Public Health Assessment

Former Inco-Increte Facility

Tampa, Hillsborough County, Florida

COM 151353
EPA ID No. FLD037829314

January 25, 2018

Prepared by:
Florida Department of Health
Division of Disease Control and Health Protection
Under Cooperative Agreement with
U. S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Table of Contents

Foreword iii
Summary 1
Site Description and History 3
Demographics 4
Land Use 4
Community Health Concerns 4
Discussion 4
Environmental Data 4
Soil 5
Groundwater 5
Soil Gas 6
Pathway Analyses 6
The Exposure Pathway 6
Completed Exposure Pathways 7
Potential Exposure Pathways 7
Eliminated Exposure Pathways 8
Public Health Implications 8
Surface Soil 9
Identifying Contaminants of Concern 11
Arsenic 11
Vinyl Chloride 11
Surface Soil (Future Residential Exposure) 12
Irrigation Wells (Future Residential Exposure) 12
Child Health Considerations 13
Limitations of Findings 13
Conclusions 13
Recommendations 14
Public Health Action Plan 14
Actions Planned 14
Report Preparation 15
References 16
Appendices 18
Appendix A: Tables 19
Appendix B: Figures 26
Appendix C: Derivation of ATSDR Comparison Values for Vapor Intrusion from Groundwater 31
Appendix D: Irrigation Model Documentation 33
Appendix E: Photographs 40
Appendix F: Response to Public Comments 42
Glossary 43

Foreword

The Florida Department of Health (Department) evaluates the public health threat of contaminated sites through a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia. This public health assessment is part of an ongoing effort to evaluate possible health effects associated with the Inco-Increte site. The Department evaluates site-related public health issues through the following processes:

Evaluating exposure: Department scientists review available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is on the site, and how human exposures might occur. The Florida Department of Environmental Protection (FDEP) provided the data for this assessment.

Evaluating health effects: If the Department finds evidence that exposures to hazardous substances are occurring or might occur, the Department scientists next determine whether that exposure could be harmful to human health. We focus on potential health effects for the community as a whole. We base our conclusions and recommendations on current scientific information.

Developing recommendations: The Department lists its conclusions regarding any potential health threat posed by groundwater, air, and soil. The Department then offers recommendations for reducing or eliminating human exposure. The role of the Department in dealing with contaminated sites is primarily advisory. Our public health assessments will typically recommend actions for other agencies (including the Environmental Protection Agency [EPA] and FDEP). If a health threat is actual or imminent, the Department will issue a public health advisory warning people of the danger and will work with the regulatory agencies to resolve the problem.

Soliciting community input: The evaluation process is interactive. The Department starts by soliciting and evaluating information from various government agencies, individuals, and organizations responsible for cleaning up the site; and those living in communities near the site. We share any conclusions about the site with the groups and organizations providing the information and we ask for feedback from the public.

If you have questions or comments about this report, please write to us at

Florida Department of Health
Division of Disease Control and Health Protection
Bureau of Environmental Health
4052 Bald Cypress Way, Bin # A-08
Tallahassee, FL 32399-1720
Or, call us at (850) 245-4250 or toll-free in Florida: 1-877-798-2772

Summary

INTRODUCTION

At the Inco-Increte site, the Florida Department of Health (Department) and the US Agency for Toxic Substances and Disease Registry's (ATSDR) top priority is to make sure nearby residents have the best information to safeguard their health. The Department initiated this assessment of the Inco-Increte site because the Department of Environmental Protection (DEP) and the Environmental Protection Agency (EPA) are evaluating the site under the federal Superfund program.

The Inco-Increte site is at 4616-4618 N. Clark Avenue in Tampa, Florida. From the early 1960s to the early 1990s, the site operators manufactured and stored a variety of chemicals on the site. County inspectors documented a variety of chemical spills and leaks that resulted in soil and groundwater pollution.

The Department reached the following six conclusions.

CONCLUSION #1

If, in the future, the site owners build houses on the site, residents could inhale (breathe) volatile air pollutants that might cause illness.

BASIS FOR DECISION #1

Consultants for the responsible party found volatile pollutants in shallow groundwater beneath the site. These pollutants could intrude as vapors into buildings. The Department cannot assess this risk, however, without a vapor intrusion evaluation.

NEXT STEPS #1

The Department recommends a vapor intrusion evaluation if site owners build houses on the site.

CONCLUSION #2

If in the future, people live on properties near the site, they could inhale (breathe) volatile air pollutants that might cause illness.

BASIS FOR DECISION #2

Consultants for the responsible party found volatile pollutants in shallow groundwater under properties near the site. These pollutants could intrude as vapors into buildings. The Department cannot assess this risk, however, without a vapor intrusion evaluation.

NEXT STEPS #2	The Department recommends a vapor intrusion evaluation before people live in the existing house at 4620 N. Clark Avenue or new houses at other adjacent properties.
CONCLUSION #3	If people were to live on the property north of the site, incidental ingestion (swallowing) pollutants in surface soil would not likely cause illness.
BASIS FOR DECISION #3	Incidental ingestion of levels of arsenic measured in surface soil at 4620 N. Clark Street would cause, at most, a low increased risk of cancer.
CONCLUSION #4	If the property owner on either 4620 N. Clark Avenue or 4108 W. Cayuga Street installed irrigation wells, pollutants in the water would not likely cause illness.
BASIS FOR DECISION #4	The highest level of vinyl chloride measured in groundwater in properties north of the site would cause, at most, a low increased risk of cancer from drinking irrigation well water.
CONCLUSION #5	Polluted soil on the site is not a current health threat.
BASIS FOR DECISION #5	Soil on the site is paved over by concrete so people do not come in contact with the polluted soil.
CONCLUSION #6	Currently, groundwater below the site or adjacent properties is not a public health threat.
BASIS FOR DECISION #6	Occupants of the site and nearby properties do not have private wells. The city of Tampa supplies potable water to the area from public wells that are not near the site and are tested regularly.
FOR MORE INFORMATION	If you have concerns about your health or the health of your children, contact your health care provider. You may also call the Department toll-free at 877-798-2772 and ask for information about the Inco-Increte contaminated site.

Background and Statement of Issues

The purpose of this public health assessment is to assess the public health threat from contamination associated with the former Inco-Increte site. The Florida Department of Health (Department) initiated this assessment because the Florida Department of Environmental Protection (DEP) and the US Environmental Protection Agency (EPA) are evaluating contamination at the site.

This assessment estimates the health risk for individuals exposed to the highest measured level of contamination. Because most nearby residents are not exposed to the highest measured levels of contamination, the health risk for most nearby residents is less than the health risks estimated in this report. Those without exposure are not at risk.

Site Description and History

The Inco-Increte site is at 4616-4618 N. Clark Avenue, Tampa, Hillsborough County, Florida (Figure 1, Photo 1). The site occupies an acre in a mixed industrial, commercial, and residential neighborhood about a mile east-northeast of the Tampa International Airport (Figure 2). Structures on the site include an "L"-shaped building, concrete pads, and a tall metal shed [DEP 2016a].

Since 1963, many businesses have operated at the site, including Florida Insulation Co. of Tampa, Inco Adhesives Inc., Universal Laboratories Inc., Eastern Laboratories Inc., Inco Chemical Supply Company (Inco) and Increte of Tampa Inc. (Increte). Noel Truck Repair operated at the site from 2005 until 2008, and Monzon Tires and Repair has occupied the L-shaped building since 1999 [DEP 2016a].

Over the years, site owners formulated, repackaged and sold various chemicals. They used or stored solvents, water-based stains, petroleum solvents, sealers, epoxies, paints, and concrete sealers. The L-shaped building had several tanks containing toluene, acetone, xylenes, and other solvents. Site operators also stored toluene, isopropyl alcohol, mineral spirits, resin and diesel fuel in underground storage tanks [DEP 2016a]. In the early 1980s, site operators reported that a toluene tank was leaking [DEP 2016a]. In the early 1990s, the Hillsborough County Environmental Protection Commission found leaking tanks and drums [DEP 2016a].

During the removal of a diesel tank in 1992, site operators discovered volatile organic compounds (VOCs) and naphthalene in groundwater. Additional assessments between 2000 and 2016 found elevated concentrations of arsenic, VOCs and semi-volatile organic compounds in soil and groundwater. Assessments also found contamination north of the site at 4620 N. Clark Avenue and 4108 W. Cayuga Street. 4620 N. Clark Avenue is an unoccupied residential property (Photo 2) and 4108 W. Cayuga Street is vacant.

The Department searched its water program database, the Southwest Florida Water Management (SWFWMD) well construction database, and DEP reports for wells in the area. They found two limited use water systems approximately a ½ mile from the site

(FLUID [Florida Unique Identification] numbers AAN0452 and AAG1963) (Mike Berry, Florida Department of Health, personal communication, 2017). Groundwater in both wells contained concentrations of VOCs below Agency for Toxic Substances and Disease Registry (ATSDR) comparison values. The Department also found one irrigation well approximately ¼ mile south of the site [SWFWMD 2017]. This well, however, is hydrologically upgradient and is not likely impacted by the Inco-Increte site.

The closest public supply wells are the St Joseph's Hospital Well #1, 1.4 miles to the east, and the MCN Mobile Home Park, 1.5 miles to the northeast [DEP 2016a]. Consultants did not find contaminants of concern in water sampled from these two wells [DEP 2016a]; (DEP, unpublished data, 2016).

