of the way that a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical.

ATSDR defines an exposure pathway as having 5 parts:

- Source of Contamination,
- Environmental Media and Transport Mechanism,

- Point of Exposure,
- Route of Exposure, and
- Receptor Population.

When all 5 parts of an exposure pathway are present, it is called a **Completed Exposure Pathway**. Each of these 5 terms is defined in this Glossary.

**Frequency**: How often a person is exposed to a chemical over time; for example, every day, once a week, twice a month.

**Hazardous Waste**: Hazardous wastes are substances that have been released or thrown away into the environment and, under certain conditions, could be harmful to people who come into contact with them.

**Health Effect**: ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).

**Intermediate Exposure:** Any chemical exposure that has occurred for more 14 days but less than one year (365 days).

**Indeterminate Public Health Hazard:** The category is used in Public Health Assessment documents for sites where important information is lacking (missing or has not yet been gathered) about site-related chemical exposures.

**Ingestion**: Swallowing something, as in eating or drinking. It is a way a chemical can enter your body (See **Route of Exposure**).

**Inhalation**: Breathing. It is a way a chemical can enter your body (See **Route of Exposure**).

**LOAEL**: **L**owest **O**bserved **A**dverse **E**ffect **L**evel. The lowest dose of a chemical in a study, or group of studies, that has caused harmful health effects in people or animals.

**Malignancy**: See **Cancer**.

**MRL**: **M**inimal **R**isk **L**evel. An estimate of daily human exposure – by a specified route and length of time -- to a dose of chemical that is likely to be without a measurable risk of adverse, noncancerous effects. An MRL should not be used as a predictor of adverse health effects.

**NPL**: The **N**ational **P**riorities **L**ist. (This is part of Superfund.) A list kept by the U.S. Environmental Protection Agency (EPA) of the most serious, uncontrolled or abandoned hazardous waste sites in the country. An NPL site needs to be cleaned up or is being looked at to see if people can be exposed to chemicals from the site.

**NOAEL**: **N**o **O**bserved **A**dverse **E**ffect **L**evel. The highest dose of a chemical in a study, or group of studies, that did not cause harmful health effects in people or animals.

**No Apparent Public Health Hazard:** The category is used in ATSDR's Public Health Assessment documents for sites where exposure to site-related chemicals may have occurred in the past or is still occurring but the exposures are not at levels expected to cause adverse health effects.

**No Public Health Hazard:** The category is used in ATSDR's Public Health Assessment documents for sites where there is evidence of an absence of exposure to site-related chemicals.

**PHA**: **P**ublic **H**ealth **A**ssessment. A report or document that looks at chemicals at a hazardous waste site and tells if people could be harmed from coming into contact with those chemicals. The PHA also tells if possible further public health actions are needed.

**Plume**: A line or column of air or water containing chemicals moving from the source to areas further away. A plume can be a column or clouds of smoke from a chimney or contaminated under groundwater sources or contaminated surface water (such as lakes, ponds and streams).

**Point of Exposure**: The place where someone can come into contact with a contaminated environmental medium (air, water, food or soil). For examples: the area of a playground that has contaminated dirt, a contaminated spring used for drinking water, the location where fruits or vegetables are grown in contaminated soil, or the backyard area where someone might breathe contaminated air.

**Population**: A group of people living in a certain area; or the number of people in a certain area.

**PRP**: **P**otentially **R**esponsible **P**arty. A company, government or person that is responsible for causing the pollution at a hazardous waste site. PRP's are expected to help pay for the clean up of a site.

**Public Health Assessment(s)**: See **PHA**.

**Public Health Hazard:** The category is used in PHAs for sites that have certain physical features or evidence of chronic, site-related chemical exposure that could result in adverse health effects.

**Public Health Hazard Criteria**: PHA categories given to a site that tells whether people could be harmed by conditions present at the site. Each are defined in the Glossary. The categories are:

- Urgent Public Health Hazard
- Public Health Hazard
- Indeterminate Public Health Hazard
- No Apparent Public Health Hazard
- No Public Health Hazard

**Receptor Population**: People who live or work in the path of one or more chemicals, and who could come into contact with them (See **Exposure Pathway**).

**Reference Dose (RfD)**: An estimate, with safety factors (see **safety factor**) built in, of the daily, lifetime exposure of human populations to a possible hazard that is not likely to cause harm to the person.

**Route of Exposure**: The way a chemical can get into a person's body. There are three exposure routes:

- Breathing (also called inhalation),
- Eating or drinking (also called ingestion), and
- Or getting something on the skin (also called dermal contact).

**Safety Factor**: Also called **Uncertainty Factor**. When scientists don't have enough information to decide if an exposure will cause harm to people, they use safety factors and formulas in place of the information that is not known. These factors and formulas can help determine the amount of a chemical that is not likely to cause harm to people.

**SARA**: The **S**uperfund **A**mendments and **R**eauthorization **A**ct in 1986 amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from chemical exposures at hazardous waste sites.

**Sample Size**: The number of people that are needed for a health study.

**Sample**: A small number of people chosen from a larger population (See **Population**).

**Source (of Contamination)**: The place where a chemical comes from, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an **Exposure Pathway**.

**Special Populations**: People who may be more sensitive to chemical exposures because of certain factors such as age, a disease they already have, occupation, sex, or certain behaviors (like cigarette smoking). Children, pregnant women, and older people are often considered special populations.

**Statistics**: A branch of the math process of collecting, looking at, and summarizing data or information.

**Superfund Site**: See **NPL**.

**Survey**: A way to collect information or data from a group of people (**population**). Surveys can be done by phone, mail, or in person. ATSDR cannot do surveys of more than nine people without approval from the U.S. Department of Health and Human Services.

**Synergistic Effect**: A health effect from an exposure to more than one chemical, where one of the chemicals worsens the effect of another chemical. The combined effects of the chemicals acting together are greater than the effects of the chemicals acting by themselves.

**Toxic**: Harmful. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.

**Toxicology**: The study of the harmful effects of chemicals on humans or animals.

**Tumor:** Abnormal growth of tissue or cells that have formed a lump or mass.

**Uncertainty Factor**: See **Safety Factor**.

**Urgent Public Health Hazard:** This category is used in ATSDR's Public Health Assessment documents for sites that have certain physical features or evidence of short-term (less than 1 year), site-related chemical exposure that could result in adverse health effects and require quick intervention to stop people from being exposed.

## CERTIFICATION

The Florida Department of Health prepared this Mill View Subdivision Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). They prepared it in accordance with the approved methodologies and procedures existing at the time the health consultation was begun. Editorial review was completed by the Cooperative Agreement partner.

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The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

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