About 25 feet of sand with occasional thin (<1 foot) lenses of clay lies under the site. Below the sand are discontinuous clay layers and clay-sand mixtures, followed by limestone between 42 to 59 feet deep. Groundwater is between two to four feet below ground surface and tends to flow to the north [DEP 2016a].

Demographics

Approximately 2,791 people live within one mile of the site. Sixty-three percent (63%) are Hispanic, 20% are non-Hispanic white, 15% are black, and 2% report more than one race or another race. Twenty percent (20%) are less than 18 years old. Sixty-two percent (62%) of adults over the age of 25 have a high school diploma or less. Seventy-eight percent (78%) of households make less than $50,000 per year [EPA 2017].

Land Use

The site is bordered to the north and east by a mix of residential, commercial, and industrial properties, and to the west and south by commercial and industrial properties.

Community Health Concerns

The Department reviewed contamination assessment reports, contacted the Department of Health in Hillsborough County, and searched newspaper archives, but did not find any community health concerns.

Discussion

Environmental Data

The Department's assessment addresses surface soil 0 to 6 inches deep. Contaminant concentrations at this depth are more representative of what people contact than deeper soil.

Soil

Onsite

Consultants found arsenic, VOC and semivolatile organic compound contamination in soil on the site. Because the site is almost entirely paved, on-site soil is an eliminated exposure pathway. The Department did not assess the public health threat from contacting the soil (see Pathways Analyses section below).

Offsite

Between 2009 and 2016, consultants took 18 surface soil samples (0 to 6 inches deep) on the residential property at 4620 N. Clark Avenue north of the site (Figure 3) [Value Environmental Services, 2013]; (DEP, unpublished data, 2016). They analyzed two samples for VOCs, and all 18 samples for arsenic. Levels of arsenic were higher than ATSDR comparison values (CVs) in ten of the samples (Table 1).

Groundwater

Onsite

Between 2004 and 2016, consultants took samples of groundwater between 2 and 44 feet deep under the site. The highest concentrations of contaminants were in shallow (2 to 12-foot depth) groundwater under or adjacent to the ”L”- shaped building. The highest levels were 300 parts per billion (ppb) benzene, 53,000 ppb toluene; and 260 ppb vinyl chloride [Value Environmental Services, 2013]; (FDEP, unpublished data, 2016). Concentrations of benzene, ethyl benzene, vinyl chloride, and toluene in shallow groundwater exceeded ATSDR CVs for vapor intrusion (Appendix C). Vapors from these chemicals in groundwater have potential to intrude into buildings. The Department cannot assess this risk, however, without a vapor intrusion evaluation.

Offsite

Between 2009 and 2016, consultants took groundwater samples between 2 and 44 feet deep under 4620 N. Clark Avenue and 4108 W. Cayuga Street. They found chemicals such as benzene, 1,1 dichloroethene, 1,2 dichloroethane, trichloroethene, trimethylbenzenes, and vinyl chloride. The levels exceeded ATSDR CVs for vapor intrusion from shallow groundwater on one or both properties. The Department cannot assess this risk, however, without a vapor intrusion evaluation.

A water sample at MW-22, taken in October 2016, found benzene and vinyl chloride at levels above ATSDR CVs for vapor intrusion. This suggests that groundwater contamination may extend under the property at 4615 N. Lois Avenue (Figure 4). 4615 N. Lois Avenue is currently an auto mechanic business. Similarly, shallow volatile groundwater contamination under 4108 W. Cayuga Street could extend under the southern portion of 4105 W. Cayuga Street, an industrial property across the street (Figure 4). The Department cannot assess this risk, however, without a vapor intrusion evaluation.

Concentrations of vinyl chloride in both shallow and intermediate (20 to 25-foot depth) groundwater zones exceeded the Florida Irrigation Water Screening Levels at 4108 W. Cayuga Street (Table 2).

Soil Gas

Data on levels of volatile organic chemicals in soil gas under the on-site buildings and the building at 4620 N. Clark Avenue are unavailable. This is a data gap. The Department cannot assess the risk of illness from vapor intrusion without these data.

Pathway Analyses

To assess any contaminant's public health importance, the Department estimates the frequency with which people could have contact with that contaminant. The method for assessing whether people face a health risk is to determine whether a completed exposure pathway connects them to a contaminant source, and whether exposures to that contaminant source are high enough to be of health concern.

Chemical contamination in the environment cannot harm a person's health unless that person is exposed to the contaminants. If exposure does occur, then risk of harm depends on quantity (level) of contaminants the person contacts, frequency of contact, duration of contact, and the danger (toxicity) of the contaminant.

The Exposure Pathway

An exposure pathway is a series of steps starting with the release of a contaminant in environmental media and ending at contact with the human body. A completed exposure pathway consists of five elements:

1. Source of contamination (in this case, the Inco-Increte site);
2. An environmental medium such as air, groundwater or soil that can hold or move the contamination;
3. A point where people contact a contaminated medium, such as their house or yard;
4. An exposure route, such as breathing contaminants in air or ingesting contaminants groundwater or soil; and
5. A population, such as people who live near a waste site.

Generally, the ATSDR and the Department consider three exposure categories:

- Completed exposure pathways—all five elements of a pathway are present;
- Potential exposure pathways—one or more of the elements might not be present, but information is insufficient to eliminate or exclude the element; and
- Eliminated exposure pathways—at least one element is not present and will not likely be present.

Exposure pathways evaluate specific ways in which people were, are, or might be exposed to environmental contamination in the past, present, and future.

Completed Exposure Pathways

The Department did not identify any completed pathways at the Inco-Increte site.

Potential Exposure Pathways

Indoor air (onsite) – Shallow groundwater below the Inco-Increte site contains VOCs such as benzene, toluene, and vinyl chloride, which could intrude as vapors into on-site buildings. Although a new residence on the site is unlikely, the Department cannot rule out the possibility.

Because soil vapor data are not available, the Department cannot assess the potential for vapor intrusion. If the site owner builds houses, the Department recommends conducting a vapor intrusion investigation.

Air in future on-site houses would be the environmental medium and point of exposure. The exposed population would be future residents and inhalation would be the route of exposure (Table 3).

Indoor air (offsite) – Shallow groundwater below 4620 N. Clark Avenue just north of the Inco-Increte site (Figure 2) contains VOCs, such as benzene and vinyl chloride, which could intrude as vapors into buildings. People do not currently occupy the building, but could in the future.

Shallow VOC groundwater contamination is also present under the vacant industrial site at 4108 W. Cayuga Street (Figure 2). Vapor intrusion is a possibility for any new buildings on this property.

Undelineated shallow VOC groundwater contamination at MW-22, located in the northwest corner of the site, could extend onto the adjacent property at 4615 N. Lois Avenue. Similarly, shallow VOC groundwater contamination identified on 4108 W. Cayuga Street could extend to the southern portion of 4105 W. Cayuga Street (Figure 4).

Because soil vapor data are not available at any of these properties, the Department cannot assess the potential for vapor intrusion. If people live on any of these properties in the future, the Department recommends the site owner investigates the potential for vapor intrusion.

At all properties, air in houses would be the environmental media and point of exposure. The exposed population would be future residents and inhalation would be the route of exposure (Table 3).

Surface soil (offsite) – Consultants found arsenic in surface soil on the residential property north of the site at 4620 N. Clark Avenue. Although the building on the site is currently vacant, soil is a future potential exposure pathway.

Surface soil at a residence would be the environmental media and point of exposure. Incidental ingestion would be the route of exposure. The exposed population would be future residents (Table 3).

Irrigation wells (offsite) – Groundwater below 4108 W. Cayuga Street contains high levels of vinyl chloride. There are no irrigation wells at this property or at 4620 N. Clark Avenue now, but property owners could install wells in the future.

Groundwater from an irrigation well would be the environmental media and point of exposure. Incidental ingestion of water, dermal absorption and inhalation of vapors would be the routes of exposure. The exposed population would be future residents (Table 3).

Eliminated Exposure Pathways

On-site surface and subsurface soil – Consultants found on-site soil contamination, but the site is nearly all paved, which eliminates current exposure to the soil. An interim restrictive covenant requires that the site owner maintains the concrete cap and limits digging on the site [Porter 2016]. Therefore, incidental ingestion of on-site soil is not likely an exposure pathway now or in the future (Table 4).

Domestic drinking water well use – No wells are currently used on the site. The City of Tampa has supplied public water to the site since 1978 (Brett Warner, City of Tampa, personal communication, 2017). An interim restrictive covenant between DEP and the site owner prohibits groundwater use on the property. Therefore, it is unlikely groundwater will be used at the site for drinking (Table 4).

On-site irrigation well use – The City of Tampa supplies water to the area (Brett Warner, City of Tampa, personal communication, 2017). The interim restrictive covenant between DEP and the site owner prohibits groundwater use on the property. Therefore, installation of irrigation wells is unlikely.

Public Health Implications

This public health assessment also considers health concerns of nearby residents and explores possible associations with site-related contaminants. This assessment requires the use of assumptions and judgments and relies on incomplete data. These factors contribute to uncertainty in evaluating the health threat. Assumptions and judgments in the assessment of the site's impact on public health err on the side of protecting public health and may overestimate the risk.

The Department makes site-specific public health recommendations based on contaminant levels, exposure pathways, exposure duration, toxicological literature, and characteristics of the exposed population. Whether a person will be harmed depends on the type/amount of contaminant, how they are exposed, how long they are exposed, how much contaminant is absorbed, genetics, and individual lifestyle.

Surface Soil

Dose

To calculate the daily doses of each contaminant resulting from incidental ingestion of surface soil, the Department uses standard factors [ATSDR 2005; EPA 2011]. In the case of arsenic, the Department assumes that people are exposed daily to the maximum level measured and assumes that 60% of the ingested chemical is absorbed into the body [EPA 2012]. The percent actually absorbed into the body is likely less. The general formula for estimating a dose is:

$$D = (C \times IR \times EF \times CF) / BW$$

Where:
D = exposure dose (mg/kg/day)
C = contaminant concentration (various units)
IR = intake rate (amount per day)
EF = exposure factor (unit less)
CF = conversion factor (10^{-6} kg/mg)
BW = body weight (kilograms or kg)

$$EF = F \times ED / AT$$

Where:
EF = exposure factor (unit less)
F = frequency of exposure (days/year)
ED = exposure duration (years)
AT = averaging time (days) (ED × 365 days/year for non-carcinogens; 78 years × 365 days/year for carcinogens)

The Department uses the following standard assumptions to estimate exposure from incidental ingestion of contaminated soil [ATSDR 2016c]:

1) Children ages 6 months to 1 year ingest an average of 60 mg of soil/day (Central Tendency Exposure or CTE) and an upper percentile of 100 mg/day (Reasonable Maximum Exposure or RME).
2) Children and adolescents ages 1 to 21 years ingest an average of 100 mg of soil/day (CTE) and an upper percentile of 200 mg/day (RME).
3) Adults over 21 years ingest an average of ingest an average of 60 mg of soil/day (CTE) and an upper percentile of 100 mg/day (RME).
4) Average weights vary with age: (birth to 1 year: 8.2 kg), (1 to 2 years: 11.4 kg), (2 to 6 years: 17.4 kg), (6 to 11 years: 31.8 kg), (11 to 16 years: 56.8 kg), (16 to 21 years: 71.6 kg), (above 21 years: 80 kg).
5) The frequency of exposure is 365 days per year.

6) A mean residential occupancy exposure duration (CTE) is 12 years; an upper level percentile residential occupancy period (RME) for an adult is 33 years, and for a child is 21 years.

Risk

For this report, the Department only estimated cancer risk associated with incidental ingestion of surface soil because contaminant levels were not high enough to cause non-cancer illnesses.

For cancer illnesses, the Department and ATSDR use the following equation to estimate cancer risk:

$$\text{Risk} = D \times SF$$

D = exposure dose (mg/kg/day). See above equation.
SF = cancer slope factor in per milligrams per kilogram per day $(mg/kg/day)^{-1}$

This is a conservative (high) estimate of the increased cancer risk. The actual increased cancer risk is likely lower. Because of large uncertainties in the way scientists estimate cancer risks, the actual cancer may be as low as zero.

Groundwater Used for Irrigation

Dose and Risk

To calculate doses and cancer risk associated with exposure for residents using contaminated water for lawn and ornamental bed irrigation, the Department uses an irrigation model created by the University of Florida for development of FDEP's Irrigation Water Screening Levels (Appendix D).

The model uses the following assumptions to estimate exposure for residents using contaminated water for irrigation:

1) Residential exposure is for an "aggregate" (representative) resident, which is an individual that lives at the residence from ages 1 to 31 years (n=30).
2) The weight of a representative resident is 51.9 kg.
3) Exposure to contaminants by inhalation and incidental ingestion occurs throughout the period of exposure.
4) Dermal exposure (playing in the sprinklers) occurs only as a child.
5) The representative resident inhalation rate is 1.04 m^3/hour
6) The water incidental ingestion rate is 0.01 liters/day
7) The irrigation exposure frequency is 52 days per year.
8) A child's surface area is 7023 cm^2.

The model estimates cancer risks associated with vinyl chloride in irrigation water. Cancer risk is a sum of cancer risks associated with dermal, inhalation, and incidental ingestion. Appendix D shows the equations used to estimate doses and cancer risk used in the irrigation model.

Identifying Contaminants of Concern

The Department compares the maximum concentrations of contaminants found at a site to ATSDR and other comparison values. Comparison values are specific for the medium contaminated (soil, water, air, etc.). They are set far below known or suspected levels associated with health effects, and are developed to protect children and adults.

The Department screens environmental data using these comparison values:

- ATSDR Cancer Risk Evaluation Guides (CREGs)
- ATSDR Environmental Media Evaluation Guides (EMEGs)
- ATSDR Reference Media Evaluation Guides (RMEGs)
- FDEP Irrigation Water Screening Levels (IWSLs)
- EPA Maximum Contaminant Levels (MCLs)
- EPA Lifetime Health Advisory (LTHA)
- EPA Reference Concentration for Chronic Inhalation Exposure (RfC)
- Other guidelines

When determining which comparison value to use, The Department follows ATSDR's general hierarchy and uses professional judgment.

Comparing the highest measured concentrations in surface soil and groundwater to ATSDR comparison values, the Department selected arsenic as a contaminant of concern in soil and vinyl chloride as a contaminant of concern in groundwater. Selection of these contaminants does not necessarily mean there is a public health risk. Rather, the Department selected these contaminants for closer scrutiny. Concentrations of other contaminants are below comparison values, are not likely to cause illness, and Department does not evaluate them further.

Arsenic

Arsenic is a metal that is naturally occurring in soil and found in arsenical pesticides and preservatives for wood treatment. It cannot be destroyed, but can change its form or become attached to other particles. Research has found an association between arsenic and cancers of the bladder, gastrointestinal tract, kidney, liver, lung, pancreas and skin [ATSDR 2016a]. Whether these effects occur or not depends on the levels of arsenic people come into contact with and other factors. Organic forms of arsenic are less toxic than inorganic forms. Analysis of arsenic, however, usually does not differentiate between inorganic and organic forms [ATSDR 2007].

Vinyl Chloride

Vinyl Chloride is an organic compound that does not occur naturally. The U.S. uses most vinyl chloride produced here to make polyvinyl chloride (PVC), a plastic product. The microbial breakdown of trichloroethylene, trichloroethane, or tetrachloroethylene creates vinyl chloride in the environment. Vinyl chloride can dissolve in water, but evaporates from water easily and therefore it often exists as a gas. Exposure to vinyl chloride over a long period may cause liver cancer, brain cancer, lung cancer, and cancers of the blood [ATSDR 2006; ATSDR 2016b]. Whether these effects occur or not depends on the levels people contact and other factors.

Surface Soil (Future Residential Exposure)

The Department estimated exposure for a child living at a residence until the age of 21, and an adult living at residence for 33 years. Varying children's body weights were used as described in the Public Health Implications section.

The Department estimated future residential user exposure using a surface soil arsenic concentration of 12 mg/kg and assuming a bioavailability factor of 0.6 [EPA 2012].

Noncancer illnesses

Future residents who incidentally ingest very small amounts of surface soil with highest arsenic concentrations (12 mg/kg) are unlikely to develop noncancer illnesses. All concentrations were below the ATSDR noncancer comparison value of 17 mg/kg.

Cancer

Future residents who ingest small amounts of surface soil with the highest arsenic levels are unlikely to develop cancer. Both children and adults would have, at most, a low increased risk of cancer. Children who incidentally ingest very small amounts of surface soil with the highest arsenic levels (12 mg/kg) would have a maximum increased cancer risk of 2 in a 100,000 people (0.00002 or 2×10^{-5}). Adults who live on the property would have a maximum increased cancer risk of 6 in 1,000,000 people (0.000006 or 6×10^{-6}) (Table 5).

To put this increased risk into perspective, the American Cancer Society estimates between 33% to 50% of people will get cancer in their lifetime (333,000 to 500,000 in 1,000,000 people) [American Cancer Society 2017].

Irrigation Wells (Future Residential Exposure)

The Department estimated the cancer risk of an individual that lives at a residence as a child, adolescent, and young adult for 30 years using the irrigation model developed by the University of Florida (Appendix D).

The Department estimated future irrigation well user exposure and associated cancer risk using the highest vinyl chloride groundwater concentration of 1,000 µg/L.

Noncancer illnesses

The Department did not assess non-cancer risks because the irrigation model does not evaluate non-cancer risks for vinyl chloride.

Cancer

Future residents who use groundwater from irrigation wells containing the highest level of vinyl chloride (1,000 µg/L) are unlikely to develop cancer (Table 6). The highest vinyl chloride level would cause, at most, a low increased risk of cancer of 1 in a 100,000 people (0.00001 or 1×10^{-5}). To put this into perspective, the American Cancer Society estimates between 33% to 50% of people will get cancer in their lifetime (33,000 to 50,000 per 100,000 people) [American Cancer Society 2017].

Child Health Considerations

In communities faced with air, water, or soil contamination, the many physical differences between children and adults demand special attention. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometime engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than adults; this means they breathe dust, soil and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. Thus, adults need as much information as possible to make informed decisions regarding their children's health. The Department considered children's health risks in estimating cancer risk for both arsenic in surface soil and vinyl chloride in soil.

Limitations of Findings

Although every attempt was made to accurately assess the potential public health hazards associated with the Inco-Increte site, there were limitations in the environmental data used to make this assessment.

The Department does not have information on past use of drinking water on or near the site. Therefore, the Department cannot assess health effects associated with past drinking water use.

This assessment was made using existing data and information. If more data were collected in the future that showed greater contaminant concentrations or extent of contaminants, the report conclusions may no longer be valid.

Conclusions

The Department reached the following six conclusions.

1. If in the future, the site owners build houses on the site, residents could inhale (breathe) volatile air pollutants that might cause illness. Consultants for the responsible party found volatile pollutants in shallow groundwater beneath the site. These pollutants could intrude as vapors into buildings. The Department, however, cannot assess the risk without a vapor intrusion evaluation.

2. If in the future, people live on properties near the site, they could inhale (breathe) volatile air pollutants that might cause illness. Consultants for the responsible party found volatile pollutants in shallow groundwater under properties near the site. These pollutants could intrude as vapors into buildings. The Department, however, cannot assess this risk without a vapor intrusion evaluation.

3. If people were to live on the property north of the site, incidental ingestion of (swallowing) pollutants in surface soil would not likely cause illness. Incidental ingestion of levels of arsenic measured in surface soil at 4620 N. Clark Street would cause, at most, a low increased risk of cancer.

4. If property owners on either 4620 N. Clark Avenue or 4108 W. Cayuga Street installed irrigation wells, pollutants in the water would not likely affect people's health. The highest level of vinyl chloride measured in groundwater in properties north of the site would cause, at most, a low increased risk of cancer from exposures to irrigation well water.

5. Polluted soil on the site is not a current health threat. Soil on the site is paved over so people do not come in contact with the polluted soil.

6. Currently groundwater below the site or adjacent properties is not a public health threat. Occupants of the site and nearby properties do not have private wells. The city of Tampa supplies water to the area.

Recommendations

The Department recommends:

1. A vapor intrusion evaluation if site owners build houses on the site.

2. A vapor intrusion evaluation before people live in the existing house at 4620 N. Clark Avenue or new homes on nearby properties.

Public Health Action Plan

Actions Planned

The Department will mail a community update to community members to summarize the report findings and solicit comments and community health concerns.
The Department will consider review of new data by request.

Report Preparation

The Agency for Toxic Substances and Disease Registry (ATSDR), U.S. Department of Health and Human Services (DHHS) funded this report through a cooperative agreement with the Department. The findings and conclusions in these reports, however, are those of the Department and do not necessarily represent the views of ATSDR or DHHS. ATSDR did not revise or edit this document.

Author

Debby Tipton, MS, Public Health Toxicology, Bureau of Environmental Health, Division of Disease Control and Health Protection

Department Reviewers

Bureau of Environmental Health, Division of Disease Control and Health Protection:

- Randy Merchant, MS, Public Health Toxicology
- Andrew Reich, MS, MSPH, RRT, Public Health Toxicology Administrator
- Kendra Goff, PhD, DABT, State Toxicologist, Bureau Chief

Carina Blackmore, DVM, PhD, State Public Health Veterinarian, State Epidemiologist, Director, Division of Disease Control and Health Protection

Kelli Wells, MD, Deputy Secretary for Health

References

[American Cancer Society 2017] American Cancer Society. Available from: https://www.cancer.org/cancer/cancer-basics/lifetime-probability-of-developing-or-dying-from-cancer.html.

[ATSDR 2005] Agency for Toxic Substance and Disease Registry. Public Health Assessment Guidance Manual (Update). U.S. Department of Health and Human Services, Atlanta, GA. January 2005.

[ATSDR 2006] Agency for Toxic Substances and Disease Registry. Toxicological Profile for Vinyl Chloride. Atlanta: US Department of Health and Human Services; August 2006.

[ATSDR 2007] Agency for Toxic Substances and Disease Registry. Toxicological Profile for Arsenic. Atlanta: US Department of Health and Human Services; August 2007.

[ATSDR 2016a] Agency for Toxic Substances and Disease Registry. Addendum to the Toxicological Profile for Arsenic. Atlanta: US Department of Health and Human Services; August 2016.

[ATSDR 2016b] Agency for Toxic Substances and Disease Registry. Addendum to the Toxicological Profile for Vinyl Chloride. Atlanta: US Department of Health and Human Services; August 2016.

[ATSDR 2016c] Agency for Toxic Substances and Disease Registry. 2016. Exposure Dose Guidance for Soil and Sediment Ingestion. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. October 2016.

[ATSDR 2016d] Agency for Toxic Substances and Disease Registry. Evaluating Vapor Intrusion Pathways: Guidance for ATSDR's Division of Community Health Investigations. Atlanta: US Department of Health and Human Services; October 31, 2016.

[DEP 2016a] Florida Department of Environmental Protection. Preliminary Assessment Inco-Increte Facility, Tampa, Hillsborough County, Florida. July 8, 2016.

[DEP 2016b]. Site Inspection Workplan/Quality Assurance Project Plan, Inco-Increte Facility, Hillsborough County, FL. October 2016.

[EPA 2011] U.S. Environmental Protection Agency, Office of Research and Development. Exposure Factors Handbook. Volumes I, II, and III. EPA/600/ P-95/002F (a, b, and c).

[EPA 2012] U.S. Environmental Protection Agency. Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil Documents. OSWER Directive 9200.1-113.

[EPA 2013] Integrated Risk Information System (IRIS) www.epa.gov/IRIS/.

[EPA 2015] U.S. Environmental Protection Agency. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. OSWER Publication 9200.2-154. June 2015.

[EPA 2016] U.S. Environmental Protection Agency Vapor Intrusion Screening Levels (VISLs). Available from: https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls

[EPA 2017] U.S. Environmental Protection Agency. Environmental Justice Geographic Assessment Tool. U.S. Census Bureau, American Community Survey 2010 - 2014. Washington, DC [accessed February 15, 2017]. Available from: http://epamap14.epa.gov/ejmap/entry.html.

[Google Earth 2017] Google Earth. 27°59’05.86”N, 82°30’45.42”W, elevation 30 feet. [viewed April 20, 2017].

[Porter 2016] Declaration of Interim Restrictive Covenant for the Inco-Increte Site. Recorded in Official Records Book 24168, Pages 1504-1513 in the Public Records of Hillsborough County, Florida. June 17, 2016.

[SWFWMD 2017]. Southwest Florida Water Management District. Well construction permit database. Available from: http://www21.swfwmd.state.fl.us/maps/pages/viewer_wcp.html

[Value Environmental Services 2013] Value Environmental Services Inc. Former Inco Chemical/Increte System Facility, 4616 N. Clark Avenue, Tampa, FL, FDEP Project #151353. December 2013.

Appendices

Appendix A: Tables

Table 1. Contaminants of Concern in Off-site Surface Soil (0 to 6 Inches Deep)

Contaminant	Concentration Range (mg/kg)	Comparison Value (mg/kg)**	Source of Comparison Value	# Samples Above Comparison Value /Total # Samples
Arsenic	BDL – 12* (IIF017)	0.25	ATSDR CREG	10/18
Vinyl Chloride	BDL	0.27	ATSDR CREG	0/3

ATSDR = Agency for Toxic Substances and Disease Registry
BDL = below detection limits
CREG = ATSDR cancer risk evaluation guide for 10^{-6} excess cancer risk
mg/kg = milligrams per kilogram
***** The Department assumes only 60% of the maximum arsenic concentration is bioavailable.
** The Department only uses comparison values to select chemicals for further scrutiny, not to judge the risk of illness.
Source of data: (FDEP, unpublished data, 2016); [Value Environmental Services 2013].

Table 2. Contaminants of Concern in Off-site Groundwater

Contaminant	Concentration Range (µg/L)	Comparison Value (µg/L)*	Source of Comparison Value	# Samples Above Comparison Value /Total # Samples
Arsenic	BDL – 19 (MW 26, 2009, 2 to 12-foot well screen)	63	FDEP IWSL (residential)	0/16**
Vinyl Chloride	BDL – 1,000 GW-3S, 2013; 2 to 12-foot well screen)	93	FDEP IWSL (residential)	3/28**

BDL = below detection limits
FDEP = Florida Department of Environmental Protection
IWSL = Irrigation Water Screening Level
µg/L = micrograms per liter
* The Department only uses comparison values to select chemicals for further scrutiny, not to judge the risk of illness.
** Includes the most recent groundwater sampling event at each monitoring location between 2 and 44 feet below ground surface.

Source of data: (FDEP, unpublished data, 2016); [Value Environmental Services 2013].

Table 3. Potential Human Exposure Pathways at the Former Inco-Increte Facility Site

PATHWAY NAME	POTENTIAL EXPOSURE PATHWAY ELEMENTS					TIME
	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	
Indoor air (onsite)	Former Inco-Increte facility	Air	Air in on-site building	Inhalation	Future on-site residents	Future
Indoor air (offsite)	Former Inco-Increte facility	Air	Air in off-site buildings	Inhalation	Future residents at 4620 N. Clark Avenue, 4108 W. Cayuga Street, 4105 W. Cayuga Street or 4615 N. Lois Avenue.	Future
Surface soil (offsite)	Former Inco-Increte facility	Soil	Off-site surface soil	Ingestion	Future residents at 4620 N. Clark Street	Future
Irrigation wells (offsite)	Former Inco-Increte facility	Air/groundwater	Future irrigation wells	Inhalation of vapors and incidental ingestion of groundwater	Future residents at 4620 N. Clark Avenue or 4108 W. Cayuga Street	Future

Table 4. Eliminated Human Exposure Pathways at the at the Former Inco/Increte Facility Site

PATHWAY NAME	ELIMINATED EXPOSURE PATHWAY ELEMENTS				
	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION
Surface and subsurface soil (onsite)	Former Inco-Increte facility	Soil	None	Ingestion	None
Domestic drinking water wells	Former Inco-Increte facility	Air /water	None	Ingestion/Inhalation	None
Irrigation wells (onsite, current and future)	Former Inco-Increte facility	Air/water	None	Inhalation, incidental ingestion, skin absorption	None

Table 5. Estimated Doses and Increased Cancer Risk from Ingestion of Arsenic in Off-Site Surface Soil

Age Group	Estimated Dose (RME) (mg/kg/day)*	Estimated Dose (CTE) (mg/kg/day)*	Oral Slope Factor $(mg/kg/day)^{-1}$	Source of Oral Slope Factor	Estimated Increased Cancer Risk (RME)	Estimated Increased Cancer Risk (CTE)
6 weeks to <1 year	1 x 10^{-6}	6 x 10^{-7}	1.5	EPA IRIS	2 x 10^{-6}	9 x 10^{-7}
1< 2 years	2 x 10^{-6}	8 x 10^{-7}			2 x 10^{-6}	1 x 10^{-6}
2 – <6 years	4 x 10^{-6}	2 x 10^{-6}			6 x 10^{-6}	3 x 10^{-6}
6 – <11 years	3 x 10^{-6}	2 x 10^{-6}			4 x 10^{-6}	2 x 10^{-6}
11 – <16 years	2 x 10^{-6}	2 x 10^{-7}			2 x 10^{-6}	2 x 10^{-7}
16 – <21 years	1 x 10^{-6}	N/A			2 x 10^{-6}	N/A
Total Childhood Risk					**2 × 10^{-5} ** (low)**	**8 × 10^{-6} (low)**
>21 (Adult)	4 x 10^{-6}	7 x 10^{-7}	1.5	EPA IRIS	**6 x 10^{-6} (low)**	**1 × 10^{-6} (low)**

CTE = Central Tendency Exposure
EPA IRIS = U.S. Environmental Protection Agency Integrated Risk Information System [EPA 2013]
N/A = not applicable
mg/kg = milligrams per kilogram
RME = Reasonable Maximum Exposure
*CTE assumes a 12-year occupancy exposure for adults and children; RME assumes a 21-year residential occupancy period for a child and a 33-year residential occupancy period for an adult.
**Summed cancer risk of all age groups, between 2 to <21 years; individual age groups are shown only to show the derivation of the total childhood risk between ages 6 weeks to <21 years.

Table 6. Estimated Doses and Cancer Risk from Ingestion, Inhalation, and Dermal Exposure to Vinyl Chloride in Groundwater Used for Irrigation

Age Group	Estimated Inhalation Dose (mg/kg/day)	Estimated Ingestion Dose (mg/kg/day)	Estimated Dermal Dose (mg/kg/day)	Estimated Cancer Risk from Inhalation (mg/kg/day)	Estimated Cancer Risk from Incidental Ingestion (mg/kg/day)	Estimated Cancer Risk from Dermal Contact (mg/kg/day)	Estimated Total Increased Cancer Risk*
Aggregate Resident (age 1 to 31 years)	8×10^{-6}	1×10^{-5}	4×10^{-6}	2×10^{-7}	6×10^{-6}	4×10^{-6}	**1×10^{-5} (low)**

mg/kg = milligrams per kilogram
***** Sum of oral, dermal and inhalation cancer risk.

Appendix B: Figures

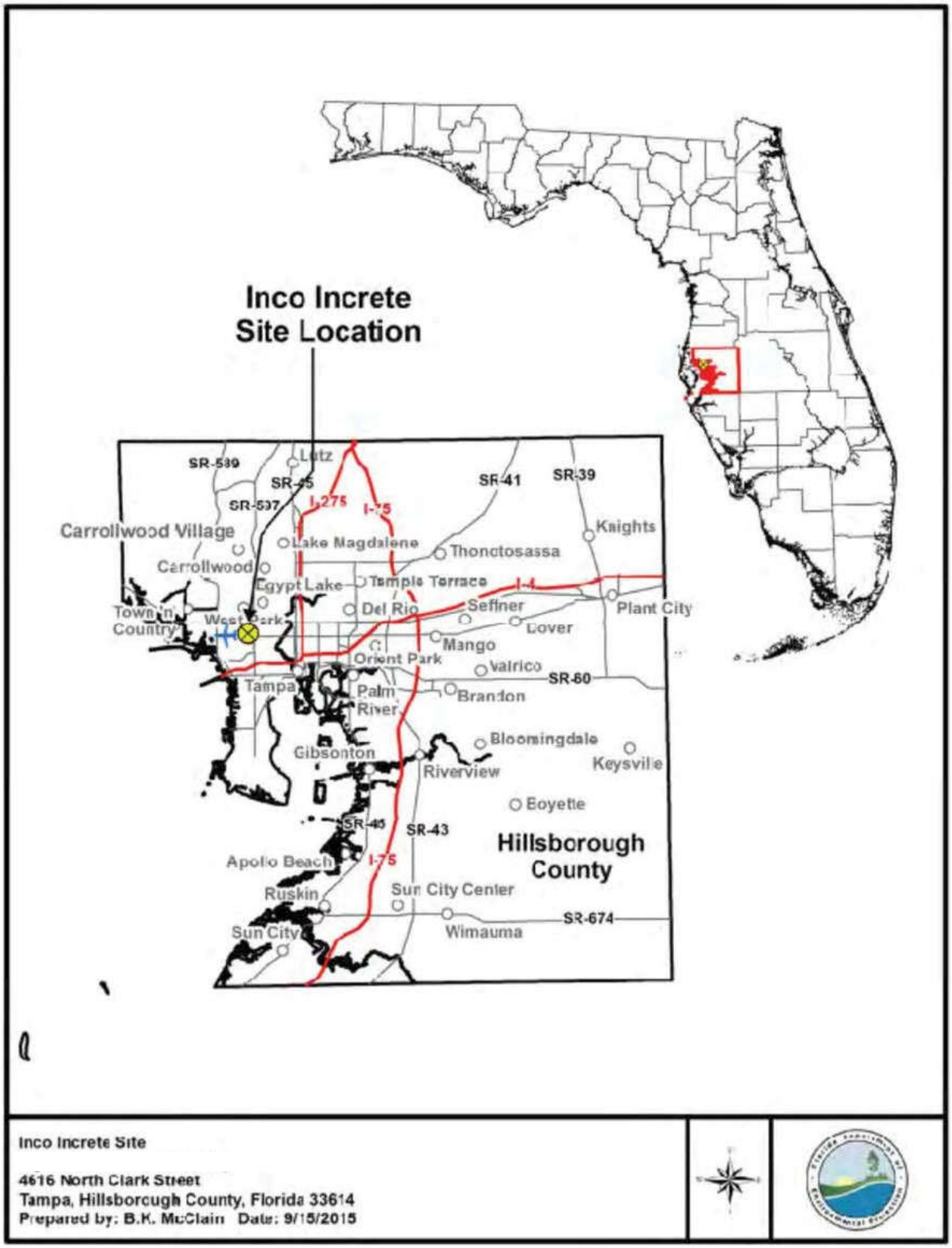

Figure 1: Site Location Map
[DEP 2016a]

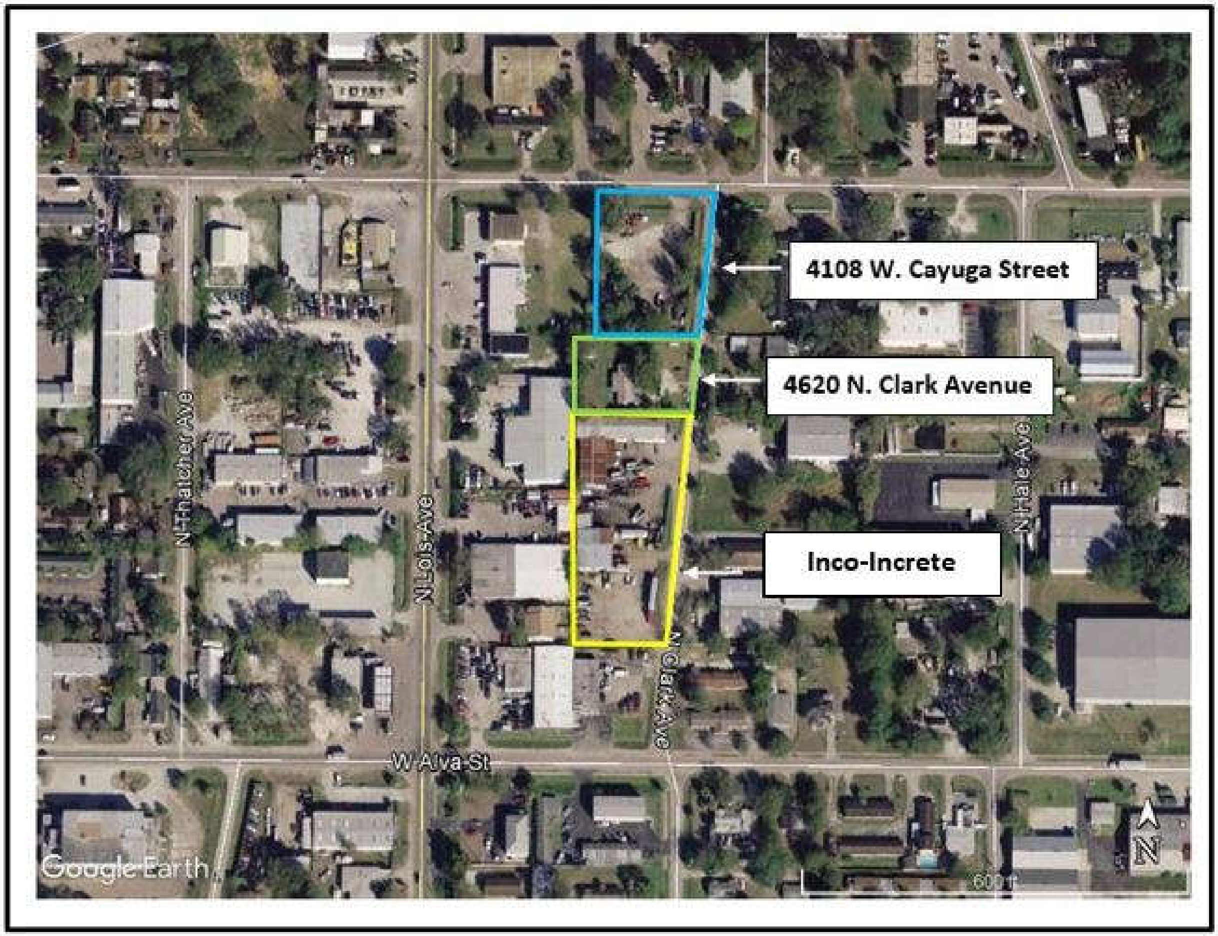

Figure 2: Site Vicinity Map
Image from [Google Earth 2017]

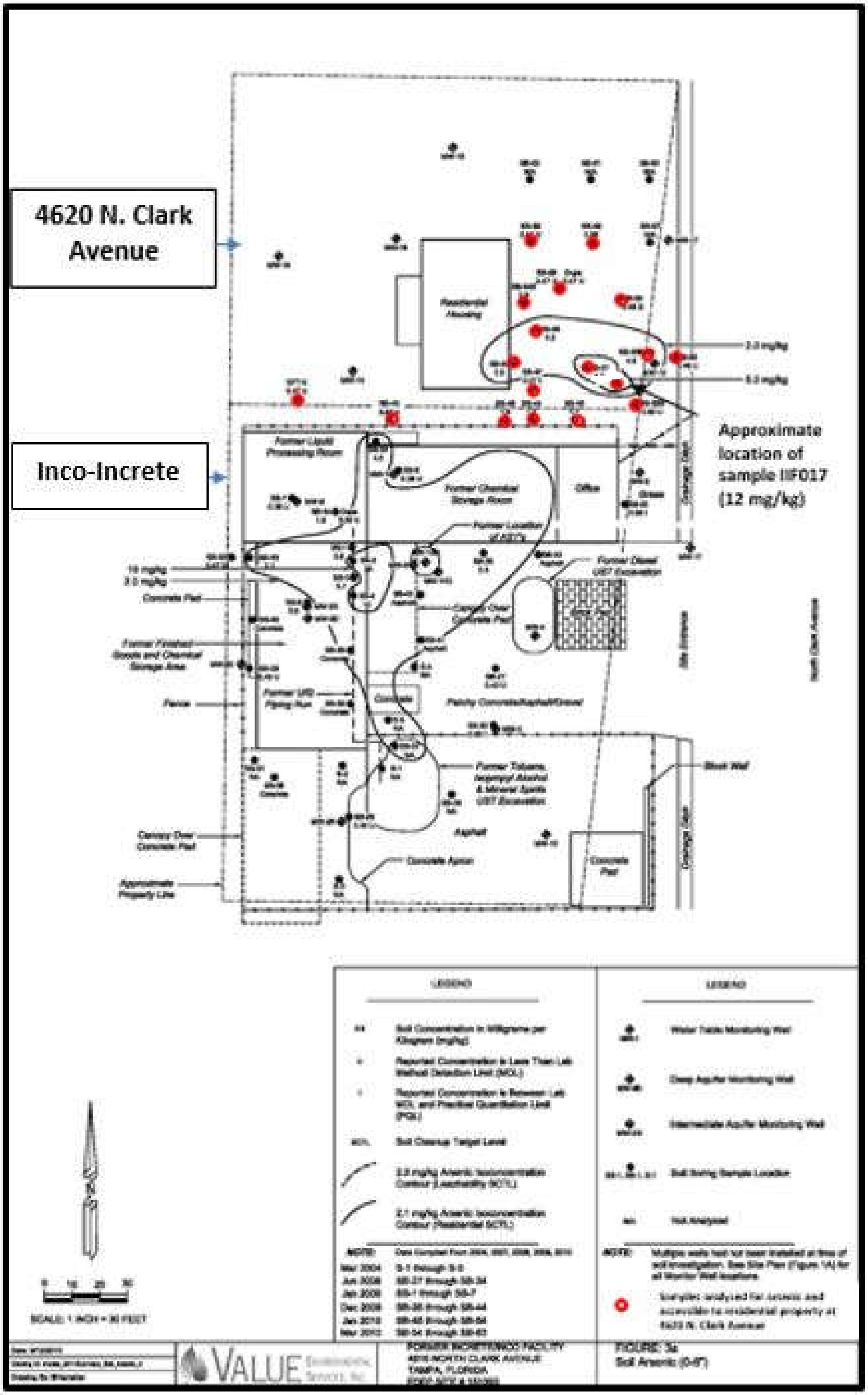

Figure 3: Arsenic Sample Locations in Shallow Soil
Adapted from [Value Environmental Services 2013]; [DEP 2016a;] [DEP 2016b]

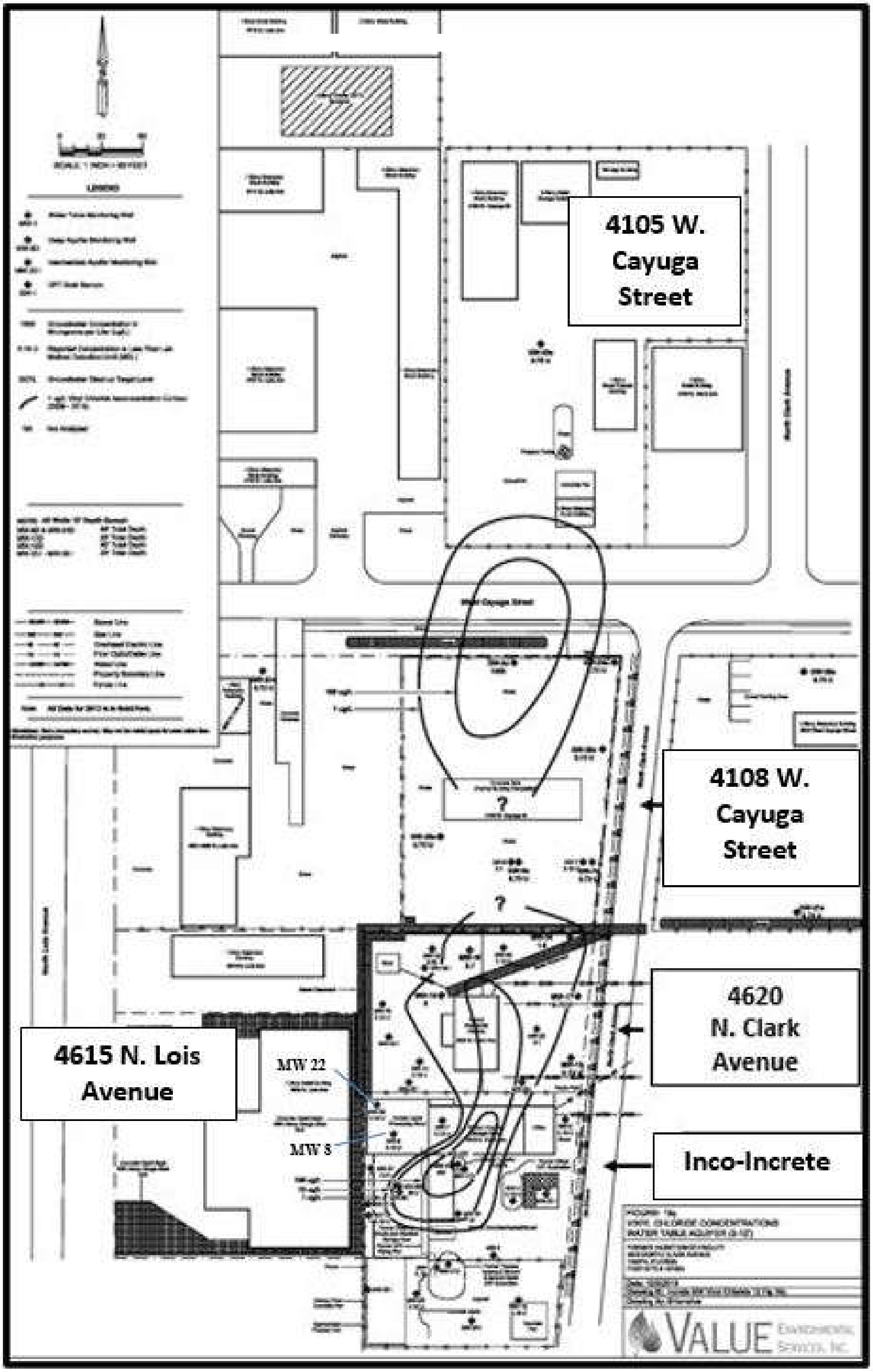

Figure 4: Vinyl Chloride Concentrations in Shallow Groundwater
Adapted from [Value Environmental Services 2013].
* This figure does not include two recent vinyl chloride measurements taken October 2016 at MW-8 (62 µg/L) and at MW-22 (9.6 µg/L), at the northwest corner of the site.

Appendix C: Derivation of ATSDR Comparison Values for Vapor Intrusion from Groundwater

The Department used ATSDR guidance for evaluating vapor intrusion pathways [ATSDR 2016d]. The Department derived comparison values (CVs) for volatile organic compounds (VOCs) in surficial aquifer groundwater to evaluate their vapor intrusion potential [ATSDR 2016d]. VOC levels in groundwater greater than CVs do not necessarily mean that people will become sick from vapor intrusion exposures. They do, however, indicate that further evaluation is necessary to evaluate the potential health effects.

The Department used ATSDR's air CVs, EPA's recommended attenuation factors [EPA 2015] and the following equation to derive comparison guidelines [ATSDR 2016d].

$CV_{gw} = CV_{air} / (H' * \alpha_{gw})$,

Where CV_{gw} = comparison value in groundwater for vapor intrusion,

CV_{air} = ATSDR's air CV (chemical-specific)

H' = unitless Henry's Law constant (chemical-specific) and

$\alpha_{gw} = 1$ = EPA's recommended screening groundwater attenuation factor when a shallow groundwater table less than 5 feet deep [EPA 2015]

For example, to derive a CV for toluene found in shallow groundwater between 2' and 4' below ground surface:

$CV_{gw} = CV_{air} / (H' * \alpha_{gw})$,

Where CV_{gw} = CV in groundwater for vapor intrusion,

CV_{air} = ATSDR's air CV for toluene, (3,800 ug/m^3)

H' = unitless Henry's Law constant for toluene (0.271) [EPA 2016]

$\alpha_{gw} = 1$ = EPA's recommended screening groundwater attenuation factor for shallow groundwater tables less than 5 feet [EPA 2015]

$CV_{gw} = (3{,}800\ ug/m^3) / (0.271 * 1)$

$CV_{gw} = 13{,}998\ ug/m^3$

To convert groundwater concentrations in μ/L, multiply by 0.001 m^3/L, so:

$CV_{gw} = 13{,}998\ ug/m^3 * 0.001\ m^3/L = 13.998\ \mu g/L$ toluene in surficial groundwater

Appendix D: Irrigation Model Documentation

UF | UNIVERSITY of FLORIDA

Center for Environment & Human Toxicology

PO Box 110885
Gainesville, FL 32611-0885
352-392-2243 Tel
352-392-4707 Fax

June 28, 2016

Gladys Liehr, PhD
Office of District and Business Support
Division of Waste Management
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Update to the assumptions for the development of irrigation water screening levels (IWSLs)

Dear Dr. Liehr:

At your request, we have updated the assumptions for the derivation of groundwater cleanup target levels for organic chemicals that are protective of human health under an irrigation scenario (Irrigation Water Screening Levels; IWSLs) and provided a list of updated IWSLs. Methodology used for the calculation of these IWSLs was described in a letter to Ms. Ligia-Mora Applegate dated January 14, 2009. Since that time, exposure factors utilized in the equation have been updated by the USEPA. The updated exposure factors are described in detail below. The exposure models used to derive the updated IWSLs for the irrigation of lawns, ornamental beds, and produce are identical to those presented in our January 14, 2009 letter. Exposure models used to derive IWSLs for the irrigation of lawns and ornamental beds are shown in Figure 1 and models used to derive IWSLs for the irrigation of produce are shown in Figure 2. The majority of the exposure assumptions used in the derivation of the IWSLs have not changed (Table 1). Exposure assumptions that have changed include an updated root and shoot produce ingestion rate, body weight, child body surface area, and residential exposure duration (Table 2).

Adult and aggregate body weight, child body surface area, and residential exposure duration were updated using OSWER Directive 9200.1-120 (USEPA, 2014). Based on this directive, an updated residential exposure duration of 26 years was incorporated into the screening levels (6 as a child, and 20 as an adult). The updated USEPA adult body weight is 80 kg and the child body weight remains the same (15 kg). An aggregate body weight of 65 kg was calculated from these values using an exposure duration of 26 years (6 years at 15 kg and 20 years at 80 kg). The recommended USEPA child resident surface area for water of 6,378 cm^2 was also used in the equation (Table 2). A comparison between the 2009 and 2016 exposure factor assumptions is shown in Table 3. The homegrown produce root and shoot ingestion rates were updated using Tables 13-1 and 13-60 through 13-62 of the 2011 Exposure Factors Handbook (EFH; USEPA, 2011). To calculate the root produce ingestion rate, an age-weighted mean root produce consumption rate was calculated for ages 1-6 (child) and 1-

The Foundation for The Gator Nation
An Equal Opportunity Institution

26 (aggregate resident) using Table 13-62 of the EFH. An age-weighted mean shoot produce consumption rate was also calculated for ages 1-6 (child) and 1-26 (aggregate resident) using Tables 13-1, 13-60, and 13-61 of the EFH. To calculate a total shoot ingestion rate, the age-weighted mean protected vegetable, mean exposed vegetable, and mean fruit consumption rates were summed. The recalculated homegrown produce ingestion rates are listed in Table 2.

In the irrigation scenario, receptors are exposed to contaminated groundwater outdoors while irrigating lawns, ornamental beds, and vegetable crops. From this scenario, separate criteria were developed based upon: 1) exposure for residents using contaminated water for lawn and ornamental bed irrigation, including exposure from recreational use of the lawn sprinklers by children; 2) exposure for landscape maintenance workers using contaminated water for the irrigation of lawns and ornamental beds at commercial facilities; and 3) exposure for residents who use contaminated water to grow fruit and vegetables for personal consumption. Updated IWSLs are included in the attached Tables.

As we have cautioned before, the model and assumptions used to calculate uptake into fruit and vegetables are particularly conservative and may substantially overestimate risk. As such, the principal value of the produce IWSLs is as protective screening values, and exceedances where fruit and vegetables are grown should merit follow up investigation including empirical measurement of contaminant levels in produce samples if possible.

Please let us know if you have any questions regarding these updates.

Sincerely,

Leah D. Stuchal, Ph.D.

Stephen M. Roberts, Ph.D.

References:

USEPA (2014) *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors.* United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC. OSWER Directive 9200.1-120.

USEPA (2001) *Exposure Factors Handbook: 2011 Edition.* United States Environmental Protection Agency, National Center for Environmental Assessment, Office of Research and Development, Washington, DC.

Figure 1 – Dose Equations for the irrigation of lawns and ornamental beds

Residential scenario, carcinogens:

$$\text{Dose} = GW \times 10^{-3}\,\text{mg}/\mu\text{g} \times \left[\left(\frac{EF_i \times IR_o \times ED_{ag}}{BW_{ag} \times AT_c} \right) + \left(\frac{EF_i \times SA \times T_t \times K_p \times \left(1 - \frac{SE}{100}\right) \times 10^{-3}\,\text{L/cm}^3 \times ED_c}{BW_c \times AT_c} \right) + \left(\frac{EF_i \times IR_{iag} \times T_t \times V_w \times \frac{SE}{100} \times ED_{ag}}{BW_{ag} \times V_a \times AT_c} \right) \right]$$

Residential scenario, non-carcinogens:

$$\text{Dose} = GW \times 10^{-3}\,\text{mg}/\mu\text{g} \times \left[\left(\frac{EF_i \times IR_o \times ED_c}{AT_{nc} \times BW_c} \right) + \left(\frac{EF_i \times SA \times T_t \times K_p \times \left(1 - \frac{SE}{100}\right) \times 10^{-3}\,\text{L/cm}^3 \times ED_c}{AT_{nc} \times BW_c} \right) + \left(\frac{EF_i \times IR_{ic} \times T_t \times V_w \times \frac{SE}{100} \times ED_c}{AT_{nc} \times BW_c \times V_a} \right) \right]$$

For this scenario, residential exposure is based on the "aggregate resident", which is an individual that lives at the residence as a child, adolescent and young adult. Exposure to contaminants by inhalation and incidental ingestion is assumed to occur throughout this period. However, dermal exposure (from playing in the sprinklers) occurs only as a child.

Landscape maintenance worker scenario, carcinogens:

$$\text{Dose} = GW \times 10^{-3}\,\text{mg}/\mu\text{g} \times \left[\left(\frac{EF_i \times IR_o \times ED_w}{BW_w \times AT_c} \right) + \left(\frac{EF_i \times IR_w \times T_t \times V_w \times \frac{SE}{100} \times ED_w}{BW_w \times V_a \times AT_c} \right) \right]$$

Landscape maintenance worker scenario, non-carcinogens:

$$\text{Dose} = GW \times 10^{-3}\,\text{mg}/\mu\text{g} \times \left[\left(\frac{EF_i \times IR_o \times ED_w}{AT_{nc} \times BW_w} \right) + \left(\frac{EF_i \times IR_w \times T_t \times V_w \times \frac{SE}{100} \times ED_w}{AT_{nc} \times BW_w \times V_a} \right) \right]$$

This scenario corresponds to a landscape worker at a commercial facility. The worker is assumed to be an adult exposed through inhalation and incidental ingestion.

Figure 2 – Dose equations for homegrown produce

Carcinogens:

$$\text{Dose} = \text{GW} \times 10^{-3}\,\text{mg}/\mu\text{g} \times \left(\frac{\text{EF}_{\text{v}} \times \left[\left(\text{RCF} \times \text{Ir}_{\text{r}} \right) + \left(\text{SCF} \times \text{Ir}_{\text{s}} \right) \right] \times \left(1 - \frac{\text{SE}}{100} \right) \times \text{RD} \times \text{ED}_{\text{ag}}}{\text{AT}_{\text{c}} \times \text{BW}_{\text{ag}}} \right)$$

Non-carcinogens:

$$\text{Dose} = \text{GW} \times 10^{-3}\text{mg}/\mu\text{g} \times \left(\frac{\text{EF}_{\text{v}} \times \text{ED}_{\text{c}} \times \left[\left(\text{RCF} \times \text{Ir}_{\text{rc}} \right) + \left(\text{SCF} \times \text{Ir}_{\text{sc}} \right) \right] \times \left(1 - \frac{\text{SE}}{100} \right) \times \text{RD}}{\text{AT}_{\text{nc}} \times \text{BW}_{\text{c}}} \right)$$

Supporting Equations:

$$\text{SE} = \left[7.95 \times \ln(\text{H}) \right] + 68.17$$

$$\text{RCF} = 10^{0.77\log K_{ow} - 1.52} + 0.82$$

$$\text{SCF} = \left(10^{0.95\log K_{ow} - 2.05} + 0.82 \right) \left(0.784 \times 10^{-0.434\left(\log K_{ow} - 1.78\right)^2 / 2.44} \right)$$

5

Table 1 – Values used in the derivation of irrigation water screening levels

Abbreviation	Definition	Value
AT_c	Carcinogenic Averaging Time	25550 d
AT_{nc}	Non-carcinogenic Averaging Time	(365 x ED) d
CSF_d	Dermal Cancer Slope Factor	chemical-specific $(mg/kg\text{-}d)^{-1}$
CSF_i	Inhalation Cancer Slope Factor	chemical-specific $(mg/kg\text{-}d)^{-1}$
CSF_o	Oral Cancer Slope Factor	chemical-specific $(mg/kg\text{-}d)^{-1}$
ED_c	Child Exposure Duration	6 y
EF_i	Irrigation Exposure Frequency	52 d/y
EF_v	Vegetable Exposure Frequency	350 d/y
H	Dimensionless Henry's Law Constant	chemical-specific
IGCTL	Irrigation GCTL	(mg/L)
IR_{iaq}	Aggregate Resident Inhalation Rate	1.04 m^3/h
IR_{ic}	Child Inhalation Rate	1.2 m^3/h
IR_o	Water Incidental Ingestion Rate	0.01 L/d
K_{oc}	Octanol-Carbon Partition coefficient	chemcial specific (L/kg)
K_{ow}	Octanol-Water Partition Coefficient	chemical-specific
K_p	Permeability Coefficient	chemical-specific (cm/h)
RCF	Root Concentration Factor	chemical-specific (L/kg)
RD	Rainfall Dilution	0.5
RfD_d	Dermal Reference Dose	chemical-specific (mg/kg-d)
RfD_i	Inhalation Reference Dose	chemical-specific (mg/kg-d)
RfD_o	Oral Reference Dose	chemical-specific (mg/kg-d)
SCF	Shoot Concentration Factor	chemical-specific (L/kg)
SE	Water-to-air Chemical Stripping Efficiency	chemical-specific
THI	Target Hazard Index	1
TR	Target Cancer Risk	1.00E-06
T_t	Irrigation Time	0.483 h/d
V_a	Volume of Air for Volatilization	31320 m^3
V_w	Volume of Water Used	1450 L

Table 2 – Updated values used in the derivation of irrigation water screening levels

Abbreviation	Definition	Value	Source
BW_a	Adult Body Weight	80 kg	USEPA, 2014
BW_{ag}	Aggregate Resident Body Weight	65 kg	Calculated
BW_c	Child Body Weight	15 kg	USEPA, 2014
ED_a	Adult Exposure duration	20 y	USEPA, 2014
ED_{ag}	Aggregate Resident Exposure Duration	26 y	USEPA, 2014
Ir_f	Aggregate Ingestion of Root Produce	0.0513 kg/d	USEPA, 2011
Ir_{rc}	Child Ingestion of Root Produce	0.0268 kg/d	USEPA, 2011
Ir_s	Aggregate Ingestion of Shoot Produce	0.2261 kg/d	USEPA, 2011
Ir_{sc}	Child Ingestion of Shoot Produce	0.1468 kg/d	USEPA, 2011
SA	Child Surface Area	6378 cm^2	USEPA, 2014

Table 3 – Comparison between 2009 and 2016 exposure factors

Abbreviation	2009 Value	2016 Value
BW_a	70 kg	80 kg
BW_{ag}	51.9 kg	65 kg
BW_c	15 kg	15 kg
ED_a	24 y	20 y
ED_{ag}	30 y	26 y
Ir_f	0.0354 kg/d	0.0513 kg/d
Ir_{rc}	0.0099 kg/d	0.0268 kg/d
Ir_s	0.2626 kg/d	0.2261 kg/d
Ir_{sc}	0.0604 kg/d	0.1468kg/d
SA	7023 cm^2	6378 cm^2

Appendix E: Photographs

Photo 1: The Inco-Increte Site (N. Clark Avenue facing west).

Photo 2: Residential Buildings at 4620 N. Clark Avenue

Appendix F: Response to Public Comments

This section addresses questions and comments received by FDOH during the public comment period for the Former Inco-Increte Facility Public Health Assessment. The following were comments and questions received:

- A resident inquired about his property (north of the site) and if a vapor intrusion test A resident inquired about his property (north of the site) and if a vapor intrusion test should be performed.
  - Our program administrator informed him that it was not necessary.

- A resident inquired about the impact of soil on the property owned (south of the site).
  - Based on the assessment and evaluation of data presented, soil contamination does not seem to be a source of health hazard. The property is mostly paved with concrete which acts as a barrier to contact and exposure from any contaminated soil.

- A resident inquired about the impact of the site on a property owned southeast of the site.
  - Based on the assessment and data provided, it does not appear to be a health risk at that property. Most of the contamination was found north of the site at 4620 N. Clark Ave and 4108 W Cayuga St both in Tampa, Florida with soil and groundwater contamination found for potential future users of these properties. The property in question does not show a health risk at this time.

- A resident inquired about who is liable for the contamination of the site, the length of time it took to notify nearby residents, if signs will be places at the site, was notification sent to present residents and if it is a requirement to disclose contamination to potential buyers of his or her property.
  - To get more information about the liability of contamination at this site, please contact an environmental attorney.
  - The Florida Department of Health (FDOH) Hazardous Waste Site Program assesses hazardous waste sites as they are inquired upon. Many times, we do not have control of when a hazardous waste site is assessed and the length of time between when contamination occurred and when the assessment is complete.
  - The role of the FDOH is to assess the health risk of contamination at a site and report potential harmful health effects. We do not enforce any type of remediation or clean-up of a contaminated site or nearby properties and we do not put up any type of warning signs on the property. The Florida Department of Environmental Protection (FDEP) and the U.S. Environmental Protection Agency (EPA) are responsible for enforcing clean-up and placing warning signs.
  - The information sent to residents regarding this site was sent to every resident within a certain mile radius from the location of the site.
  - Any questions concerning the disclosure of contamination on an owner's property, should contact the Property Appraiser's Office for that specific county.

Glossary

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

Cancer risk
A theoretical risk of for getting cancer if exposed to a substance every day for 78 years (a lifetime exposure). The true risk might be lower.

Carcinogen
A substance that causes cancer.

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.

Completed exposure pathway [see **exposure pathway**].

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.

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

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

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.

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

EPA
United States Environmental Protection Agency.

Exposure
Contact with a substance by swallowing, breathing, or touching the skin or eyes.

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**.

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

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

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**].

Limited Use Water System
A public water system not covered or included in the Florida Safe Drinking Water Act. Often these systems are too small and/or serve people too few days of the year to be regulated by the Florida Safe Drinking Water Act.

mg/kg
Milligram per kilogram.

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).

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 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**].

Receptor population
People who could come into contact with hazardous substances [see **exposure pathway**].

Risk
The probability that something will cause injury or harm.

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**].

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**.

Substance
A chemical.

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.